DEPARTMENT OF THE ARMY
HEADQUARTERS, 3D INFANTRY DIVISION (MECHANIZED) AND FORT STEWART
DIRECTORATE OF PUBLIC WORKS
1550 FRANK COCHRAN DRIVE
FORT STEWART, GEORGIA 31314-4927

REPLY TO
ATTENTION OF

15 MAR 2001

AFZP-PWV-E (200-1a)

MEMORANDUM FOR HEADQUARTERS, FORSCOM, DCSPIM,
ATTN: STEPHANIE SIGLER, 1777 HARDEE AVENUE SW
FORT MCPHERSON, GA 30330-1062

SUBJECT: Decision Documents for Final Remedial Action at Fort Stewart and Hunter Army Airfield, Georgia

1. The attached decision documents are provided for your use and convenience in documenting the distribution of fiscal year 01 funding for the Final Remedial Action (FRA) at the following sites:

a. FST-02, Camp Oliver Landfill.
b. FST-03, TAC-X Landfill.
c. HAA-13, Former Pumphouse 2 (Only one of the 3 areas listed under this site [Pumphouses 1, 2 and 6])

2. Although HAA-13 includes three areas, HAAF's former Pumphouses 1, 2 and 6, only Pumphouse 2 is being considered for final remedial action at this time. Pumphouse 6 was granted a "No Further Action Required" status in Nov 98. A final remedial action for Pumphouse 1 is still awaiting development and review.

3. Mr. Joe King at the Army Environmental Center has received copies of these decision documents for review and approval.

4. The point of contact for this memorandum is Ms. Melanie Little or Ms. Tressa Rutland, DPW Environmental Branch, at (405) 364-8461 or (912) 767-7919, respectively.

FOR THE COMMANDER:

Enclosures

GREGORY V. STANLEY
COL, EN
Director, Public Works

DOCUMENT 9

DECISION DOCUMENT FOR THE FINAL REMEDIAL ACTION AT THE CAMP OLIVER LANDFILL (SWMU 2)

FORT STEWART, GEORGIA

15 MAR 2001

PURPOSE

This decision document describes the selected Final Remedial Action (FRA) for the Camp Oliver Landfill (SWMU 2) located at Fort Stewart, Georgia, which consists of Institutional Controls (ICs). Specifically, the ICs proposed for FST-02 includes documentation in the Base Master Plan (BMP), deed recordation, zoning controls, maintenance of existing physical barriers, installing warning signs, and implementation of the Operation & Maintenance (O&M) plan. The selected ICs are described in detail in the *Final Corrective Action Plan for the Camp Oliver Landfill (Solid Waste Management Unit 2),* dated March 2001. The document will be reviewed by Georgia Environmental Protection Division (GA EPD) and comments and/or tentative approval is anticipated in June 2001. FST-02 is a Defense Site Environmental Restoration Tracking System (DSERTS) site and the FRA will be funded using fiscal year (FY) 2001 Environment, Restoration Account (E,RA) funds.

This decision document presents the justification for the selected FRA and specifically provides details on the following:

- Site Location and History
- Nature and Extent of Contamination
- Remedial Response Objectives
- Conceptual Design and Implementation
- Public Notification
- Declaration

Site Location and History

The Camp Oliver Landfill is located approximately 17 miles northwest of the Fort Stewart garrison area along Fort Stewart Road 129. It is just north of the bivouac area on the northern side of a small hill and is reported to be 15 feet wide by 300 feet long by 5 feet to 6 feet deep. From the 1960s to 1979, the area was used for disposal of refuse from troop training activities and nearby residents via open-pit burning. The landfill was officially closed in 1970; however, the trench method of solid waste disposal was reported to have continued. General refuse from ground maintenance activities and construction debris were placed in the landfill from 1979 to 1984 during the annual 3- to 4-month period of training activities.

The disposed waste included garbage and refuse, grass clippings, tree branches, root stumps, and chunks of asphalt and concrete. No evidence of toxic or hazardous waste disposal was indicated in the records searched by Environmental Science and Engineering (1982).

Currently, there is little obvious surface evidence that a landfill or open dumping area existed. During a site reconnaissance in November 1995, small soil piles, some roofing tin, and wooden construction-type debris were observed. Also, spent small weapons cartridges were observed in the ditch along the site's southwestern and southeastern boundaries. A site reconnaissance in September 1996 indicated no evidence of any landfill operations. Grass, small trees, and bushes now cover the area.

