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ENGINEERING AND ENVIRONMENTAL SERVICES

DRAFT
ACTION MEMORANDUM

FOR

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SOUTHWEST FUNSTON LANDFILL
FORT RILEY, KANSAS

U.S. ARMY CORPS OF ENGINEERS
KANSAS CITY DISTRICT

JOB No. 11-2537
CONTRACT No. DACW41-89-D-0124
DELIVERY ORDER No. 0044

OCTOBER 1993

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

October 21, 1993

Major Nanci Higginbottham
U.S. Army Engineering District, Kansas City
Attention: CEMRK-MD-H
601 East 12th Street
Kansas City, Missouri 64106-2896

Subject: **Draft Action Memorandum**
Southwest Funston Landfill Site/Ft. Riley, Kansas
Contract No. DACW41-89-D-0124
Delivery Order No. 0044
LEGS Project No. 11-2537

Dear Major Higginbottham:

On behalf of Fort Riley, enclosed is the Draft Action Memorandum document for the Southwest Funston Landfill site. This document describes the proposed removal action and includes a Responsiveness Summary (Appendix A) consisting of comment responses for the Final Engineering Evaluation/Cost Analysis (EE/CA) Study Report. Appendix B includes supplemental information provided at the public meeting held on September 7, 1993. A document distribution list is attached.

Please review and provide comments no later than November 5, 1993 to Mr. Rick Van Saun, USACE, Attention: CEMRK-ED-TP, 601 East 12th Street, Kansas City, Missouri 64106-2896, Telephone: (816) 426-5655.

The shipment to USACE, MRD, Omaha, Nebraska is for information only and review comments are not required.

Sincerely,

LAW ENVIRONMENTAL, INC.

Edward F. Witkowski, Jr., P.E.
Project Manager

Keith A. Hansen, P.E.
Principal

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION
114 TOWNPARK DRIVE, SUITE 400 • KENNESAW, GA 30144-5569
(404) 499-6800 • FAX (404) 421-3593

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SOUTHWEST FUNSTON LANDFILL
FORT RILEY, KANSAS

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ACTION MEMORANDUM
FOR

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SOUTHWEST FUNSTON LANDFILL

FORT RILEY MILITARY INSTALLATION
FORT RILEY, KANSAS

Prepared for:

U.S. Army Corps of Engineers
Kansas City District
601 East 12th Street
Kansas City, Missouri 64106

Prepared by:

Law Environmental, Inc.
Government Services Division
114 TownPark Drive
Kennesaw, Georgia 30144

21 October 1993

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The surface of the SFL is presently covered by areas of tall weeds and underbrush and is irregular. There is not a continuous grade over the entire site to promote the drainage of storm water off the landfill surface. Depressions which are suspected to have formed from settling of disposal trenches, as well as naturally occurring low topographic features which may not have been filled in, retain storm water during wet weather. During a visual observation in August, 1992, approximately five percent of the landfill surface had observable ponded water. Approximately 20 to 30 percent of the landfill surface has observable settlement and does not drain effectively. Less than two percent of the surface has observable surface erosion, mainly in the vicinity of a culvert. Retention of storm water due to poor surface drainage is likely to increase surface infiltration through the landfill cover and the potential for leachate production. Less than three percent of the landfill surface had evidence of surface dumping or exposed debris.

River bank erosion, minor slope subsidence and erosion of the slope face have occurred at certain locations along the bank of the Kansas River, which forms the southern perimeter of the landfill site. Bank erosion is occurring along the southwestern perimeter of the landfill. The major causes of the bank erosion along the Kansas River appear to be streambed scour and toe erosion, bank seepage following rapid drops in river water level, overbank drainage, wave attack and debris impact. These five mechanisms are probably acting in combination to place the river bank in a distressed condition.

2. Physical Location

Fort Riley is located near the confluence of the Republican and Smoky Hill Rivers, occupying approximately 150 square miles in Geary and Riley Counties in Kansas (Figure 1). The SFL encompasses approximately 107 acres and is located in the southern portion of Fort Riley on the north bank of the Kansas River, west of Camp Funston and Threemile Creek, south of Huebner Road, and east of an old channel of the Kansas River (Figure 2).

3. Site Characteristics

Fort Riley, including the SFL, is a federally-owned facility, operated by the Department of the Army (DA), 1st Infantry Division (Mechanized). Fort Riley was established in the 1850s in response to the need to provide military protection for the westward expansion of civilian populations. Since its inception, Fort Riley has continually served as a major center for

DRAFT
ACTION MEMORANDUM

DATE: October 1993

SUBJECT: Request for Removal Action at Southwest Funston Landfill (SFL) Site, Fort Riley, Kansas

FROM: The United States Department of the Army (DA), Fort Riley, Kansas

TO: U. S. Environmental Protection Agency (USEPA), Region VII, and Kansas Department of Health and Environment (KDHE)

I. PURPOSE

The purpose of this Action Memorandum is to request and document the concurrence of the proposed removal action described herein for the Southwest Funston Landfill (SFL) site, Fort Riley, Kansas. The Final Engineering Evaluation/Cost Analysis (EE/CA) Study Report, July 1993, recommends filling and grading of the landfill surface and placement of a quarry run stone revetment with baffles for river bank slope protection and stabilization.

II. SITE CONDITIONS AND BACKGROUND

The following sections provide an overview of the history and current characteristics of the SFL site. The proposed action for the SFL site is a non-time-critical removal.

A. Site Description

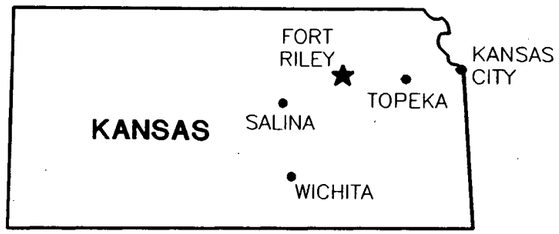
1. Removal Site Evaluation

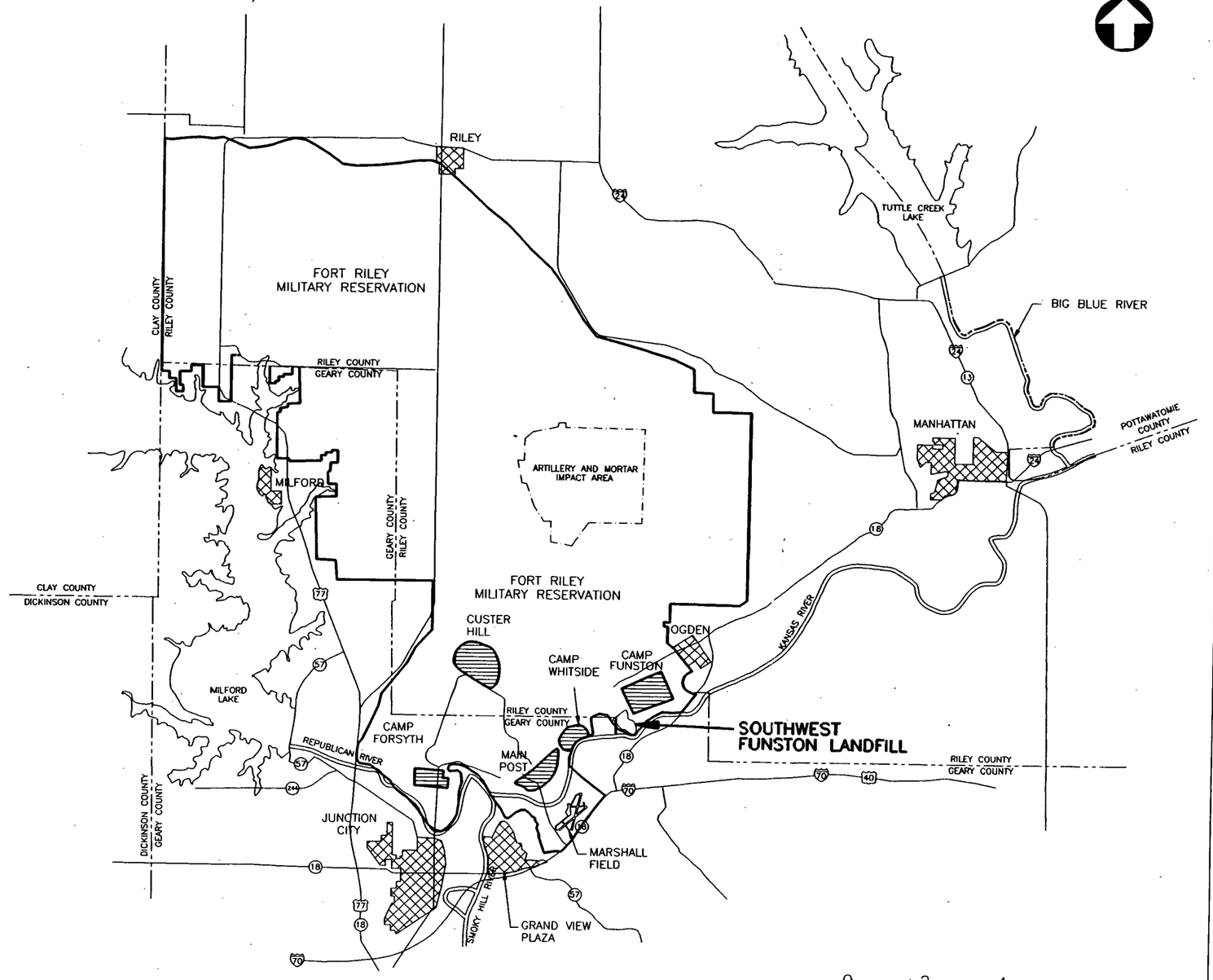
The SFL was operated between the mid-1950s and 1981, and ceased operations in 1981. Most wastes disposed at the SFL consisted of domestic refuse and wastewater treatment sludges, but some waste motor oils and degreasing solvents were also disposed in the landfill. The landfill closure in 1983-1984 included placement of a clayey to silty loam soil cover. Portions of the soil cover were obtained from a former rifle range berm and have been found to contain elevated lead concentrations, but not at levels exceeding those established for non-residential use areas.

FIGURE 1

SOUTHWEST FUNSTON LANDFILL LOCATION MAP

FORT RILEY, KANSAS



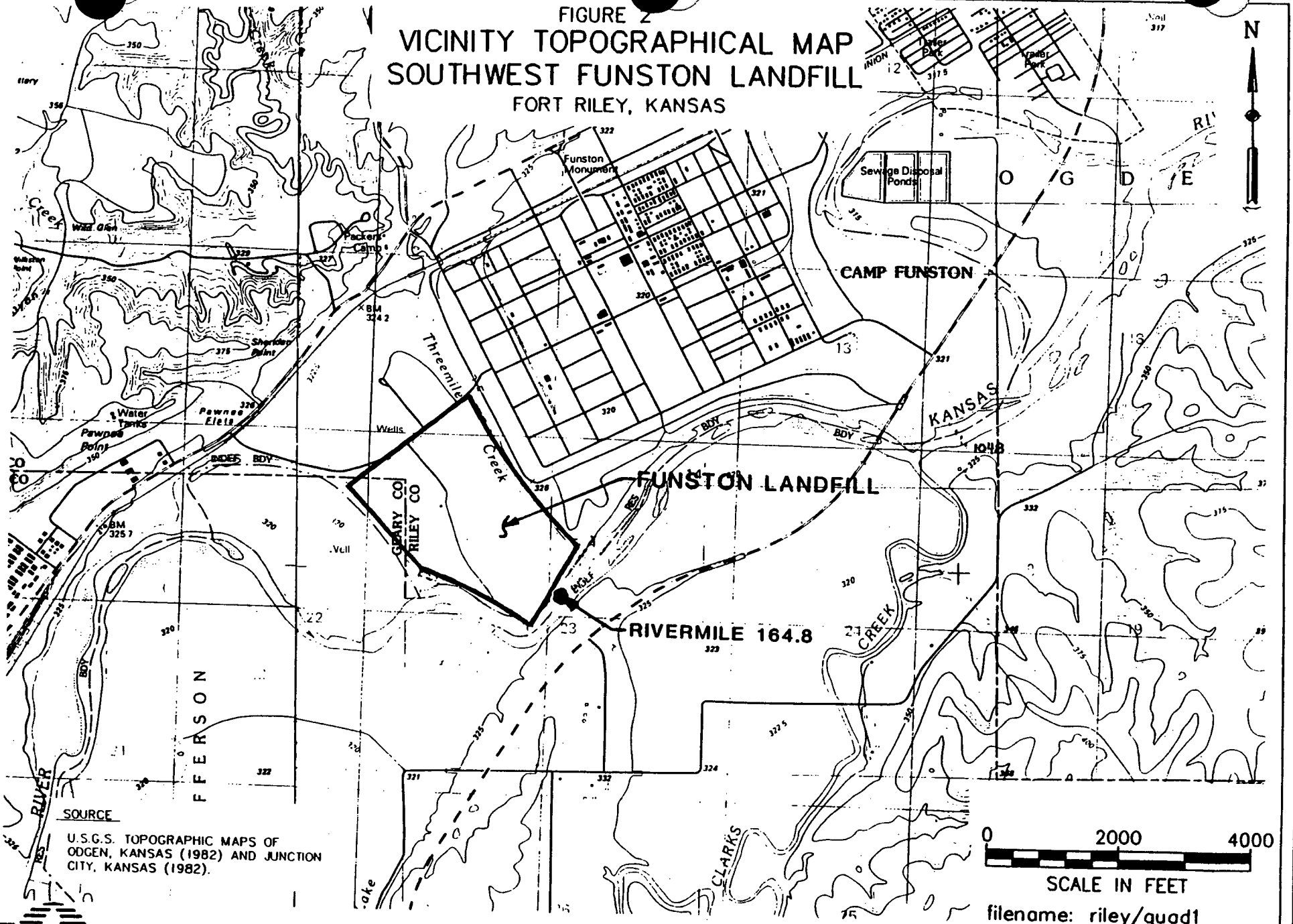


LEGEND

- CITY
- CANTONMENT
- RIVER
- COUNTY BOUNDARIES
- RESERVATION BOUNDARY
- HIGHWAY

FIGURE 2

VICINITY TOPOGRAPHICAL MAP
SOUTHWEST FUNSTON LANDFILL
FORT RILEY, KANSAS



SOURCE

U.S.G.S. TOPOGRAPHIC MAPS OF ODGEN, KANSAS (1982) AND JUNCTION CITY, KANSAS (1982).

