

REMOVAL ACTION REPORT

**Southwest Funston Landfill
Operable Unit 001
Fort Riley, Kansas**

April 1994 - March 1997

**Directorate of Environment and Safety
Fort Riley, Kansas
June 23, 1997**



SFL_3_7_001

EXECUTIVE SUMMARY

SITE: Southwest Funston Landfill, Operable Unit 001

LOCATION: Fort Riley, Kansas

PROJECT DATES: February 1994 - March 1997

SITE BACKGROUND: The site, listed on the NPL, is a closed Solid Waste Municipal Landfill encompassing approximately 110 acres. The landfill was operated from the mid-1950s until 1981, receiving wastes which included typical municipal waste and industrial wastes from various activities at the installation. Some of the industrial wastes were reported to have contained hazardous substances and are thus potential sources of contamination. Pursuant to section 105 of the Comprehensive Environmental Response and Liability Act (CERCLA), Fort Riley was placed on the National Priorities List (NPL) as of October 1, 1990. To ensure that environmental impacts associated with activities at the installation were thoroughly investigated and appropriate remedial action taken, Fort Riley, the EPA and the State of Kansas entered into a Federal Facility Agreement (FFA) effective June 18, 1991. Under that agreement, Southwest Funston Landfill was specifically identified as a potential area of contamination and a schedule for a site Remedial Investigation and Feasibility Study was established.

ACTION: At the time the FFA went into effect, surface erosion and settlement had led to widespread ponding across the landfill surface. In addition, a portion of the southern perimeter of the landfill was being eroded by the Kansas River. Landfill contents, principally composed of construction debris, were exposed along portions of the river bank. As lead agency under the FFA, Fort Riley initiated a non-time critical removal action at the site to reduce the risk of exposing and eroding landfill contents along the river bank and to repair the existing landfill cover. An Engineering Evaluation/Cost Analysis was performed, the results were documented in an EE/CA Report dated July 1993 and a public comment period was provided from August 17 to September 16, 1993. Having received no public objections to the proposed actions, the removal was executed in three projects (construction contracts) from February 1994 through March 1997. Initially, rockfill revetment was installed to stabilize the river bank during February through April 1994. In the next project, which ran from November 1994 through October 1995, the native soil cover was repaired to eliminate depressions and provide positive drainage. The final project phase, which began in May 1996 and was completed in March 1997, corrected deficiencies in the thickness of the existing cover which were identified during the previous repair project and established a stand of native grasses on the surface of the landfill.