Nature and Extent of Contamination

(A tabular summary of site-related contaminants for SWMU 2 is presented in Table 1.)

SOIL Eleven surface soil samples were collected at SWMU 2 during the Phase II RFI from three surface soil locations, five soil boring locations, and three monitoring wells. Acetone and 2-Butanone were detected in one surface soil sample from MW6. Acetone was also detected in surface soil samples collected from SB2 and SB5. Bis(2-ethylhexyl)phthalate was detected in one of the surface soil samples at SB2. Fourteen pesticides were detected in the surface soil. These pesticides were 4,4'-DDD; 4,4'-DDE; 4,4'-DDT; aldrin; alpha-chlordane; alpha-BHC; delta-BHC; dieldrin; endosulfan II; endosulfan sulfate; endrin ketone; heptachlor; heptachlor epoxide; and methoxychlor. Arsenic, barium, cadmium, chromium, lead, and mercury were detected in surface soil samples from one or more of the monitoring wells, soil borings, and surface soil locations at concentrations above the reference background criteria and were considered to be potential site-related contaminants (SRCs). Arsenic was detected at less than two times the reference background criterion, including the site-specific background concentration. While barium was elevated above background at most locations, the maximum concentration was less than two times background, and the sampling locations at which the exceedances of reference background occurred were widely distributed, suggesting that barium occurs naturally in surface soil in this area. Cadmium was detected at only one surface soil sampling location at a concentration only slightly above the reference background criterion. Lead was found in only one surface soil sample, SS3, at a concentration that was only slightly more than two times the reference background criterion. Mercury was detected at a maximum concentration of 0.04 mg/kg, compared to the reference background criterion of 0.03 mg/kg.

Eight subsurface soil samples were collected from five soil borings and three monitoring wells during the Phase II RFI. The only VOC detected in subsurface soil samples was 2-Butanone and is considered to be an SRC in subsurface soil. Bis(2-ethylhexyl)phthalate was the only SVOC detected (SB5) and is considered to be an SRC in subsurface soil. Alpha-BHC was detected in subsurface soil samples from MW5 and SB1. No other pesticides/PCBs were detected in the subsurface soil samples from the monitoring wells. 4,4'-DDE and 4,4'-DDT were detected in soil boring SB1. No pesticides/PCBs were detected in the subsurface soil samples from SB2, SB3, SB4, and SB5. 4,4'-DDE; 4,4'-DDT; and alpha-BHC are considered to be SRCs in subsurface soil. Analytical results from subsurface soil samples collected during the Phase I RFI did not indicate concentrations of RCRA metals that exceeded reference background concentrations. However, analytical results from subsurface soil samples collected from SB2, SB3, and SB5 during the Phase II RFI indicated concentrations of barium, chromium, and mercury that did exceed reference background concentrations. RCRA metals that exceeded the reference background criteria at this site were primarily detected at locations around its perimeter, with no metals detected at the most central sampling location (MW6). Barium, chromium, and mercury are considered to be potential SRCs in subsurface soil.

GROUNDWATER Three groundwater screening wells and one vertical-profile boring (VP1) were installed within the boundary of the landfill using DPT techniques and were analyzed for VOCs. The analytical laboratory missed the holding times for VOCs for one of the intervals of the vertical-profile boring installed during the initial sampling endeavor (January 1998). Another vertical-profile boring (VP2) was installed next to the previous location, and groundwater was resampled in May 1998; however, the groundwater was inadvertently analyzed for only benzene, toluene, ethylbenzene, and total xylenes. In addition, seven groundwater samples were collected from three newly installed monitoring wells and four existing monitoring wells. The groundwater samples from the monitoring wells were analyzed for VOCs, SVOCs, pesticides/PCBs, and RCRA metals.