filename: riley/quad1

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military training and military readiness, including the supply and maintenance of facilities and equipment. The installation's function has historically required management and disposal of wastes associated with these activities.

The SFL was operated between the mid-1950s and 1981, and ceased operations in 1981. The landfill was closed in 1983 pursuant to the closure plan approved by the Kansas Department of Health and Environment (KDHE) Permit No. 370. The operation of the landfill included both area and trench disposal methods. No specific information exists which recorded the waste types disposed in the landfill. By volume, most wastes generated and disposed at Fort Riley during the period of operation of the SFL consisted of domestic refuse, construction debris and sludge from wastewater treatment facilities. Waste petroleum products and waste solvents were apparently also disposed in the SFL. From 1950 to 1970, waste motor oils and degreasing solvents from vehicle maintenance operations were mixed, then disposed by dumping in this landfill.

Portions of the landfill cover soils placed during closure were removed from a former rifle range berm. The cover soils have been found to contain elevated concentrations of lead, but at levels below those established for Superfund sites in the "Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites" (OSWER, undated).

Previous attempts have been made to control Kansas River bank erosion. A description of these activities is provided in Section II.B.

4. Release or Threatened Release into the Environment of a Hazardous Substance, or Pollutant or Contaminant

No specific data are available recording the waste types disposed in the landfill. Substances known or thought to be disposed at the SFL include waste motor oils and degreasing solvents. During the time period when these solvents were disposed at the SFL, most degreasing solvents used consisted of chlorinated hydrocarbons, including trichloroethene (TCE), tetrachloroethene (PCE), and carbon tetrachloride.

Sampling and analysis results for the surface water and sediment indicate that the SFL is not contributing organic contaminants to the Kansas River. This is confirmed by the results of the ground-water samples collected from the monitoring wells located beside the river. Results indicated that the SFL may be contributing low levels of chromium and arsenic to the sediments adjacent to the site.

In addition to the lead found in the landfill cover soils, the results of subsurface soil analyses indicate the presence of volatile organics, a pesticide degradation product (DDE), Aroclor-1248, and phthalates. Metals and low levels of petroleum hydrocarbons were detected in subsurface soil samples at concentrations consistent with the background samples. Only beryllium and thallium concentrations in the soil samples analyzed exceeded RCRA Corrective Action Levels (CALs). The volatile and pesticide concentrations are limited and below CALs. The phthalate concentrations are below CALs as well.

In subsurface soils, the Aroclor-1248 concentration exceeded the CAL of 90 micrograms per liter (μg/L). The measured concentration of Aroclor-1248 was 250 μg/L, which was collected from a single sample at the 16- to 20-foot depth. Therefore, releases or surface exposure to Aroclor-1248 do not appear likely. Migration is not expected due to the low water solubility and high soil adsorption potential of Aroclor-1248.

The results of the chemical analyses of ground-water samples indicate localized volatile contamination of the ground water. The Maximum Contaminant Levels (MCLs) for vinyl chloride and benzene and the proposed MCL for 1,1,2-trichloroethane were exceeded during the baseline sampling event in two well clusters. Metals were detected in ground-water samples at background levels.

Actual or threatened releases of hazardous substances and pollutants or contaminants from this site have not been identified during the site investigation activities conducted to date at the SFL.

5. NPL Status

Fort Riley was proposed for inclusion on the National Priority List (NPL) on July 14, 1989.

B. Other Actions to Date

1. Previous Actions

Stabilization or protection of the river bank has been attempted in the past. During operation of the landfill, field observations and historical photographs show that material conducive to erosion control (including construction demolition debris and other large unmanageable white goods, such as household appliances) were segregated and dumped within the southern portion of the landfill against certain areas of the bank in an

attempt to provide erosion control. The construction demolition debris included concrete debris, such as broken pieces of slabs, walls and pavement, bricks, concrete blocks and other related debris. Erosion continued after the placement of this debris.

Sources from Fort Riley indicate that a two-day white goods retrieval and bank repair project occurred in approximately 1989. During this operation, a crane was used to retrieve readily accessible debris along the bank. One badly eroded area along the bank was filled with soil. This location was not documented and could not be positively identified. The white goods retrieved during this operation were disposed within the Fort Riley construction-demolition landfill. The material placed for erosion control has apparently limited erosion and slope failure to some degree, but unstable areas exist.

During a September 1992 site visit, a limited amount of bank protection at the landfill was observed. Construction rubble consisting of rocks, bricks, concrete and other material was seen protruding from the bank of the landfill along approximately 20 percent of the length of the SFL area bank. The rubble was not in an established continuous pattern, but randomly covered part of all of the bank in certain areas. The observed construction rubble was previously placed or dumped along the bank with the intention of protecting the bank from the Kansas River.

2. Current Actions

The Draft Final Community Relations Plan (CRP) was prepared by Fort Riley in 1992. This plan includes a description and history of Fort Riley, recognizes key areas of concern to nearby residents and outlines specific community relations techniques.

The Final EE/CA Study Report for the SFL has been submitted for the SFL site. The EE/CA provides an evaluation of non-time-critical removal action alternatives for repairs/improvements to the landfill cover and stabilization of the Kansas River bank. The EE/CA is described further in Section V.A.4. Responses to USEPA and KDHE comments on the Final EE/CA Study Report are included in the Responsiveness Summary, provided in Appendix A of this Action Memorandum.

A public meeting was held at Fort Riley on 7 September 1993. A management strategy for the proposed borrow site for providing soil for the repair of the SFL cover was presented at the meeting. The management strategy includes wetland development and tree planting.

Information provided at the public meeting is included in Appendix B of this Action Memorandum.

Fort Riley is currently conducting a Remedial Investigation/Feasibility Study (RI/FS). Descriptions of characterization activities performed at the landfill site will be presented in the Remedial Investigation Report. These activities include a surface features investigation and collection and analysis of sediment, surface water, subsurface soil and ground-water samples. As part of the work, twenty monitoring wells were installed at the SFL in 1992.

C. State and Local Authorities' Role

In 1991, a Federal Facility Agreement (FFA) was entered into by the U. S. Department of the Army (DA), 1st Infantry Division (Mechanized) and Fort Riley, KDHE and USEPA. The general purposes of the FFA are: 1) to ensure that the environmental impacts associated with past and present activities at Fort Riley are thoroughly investigated and appropriate remedial action is taken as necessary to protect the public health, welfare and the environment; 2) to establish a procedural framework and schedule for developing, implementing and monitoring appropriate response actions at Fort Riley in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the National Contingency Plan (NCP), Superfund guidance and policy, the Resource Conservation and Recovery Act (RCRA), RCRA guidance and policy, and applicable state law; and 3) to facilitate cooperation, exchange of information and participation of the parties in such actions.

1. State and Local Actions to Date

In addition to participating in the FFA, the KDHE and the USEPA, as support agencies, have reviewed and provided comments on the Final EE/CA Study Report.

2. Potential for Continued State/Local Response

The KDHE and the USEPA will be furnished copies of the Action Memorandum for reviewing and providing comments.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Bank sections along the Kansas River are believed to be eroding toward the landfill disposal areas under current conditions at the site. Flooding over the existing landfill

cover is likely to cause some surface erosion of the cover, especially in areas without established vegetation. Erosion of the stream bank and cover soils could potentially expose and transport landfill contents, which would adversely affect areas along the Kansas River downstream from the site.

The current SFL cover retains surface water in several low areas which pond water for extended periods following rainfall events. This increases the potential for landfill leachate, which can mobilize and transport contaminants into the ground water and the Kansas River. The discharge of contaminated ground water from the alluvial aquifer under the SFL into the Kansas River or river sediments is a potential pathway of contaminant transport.

The main potential environmental threats at the SFL site appear to be bank erosion and, to a lesser extent, poor landfill cover grading and drainage. Based on available site data considered in the EE/CA and current land and water use scenarios, exposure to soils and ground water in the vicinity of the SFL do not present immediate threats to human health or the environment.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances and pollutants or contaminants from this site which may present an imminent and substantial endangerment to public health, or welfare, or the environment have not been identified during the site investigation activities conducted to date at the SFL. Therefore, a non-time-critical removal action is appropriate for the SFL site.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

It is recommended that the existing landfill cover at the SFL be repaired by filling and grading and that river bank slope protection and stabilization be accomplished by the placement of a quarry run stone toe revetment with baffles.

A. Proposed Actions

1. Proposed Action Description

Landfill Cover Repairs/Improvements

The recommended non-time-critical removal action for the landfill cover at the SFL is the repair of the existing cover by filling and grading. This will involve placing, grading and compacting fill in depressions, erosion channels and other low areas creating positive drainage within the landfill limits in order to decrease the potential for erosion of the cover and to

improve drainage off the landfill. Specifically, the recommended removal action includes:

- Placement, grading and compaction of fill; and
- Establishment and maintenance of grass on new fill areas for erosion control.

This removal action will reduce erosion potential by improving surface drainage and establishing a consistent vegetative cover on the landfill surface. Leaching potential will be reduced by eliminating the current long-term retention of storm water in surface depressions and improving evapotranspiration. This action will provide an adequate cover over the small areas used for surface dumping with exposed debris.

River Bank Repairs/Improvements

The recommended non-time-critical removal action for repairs/ improvements to the Kansas River bank adjacent to the landfill is placement of revetment (quarry run stone) on the bank slope and at the toe of the bank, as described below:

- Place quarry run stone revetment along the perimeter of the western section of the landfill. This would include approximately 1200 linear feet along the river, from just west of survey point 4 to survey point 12 (Figure 3).

Bank stabilization will prevent or significantly reduce the erosion of the river bank and should limit potential river movement. By stabilizing the river bank, future exposure and migration of landfill contents will be unlikely.

2. Contribution to Remedial Performance

The proposed removal action is anticipated to be consistent with the final remedy for the SFL site, which could include additional filling on the landfill surface. Alternatives for the final remedial action will be evaluated in the Feasibility Study (FS), and the final remedy will be determined in the Record of Decision (ROD) for the SFL site.