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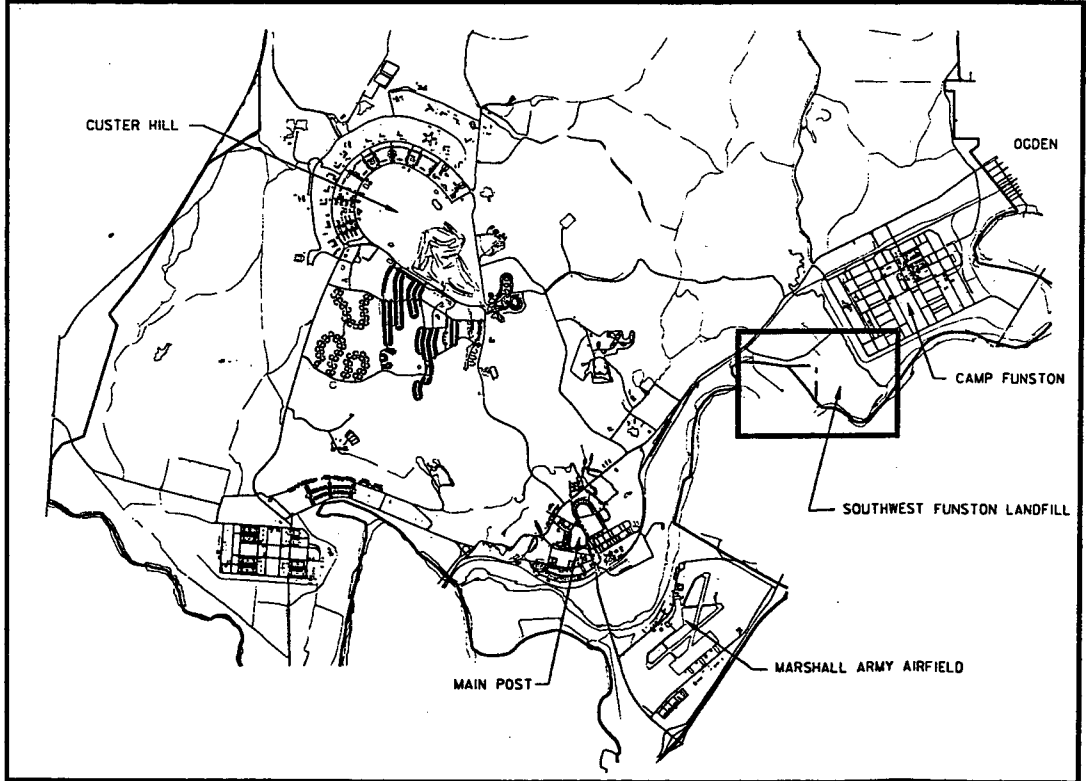
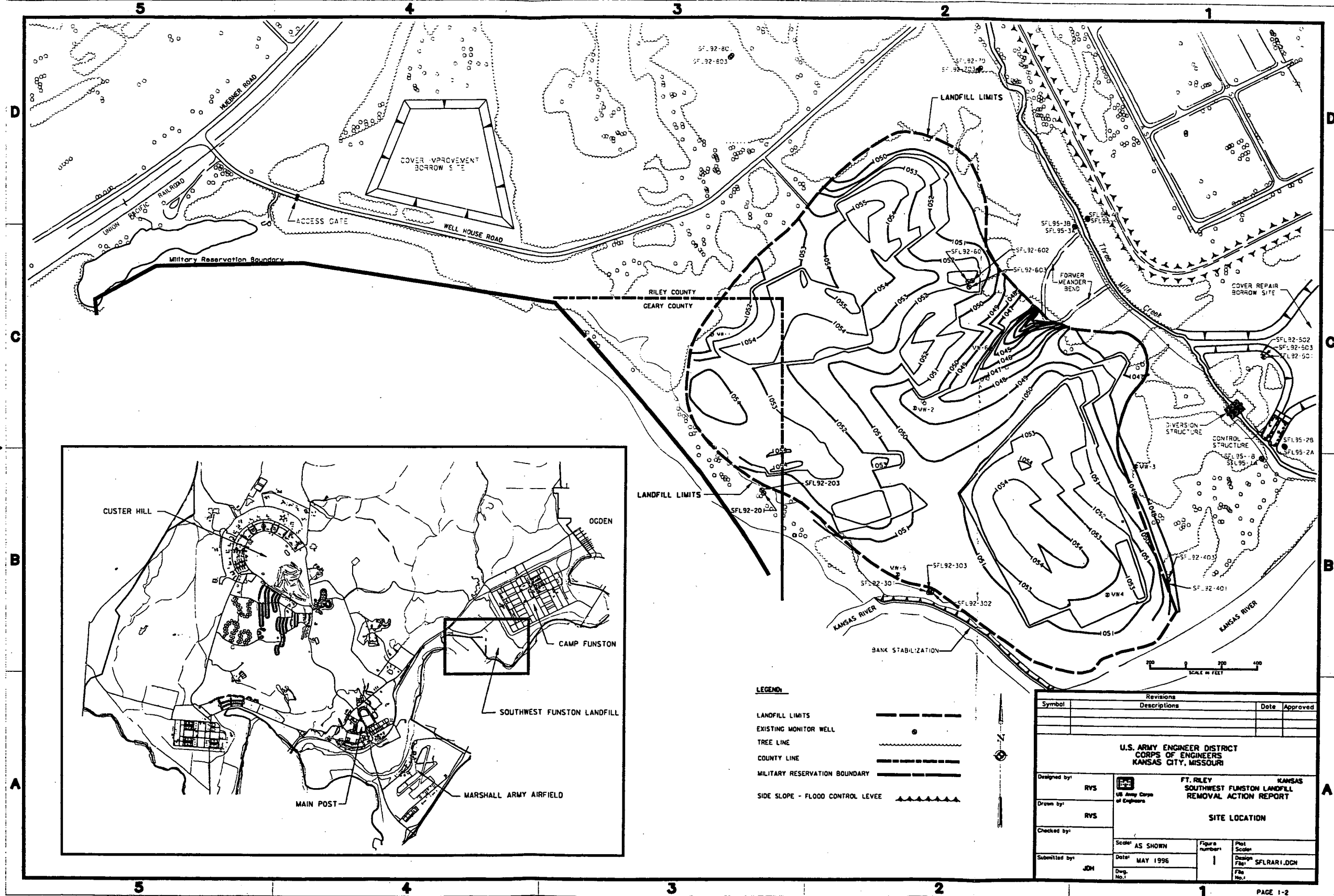
I. Summary of Events