VOCs were detected in groundwater at relatively low concentrations at three sampling locations (MW6, VP1 and VP2). These VOCs included 4-methyl-2-pentanone, toluene, and total xylenes, which were considered to be potential SRCs in groundwater. Bis(2-ethylhexyl)phthalate was detected in MW8 at a concentration of 240 µg/L, which exceeds its maximum contaminant level (MCL). Bis(2-ethylhexyl)phthalate was believed to be the result of field or laboratory contamination; therefore, with the concurrence of GA EPD (SAIC 1999), the groundwater at MW8 was resampled on July 10, 1999. Bis(2-ethylhexyl)phthalate was not detected in MW8 during the resampling. The elevated concentration of bis(2-ethylhexyl)phthalate initially detected was considered to be the result of field or laboratory contamination; therefore, bis(2-ethylhexyl)phthalate is not an SRC at SWMU 2. No pesticides/PCBs were detected in the groundwater samples.

Mercury was detected at four of the six groundwater sampling locations that were analyzed for RCRA metals at concentrations that slightly exceeded the reference background criterion. Lead was detected at two locations (MW5 and MW8) at concentrations that exceeded the reference background criterion. Lead exceeded its MCL at MW5, which is a background sampling location. Selenium was detected at only one location, MW3, at a concentration that slightly exceeded the reference background criterion. Barium was detected at all monitoring well sampling locations at concentrations that were below the reference background criterion. Lead, mercury, and selenium are considered to be potential SRCs in groundwater. Lead is not considered to be site related because it was detected at an off-site location (MW8), it was not detected in any on-site wells above the reference background criterion, and it was detected at its highest concentration at the upgradient sampling location. Mercury was detected at levels near the detection limit and was detected above the reference background criterion at the upgradient sampling location; therefore, mercury is not considered to be site related. Selenium was detected in only one well (MW3), which is downgradient, but at a concentration only slightly above the reference background criterion (i.e., 2.5 µg/L versus 1.90 µg/L); therefore, selenium is not considered to be site related.

SURFACE WATER AND SEDIMENT Two surface water and sediment samples were collected from Canoochee Creek, one upstream sample and one downstream sample. The surface water and sediment samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and RCRA metals. No organic contaminants were detected in surface water, and metals constituents were detected below reference background criteria; therefore there are no SRCs in surface water.

While no VOCs, SVOCs, or RCRA metals were observed in the downstream sediment sample (SWS1), Alpha-chlordane, a pesticide, was observed in the downstream and upstream sediment samples. The downstream concentration of alpha-chlordane was less than the upstream concentration. Alpha-chlordane is considered to be a potential SRC in sediment.

RISK ASSESSEMENT A Baseline Human Health Risk Assessment (BHHRA) and an Ecological Risk Assessment was conducted for the site. The constituents of potential concern (COPCs) addressed in the baseline risk assessment included human health COPCs (arsenic and chromium) and contaminant migration COPCs (alpha-BHC, delta-BHC, arsenic, chromium, and mercury). Based on the required human health risk assessment, remedial levels were developed for the constituents identified as Contaminants of Concern (COCs) and are summarized in Table 2. The ecological risk assessment concluded that there is no present ecological risk at SWMU 2 and that the site is unlikely to pose an ecological risk in the future; therefore further investigation and/or evaluation of ecological COPCs was not required.

Remedial Response Objectives

Based on the findings of the site characterization at SWMU 2, the primary goal and purpose for implementing corrective measures at this site is limited to protection of human health and safety. To achieve this goal, the following remedial response objective has been established for the site: to prohibit the ingestion of shallow groundwater from the subject site and to prohibit the disturbance of surface and subsurface soil to minimize contact with soil and buried waste. Any corrective measures that pose a significant threat to human health and safety during implementation (e.g., methods that would involve disturbance of subsurface soil) will not be evaluated. Implementation of the selected remedial response will achieve the best overall results with respect to such factors as long-term reliability and effectiveness, short-term effectiveness, implementability, and cost.

Conceptual Design and Implementation

This section presents a conceptual design and plan for implementation of the selected corrective action alternative for SWMU 2. Based on the level and type of soil contamination, a cost-effective corrective action was selected that would adequately protect human health and safety. The technology evaluation presented in Chapter 4.0 of the March 2001 Corrective Action Plan for the site compared different corrective action alternatives based on their effectiveness at protecting human health and safety, life-cycle costs, and technical factors. All the alternatives evaluated included institutional controls (ICs): BMP, deed recordation, zoning controls, maintenance of existing physical barriers, well abandonment, post-mounted warning signs, and implementation of an O&M Plan. Variations of alternatives included groundwater monitoring and installation of fencing. The selected corrective action alternative involves a multi-layered approach to restricting human activity within the boundaries of the subject site. The selected set of institutional controls comprising this alternative will provide a combination of land-use restrictions and prohibitions. Land-use restrictions will be documented and/or enforced through deed recordation, the BMP, zoning restrictions, and signage.