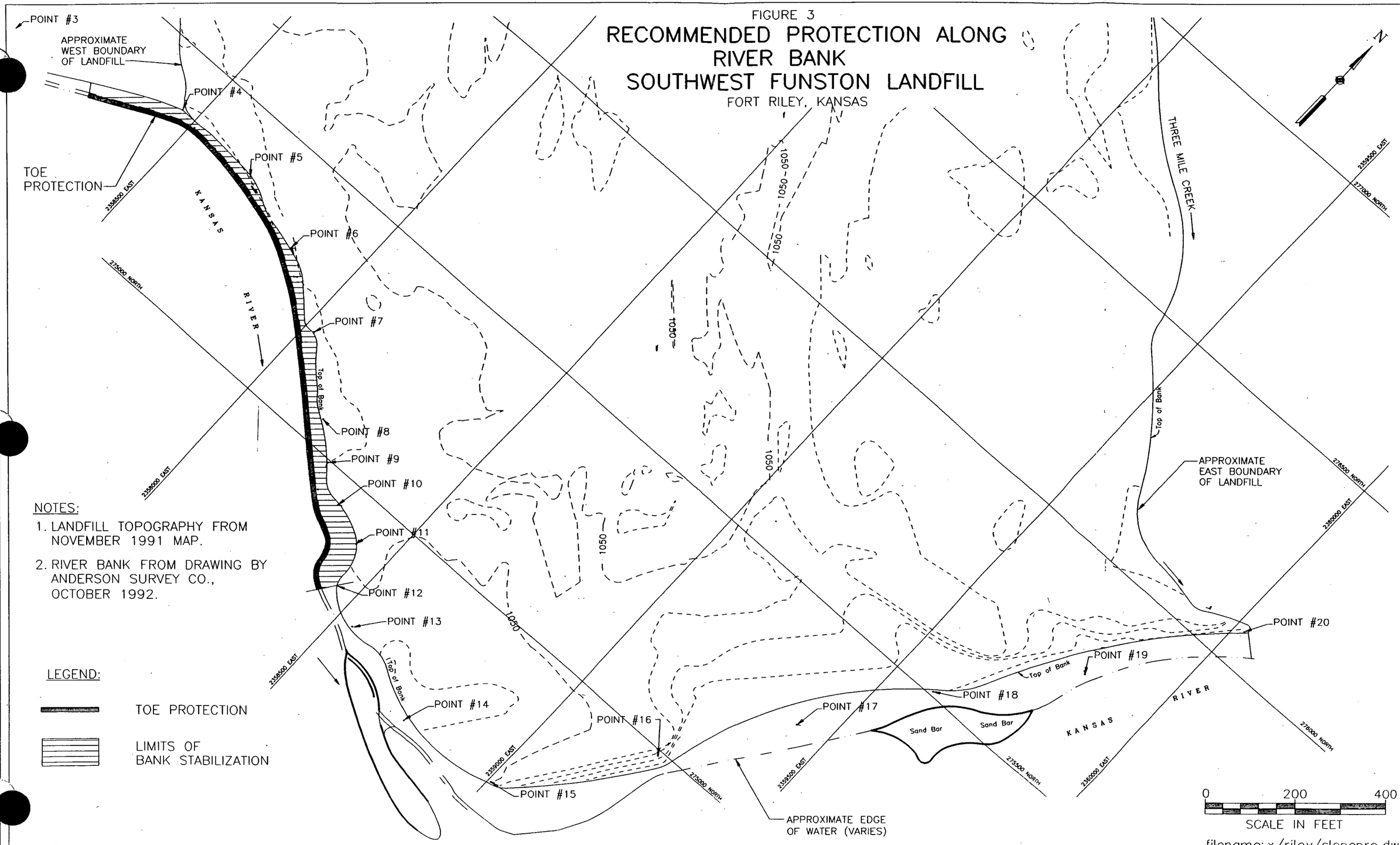
3. Description of Alternative Technologies

The removal action for the SFL focuses on reducing or eliminating visually identified areas of concern and does not address the removal or

FIGURE 3

RECOMMENDED PROTECTION ALONG RIVER BANK SOUTHWEST FUNSTON LANDFILL

FORT RILEY, KANSAS



NOTES:

1. LANDFILL TOPOGRAPHY FROM NOVEMBER 1991 MAP.
2. RIVER BANK FROM DRAWING BY ANDERSON SURVEY CO., OCTOBER 1992.

LEGEND:

- TOE PROTECTION
- LIMITS OF BANK STABILIZATION

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treatment of contaminated media at the SFL site. Therefore, alternatives to land disposal are not appropriate.

4. EE/CA

The Final EE/CA Study Report, dated July 1993, provides a comparison of several non-time-critical removal action alternatives for landfill surface and river bank repairs/improvements.

The intent of the removal action for the landfill cover is to improve soil cover for more effective drainage and erosion control and to reduce potential for exposing landfill debris. The following alternatives for landfill surface repairs/improvements were considered:

- Site Filling and Grading;
- Complete Soil Cover; and
- Complete Soil Cover with Clay Cap.

The intent of the removal action for the river bank is to stabilize the western section of the bank along the bend in the river. Stabilization should include toe reinforcement and protection of the slope to withstand the effects of river erosion and surface water runoff. The following alternatives for river bank repairs/improvements were considered:

- Vegetation;
- Bank Shaping;
- Riprap;
- Rubble;
- Rock Revetment;
- Structural Walls;
- Grout Blankets;
- Gabions;
- Sand-Cement Bags;
- Used Tires;
- Fences;
- Kellner Jacks;
- Dikes; and
- River Rerouting.

These alternatives are discussed in detail in the EE/CA.

5. ARARs

Removal actions taken under CERCLA may have to comply with several types of requirements. According to the FFA, "with respect to releases of hazardous waste covered by this Agreement, RCRA shall be considered an applicable or relevant and appropriate requirement pursuant to Section 121 of CERCLA." Three types of ARARs may be determined: chemical-specific, location-specific and action-specific. Since the removal action at the SFL is to be integrated into the final site remedial activities, compliance with ARARs to the extent practicable is a primary objective.

Chemical-Specific ARARs

Chemical-specific ARARs do not apply to this project since the removal action does not include treatment and removal of contaminants. However, OSHA Regulations (29 CFR Part 1926 Subpart D - Occupational Health and Environmental Controls) will be applicable.

Location-Specific ARARs

The following location-specific ARARs are applicable to the removal action:

- Flood Plain Management
  (Executive Order 11988, 16 USC 661 *et seq.*,
  40 CFR 6.302, Appendix A);
- Endangered Species Act of 1973
  (16 USC 1531-1544);
- Fish and Wildlife Protection
  (16 USC 661-666c, 16 USC 2901 *et seq.*,
  33 CFR 320-330; 40 CFR 6.302);
- Surface Water Use Designations
  (KAR 28.16.28d);
- Designation of Critical Water Quality Management Areas
  (KAR 28.16.70);
- Historic, Architectural, Archeological, and Cultural Sites
  (Executive Order 11593, 40 CFR 6.302);

- Clean Water Act, Section 404 Permitting Requirements (33 USC 1341, 33 CFR 320-330, 40 CFR 230); and

- Clean Water Act, Section 401 Water Quality Certification (33 USC 1341).

As described in the EE/CA, location-specific ARARs identified for consideration, but not applicable to the removal action include:

- Protection of Wetlands (Executive Order 11990, 40 CFR 6.302, Appendix A);

Action-Specific ARARs

Potentially applicable action-specific ARARs include:

- National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR 61);

- National Ambient Air Quality Standards (NAAQS) (Clean Air Act 40 CFR 50);

- Ambient Air Quality Standards and Air Pollution Control Regulations (KAR 28.19);

- Solid Waste Management Regulations (KAR 28.29 Part II); and

- Stormwater Discharge Requirements, National Pollutant Discharge Elimination System (Clean Water Act 40 CFR 122.26).

These ARARs are described in greater detail in the EE/CA. This removal action is intended to address the physical rather than the chemical concerns of the site. Identified ARARs can be met through proper implementation of site controls during construction, with the exception that floodplain impacts caused by filling may need to be verified as minimal in accordance with Executive Order 11988.

6. Project Schedule

Although the removal action has no specific time constraint, it will be implemented as soon as practicable to limit the potential for further degradation of the river bank and the landfill surface. The schedule will depend on the time required for: collecting necessary detailed field data for design; the design, bidding and construction process; and obtaining funding. Typical weather conditions which may create problems during construction, such as flooding conditions or freezing weather, will be considered during scheduling.

B. Estimated Costs

The expected costs for the site filling and grading and river bank stabilization, as outlined in Section V.A.1, are approximately $2.5 million. A cost breakdown can be found in Tables 1 and 2, which were also presented in the Final EE/CA Study Report. It should be noted that the costs presented do not reflect the development and maintenance of the borrow area or long-term maintenance of the removal action improvements.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

The existing topography and vegetative cover over the landfill surface do not control surface water run-off sufficiently to prevent erosion of the soil, as evidenced by erosional features such as rills and channels. Surface depressions with standing water and areas with poor surface drainage characteristics have also been observed. Flooding of the Kansas River is not expected to have an adverse impact of the integrity of the landfill cover, but may cause additional infiltration. The SFL is located within the 50-year flood plain. Without landfill cover improvements, the potential for erosion, infiltration, and exposure of landfill contents during flood events will likely continue and possibly accelerate over time.

Portions of the Kansas River bank are eroding toward the former landfill disposal areas under current conditions at the site. Without stabilization of the river bank, the erosion and the potential for future exposure and migration of landfill contents will likely continue and possibly accelerate over time.

VII. OUTSTANDING POLICY ISSUES

No outstanding policy issues are known to exist for the SFL site.

TABL

CONCEPTUAL CONSTRUCTION COSTS
SOUTHWEST FUNSTON LANDFILL SURFACE REPAIRS – SITE FILLING AND GRADING
Fort Riley, Kansas

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Site Preparation (Mowing)	80	Acres	$625	$50,000
2	Place & Compact Soil in Depressions	100,000	C.Y.	$15	$1,500,000
3	Seed and Mulch	80	Acres	$2,000	$160,000
			SUBTOTAL		$1,710,000
			CONTINGENCY (APPROX. 25%)		$427,500
			TOTAL ESTIMATED COST		$2,137,500

TABL

CONCEPTUAL CONSTRUCTION COSTS
KANSAS RIVER BANK STABILIZATION USING REVETMENT
Fort Riley, Kansas

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Supply, Haul and Place Revetment	$9,000	C.Y.	$35	$315,000
		SUBTOTAL			$315,000
		CONTINGENCY (APPROX. 25%)			$78,750
		TOTAL ESTIMATED COST			$393,750

VIII. ENFORCEMENT

No enforcement strategy is proposed because Fort Riley is the only known potentially responsible party (PRP).

IX. RECOMMENDATION

This decision document represents the selected removal action for the SFL site at Fort Riley, Kansas, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the administrative record for the site. Conditions at the site meet the NCP section 300.415(b)(2) criteria for removal.

Fort Riley
Department of the Army
1st Infantry Division (Mechanized)

_____ _____

Name Date

_____

Title

REFERENCES

Law, 1993. Final Engineering Evaluation/Cost Analysis (EE/CA) Study Report for Remedial Investigation/Feasibility Study, Southwest Funston Landfill, Fort Riley, Kansas. July 1993.

CDM, 1992. Draft Final Community Relations Plan, Installation Restoration Program, Fort Riley, Kansas. January 1992.

OSWER, Directive No. 9355.4-02. Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites. Memorandum from H. Longest and B. Diamond to EPA Regions.

USEPA, 1991. United States Environmental Protection Agency Region VII and the State of Kansas in the Matter of: the U. S. Department of he Army, 1st Infantry Division (Mechanized) and Fort Riley, Fort Riley, Kansas: Federal Facility Agreement.

USEPA, 1990. Superfund Removal Procedures Action Memorandum Guidance. OSWER Dir. 9360.3-01. December 1990.

APPENDIX A

RESPONSIVENESS SUMMARY

APPENDIX A - RESPONSIVENESS SUMMARY

COMMENT RESPONSES

Final Engineering Evaluation/Cost Analysis Study Report
Southwest Funston Landfill
Fort Riley, Kansas

Commentor: USEPA

General Comments

1. References should be provided to validate the cost estimates provided for the various alternatives.

   R: Costs were estimated using the "Means Building Construction Cost Data, 51st Annual Edition", R.S. Means Company, Inc. Under Section 022 712 the cost for rip-rap, random, broken stone, machine placed is listed in the 1990 Edition. The rip-rap cost presented in the EE/CA did not include a haul cost. Depending on the location of an acceptable quarry, haul cost could range from 10 to 20 dollars per cubic yard. The estimate for grout blankets was based on a discussion with a manufacturer's representative (Nicolon Corporation, Armorform blankets). Revetment costs were based on previous USACE experience.

2. In organizing the report, it would be more efficient to include the tables and figures within the context of their reference rather than in a separate section of the document.

   R: EPAs preference is noted. The organization was used to simplify report production.

3. The baseline risk assessment contained in the draft Remedial Investigation (RI) report for the SFL depicts a risk due to potential future groundwater consumption at the site which exceeds the level which is deemed acceptable by EPA. As required by the NCP, a remedial action is thereby necessary to abate this risk. EPA reiterates that a need to reduce infiltration of precipitation through the landfill has been demonstrated based upon risk criteria and the comparative analysis examining the infiltration/groundwater elevation issue, as presented in the draft RI report and in the "draft" EE/CA. We maintain that the construction of an impermeable cap on the landfill is necessary to accomplish risk reduction at the site and is likely to be required as part of the final Remedial Action.