A. Site Conditions and Background

1. Initial situation

- Current and Prior Uses of the Site - Fort Riley was established in 1852 as a small outpost near the confluence of the Republican and Smoky Hill Rivers. Since its inception, Fort Riley has continually served as a major center of military education and readiness, at times comprising a population of more than 20,000 military residents and civilian employees. Southwest Funston Landfill, listed on the NPL, is a closed Solid Waste Municipal Landfill. It was operated from the mid 1950s until 1981, receiving wastes which included typical municipal waste and industrial wastes from various activities at the installation. The closure native soil cover was constructed in 1982 and the landfill was closed in a manner approved by KDHE in 1983. Currently, access to the landfill is restricted by a locked gate on the access road and posted signs along its perimeter. The Record of Decision calls for the implementation of institutional controls to restrict access and control future use of the site.
- Site Location - Fort Riley encompasses 101,058 acres and lies in portions of Riley, Geary and Clay counties in the State of Kansas. The installation is located approximately between latitudes 30° 02' and 39° 18' north and longitudes 96° 41' and 96° 58' west. Southwest Funston Landfill is located in the southern portion of Fort Riley on the north bank of the Kansas River, west of Threemile Creek, south of Well House Road, and east of a former meander bend in the Kansas River (figure 1). The approximate population of Fort Riley is over 15,000 military personnel and civilian employees and 7,600 on-post dependents of military personnel. Nearby communities include the City of Ogden with a population of 1,500 and Junction City with a population over 20,000.
- History - Both landfarming and trench disposal landfilling methods were used at Southwest Funston Landfill. The trenches were typically excavated to a depth of 16 feet below the surrounding ground surface. The closure native soil cover was constructed in 1982. As a result of compression, decomposition and settlement of the landfill contents, depressions formed on the landfill surface in which water ponded or drainage was restricted. Some effort had been made to protect a section of the southern perimeter of the landfill which is exposed to the erosive forces of the Kansas River. Construction debris consisting of concrete rubble, rock, brick, and other materials was placed along the river bank to protect it. However, inspection of the bank in September 1992 indicated that the rubble was placed randomly and sections of the bank showed evidence of localized erosion and sloughing.

VALU ENGINEERING PAYS



LEGEND

LANDFILL LIMITS	---
EXISTING MONITOR WELL	⊙
TREE LINE	~~~~~
COUNTY LINE	-----
MILITARY RESERVATION BOUNDARY	=====
SIDE SLOPE - FLOOD CONTROL LEVEE	~~~~~

Revisions		Date	Approved
Symbol	Descriptions		
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RVS	FT. RILEY SOUTHWEST FUNSTON LANDFILL REMOVAL ACTION REPORT	
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Material on Site - Typical municipal wastes such as domestic garbage and construction debris and material normally found in the waste streams of various military and support activities were disposed of at Southwest Funston Landfill. Some of the industrial wastes were reported to have contained hazardous substances and are thus potential sources of contamination. The types of substances which were disposed of at the landfill include wastes generated by vehicle and aircraft maintenance shops, print shops, furniture repair shops, painting facilities and an oil analysis laboratory, autoclaved biological matter, pesticide and herbicide storage and preparation vessels, and materials derived from laundry, dry cleaning and wastewater treatment plant operations. Wastes from these facilities may have included metal-laden oils, solvents, inks, paints and heavy metals and dried wastewater treatment plant sludge.

2. Location of hazardous substances

A review of available documentation indicates that detailed records regarding the volume or identity of materials and their locations within the landfill are not available. Magnetometer and electromagnetic surveys were conducted in October and November 1991 to identify the limits of landfill activity. An inferred landfill margin was developed based on those surveys and other historical information as indicated on Figure 1. Wastes deposited as area fill or in trenches excavated to or near the depth of the water table.

3. Causes of release or discharge

Remedial Investigations detected sporadic, low level Volatile Organic Compound and metals contamination in the groundwater at Southwest Funston Landfill. The landfill was placed in operation in the mid 1950s and documented landfill operations ceased in 1981 prior to the effective date of RCRA. As a result, the landfill is not lined but is underlain by native alluvial soils. Normal rainfall percolation, fluctuations in the level of the water table, and occasional high water events in the Kansas River cause leachate from the landfill to enter the groundwater. Water ponded in depressions formed by the compression and decomposition of landfilled materials increases the amount of leachate produced. Landfill contents consisting primarily of construction debris was exposed along a 1200 foot reach of the Kansas River. It is possible that some of that debris has been released as a result of the erosive action of the Kansas River during infrequent high water events.

4. Lead agency

Subsequent to the listing of Fort Riley on the NPL, the Department of the Army - Fort Riley, the USEPA, and the State of Kansas entered into a Federal Facilities Agreement (FFA), also referred to as an Interagency Agreement (IAG), effective 28 June 1991. Under Section XVIII of the agreement, the Department of the Army agreed to seek sufficient funding through the Department of Defense budgetary process to fulfill its obligation. All funding for this removal action was appropriated through the Defense Environmental Restoration Act.

B. Organization of the Response

The response was undertaken by Fort Riley as a non-time critical removal action in a manner consistent with CERCLA and the FFA. An immediate threat to human health or the environment was not identified at this site. As a result, the action was executed as a non-time critical removal. Appropriate notification of key agencies and the public was accomplished through the established EE/CA process under CERCLA.