Alternative 1 has been selected because it will provide effective protection of human health at a relatively low cost. Although the installation of fencing would provide an additional degree of protection, Alternative 2 is not considered cost-effective. The additional protection that the fence would provide against inadvertent access to the site and unauthorized soil excavation would be minimal and would not justify the significantly greater expense of implementing Alternative 2. Groundwater monitoring as described under Alternatives 1a and 2a does not provide enough additional protection to human health to justify its increased costs. The groundwater presently does not present a risk to human health. The institutional controls described for Alternative 1 will provide a sufficient level of protection of human health and an adequate degree of long-term reliability and effectiveness as well as short-term effectiveness. The institutional controls under Alternative 1 can be easily and cost-effectively implemented. Justification for selection of this corrective action alternative is further detailed in the following evaluations of effectiveness, implementability, and cost.

Effectiveness Post-mounted warning signs and documented land-use restrictions will be highly effective and provide long-term reliability with respect to preventing human exposure to physical contact with the buried waste within the boundaries of SWMU 2. To maintain an acceptable level of long-term reliability and effectiveness, the BMP will establish land-use controls during ownership by the Department of Defense. Prior to the planning of any construction activities at the Installation, the BMP must be reviewed. In addition, the Base Master Planner and the DPW will review all construction projects during the planning stages for approval. These land-use controls will remain in effect after transfer of Department of Defense ownership by restrictions imposed through deed recordation.

Additionally, the proposed abandonment of monitoring wells (MW2, MW3, MW4, MW5, MW6, and MW7) and the groundwater-use restrictions will provide an effective method for preventing the use of groundwater for drinking water or for irrigation at the site. The surficial aquifer is not an adequate source of drinking water at the Installation and is not used. The BMP will be modified to officially restrict its use, further preventing use of the surficial groundwater at the site.

An annual O&M program will be administered to replace or repair warning signs, which may deteriorate over time (see Appendix A in the Corrective Action Plan). Implementation of the O&M Plan will ensure the effectiveness of this program. The O&M program for this Corrective Action Plan will involve inspection as well as potential replacement or repair of warning signs.

Providing institutional controls over the short term will be a very effective means of minimizing or eliminating human exposure to buried waste within the boundaries of SWMU 2. Warning signs will be most effective over the short term. There is no current risk, and the site is not being used, so access is already limited.

Implementability Very few factors limit implementability of the institutional controls under evaluation. On-site personnel or contractors can readily perform posting of signs. The materials for the installation of warning signs are readily available to local contractors. Annual O&M inspections require few resources with respect to inspection personnel and materials for repair. Establishment of an adequate combination of land-use management tools will require additional time and effort for development, preparation, and processing of the necessary paperwork; however, the time and resources are available to administer and acquire the necessary land-use controls because the property is not expected to be sold or leased in the near future. Administrative provisions already exist to allow for incorporation of land-use controls into the BMP and to facilitate deed recordation.

Cost The estimated total life-cycle cost of installation of warning signs, well abandonment, administrative activities associated with acquisition of legal controls, O&M activities, and management and oversight is $194,662 (E,RA funds). This alternative provides adequate protection of human health and the environment.

Public Notification

GA EPD will prepare a notification which explicitly describes the FRA selected for SWMU 2, and per Fort Stewart's Hazardous Waste Permit HW-045(S&T) the public will be afforded the opportunity to review the notification and/or the entire Corrective Action Plan for a period of thirty days. At the conclusion of the review period, GA EPD will either grant final approval of the selected FRA or revise their tentative approval based on review and comments received by the public. It is anticipated that this review period will occur in July 2001 (i.e., after receipt of projected GA EPD June 2001 tentative approval) and final approval (i.e., after public review period) from GA EPD will be provided to the Installation in early September 2001; however, GA EPD will provide tentative approval of the Corrective Action Plan prior to this timeframe which will allow Fort Stewart to proceed with implementation of the recommended FRA.

Declaration

The selected Final Remedial Action for SWMU 2 is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to the FRA, and will be cost-effective.

As the selected course of action for SWMU 2 was presented in the March 2001 Corrective Action Plan and will be approved by GA EPD, the five-year review will not apply to the proposed FRA.