   We are unclear as to the exact nature of the removal action which is being proposed for "capping" the SFL. The August 16, 1993 attachment to the SFL EE/CA contains few details to describe how the Army's removal action which has been verbally proposed differs from that specified in the EE/CA. It is our understanding that the Army is

proposing to install a cap on the SFL which complies with RCRA subtitle "D" closure requirements. We would concur with such an approach. The Removal Action Decision Document should reflect the exact nature of the action to be taken at the SFL. Please clarify your intentions if they are in conflict with our understanding.

R: The baseline risk assessment will be revised in the draft-final RI report, and is beyond the scope of the EE/CA document. Ground-water issues and future FS activities are beyond the scope of the EE/CA and will be addressed in the Draft-Final RI. The justification for providing an impermeable cap will be re-evaluated in the RI and the FS, considering a more appropriate future land use scenario, and the effects of river infiltration which are significant.

Your understanding of the Army's intent for t removal action is correct. The action proposed in the EE/CA is for repair of the existing cover with no thickness nor permeability criteria. The attachment to the EE/CA is intended to be a formal proposal from the Army that RCRA subtitle "D" closure requirement will be met at Southwest Funston Landfill. This means that the design will insure that the cover soil is a minimum of 18" thick at a maximum permeability of 1×10^{-5} cm/sec.

4. The Army has not demonstrated that landfill cover material which will be sufficient to meet the 1E(-5) cm/sec permeability criteria is available from the proposed borrow area adjacent to the SFL. The procedure the Army intends to utilize to verify the effectiveness of this proposed cover material should be specified. If these soils are ineffective in meeting the permeability criteria specified, alternate sources would be required, having possibly dramatic impacts to overall project costs. How would this impact the proposed actions?

Additionally, a map of the affected area should be included with the report "Environmental Management of the Southwest Funston Landfill Soil Borrow Area." The report seems rather biased towards emphasizing the positive aspects of creating a wetlands in the borrow area, and somewhat lacking in an objective analysis of the potential positive and negative impacts of such a project. We concur with the concept being proposed, however, we will be coordinating review of the document with other programs within EPA to evaluate the details of the implementation.

R: Soil from the proposed borrow area will be tested to ensure that the RCRA subtitle "D" permeability criteria can be met. Soil samples will be collected from five locations within the borrow area. At each location, a sample will be taken

at 0 to 3' below ground surface (bgs), 3' to 6' bgs, and 6' to 9' bgs. This will provide a total of 15 samples. A Proctor analysis will be performed to determine the maximum density and optimum moisture content of each sample. Permeability test specimens will then be prepared from each of the 15 samples which will be compacted to the maximum density and at a number of moisture contents above the optimum moisture content determined in the proctor test. (The literature reports that lower permeabilities are achieved at moisture contents above optimum.) If a sufficient quantity of acceptable material cannot be obtained from the proposed borrow area, alternatives will be considered which include but are not limited to: locating another borrow area and repeating the testing described above, mixing the borrow material with a commercially available clay additive or clayey material from another borrow area and repeating the testing described above.

A drawing which shows the proposed borrow area is attached for your review. There was no deliberate attempt by Fort Riley or the author of the Borrow Area Management Plan to bias the presentation or provide less than fully objective analysis of the impacts. The document was prepared on very short notice when it was recognized that removal of soil would have a possible environmental impact which had to be mitigated. The details of the implementation will be addressed during the design phase. Fort Riley has received a letter from the U.S. Fish and Wildlife Service (USFWS) in which they report "no objections to the proposed action."

5. EPA suggests that the sheet pile wall alternative be further examined as a viable approach for bank stabilization in the western area of the landfill at areas where high river velocities are anticipated. It is believed that sheet piling may offer improved structural stability compared to the revetment alternative, thereby justifying the increased expense associated with its implementation.

We suggest that you evaluate extending the sheet pile wall from a point west of survey point #4 (see Figure 2-8), due to the erosion which is occurring in this area, to near survey point #7. The revetment option appears viable in the lower velocity areas of the river, downstream of survey point #7. We recommend that the revetment extend past survey point #13, where indications of erosion are present, to approximately survey point #15.

Further, an evaluation of the impacts of the recent flooding on landfill/river bank conditions should be included to provide a current assessment of conditions at the site which may influence the nature of any removal actions proposed.

R: Disagree. The sheet pile wall offers no significant structural improvements over the use of rock revetment, is difficult to install (drive) into debris and rubble present along the bank, and is more expensive. The repair and extension of revetment is also accomplished easily, at less cost than a sheet pile wall extension, if needed. The sheet pile wall may increase stream velocities near the bank. Revetment will increase the buffer area between the river and landfill contents by extending the bank slope into the river.

Disagree. Sandbars are present on the north side of the river upstream from Section 4, and downstream of Section 13, indicating patterns of deposition. The stream flow upstream from Section 4 is generally parallel to the bank, while downstream from Section 13 river flows appear to be shifting away from the SFL toward the bank opposite to the landfill.

A representative from the Kansas City District, Corps of Engineers evaluated the impact which recent flooding had on landfill/river bank conditions. There was very little erosion of the landfill cover while a considerable amount of sediment was deposited on the southwestern quarter of the cover when the river overflowed its bank. Although flow was reestablished in the former meander bend during the high water events preceding and after the flood, it appears that the river will return to the channel it occupied prior to the flood. There is evidence of significant erosion of the portion of the river bank proposed for stabilization but the remainder of the bank shows little impact from the flood. A topographic survey should be completed by 15 October 93, and the design will be adjusted to account for changes in the bank resulting from the flood of '93.

6. RCRA requirements will be ARARs rather than TBCs for remedial/removal activities at the site.

R: The EE/CA presents a preliminary determination of ARAR's and TBC's. Final determinations will be made during the Feasibility Study. RCRA contains many provisions which may be either ARARs, TBCs, or not pertinent. RCRA requirements must be considered individually for their status as possible ARARs.

Specific Comments

1. Page ES-1, second paragraph. Insufficient information is provided to justify dismissing concerns associated with possible landfilling operations at the eastern boundary of the SFL.

R: The eastern boundary of the SFL (within the wooded area) is not within the scope of the EE/CA. This area may be considered further in the FS. For this removal action, the potential detrimental impacts to the biological environment are considered by Fort Riley to be sufficient justification for not disturbing the area at this time. The statement in the Executive Summary was not intended to justify dismissing concerns about the area.

2. Page ES-1, third paragraph. Since surface erosion and settlement have lead to widespread ponding on the landfill, why do you conclude that debris observed on the landfill surface is a result of dumping rather than erosion of soil cover material?

R: Evidence of surface erosion was not present in the areas where localized surface debris was present, therefore surface deposition of debris was concluded.

3. Page ES-3, last paragraph. While the risk associated with current uses at the SFL, as found in the baseline risk assessment in the draft RI report, does not exceed the level deemed acceptable, the future use scenario involving potential groundwater consumption at the site illustrates an unacceptable risk.

R: Comment is noted by Fort Riley. Risk factors will be addressed in the RI and FS documents.

4. Page 2-3, section 2.1.2.3. Permeability data for soils from within the landfill would provide useful information regarding the degree of infiltration likely.

R: Permeability data for soils within the landfill will be addressed in the Draft-Final RI report, and is outside the scope of the EE/CA.

5. Page 2-6, first paragraph. To evaluate potential contaminant transport, the Army should define at what river elevations groundwater flow reversal conditions occur. A historical comparison should be made to evaluate the frequency of such flow reversal occurrences, based on river elevation data. Discussion should also be included to correlate river elevation data with groundwater elevations for comparison against the suspected depth of landfilling operations from past practices. Our interpretation of the information presented in previous reports would be that landfilling at the SFL occurred to a depth of approximately 15-18 feet below the surface. The landfill surface is at approximately 1050 ft. MSL. This would suggest that the groundwater elevations within the landfill would have to exceed approximately 1032 ft. MSL for groundwater to begin to contact landfilled materials. Based on the information presented, it does not appear that

groundwater typically exceeds that level at the SFL. In cases where groundwater could contact landfill wastes, the level would have to rise significantly above 1032 ft. MSL to contact relatively high volume percentages of the total wastes landfilled.

R: The discussion of ground-water flow, and potential landfill waste contact will be presented in the Draft-Final RI report, and is outside of the scope of the EE/CA.

6. Page 2-9, first and second paragraphs. We would suspect that the correlation between the Fort Riley river gauge and the river elevation at the SFL would not be linear since the river volume will not vary linearly with the river elevation. It would be more appropriate to use additional data points to develop the correlation between the Fort Riley gauge reading and the SFL river elevation.

Do records exist which would document flooding conditions at the SFL since the construction of Milford Dam? Water management practices at Milford would significantly influence the potential for flooding at the SFL.

R: A linear correlation is an acceptable approximation to relate river levels at the SFL to the Fort Riley gauge height for the purposes of the EE/CA. Additional correlation between the Fort Riley gauge and SFL water level will be presented in the Draft-Final RI, along with additional information on river stages and flooding events.

Management practices at Milford can influence the potential for flooding at SFL. In general, Milford management practices significantly reduce both the severity and frequency of flooding events at SFL.

7. Page 2-12, first paragraph. It would appear that a more detailed topographic map is necessary to fully evaluate the extent of settlement on the landfill. How does this impact the evaluation of the various removal alternatives?

R: The current topographic map, combined with the map annotated with areas of concern (Figure 2-7), are adequate for the level of detail needed to evaluate conceptual designs in the EE/CA. There was no impact on our evaluation of the various removal alternatives.

8. Page 2-16, first paragraph. Please provide a reproduction of the 1972 photo of six open trenches in the southwest portion of the landfill.

R: The photos are available for viewing at Fort Riley. Photocopies can be provided if desired.

9. Page 2-17, first paragraph. It should be noted that, due to erosion and poor documentation of closure (cover) activities, the possibility exists that organic contaminants may be present in surface to near-surface soils.

R: Disagree. Organic contaminants are not expected in the SFL cover soils, considering the borrow sources used and time of placement at least two years after landfill operations had ceased. Cover soils will be addressed further in the Draft-Final RI report.

10. Page 2-20, section 2.3.3, second paragraph. It should be stated that the risk due to the possible future consumption of groundwater in proximity to the site, as determined in the baseline risk assessment in the draft RI report, exceeds the level which EPA has established as acceptable.

R: The risk assessment is beyond the scope of the EE/CA and is to be addressed in the Draft-Final RI report.

11. Page 2-21, section 2.4.1, third paragraph. The frequency of actual flooding events at the SFL should be determined if records are available, since the correlations provide only estimates. The impacts of possible flooding on proposed removal actions should be evaluated. Are additional actions necessary, such as the construction of a levee, to mitigate these potential conditions?

R: Additional data concerning SFL flooding events will be presented in the RI. Flooding must be considered in the evaluation of the 2% and 3% grading schemes since their construction is on a flood plain. The reduction in flood plain volume may have to be mitigated. (See response to comment Number 23.) The evaluation of additional remedial actions, such as a levee, are beyond the scope of the EE/CA and can be evaluated in the FS.

12. Page 3-3, section 3.4. The ARARs for a removal action are the same as for remedial action. The NCP states that removals are to address ARARs to the extent practicable. Some ARARs may be beyond the intended scope of a particular removal, whereby it may be impracticable to address these. Please note that several exceedances of the Safe Drinking Water Act MCLs have been documented.

R: Noted. ARAR's will be further addressed in the FS report. Exceedances of MCL's are presented in Section 2.3.3 of the EE/CA report. (See response to general comment 6).

13. Page 3-9, section 3.4.3. RCRA closure requirements as found in 40 CFR Part 264 should be considered an ARAR in evaluating the efficacy of any proposed actions.

R: Noted. ARAR's will be further addressed in the FS report. Exceedances of MCL's are presented in Section 2.3.3 of the EE/CA report. (See response to general comment 6).

14. Page 4-1, section 4.1.1. The evaluation criteria for determining a need for improvements to the landfill surface should include RCRA requirements and risk factors as established in the draft RI report/risk assessment.

R: This EE/CA/removal action is intended to address the physical rather than the chemical concerns of the site. Therefore, risk factors are beyond the scope of this EE/CA. The FS will address risk factors as well as ARARs.

15. Page 4-2, section 4.1.2.3. It appears that the construction of a levee (or similar flood prevention measures) to prevent flooding of the landfill area is an appropriate action to consider as a removal. Discussion should be provided to address this possibility.