An Engineering Evaluation/Cost Analysis (EE/CA) was conducted and the report finalized in July 1993. An attachment was added in August 1993 to address development of the borrow area. A public comment period was provided from August 17 to September 16, 1993, and an Action Memorandum and Responsiveness Summary was issued thereafter. Having received no public objections, the proposed removal action was executed under three projects (i.e. three construction contracts). The first project was directed towards stabilization of the Kansas River Bank because of the potential threat of release of landfill debris on the next high water event. The second project consisted of repairing the existing native soil cover to eliminate ponding and provide positive runoff from the cover. The third project was executed to improve areas of the landfill which had less than 2 feet of cover, as discovered during construction of the cover repairs.

The agencies or parties which participated in this removal action and the actions or roles each took are outlined in Table 1.

C. Injury or Possible Injury to Natural Resources

Development of the borrow area for the cover repair project involved removal of trees within the riparian corridor along the Kansas River. In consultation with the U.S. Fish and Wildlife Service, Fort Riley developed a plan to address the resulting loss of wildlife habitat. The borrow area was developed as a wetland for the management of waterfowl and cottonwood were planted along the riverbank edge of the landfill.

D. Chronological Narrative of Response Actions

1. Threat abatement actions taken

In January 1993 Fort Riley advised the other parties to the IAG of its intent to pursue a non-time critical removal action to address the condition of the landfill cover and of the Kansas River bank along the perimeter of the landfill. A contract was issued to Law Environmental, Inc. to conduct an Engineering Evaluation/Cost Analysis on March 25, 1993. The EE/CA report was finalized in July 1993 and a public comment period was provided from August 17 to September 15, 1993. An Action Memorandum and Responsiveness Summary, finalized in December 1993, identified two distinct elements of the planned removal action. First, the landfill cover would be repaired to eliminate