This decision document was developed by the Fort Stewart Directorate of Public Works, with support from the U.S. Army Corps of Engineers and SAIC.

Table 1. Summary of Site-Related Contaminants

Analyte	Maximum Concentration (mg/kg)			Maximum Concentration (µg/L)	
	Surface Soil	Subsurface Soil	Sediment	Groundwater	Surface Water
Volatile Organic Compounds					
2-Butanone	0.0055	0.0076	ND	ND	ND
4-Methyl-2-pentanone	ND	ND	ND	9.9	ND
Acetone	0.511	ND	ND	ND	ND
Toluene	ND	ND	ND	15.6	ND
Xylenes, total	ND	ND	ND	15.3	ND
Semivolatile Organic Compounds					
Bis(2-ethylhexyl)phthalate	1.1	0.229	ND	ND	ND
Pesticides/PCBs					
4,4'-DDD	0.0032	ND	ND	ND	ND
4,4'-DDE	0.01	0.0088	ND	ND	ND
4,4'-DDT	0.0042	0.0089	ND	ND	ND
Aldrin	0.0011	ND	ND	ND	ND
alpha-BHC	0.00024	0.00056[a]	ND	ND	ND
alpha-Chlordane	0.00095	ND	0.00071	ND	ND
delta-BHC	0.0016	ND	ND	ND	ND
Dieldrin	0.003	ND	ND	ND	ND
Endosulfan II	0.0018	ND	ND	ND	ND
Endosulfan sulfate	0.0032	ND	ND	ND	ND
Endrin ketone	0.0026	ND	ND	ND	ND
Heptachlor	0.001	ND	ND	ND	ND
Heptachlor epoxide	0.00076	ND	ND	ND	ND
Methoxychlor	0.012	ND	ND	ND	ND
Metals					
Arsenic	3.4	BRBC	ND	ND	ND
Barium	29.5	24.5	ND	BRBC	BRBC
Cadmium	0.2	BRBC	ND	ND	ND
Chromium	47.5	22.5	ND	ND	BRBC
Lead	19.7	BRBC	ND	12.6[a]	ND
Mercury	0.04	0.23	ND	0.21	ND
Selenium	BRBC	BRBC	ND	2.5	ND

[a]Maximum concentration detected excluding data from the site-specific background location (MW5).
BRBC = Below reference background criterion.
ND = Not detected.

Table 2. Remedial Levels, SWMU 2

SOIL BASED ON DIRECT EXPOSURE

Constituent of Concern	Maximum Detected Concentration (mg/kg)	Reference Background Criterion Surface Soil	Risk-based Remedial Levels (mg/kg)					
			HI			ILCR		
			1	0.5	0.1	1×10^{-6}	1×10^{-5}	1×10^{-4}
Arsenic	3.4[a]	2.10	23.37	11.68	2.34	0.6	6.1	60.6
Chromium	47.5	6.21	1.53	0.77	0.15	NA[b]	NA[b]	NA[b]

SOIL BASED ON PROTECTION OF GROUNDWATER AND SURFACE WATER

Constituent of Concern	Maximum Detected Concentration (mg/kg)	Reference Background Criterion Subsurface Soil	Risk-based Remedial Levels (mg/kg)				Remedial Levels Based on the MCL (mg/kg)
			HI				
			3	1	0.5	0.1	
Groundwater Point of Exposure[c]							
Chromium	47.5	11.60	3.74	1.25	0.62	0.12	4.6
Mercury	0.23	0.05	1.28	0.43	0.21	0.04	0.13[d]
Surface Water Point of Exposure[c]							
Mercury	0.23	0.05	0.02	0.006	0.003[e]	0.001	NA[f]

[a]Maximum detected concentration of constituent below recommended remedial level.
[b]NA = Not applicable; toxicity data required for calculation of remedial level were not available.
[c]Groundwater represents groundwater underlying the site, and surface water represents surface water in Canoochee Creek.
[d]Remedial level for mercury based on protection of groundwater.
[e]Risk-based remedial level for mercury based on protection of surface water.
[f]NA = Not applicable; MCLs are not applicable to surface water.
Bold indicates values that are the recommended remedial values.
HI = Hazard Index
ILCR = Incremental Lifetime Cancer Risk
MCL = Maximum Contaminant Level