R: The construction of a levee is not a viable removal action for a closed, unlined landfill. As witnessed by the recent flood, erosion of the cover is not a concern because the sheet flow velocities are low and erosion did not occur. A levee will not prevent the significant rise in the ground-water table which will occur during flood events. A levee might be an appropriate removal action in the case of an active landfill where open trenches could be filled and the contents washed away, or in the case of a lined landfill with a soil cover where the flood waters would pond.

16. Page 4-3, section 4.1.2.4, second paragraph. Improving surface run-off will reduce infiltration through the landfill surface. The EE/CA should evaluate to what extent the proposed alternatives will be effective in accomplishing this goal with respect to ARARs, risk-based criteria, and consistency with the final remedy.

R: Additional information pertaining to infiltration is to be presented in the draft-final RI report. Reduction of storm water ponding by improving surface drainage

is likely to reduce infiltration significantly, considering that approximately 20 percent of the landfill surface does not drain effectively. The FS will include a HELP model evaluation of the effectiveness of the removal action.

17. Page 5-3, section 5.2.1.3. RCRA subtitle "C" and "D" closure requirements should be evaluated and included as alternatives for the impermeable cap.

R: Subtitle D closure requirements have been accepted by Fort Riley as appropriate in the "Attachment to the EE/CA" and will be incorporated into the design.

18. Page 5-7, last paragraph. A description of the details of the sheet pile wall alternative should be provided.

R: Disagree. The sheet pile wall details are not necessary to evaluate the conceptual design for implementability or general cost.

19. Page 6-4, section 6.2.2. Please clarify how you are estimating costs for soils obtained from sources on the installation. In addition, EPA does not consider disturbances of various amounts of surface soils to constitute a deterrent to capping landfill sites, as illustrated by the prevalence of capping in remedial actions at such sites.

R: Unit costs for soils were taken from the R.S. Means Building Construction Cost Data, as described in general comment Number 1. Since cost estimates were developed for relative comparisons, consistent unit rates were used in the estimates. The statement in the text was not intended to indicate a bias against capping but rather to point out there are potential adverse environmental impacts associated with borrow areas. The need for additional remedial action will be determined in the FS and is beyond the scope of the EE/CA.

20. Page 6-5, third paragraph. Please recall that EPA does not necessarily utilize data from one round of the quarterly groundwater monitoring program at the SFL to "confirm" data from prior rounds. Our intent is to monitor the change in the groundwater chemistry at the site. Also note that the prime consideration used in evaluating the site is not the concentration of the hazardous constituents which may be present, but the risk associated with those constituents.

R: Noted. Ground Water data will be evaluated in the RI and the FS.

21. Page 6-6, first paragraph. Your conclusion that the installation of an impermeable cap over the landfill would be of questionable effectiveness in reducing infiltration/ contaminant migration at the site does not appear to be supported by analytical information.

R: The intent of this paragraph was to illustrate that capping would not eliminate water contact with the waste. The statement did not indicate an 80 percent reduction of infiltration, but rather stated that "at least 20 percent of infiltration is estimated to be from the river." Additional information will be presented in the RI report.

22. Page 6-8, section 6.3.2.4. It would be beneficial to include specific examples of other instances where rock revetment has been utilized along the Kansas River for effective bank stabilization. This should include a comparison to show that river conditions are sufficiently comparable at the SFL such that similar success would be anticipated. Any deleterious impacts on the river due to revetment at similar sites should be noted as well.

R: The use of revetments is documented in the Missouri River Hydrographic Survey published by the U.S. Army Corps of Engineers, Kansas City District. A similar document has not been developed for the Kansas River. Based on a review of available information, it appears that a structure similar to the revetment proposed for the bank along Southwest Funston Landfill has not been used on the Kansas River. In general, low river velocities on the Kansas River when compared with the Missouri River do not necessitate design of a structure with the level of protection afforded by revetment. However, the success of similar structures on the Missouri River gives every indication that revetment will provide adequate protection for the river bank along Southwest Funston Landfill. No deleterious impacts are known, because a similar revetment has not been used on the Kansas River. One possible deleterious effect at this location might be a narrowing on the point bar, opposite bank. However, no significant adverse effects are anticipated.

23. Page 6-9, section 6.3.2.9. Please compare rates of the sedimentation/erosion process using the Kellner Jack/Fence alternative relative to the rock revetment alternative.

R: The use of Kellner jacks will allow sediment deposition to build up the bank, however, the deposition process would likely be slow, and the potential for bank erosion extending into the limits of the existing landfill will remain high until this build-up is accomplished. Erosion will likely occur in the future during major

flood stages even with these devices in place. Long-term substantial sediment deposition leading to increased bank stabilization appears unlikely along the SFL if Kellner jacks are used. Long term sediment deposition between baffles is predicted with the revetment, where low velocity conditions are expected even during high water stages. The revetment also structurally stabilizes the bank, and this stability is enhanced by the sediment deposition. Revetment has been used successfully on the Missouri River and is believed to be appropriate for the SFL.

24. Page 7-1, section 7.1.1, first and third bullets. Please attempt to quantify the amount that infiltration through the landfill would be reduced based upon implementation of this alternative.

It is stated that the filling/grading alternative is consistent with the long-term remedy for the site. Please discuss your perception of what the long-term remedy for the site may be and demonstrate this consistency.

R: Additional information pertaining to infiltration will be presented in the Draft-Final RI report.

A potential long term remedy for the site is a RCRA subtitle C cover which would require a vast volume of soil to be deposited on the site. The filling and grading alternative is consistent with this potential additional action because it will reduce, to a small degree, the amount of additional fill which will have to be brought to the site.

25. Page 8-1, last paragraph. It is stated that the "filling/grading) alternative will be consistent with the final remedy which could include additional filling on the surface of the SFL." From this statement, it appears that one of the other alternatives proposed for the removal action may likely constitute the "final remedy" for the site. Please identify the additional information which you require to make an assessment of the final remedy for the site. Also, see general comment #3.

R: Fort Riley believes the filling/grading alternative may be appropriate as the final remedy for the SFL. Further evaluation of ground water and river stage dynamics, and infiltration will be presented in the RI and FS. Alternative evaluation will be presented in the FS.

26. Table 6-1, page 2. The potential environmental/ecological impacts of revetment on the river have not been fully presented.

R: An Environmental Assessment for Missouri River Bank Stabilization was reviewed to determine additional impacts which should be considered for bank stabilization projects. The following is a summary of those items:

a. Reduction in quantity or diversity of wildlife habitat.

* An argument could be made that certain bank stabilization methods would actually improve the diversity of animal habitats considering that a majority of the Kansas River bank is alluvial deposits and not rock or gravel.

b. Accretion of sediment with possible loss of water surface area.

* Project design specifications being developed for the revetment call for fines (materials under three inch size) to not exceed 15 percent. Actually erodible materials would be much smaller than the three inch stone. Due to the fact that relatively clean quarry run stone with very little fines will be used, the impact of revetment construction will be minimal when compared with the naturally occurring sediment load of the Kansas River.

c. Possible destruction or burial of unknown cultural resources.

* Since the construction will be in an area disturbed previously, this possibility is estimated to be minimal.

d. Alteration of established invertebrate and algal communities.

e. Short term reduction of fish habitat.

f. Loss of riparian timber due to clearing operations for access roads.

* Minimal timber loss is expected as the majority of the bank proposed to receive treatment is not converted with trees except for a short stretch from survey point 4 to survey point 6.

Commentor: KDHE

General Comments

1. KDHE concurs with all EPA comments as submitted 16 July 1993 and expresses like concerns.

   R: Noted.

2. KDHE is in general concurrence with the landfill surface removal action as proposed in the EE/CA and at the 7 September 1993 EE/CA public meeting, namely installation of a minimum 18" cover which would meet a vertical permeability requirement of 10^{-5} cm/sec and therefore be in compliance with RCRA Subtitle D landfill closure requirements as specified by KDHE. The draft Remedial Investigation (RI) baseline risk assessment concluded that an unacceptable risk due to future ground-water consumption exists for the SFL. Both the draft RI and the EE/CA maintain both qualitatively and roughly quantitatively that the primary mechanism for ground water migration through waste areas (causing leachate generation and hazardous substance release) is vertical infiltration of surface runoff (precipitation). The 10^{-5} cap effectively mitigates the risk for future leachate generation and is certainly the central component of the final remedy for the site.

   R: Noted.

3. KDHE also recommends an additional 6" (minimum) soil layer on top of the compacted fill which should be seeded with hardy grasses to prevent erosion of the compacted cover. This layer should be of a soil material capable of establishing and maintaining grass growth as an erosional control.

   R: Noted.

4. KDHE is in concurrence with the bank stabilization action as proposed; however we concur with EPA #5 with regards to the extension of revetment to point #15. This comment was also previously submitted by KDHE as specific comment #5 in the letter from KDHE to Ft. Riley dated 1 July 1993.

   R: Concurrence noted. Disagree. The sheet pile wall offers no significant structural improvements over the use of rock revetment, is difficult to install (drive) into debris and rubble present along the bank, and is more expensive. The repair and

extension of revetment is also accomplished easily, at less cost than a sheet pile wall extension, if needed. The sheet pile wall may increase stream velocities near the bank. Revetment will increase the buffer area between the river and landfill contents by extending the bank slope into the river.

Disagree. Sandbars are present on the north side of the river upstream from Section 4, and downstream of Section 13, indicating patterns of deposition. The stream flow upstream from Section 4 is generally parallel to the bank, while downstream from Section 13 river flows appear to be shifting away from the SFL toward the bank opposite to the landfill.

A representative from the Kansas City District, Corps of Engineers evaluated the impact which recent flooding had on landfill/river bank conditions. There was very little erosion of the landfill cover while a considerable amount of sediment was deposited on the southwestern quarter of the cover when the river overflowed its bank. Although flow was reestablished in the former meander bend during the high water events preceding and after the flood, it appears that the river will return to the channel it occupied prior to the flood. There is evidence of significant erosion of the portion of the river bank proposed for stabilization but the remainder of the bank shows little impact from the flood. A topographic survey should be completed by 15 October 93, and the design will be adjusted to account for changes in the bank resulting from the flood of '93.

5. KDHE is in agreement with EPA general comment #5 with regards to the further consideration of a sheet pile wall to be used as a means of bank stabilization in the higher velocity regime (west portion) of the landfill area.

R: Disagree (see response to comment 4 above).

APPENDIX B

SUPPLEMENTAL INFORMATION

FROM

PUBLIC MEETING

7 SEPTEMBER 1993

Attachment to 16 August 1993

Engineering Evaluation / Cost Analysis (EE/CA)

Southwest Funston Landfill
Fort Riley, Kansas
July 23, 1993

In response to comments received from the Environmental Protection Agency, Region VII and the Kansas Department of Health and Environment to a draft of this Engineering Evaluation / Cost Analysis (EE/CA) for river bank stabilization and landfill cover improvements, Fort Riley has agreed that the cover should meet the current criteria for closure of a sanitary landfill. That is, have a minimum of eighteen inches of cover (18") with a permeability of 10^{-5} centimeters per second (cm/sec). This criteria in not included in the July 23, 1993 EE/CA document.

An EE/CA, or other type of engineering feasibility study, is generally intended to present a range of alternatives which may be used to solve a problem. It is recognized that, in the decision-making process, changes may be made to the alternatives or that other alternatives may be developed. The selected action or features are then developed and refined in the design phase.

In an effort to expedite the implementation of this Removal Action, the Kansas City District Corps of Engineers has initiated the design of both the bank stabilization and cover improvements. During this design phase, samples will be obtained from the landfill surface and the proposed borrow area to determine what actions are necessary to meet the above closure criteria. The results of this testing may or may not indicate a need to modify the recommended alternative in order to meet the criteria. If modification is necessary, it is expected that additional thickness of appropriate soil material would be utilized, result in higher final elevations, perhaps increased slopes and/or revised drainage patterns and a larger volume and/or different type of borrow soil needed.

The early initiation of design is intended only to expedite project implementation and is in no way intended to preclude or result in less than due consideration of public comments on the EE/CA. **Beginning the design efforts early does not and will not diminish the importance of the public review and comment in our decision-making. Pertinent comments will be considered in decision-making and incorporated into the final design.**

Included with this EE/CA is a plan for the "Environmental Management of the Southwest Funston Landfill Soil Borrow Area." This plan outlines mitigation efforts deemed appropriate by Fort Riley, in consultation with the U.S. Fish and Wildlife Service, to address the loss of wildlife habitat in the area selected for use as a borrow area. The mitigation includes development of the borrow area as a wetlands and planting of trees to replace some of those lost from the borrow area.