Table 1
ORGANIZATION OF RESPONSE

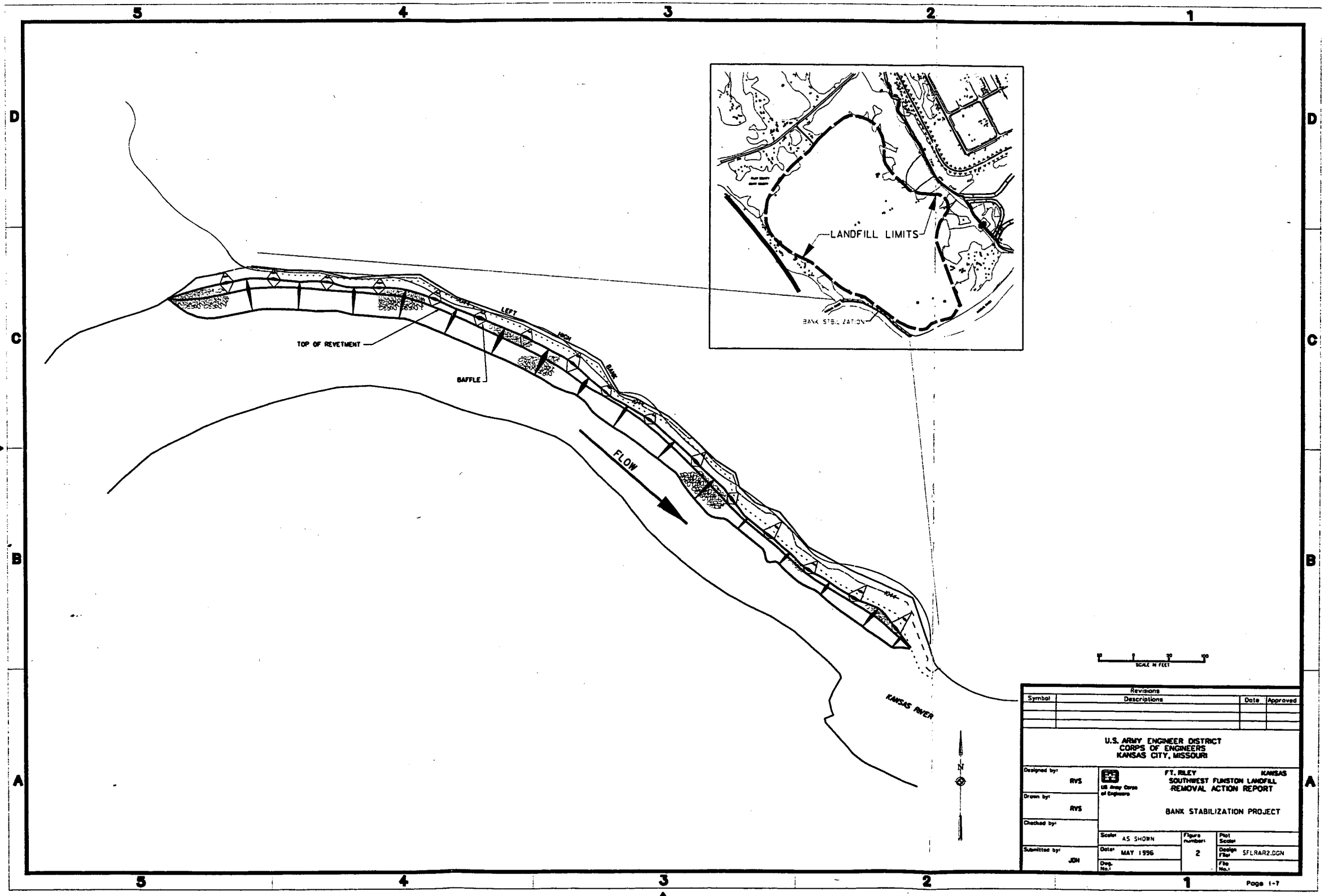
Agencies or Parties Involved	Contact	Description of Participation
Directorate of Environment & Safety Planning Restoration Division Building 407 Fort Riley, KS 66442-6016 913-239-3343	Janet Wade	Lead agency under IAG responsible for initiation, development, budgeting, and execution of the removal action.
Federal Facilities and Special Projects USEPA, Region VII 726 Minnesota Avenue Kansas City, KS 66101 913-551-7468	Bob Koke	Party to the IAG - reviewed and approved the EE/CA Report , Action Memorandum, and Design documents. Provided field oversight during construction.
Remedial Section Bureau of Environmental Remediation Kansas Department of Health & Environment Forbes Field, Building 740 Topeka, Kansas 66620-7500 913-291-3245	William Dodd	Party to the IAG - reviewed and approved the EE/CA Report , Action Memorandum, and Design documents. Provided field oversight during construction.
Corps of Engineers, Kansas City District CEMRK-EP-EG 601 East 12th Street Kansas City, Missouri 64106 816-983-3552	Dennis Karns Richard Van Saun	Executing agency for Fort Riley. Administered contract for EE/CA . Prepared plans and specifications for bank stabilization, cover repair and cover improvement projects. Administered construction contracts.
Law Environmental, Inc. 114 Townpark Drive, Suite 400 Kennesaw, Georgia 30144-5508 770-499-6800	Ed Witkowski	Performed EE/CA Study and prepared EE/CA Report and Action Memorandum.
K&K Construction Company, Inc. 150 South Rock Road, Suite 300 Wichita, Kansas 67207 913-	Willie Kelly	Contractor for Bank Stabilization Project. Contract No. DACA41-94-C-0026
American Eagle Industries, Inc. P.O. Box 5992 Cheyenne, Wyoming 82003 307-634-3157	Richard White	Contractor for Cover Repair Project. Contract No. DACA41-94-C-0168
Malco Construction Company, Inc 1320 East 19th Street Kansas City, Missouri 816-221-6644	Raymond Malco Jeffrey Johnson	Contractor for Cover Improvement Project. Contract DACA41-96-C-8006

depressions and improve site drainage while providing a minimum of 18 inches of cover soil. Second, the bank of the Kansas River along the southwestern perimeter of the landfill would be stabilized using quarry run stone revetment with baffles. The removal action was executed in three distinct construction phases.

Bank Stabilization: The design for the Kansas River bank stabilization, accomplished by the Kansas City District, Corps of Engineers, was completed in December 1993. It called for the placement of 13,000 tons of quarry run stone revetment along 1200 lineal feet of Kansas River Bank. The design incorporated baffles running perpendicular to the revetment from the river bank at 75 foot intervals (See figure 2). The baffles promote deposition of silts carried by the river and aid in healing the exposed scarp along the landfill. A construction contract to install the rock revetment and baffles was awarded to K&K Construction Company, Inc., Wichita, Kansas on January 13, 1994. The contractor began work on 12 February 1993. Initial work involved clearing and removing trees and dense vegetation along the river bank and installing a crushed rock access road across the landfill surface. Quarry run stone was then delivered to the site and stockpiled along the top of the river bank on nearly a daily basis. The rock was moved from the stockpiles and placed to form the revetment and baffles using a backhoe. A final survey indicated that the revetment and baffles had been constructed to the lines and grade specified and the parties to the IAG inspected the completed project on 9 April 1993.

Cover Repairs: The Kansas City District, Corps of Engineers designed the next phase of the removal action which was to repair the existing native soil cover on the landfill and meet RCRA Subtitle D criteria (40 CFR 258). Based on record drawings from the 1982 closure cover construction project and analysis of 23 shelly tube samples taken in a random pattern across the landfill, the design assumed that the existing cover met RCRA Subtitle D requirements for a minimum thickness of 2 feet. In addition, HELP model analysis showed that the existing cover soil would provide a reduction in infiltration equivalent to that which would be obtained by soils meeting the hydraulic conductivity requirements of 40 CFR 258. Therefore, the repair project was designed solely to fill in depressions on the landfill surface and improve site drainage. A corollary requirement for the cover repair project was to establish a waterfowl management area at the borrow site to mitigate loss of riparian woodland as agreed to with the U.S. Fish and Wildlife Service. That requirement was met by constructing inlet and outlet channels from Threemile Creek to the borrow site. A sheet pile water diversion structure on Threemile Creek and a water control structure on the outlet channel from the borrow pit gives Fort Riley Natural resources personnel the capability to manage water levels and wet dry periods within the former borrow site. The components of the waterfowl management area are shown on figure 1. The final design called for the placement of 160,000 cubic yards of fill on the landfill surface with a final grading plan as shown on figure 3. A contract to construct the project was awarded to American Eagle

VALUE ENGINEERING PAYS



SCALE IN FEET

Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RVS	FT. RILEY SOUTHWEST FUNSTON LANDFILL REMOVAL ACTION REPORT	KANSAS
Drawn by:	RVS	BANK STABILIZATION PROJECT	
Checked by:			
Submitted by:	JON	Scale: AS SHOWN	Plans number: 2
		Date: MAY 1956	Plot Scale: SFLRAR2.DGN
			File No.:



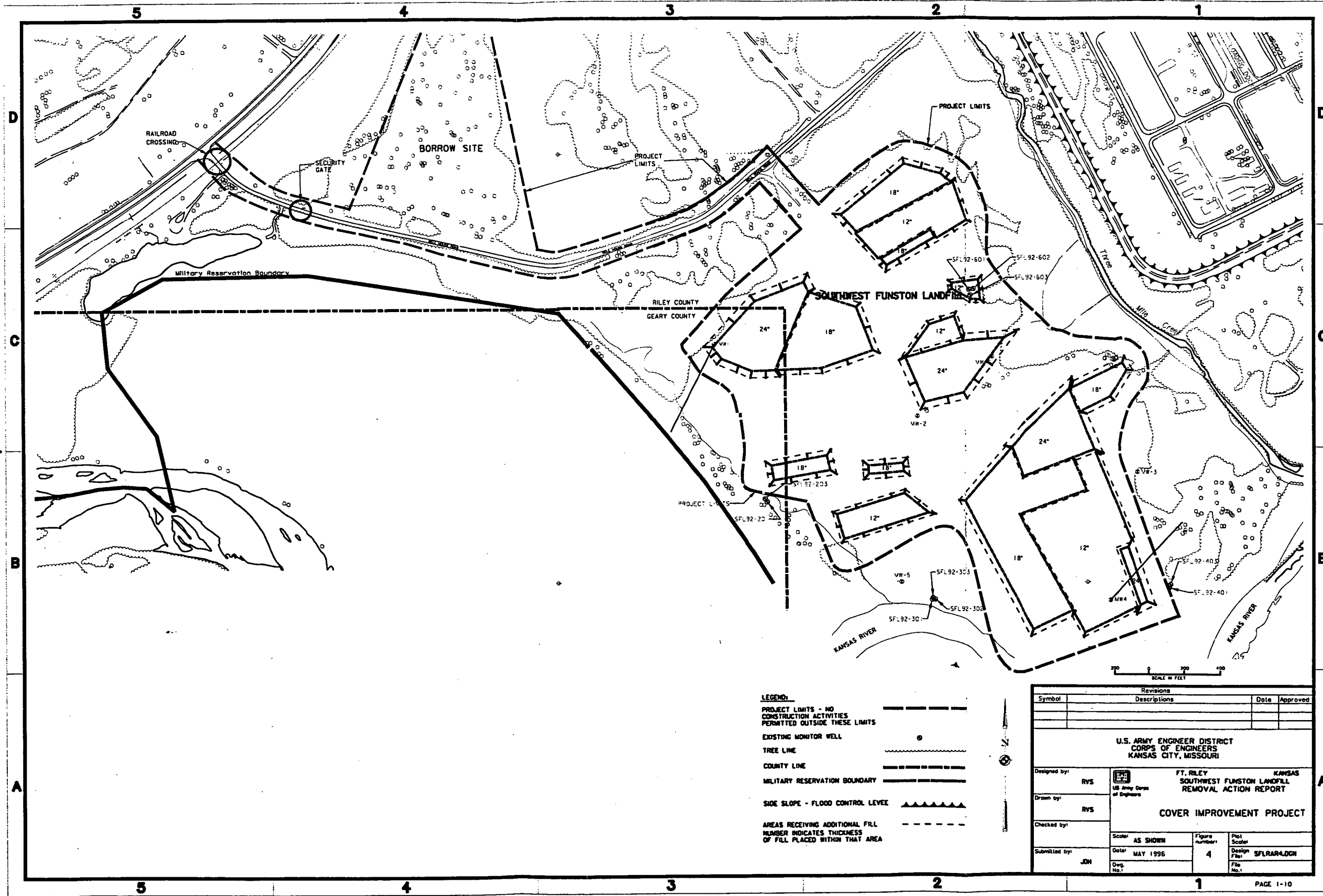
Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RVS	FT. RILEY KANSAS SOUTHWEST FUNSTON LANDFILL REMOVAL ACTION REPORT	
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Checked by:			
Submitted by:	JDH	Scale: 1"=200'	Figure number: 3
Date:	MAY 1996	Plot Scale: 200:1	Design File: SFLRAR3.DGN
Dep. No.:		File No.:	