The borrow area discussed in the management plan was selected due to it's proximity to the site. In addition to the cost advantages (shorter haul distance, lower fuel requirements), hauling equipment does not have to travel over roadways to reach the Southwest Funston Landfill site. Use of other, more distant borrow areas would not only increase project costs, but put a significant strain on the installation's transportation network. Transporting the required amount of soils would require five to twenty thousand (5,000 - 20,000) large truck loads. The traffic congestion could create or result in safety hazards which can be reduced or avoided by using the selected borrow area.

ENVIRONMENTAL MANAGEMENT OF
THE SOUTHWEST FUNSTON LANDFILL
SOIL BORROW AREA

1.0 DEVELOPMENT OF THE MANAGEMENT STRATEGY

1.1. Introduction

The United States Department of the Army, Fort Riley, Kansas has developed an environmental management strategy for a borrow site near the Kansas River. The borrow is to provide soil for repair of the Southwest Funston Landfill cover. The repair is a component of a proposed Comprehensive Environmental Restoration, Compensation and Liability Act (CERCLA) Removal Action. The size of the borrow site may be as small as 6 1/2 acres (entailing removal of 120,000 cubic yards of soil) to as large as 18 acres (removal of 400,000 cubic yards of soil). The size is dependent on final engineering requirements for the Removal Action.

Management will consist of environmental protection measures, and wildlife habitat reclamation and replacement. Primary management activities will consist of wetland development and tree planting. The purpose of the wetland development is to rehabilitate negatively affected wildlife habitat and enhance existing wildlife habitat which is adjacent to the borrow site. Tree planting along the Kansas River will be accomplished to replace trees destroyed during soil removal. The underlying management objectives are to restore the long-term ecological integrity of the borrow area and mitigate negative impacts to wildlife habitat resulting from soil removal.

1.2. Management Strategy

A manageable wetland will be developed by diverting nearby Three-Mile Creek into the borrow area and constructing a water control structure. The key to developing a "manageable" wetland is the capacity to stabilize and control water levels. The creek will be diverted to provide an adequate and reliable water source for the wetland. The water control structure will allow for permanent retention of water in the wetland during periods of low flow in the creek. Also, the control structure will allow the water level to be manipulated, primarily for the purpose of vegetation management. Total size of the wetland will be dependent on the size of the borrow site. The wetland will encompass the new borrow area and an adjacent old, unreclaimed borrow site which is approximately 5 acres in size. Total size could range from 11 - 12 acres to as large as 28 acres.

The channel of Three-Mile Creek, a perennial stream, will be dammed and diverted into the borrow area. The creek will be diverted at a point approximately 400 meters from its confluence with the Kansas River. The depth of the channel cut will be equal to the depth of the borrow area (12 feet). The elevation at ground level of the borrow area is 1046 mean sea level(msl). The bottom of the borrow cut will go down to the normal elevation of water in Three-Mile Creek (1034 feet msl). When the creek is cut and diverted into the borrow area, a wetland 2-3 feet deep will be created. Flow will be routed into the borrow area and out through the water control structure.

The control structure will be built similar to a spillway on a pond. The water control structure will be constructed of concrete and will include three 30 inch concrete culverts. The bottom of the culverts will be at 1034 msl and the top of the water control structure (i.e. spillway) will be at 1037 msl. Total spillway width will be 102 feet. The spillway has a 30 foot wide bottom, is 12 feet deep with 3:1 sideslopes. During periods of normal flow in the creek, 1 - 2 feet of water will be flowing over the top of the spillway.

Water levels will be controlled by simply blocking the culverts with boards. Complete blockage of culverts will maintain a fully flooded wetland. If the area should require draining, then all boards can be removed. Flexibility to control water levels is an important wetland management approach. Moist soil unit management, the planting of Japanese millet or vegetation control may require temporary, periodic draw-downs of water. Manipulation of water levels may also be used for shorebird management by exposing mudflats during spring migration. Another management activity will be the construction of waterfowl nesting island(s) and/or structures.

The second major aspect of the management strategy is to replace trees destroyed in the borrow area with native species. Native eastern cottonwoods (Populus deltoides) will be planted along the Kansas River, approximately one-quarter mile upstream of the borrow site. The number of trees planted will be equivalent to the number destroyed during soil borrow.

Environmental protection measures were taken into consideration in managing this site. Riparian corridors, 50 meters in width, will be retained between the wetland and the Kansas River and Three-Mile Creek. Mature cottonwoods and snags adjacent to the river will be protected.

1.3. Environmental Issues

A scoping process was used to identify environmental issues related to management of the borrow area. Scoping was based on discussions with Fort Riley staff biologists, biologists with the U.S. Fish and Wildlife Service, site visits (conducted on 6 and 9 July 1993), biological field surveys and compliance with pertinent laws and regulations. The scoping process identified four environmental issues which have guided development of the strategy for managing the borrow area. The issues are: 1) threatened and endangered species, 2) other wildlife and associated habitat, 3) native fisheries, and 4) wetland conservation. These issues reflect public concerns, as well as legal and regulatory considerations.

Impacts to threatened and endangered species is a legal and regulatory consideration, as well as a public concern. The Endangered Species Act of 1972 (16 U.S.C. 1531-1543) protects plants, as well as animals, on federal lands. Army regulations require the analysis of impacts to state-listed species in addition to those species federally listed. The U.S. Fish and Wildlife Service (USFWS) was contacted and made a site visit with Fort Riley staff biologists to assess potential impacts and the extent of identified impacts to threatened and endangered species. The USFWS expressed particular concern regarding potential effects on bald eagle (Haliaeetus leucocephalus) winter habitat.

The conservation and management of wildlife, other than threatened and endangered, and wildlife habitat are considered to be major public concerns. Local citizens are keenly interested in the stewardship of wildlife and its habitat. Of particular concern to biologists are impacts to riparian habitats, particularly bottomland hardwood, which are limited in distribution within the Flinthill region of Kansas and are considered to be important to wildlife (Draft Position Statement: Kansas Chapter of The Wildlife Society, March 1993). The associated fauna of greatest concern are neotropical bird species. These migrant bird species have recently become a high profile concern to the public as well as to biologists.

The USFWS also identified impacts to native fisheries as an issue arising from the diversion Three-Mile Creek. Concerns were raised regarding potential obstruction by the water control structure of upstream movement by fish. If upstream movement of fish were to be inhibited, then fish may be prevented from meeting certain life requirements such as spawning. Also, changes in hydrology will potentially affect habitat and associated fisheries.

Another public concern to be addressed is wetland protection and conservation. The accelerated loss of wetlands that has occurred since the 1950's has heightened public concerns regarding this community type and its associated fauna.

Extensive wetland losses throughout the United States is a major contributing factor in the precipitous decline of continental waterfowl populations. Also, it has been recently recognized that wetlands are critical links in hydrological cycling. This concern has evolved into public policy providing for the protection of wetlands (Executive Order 11990, No Net Loss of Wetland). The alteration of the channel of Three-Mile Creek could be a specific concern.

2.0 AFFECTED ENVIRONMENT

This section is a description of environmental components that will be affected by borrow area management. The description emphasizes those components considered relevant to the identified issues. The description includes information from various field surveys and from observations made during two site visits on 7 and 9 July 1993. USFWS biologists accompanied Fort Riley staff biologists on 9 July.

2.1 Location and Land Use

The borrow site is located in the extreme southeast corner of Fort Riley, within Riley County. The Universal Transverse Mercator grid coordinates of the project are 696300, 4328600. Site location is within the floodplain of the Kansas River. The borrow will be approximately 100 meters north of the river and 100 meters east of Three-Mile Creek drainage.

Minimal military training occurs in the area. That training which does occur is small unit training. No weapons firing occurs in this area. A portion of the area encompassed by the wetland has been previously used as a borrow area (and not reclaimed) and is an area where concrete fill had been placed.

2.2 Physical Components

Three-Mile Creek flows directly into the Kansas River and has a watershed encompassing 14,619 acres. Although, Three-Mile Creek is classified as intermittent, the discharge of upstream effluent from Fort Riley's wastewater treatment plant creates a perennial flow. Mean annual flows are calculated as approximately 1,500,000 gal per day. The banks are moderately stable and channel width is generally about 27 feet when bank full. The substrate varies from unconsolidated mud to small gravel and rock. Hydrological information was taken from the 1977 Terrain Analysis for Fort Riley (U.S. Army Engineer Topographic Laboratories).

Water quality is degraded in Three-Mile as a result of effluent from the wastewater treatment plant. Levels of ammonia are elevated but within legal limits pursuant to the Clean Water Act.

The primary soil present on the project location is classified as Eudora silt loam (Soil Conservation Service, 1975 Soil Survey of Riley and Parts of Geary Counties). Some Ivan and Kennebec silt loams are present in the extreme southwestern corner, adjacent to Three-Mile Creek. According to the SCS, Eudora silt loam takes in water well and has a high available water capacity. Ivan and Kennebec silt loams are present on floodplains and have similar qualities as the Eudora soils. They also absorb water well and have a high water capacity.

2.3 Biological Components

The area to be affected is a riparian community characterized by three distinct vegetative elements. The first consists of an area that has been previously disturbed and is comprised of secondary growth woodland which encircles an open grassy meadow. This area is the site location of the new borrow area. The second element is a wetland that occurs within an old borrow area. The third element is a narrow band of mature bottomland hardwood forest adjacent to the Kansas River and Three-Mile Creek.

The first element is composed of secondary growth, mixed hardwood timber with a relatively open canopy. The trees encircle an open, grassy meadow. Most of the soil removal will occur within this grassy meadow.

The most abundant tree species in the borrow site is the eastern cottonwood. Most of the cottonwoods are intermediate in age, converting to mature growth. Most are 5-11 inches in diameter. A few mature cottonwoods are present along the edge of the new borrow area. Other tree species present on site include green ash (Fraxinus pennsylvanica), honey locust (Gleditsia triacanthos), American elm (Ulmus americana), red mulberry (Morus rubra) and black walnut (Juglans nigra). Most of these trees are saplings (up to 5 inches in diameter) or intermediate in size (5 - 11 inches). The meadow in the new borrow area is predominately grass and forb with a relatively minor shrub component. The most abundant grass is smooth brome (Bromus inermis) intermixed with facultative-wetland grasses such as Virginia wild rye (Elymus virginiana) and prairie cordgrass (Spartina pectinata). The common forbs are sunflower (Helianthus spp.), nettles (Urtica spp.), poison ivy (Toxicodendron radicans), flannel mullien (Verbascum thapsus) and partridge pea (Cassia fassiculuata). Some roundhead lespedeza (Lespedeza capitata) and white sweetclover (Melilotus alba) is present. Shrubs such as roughleaf dogwood (Cornus drummondii) and smooth sumac (Rhus glabra) occur along the edges of the timber and meadow.

The second element, found in the old borrow area, is a Palustrine wetland (USFWS 1993, National Wetland Inventory of Fort Riley). It is classified as a temporarily flooded area with emergent vegetation. Willows (probably Salix nigra) and eastern cottonwoods are the dominant plant species. Other hydrophytic and hydrophilic vegetation include various sedge species (Carex spp.), cattails (Typha spp.) and rushes (Juncus spp.). The area to be affected is bounded on two sides by Riverine wetland habitats associated with Three-Mile Creek and the Kansas River.

The third vegetative element is comprised of mature bottomland hardwood along Three-Mile Creek and Kansas River. These woodlands exist as a narrow corridors and are much more diverse than vegetation within the new borrow area. In addition to the previously mentioned tree species, this riparian corridor also includes mature chinquapin oak (Quercas muehlenbergii) and sycamore (Platanus occidentalis). The understory appears to be quite diverse and includes a substantial shrub component. Many large grape (Vitis spp.) vines are present.

Bird species which inhabit the area are believed to be typical of those present in riparian habitats throughout the installation and along major rivers in central Kansas. On Fort Riley, breeding bird surveys have documented the occurrence of 63 potentially breeding species (Jones 1989 and 1990) (Table 1). Bird surveys conducted during spring and summer as part of the Land Condition and Trend Analysis program documented observations of 74 bird species (Keating 1990)(Table 2). The most frequently observed avian species along LCTA forest transects were the blue jay (Cyanocitta cristata), the black-capped chickadee (Parus atricapillus), the red-winged blackbird(Agelaius phoeniceus), northern cardinal (Cardinalis cardinalis), the tufted titmouse (Parus bicolor), northern bobwhite quail (Colinus virginanus), and the eastern wood pewee (Contopus virens) (Dubois and Phillips 1990). Brown thrasher (Toxostoma rufum), red-bellied (Melanerpes carolinus) and red-headed woodpeckers (Melanerpes erythrocephalus) are commonly observed. In addition to the pewee, other neotropical bird species that have been observed on Fort Riley and would be expected to occur in this area include indigo bunting (Passerina cyanea), common yellowthroat (Geothlypis trichas), yellow-billed cuckoo (Coccyzus americanus) and various wood warblers such parula warbler (Dendroica), black-and-white warbler (Mniotila varia) and possibly the Cerulean warbler (Dendroica cerulea). Eastern wild turkey (Meleagris gallopavo) are present along Three-Mile Creek drainage.