Industries, Inc, Cheyenne, Wyoming on 27 Sep 94 with a 270 day performance period. Initial work at the site, which began in late November 1994, included clearing and grubbing vegetation at the borrow site and constructing a haul road across Threemile Creek. Operations to clear vegetation from the landfill surface, remove and stockpile topsoil and place fill began in January 1995. Through the course of the project, EPA, KDHE and Fort Riley inspectors observed that landfill contents was being exposed as the top 4 inches of topsoil was removed. An inspection conducted in March 1995 with all IAG parties present showed that, in areas of the landfill, the cover was less than 2 feet thick. A decision was made to continue with the project and achieve its design goals of eliminating the depressions across the landfill and improving site drainage. Construction activities continued on schedule from January through May 1995. During the later part of May, unseasonable rains resulted in high runoff in Threemile Creek and high water levels in the Kansas River. The contractor haul road across Threemile Creek was washed out, the borrow site was flooded, and the sheet pile cutoff wall across Threemile Creek was bypassed on the west side. As a result, the contractor suspended all construction activities during the months of June and July 1995. Work was resumed in August 1995 and construction was completed in November 1995.

Cover Improvements: The Kansas City District, Corps of Engineers designed a follow-on project to correct the cover thickness deficiencies discovered during the cover repair project. The major features of the design which involved placement of varying thickness of additional fill on areas of the landfill are shown on Figure 4. The design was completed in February 1996 and a contract was awarded to Malco Construction Company, Kansas City, Missouri on 22 March 1996. Work began in April 1996 with clearing and grubbing at the borrow site. Construction activities continued without disruption and the cover improvement phase of the project was completed on 24 October 1994. The parties to the IAG inspected the cover on 17 October 1996. Two trenches, 100 feet long and 2 feet deep were excavated through the new cover. The inspection confirmed that the RCRA Subtitle D requirement for a minimum thickness of two feet had been met. In March 1997, a native grass seed mixture was planted on the landfill surface and tree cuttings were planted along the Kansas river bank completing the final phase of the cover improvement project.

2. Treatment/disposal/alternative technology approaches pursued

Each of the three construction phases required to execute this removal action employed standard construction methods and technology. Fort Riley's decision to adapt the cover repair project borrow site for use as a waterfowl management area is innovative. The resulting area provided a new habitat for waterfowl and mitigated the long term impact that the construction of the borrow site might have had on the environment.



LEGEND:

- PROJECT LIMITS - NO CONSTRUCTION ACTIVITIES PERMITTED OUTSIDE THESE LIMITS
- EXISTING MONITOR WELL
- TREE LINE
- COUNTY LINE
- MILITARY RESERVATION BOUNDARY
- SIDE SLOPE - FLOOD CONTROL LEVEE
- AREAS RECEIVING ADDITIONAL FLL NUMBER INDICATES THICKNESS OF FLL PLACED WITHIN THAT AREA

Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by: RVS Drawn by: RVS Checked by: RVS Submitted by: JON		FT. RILEY KANSAS SOUTHWEST FUNSTON LANDFILL REMOVAL ACTION REPORT COVER IMPROVEMENT PROJECT	
Scale:	AS SHOWN	Figure number:	Plot number:
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Dep. No.:			SFLR4R4L0CH

3. Public information and community relation activities

As required by the IAG, Fort Riley had implemented a Community Relations Plan before this removal action was started. In addition, a Technical Review Committee, composed of representatives from communities and counties around Fort Riley as well as the parties to the IAG, was in-place. A meeting of the Technical Review Committee was held on 1 September 1993 during which members were briefed on the removal action proposed for Southwest Funston Landfill and the contents of the EE/CA report. In compliance with CERCLA, a public comment period was provided from 17 August through 16 September 1993. Announcements of the public comment period were published in local newspapers and a meeting addressing the proposed removal action was held during the public comment period.

E. Resources Committed

Table 2 contains a summary of costs for this removal action. (Note: the values shown may not include the results of pending contract modifications or claims)

Table 2

REMOVAL ACTION TOTAL COST SUMMARY

DESCRIPTION	COST (\$K)
EE/CA	
Prepare EE/CA & Action Memorandum	\$ 71
Contract Supervision and Review	\$ 7
DESIGN	
Bank Stabilization	\$ 12
Cover Repair Project	\$ 115
Cover Improvement Project	\$ 90
CONSTRUCTION	
Bank Stabilization Contract	\$ 443
Supervision, Administration, Engineering and Design (E&D) during construction	\$ 38
Cover Repair Contract	\$ 1,900
Supervision, Administration, E&D	\$ 114
Cover Improvement Contract	\$ 1,020
Supervision, Administration, E&D	\$ 92
TOTAL REMOVAL ACTION COSTS	\$ 3,902

II. Effectiveness of Removal Action

A. Actions Taken by Lead Agency

- As lead agency under the Federal Facilities Agreement (FFA), Fort Riley initiated and executed this removal action to reduce infiltration through the landfill cover and reduce the risk that landfill debris would be eroded away by the Kansas River. As agreed to under the FFA, Fort Riley budgeted for and secured DERA funding for each study, design and construction action required to implement the removal action.

B. Actions Taken by State and Local Forces

- KDHE reviewed and commented on the EE/CA Report, Action Memorandum and design documents and participated in the TRC meeting.
- As a party to the IAG, KDHE participated in the screening of alternatives and concurred in the selection of the final removal actions for the site.
- KDHE provided field oversight during each construction phase and was involved in decisions made to correct deficiencies noted.

C. Actions Taken by Federal Agencies and Special Teams

- EPA Region VII reviewed and commented on the EE/CA Report, Action Memorandum and design documents and participated in the TRC meeting.
- As a party to the IAG, EPA participated in the screening of alternatives and concurred in the selection of the final removal actions for the site.
- EPA provided field oversight during each construction phase and was involved in decisions made to correct deficiencies noted.
- The Kansas City District Corps of Engineers executed and provided contract oversight for the preparation of the EE/CA Report and Action Memorandum as well as each construction phase. In addition, they designed each of the construction phases in-house.
- The U.S. Fish and Wildlife Service reviewed the EE/CA and provided input into the development of the Environmental Management of the Southwest Funston Landfill Soil Borrow Area plan.

D. Actions Taken by Contractors, Private Groups, and Volunteers

- Law Environmental, Inc was responsible for preparing and revising the EE/CA Report and the Action Memorandum and they participated in the Technical Review Committee meeting.
- The bank stabilization project was constructed by K&K Construction Company, Inc., Wichita, Kansas. All health and safety protocols and safety and environmental laws were followed during this element of the removal action. Based on an inspection of the river bank conducted 18 months after the completion of the work, the bank stabilization project appears to have been effective in minimizing the erosive effects of the Kansas River. The area between the baffles is filling with river sediments as was intended and vegetation is beginning to establish along the river bank which will further enhance its ability to withstand erosion.
- American Eagle Industries, Cheyenne Wyoming executed the cover repair project. The landfill cover was repaired to the lines and grades established under the design which eliminated depressions and promoted positive drainage off the cover. The borrow pit was effectively developed into a waterfowl management area with water control and water diversion structures performing as designed. The contractor developed and implemented effective site safety and erosion control plans for this project.
- The Cover Improvements, was completed by Malco Construction Company, Kansas City, Missouri. As determined during a 17 October 1996 inspection conducted by parties to the IAG, the landfill cover meets the minimum 2 foot thickness requirement of 40 CFR 258. Native grasses were planted in March 1997. The contractor developed and implemented effective site safety and erosion control plans for the site.

It is estimated that it will take two to three years from the planting of the native grasses on the landfill surface in March 1997 before the effectiveness of the cover repairs and cover improvements in reducing the amount of infiltration through the landfill surface can be determined. As provided for in the Record of Decision, semi-annual sampling and analysis will be conducted to monitor trends in the types and concentrations of chemical constituents in the groundwater

III. Difficulties Encountered

A. Items that Affected the Response

Weather - Unusually high rainfall during the last half of May 1995 caused damage to existing construction and a two month delay in project execution for the cover repair project.

B. Issues of Intergovernmental Coordination

None

C. Difficulties Interpreting, Complying with, or Implementing Policies and Regulations

None

IV. Recommendations

A. Means to Prevent a Recurrence of the Discharge or Release

The development of depressions on the landfill cover and erosion along the Kansas River bank were the result of ineffective and/or neglected inspection, maintenance and repair efforts. Fort Riley has implemented a Operation and Maintenance Plan for Southwest Funston Landfill to correct those deficiencies in the future. The plan calls for annual inspections of the landfill cover and Kansas River bank and provides for periodic and as required maintenance and repair of both.

B. Means to Improve Response Actions

None

C. Proposals for Changes in Regulations and Response Plans

None