Raptors which utilize this area are probably typical of those observed in similar habitat throughout the state. Red-tailed hawks (Buteo jamaicensi) are very abundant throughout the year. During the winter, raptors such as sharp-shinned hawk (Accipter striatus) could potentially occur in this riparian area.

Mammalian species which inhabit this area are thought to be typical of Fort Riley and the Kansas Flinthills. These typical species include coyote (Canis latrans), white-tailed deer (Odocoileus virginianus) and fox squirrel (Sciurus niger). Common furbearers are raccoon (Procyon lotor), beaver (Castor canadensis), and muskrat (Ondatra zibethica). Bobcat (Lynx rufus) tracks have been observed during site visits to the site (John Kelley, pers. comm., 1993). Mink (Mustela vison) probably also inhabit this area. The most common small mammals trapped in LCTA forest transects were the white-footed mouse (Peromyscus leucopus), western harvest mouse (Reithrodontomys megalotis), deer mouse (Peromyscus maniculatus), and the eastern wood rat (Neotoma floridana).

The Kansas Biological Survey (KBS) is currently conducting an inventory of reptile and amphibian species that occur on Fort Riley. An area near the old borrow site is currently being surveyed and thus far, the species recorded are typical of those found in this region along large rivers. During July site visits by Natural Resources staff biologists, American toads (Bufo americana), western chorus frogs (Pseudacris triseriata) and a gravid female red-eared slider (Chrysemys scripta) laying eggs were observed. Other common species such as the common snapping turtle (Chelydra serptina) and various frogs will be expected to use this riparian area along the Kansas floodplain.

The United States Fish and Wildlife Service completed a survey in 1992 of threatened and endangered species that could potentially occur on Fort Riley. The survey included state-listed as well as federally-listed species. The USFWS concluded eight federally-listed species and 13 federal category 2 candidate species potentially occur on Fort Riley (Table 3). Many of these species are wetland dependent or use riparian habitats. Category 2 candidate species are those being considered for listing as threatened or endangered. Of the 21 total federal species potentially occurring, ten are also state-listed.

There are two species of concern which are not federally- or state-listed or federal candidate species. Both of these are considered by the state as a "Species In Need of Conservation" (SINC) and both are hognose snakes: the eastern hognose (Heterodon platirhinos) and the western species (H. nasicus). The western hognose has been confirmed to occur on Fort Riley along the Republican River.

Two federally-listed species, the bald eagle and the peregrine falcon (Falco peregrinus) have been confirmed to occur Fort Riley. Surveys have documented wintering bald eagles using mature trees and large snags as roosts along the Republican and Kansas Rivers, and along the Madison and Farnum Creek coves at Milford Reservoir. The peregrine sighting was made by Natural Resources staff in the southeastern portion of the installation (Abel 1993). Both of these species are also state-listed as endangered. Confirmed observations of eight candidate species on

Fort Riley have been made. One of these candidate species is also state-listed as threatened. Three of these confirmed federal candidate species are also SINCs. Table 4 shows those species confirmed to occur on Fort Riley.

In addition to the two federally-listed species confirmed to occur at or near the mitigation project (i.e. the bald eagle and peregrine falcon), ten other species of concern associated with wetland or riparian habitats could potentially occur in this area (Table 5). Eight of the nine are birds and two are snakes of the genus Heterodon. Three of these are federally- and state-listed as endangered, one is a federally and state-listed threatened, two are federal candidates and state-listed threatened, two are federal candidates only and two are SINC's only (hognose snakes). This area is potential habitat for these two SINC species, but the KBS herpetological inventory has confirmed that only the western species exists on Fort Riley.

No federally- or state-listed (or candidates or SINC) fish species have been found to occur on Fort Riley. A 1992 survey, conducted by the USFWS, for the Topeka shiner (Notropis topeka) did not confirm the presence of this species on Fort Riley.

Although the fisheries in Three-Mile Creek has not been inventoried, it is expected that viable populations of fish are present in the lower end near its confluence with the Kansas River. The species are typical of those inhabiting perennial creeks in this region. Fish which occur in the lower portion of Three-Mile Creek probably include common species such as black and yellow bullheads (Ictalurus melas and I. natalis), channel catfish (Ictalurus punctatus), green sunfish (Lepomis cyanellus), white bass (Morone chysops), largemouth bass (Micropterus salmoides) gizzard shad (Dorosoma cepedianum) smallmouth buffalo (Ictiobus bubalus), creek chub (Semotilus atromaculatus) and common carp (Cyprinus carpio).

3.0 ENVIRONMENTAL EFFECTS

The "Environmental Effects" section is a description of the environmental impacts which could potentially occur as a result of borrow area management. The purpose of this section is to provide reader with an understanding of the potential ecological consequences as a result of implementation of the management strategy. Thus, readers may make informed comments on the borrow area managment strategy.

The impacts described are directly linked to the relevant issues listed in Section 1.3. Direct and indirect and unavoidable impacts are addressed. Additionally, long- and short-term effects and irreversible and irretrievable resource commitments are included in the discussion.

3.1 Physical Components

The physical characteristics and hydrology of Three-Mile Creek will be altered as a result of its proposed diversion. The alterations will be long-term and will directly effect the flow pattern of water through the creek. These unavoidable changes in hydrology could potentially affect bank configuration, particularly during periods of high flow. It is possible that some areas of the bank will become more stable and others more vulnerable to sloughing. These changes in hydrology are expected to cause little if any effect on that portion of the Kansas River where the creek is located.

The water regime of both borrow areas will be altered. Both borrow areas will be permanently flooded. According to the 1975 SCS Soil Survey, soils in this area have a high capacity to hold water and it is feasible to retain water in the borrow areas over the long-term. Soils will eventually become hydric (if not already) in which anaerobic conditions exist for prolonged periods.

Water quality could potential improve under this managment strategy. Ammonia in the effluent from the upstream wastewater treatment plant could be taken up by vegetation as water circulates through the wetland. Natural "treatment" systems of wastewater effluent are currently being used successfully in the United States.

Biological Components

As a result of long-term flooding of the new borrow area, wetland vegetation will become established. Permanent shallow surface water present for the long-term will support a greater diversity and biomass of obligate species than would occur if the site was not managed. Facultative-wetland species will become dominant around the periphery of the impoundment rather than facultative-upland species. Obligate species probably will include cattails, arrowhead (Sagittaria latifolia), common water hemlock (Cicuta maculata), American lotus (Nelumbo lutea) and water buttercup (Ranunculus spp). Thus, the water regime will directly effect the type of vegetation.

The inundation will also directly affect the vegetation which is present in the old borrow area. Over the long-term, species composition of the existing community will shift from facultative- to obligate-wetland species. Specifically, woody species such as cottonwood, elm and willows which currently dominate the wetland will die and will be replaced with species more adapted to water-saturated, anaerobic soil conditions.

Planting native eastern cottonwoods will result in trees growing along the Kansas River where currently none are present. This is a long-term gain that will require at least 20 years before the trees reach maturity. Tree planting will be a direct

impact to the current environment along this portion of the river.

Construction of the mitigation wetland will not only rehabilitate an impacted area devoid of "quality" habitat but will also enhance the biological value of the existing wetland in the old borrow area by providing reliable water. Wetland dependent wildlife, including threatened and endangered species, will directly benefit in a net gain of wetland habitat. Benefits to wildlife will be accrued in the short-term and will persist over the long-term. Due to the wetland juxtaposition with and proximity to the Kansas River and Three-Mile Creek, it possible that the biological value of the wetland may be further enhanced.

It is anticipated that waterfowl, in particular, will be positively impacted. Nesting island(s) and/or structures will be constructed to encourage waterfowl nesting. Upland habitat adjacent to the wetland could also potentially be used by such species as mallards (Anas platyrhynchos) and blue-winged teal (Anas discors). Wood duck (Aix sponsa) nesting boxes will be provided. Canada goose (Branata canadensis) nesting baskets are being considered as an option. Waterfowl may directly benefit from a potential increase in available nesting habitat. An indirect benefit may be increased nest success as a result of enhancing existing habitat and providing new nesting sites relatively secure from predation (i.e. islands and boxes). These four species of waterfowl are known to breed on Fort Riley.

Due to the project's close proximity to the Kansas River, a major migratory corridor, it is expected that birds such as shorebirds, gulls and members of the family Rallidae (coots, rails and gallinules) will use this area during migratory periods. Water drawdowns during the spring may be utilized to create mudflat habitat for species in the family Charadriformes (i.e. shorebirds).

Amphibians and reptile species associated with wetland habitats will directly benefit. The attraction of prey species may also partially mitigate the direct and unavoidable loss of habitat for the eastern and western hognose snake as a result of soil removal from the site. Results from the herpetological inventory suggest that this area is frequently utilized by these classes of animals.

Four avian species of concern (i.e threatened or endangered, candidate or SINC) could also be expected to directly benefit from the proposed mitigation. The western snowy plover (Charadrius alexandrinus), piping plover (Charadrius melodus), least tern (Sterna antillarum) and the black tern (Chlidonias niger) may benefit. It is possible that the wetland project may be indirectly beneficial to the peregrine falcon and bald eagle because the project site will attract prey species.

Construction of nesting islands for least terns was considered but rejected after discussions with Kansas Department of Wildlife and Parks biologists (Helen Hands and Carl Grover, pers. comm. 1993). The wetland area may not provide appropriate habitat because the area is relatively enclosed by woodland.

Tree replacement along the Kansas River will potentially directly benefit the bald eagle. Trees greater than 30 feet in height provide roost sites for wintering bald eagles. Tree replacement will also potentially benefit neotropical migratory birds once the trees reach maturity. Other species of wildlife will potentially benefit from the creation of a riparian buffer adjacent to the river where one does not currently exist. However, these benefits will not occur until the trees mature. Native cottonwoods were chosen specifically because their longevity will maintain long-term benefits to wildlife. Other tree species with similar structure such as poplars may be fast growing but tend to die after ten years (pers. comm, USFWS 1993).

Construction of the water control structure should not obstruct fish movement upstream during normal flow periods. During normal flow periods, 1 to 2 feet of water should be flowing over the top of the spillway which should allow fish to move from the mouth of the creek into the wetland. Fish should be able to move out of the wetland and back into Three-Mile through the inlet channel cut. During periods of low flow, fish movement may be inhibited. This periodic obstruction is not expected to jeopardize the viability of the fish populations.. Most spawning activities occur in the spring during periods of adequate flow. Thus, spawning fish should be able to move upstream via the wetland.

The wetland may indirectly benefit fisheries by potentially improving water quality. As discussed previously in this section, wetland vegetation will take up ammonia from the wastewater effluent. Elevated levels of ammonia may negatively effect fish, particularly during periods of low flow when ammonia is concentrated in the flow.

4.0 CONCLUSION

Positive habitat remediation efforts at the borrow site are expected to result in short- and long-term benefits to wildlife, including threatened and endangered species. Cumulative positive effects are anticipated to mitigate negative environmental consequences resulting from the soil removal. There will be no irretrievable or irreversible resource commitments that would occur from management of the borrow area. It is possible to reverse the diversion by filling the cuts and removing the diversion dike. The long-term ecological integrity of the impacted borrow areas should be enhanced.

TABLES

TABLE 1

Species	Safe Dates	Date of Highest Evidence	PO	PR	CO
reat Blue Heron (194)	5/1-7/1				X
reat Egret (196)	5/20-7/1				
reen-backed Heron (201)	5/15-7/15		X		
Black-cr. Night-Heron (202)	5/10-7/1				
Yellow-cr. Night-Heron (203)	5/10-7/1				
anada Goose (172)	5/1-8/3				
Wood Duck (144)	5/1-8/15				X
Mallard (132)	5/1-8/30				X
urkey Vulture (325)	5/1-8/1		X		
Northern Harrier (331)	5/15-7/30		X		
Sharp-shinned Hawk (332)	6/1-8/15				
Cooper's Hawk (333)	5/20-8/15				
Red-shouldered Hawk (339)	5/1-8/30				
Broad-winged Hawk (343)	5/15-8/15				
ed-tailed Hawk (337)	5/1-8/30		X		
merican Kestrel (360)	4/30-7/31		X		
ing-necked Pheasant (309)	4/15-9/30				X
Ruffed Grouse (300)	4/1-7/15				
Grtr. Prairie-Chicken (305)	3/30-8/30			X	
Wild Turkey (310)	4/30-9/30				X
Northern Bobwhite (289)	4/30-8/30				X
King Rail (208)	5/30-7/31				
Common Moorhen (219)	5/30-8/31				
American Coot (221)	6/10-8/31				
Killdeer (273)	4/20-7/5				X
potted Sandpiper (263)	6/5-6/25				
Upland Sandpiper (261)	5/20-6/25				X
merican Woodcock (228)	4/15-9/20				
ock Dove (313)	all year		X		
Mourning Dove (316)	5/1-7/20				X
Black-billed Cuckoo (388)	6/15-7/20				
Yellow-billed Cuckoo (387)	6/15-7/31		X		
astern Screech-Owl (373)	4/30-8/15				
reat Horned Owl (375)	3/15-8/31				X
arred Owl (368)	3/15-8/31				
ommon Nighthawk (420)	6/5-7/15				X
huck-will's-widow (416)	5/25-8/10				
Whip-poor-will (417)	5/25-8/10				
himney Swift (423)	5/10-8/15		X		
uby-thr. Hummingbird (428)	5/25-7/31				
elted Kingfisher (390)	5/10-7/20		X		
ed-headed Woodpecker (406)	5/25-8/20		X		
ed-bellied Woodpecker (409)	3/31-8/31		X		
[redacted] ker (394)	3/15-8/31				
[redacted] r (394)	4/1-8/31		X		
[redacted]	5/10-8/25		X		

Species	Safe Dates	Date of Highest Evidence	PO	PR	CO
Pileated Woodpecker (405)	4/1-8/31				
Eastern Wood-Pewee (461)	5/25-8/1		X		
*Acadian Flycatcher (465)	5/20-8/5				
*Willow Flycatcher (466)	6/10-7/25				
Eastern Phoebe (456)	5/15-8/31				X
Grt. Crested Flycatcher (452)	5/25-8/1		X		
*Western Kingbird (447)	5/20-7/25		X		
Eastern Kingbird (444)	5/20-7/25				X
Sc.-tailed Flycatcher (443)	5/1-6/20				X
Horned Lark (474)	4/10-9/1		X		
Purple Martin (611)	5/25-6/25				
Tree Swallow (614)	5/25-6/25				
No. Rough-winged Sw. (617)	5/25-6/25				
Bank Swallow (616)	5/25-6/25				
Cliff Swallow (612)	6/5-6/21				
Barn Swallow (613)	5/25-7/25				X
Blue Jay (477)	5/1-8/31			X	
American Crow (488)	5/1-8/31		X		
*Black-capped Chickadee (735)	5/1-9/20		X		
*Carolina Chickadee (736)	4/15-8/31				
Tufted Titmouse (731)	4/15-8/31			X	
Wh.-breasted Nuthatch (727)	5/1-8/15				X
Carolina Wren (718)	4/1-9/30				
Bewick's Wren (719)	5/10-8/31				
House Wren (721)	5/15-8/15		X		
*Sedge Wren (724)	6/10-9/10				
*Marsh Wren (725)	5/25-8/25				
Blue-gray Gnatcatcher (751)	5/15-8/31				
Eastern Bluebird (766)	5/15-8/31			X	
Wood Thrush (755)	5/30-8/20				
American Robin (761)	5/1-8/31				X
Gray Catbird (704)	5/20-8/30		X		
Northern Mockingbird (703)	4/15-9/1				
Brown Thrasher (705)	5/1-7/31			X	
Cedar Waxwing (619)	6/15-7/31				
Loggerhead Shrike (622)	4/20-7/20				X
European Starling (493)	4/10-9/5		X		
White-eyed Vireo (631)	5/20-8/15				
*Bell's Vireo (633)	5/25-8/15				
Yellow-throated Vireo (628)	5/25-8/15				
Warbling Vireo (627)	6/1-8/10				
Red-eyed Vireo (624)	6/1-7/31				
Blue-winged Warbler (641)	5/20-7/20				
Northern Parula (648)	[redacted]15-8/15				
Yellow Warbler (652)	[redacted]1-7/10				
Yellow-thr. Warbler (6[redacted]	5/1-7/15				

Species	Safe Dates	Date of Highest Evidence	PO	PR	CO
*Pine Warbler (671)	4/20-8/15				
Prairie Warbler (673)	5/25-7/20				
Cerulean Warbler (658)	5/25-8/15				
Black-and-white Warb. (636)	5/20-7/31				
American Redstart (687)	6/10-7/20				
Prothonotary Warbler (637)	5/20-7/20				
Worm-eating Warbler (639)	5/20-7/20				
Ovenbird (674)	5/25-8/5				
Louisiana Waterthrush (676)	5/15-7/10				
Kentucky Warbler (677)	5/25-7/15				
Common Yellowthroat (681)	5/20-8/10		X		
*Hooded Warbler (684)	5/25-7/25				
Yellow-breasted Chat (683)	5/25-8/5				
Summer Tanager (610)	6/1-8/10				
Scarlet Tanager (608)	6/1-8/10				
Northern Cardinal (593)	3/15-9/15			X	
Rose-breasted Grosbeak (595)	5/25-8/10				
Blue Grosbeak (597)	5/25-8/10		X		
Indigo Bunting (598)	5/25-8/10		X		
Dickcissel (604)	5/25-8/15			X	
Rufous-sided Towhee (587)	5/20-8/31				
*Bachman's Sparrow (575)	6/1-8/15				
Chipping Sparrow (560)	5/10-8/15				X
Field Sparrow (563)	5/1-8/31			X	
Lark Sparrow (552)	6/1-7/31				
Savannah Sparrow (542)	6/1-8/31				
Grasshopper Sparrow (546)	5/15-8/31		X		
*Henslow's Sparrow (547)	5/15-8/31				
Song Sparrow (581)	5/15-9/10		X		
Bobolink (494)	6/1-7/20				
Red-winged Blackbird (498)	5/1-8/1			X	
*Eastern Meadowlark (501)	5/1-9/10			X	
*Western Meadowlark (502)	5/1-9/10			X	
*Great-tailed Grackle (512)	5/10-8/1				
Common Grackle (511)	4/15-7/10				X
(A)Brown-headed Cowbird (495)	4/20-7/10			X	
Orchard Oriole (506)	6/1-7/5				
Northern Oriole (507)	6/1-7/25				X
*House Finch (519)	5/15-8/31				
American Goldfinch (529)	6/1-9/1				X
House Sparrow (688)	2/1-9/30				X
Blue-winged Teal					X

*Verification Form Required

(A) If known, list host in notes.

[redacted] al 27 12 24

1989 & 1990 Pooled

TABLE 2

FT. RILEY BIRD SPECIES LIST

compiled by Jeff Keating in June 1990

Sharp-shinned hawk
Wood duck
Blue-winged teal
Great blue heron
Upland sandpiper
Great horned owl
Northern cardinal
American goldfinch
Larksparrow
Chimney swift
Yellow-billed cuckoo
American crow
Northern bobwhite
Blue jay
Yellow warbler
Acadian flycatcher
Common yellowthroat
Cliff swallow
Northern oriole
Red-bellied woodpecker
Northern mockingbird
Great-crested flycatcher
Tufted titmouse
House sparrow
Rose-breasted grosbeak
Downy woodpecker
Blue-gray gnatcatcher
White-breasted nuthatch
Dickcissel
Eastern meadowlark
European Starling
Bewick's wren
Brown thrasher
American robin
Western kingbird
White-eyed vireo
Greater prairie-chicken
Red-winged blackbird
Grasshopper sparrow
Ruby-throated hummingbird
Long-eared owl
Green-backed heron
Turkey vulture
Lark bunting
Belted kingfisher
Common nighthawk
Killdeer
Northern flicker
Rock dove
Eastern wood-pewee
Prairie warbler
Gray catbird
American kestrel
Blue grosbeak
Barn swallow
Orchard oriole
Red-headed woodpecker
Brown-headed cowbird
Black-capped chickadee
Indigo bunting
Ring-necked pheasant
Rufous-sided towhee
Hairy woodpecker
Common grackle
Eastern bluebird
Field sparrow
Western meadowlark
Tree swallow
Carolina wren
House wren
Eastern kingbird
Warbling vireo
Mourning dove
Scissor-tailed flycatcher

TABLE 3

SPECIES OF CONCERN POTENTIALLY OCCURRING
ON FORT RILEY

Species	Status
Bald Eagle (*Haliaeetus leucocephalus*)	FE, SE
Peregrine Falcon (*Falco peregrinus*)	FE, SE
Whooping Crane (*Grus americana*)	FE, SE
Eskimo Curlew (*Numenius borealis*)	FE, SE
Least tern (*Sterna antillarum*)	FE, SE
American burying beetle (*Nicrophorus americanus*)	FE, SE
Piping plover (*Charadrius melodus*)	FT, ST
Western prairie fringed orchid (*Platanthera praeclara*)	FT
Eastern spotted skunk (*Spilogale putorius*)	C2, ST
White-faced ibis (*Plegadis chihi*)	C2, ST
Western snowy plover (*Charadrius alexandrinus nivosus*)	C2, ST
Long-billed curlew (*Numenius americanus*)	C2
Black tern (*Chlidonias niger*)	C2, SINC
Loggerhead shrike (*Lanius ludovicianus*)	C2
Henslow's sparrow (*Ammodramus henslowii*)	C2, SINC
Texas horned lizard (*Phrynosoma cornutum*)	C2
Sturgeon chub (*Hybopsis gelida*)	C2
Topeka shiner (*Notropis tristis*)	C2
Regal fritillary butterfly (*Speyeria idalia*)	C2
Prairie mole cricket (*Gryllotalpa major*)	C2, SINC
Hairy false mallow (*Sphaeralcea angusta*)	C2
Eastern hognose snake (*Heterodon platirhinos*)	SINC
Western hognose snake (*Heterodon nasicus*)	SINC

Status Abbreviations:
FE = federally-listed endangered
FT = federally-listed threatened
C2 = federal category 2 candidate
ST = state-listed endangered
SE = state-listed threatened
SINC = Species In Need of Conservation (state designation)

TABLE 4

SPECIES OF CONCERN CONFIRMED TO
ON FORT RILEY

Species	Status
Bald Eagle (*Haliaeetus leucocephalus*)	FE, SE
Peregrine Falcon (*Falco peregrinus*)	FE, SE
White-faced ibis (*Plegadis chihi*)	C2, ST
Loggerhead shrike (*Lanius ludovicianus*)	C2
Texas horned lizard (*Phrynosoma cornutum*)	C2
Regal fritillary butterfly (*Speyeria idalia*)	C2
Hairy false mallow (*Sphaeralcea angusta*)	C2
Black tern (*Chlidonias niger*)	C2, SINC
Henslow's sparrow (*Ammodramus henslowii*)	C2, SINC
Prairie mole cricket (*Gryllotalpa major*)	C2, SINC
Eastern hognose snake (*Heterodon platirhinos*)	SINC
Western hognose snake (*Heterodon nasicus*)	SINC

Status Abbreviations:
FE = federally-listed endangered
FT = federally-listed threatened
C2 = federal category 2 candidate
ST = state-listed endangered
SE = state-listed threatened
SINC = Species In Need of Conservation (state designation)

TABLE 5

WETLAND DEPENDENT SPECIES OF CONCERN
POTENTIALLY OCCURRING ON PROJECT AREA

Bald Eagle (*Haliaeetus leucocephalus*)	FE, SE
Peregrine Falcon (*Falco peregrinus*)	FE, SE
Whooping Crane (*Grus americana*)	FE, SE
Eskimo Curlew (*Numenius borealis*)	FE, SE
Least tern (*Sterna antillarum*)	FE, SE
Piping plover (*Charadrius melodus*)	FT, ST
White-faced ibis (*Plegadis chihi*)	C2, ST
Western snowy plover (*Charadrius alexandrinus nivosus*)	C2, ST
Long-billed curlew (*Numenius americanus*)	C2
Black tern (*Chlidonias niger*)	C2, SINC
Sturgeon chub (*Hybopsis gelida*)	C2
Topeka shiner (*Notropis tristis*)	C2
Eastern hognose snake (*Heterodon platirhinos*)	SINC
Western hognose snake (*Heterodon nasicus*)	SINC

Status Abbreviations:
FE = federally-listed endangered
FT = federally-listed threatened
C2 = federal category 2 candidate
ST = state-listed endangered
SE = state-listed threatened
SINC = Species In Need of Conservation (state designation)