United States Air Force
15th Air Base Wing
Environmental Restoration Program

EXECUTIVE SUMMARY

INFORMAL TECHNICAL INFORMATION REPORT FOR WAIMANALO STREAM

Engineering Evaluation/Cost Analysis for Operable Unit 1 (Sites LF01, DP17, SD22, and DP06)
Bellows Air Force Station
Oahu, Hawaii

January 7, 2000

Executive Summary

This Informal Technical Information Report (ITIR) for Waimanalo Stream has been prepared to meet one of the reporting requirements of the Engineering Evaluation/Cost Analysis (EE/CA) of Operable Unit 1 (OU1) at Bellows Air Force Station (AFS), Oahu, Hawaii. Under the Installation Restoration Program (IRP), the U.S. Air Force is conducting field investigations at four sites located in the west-central portion of Bellows AFS that comprise OU1 (Figure ES-1): LF01 (Base Landfill), DP17 (Burn Disposal Site), SD22 (Abandoned Drums), and DP06 (Multiple Dump Sites). A separate field investigation is being conducted for Waimanalo Stream to assess whether the OU1 sites have potentially impacted the stream.

The four OU1 sites are suspected to have been subject to the historical release of potentially hazardous contaminants. The strategy for the initial field investigation phase is to collect the data necessary to support one of three decisions: (1) proceed to an EE/CA; (2) proceed to a No Further Response Action Planned (NFRAP) designation; or (3) acquire additional site characterization data to refine the conceptual exposure models (CEMs). The decisionmaking recommendations are based on a risk screening evaluation process that included comparison to appropriate screening levels and estimation of risk to potential human and ecological receptors.

Waimanalo Stream originates approximately 2 miles west of Bellows AFS and discharges into Waimanalo Bay. The segment within Bellows AFS was extensively rechanneled to accommodate development of the installation during World War II. This segment is managed as a floodway, and the stream banks were regularly sprayed until 1996 or 1997 with herbicide down to the water's edge to prevent vegetation from clogging the channel (Hawaii Department of Health [HDOH], March 1998; Abad, 1999). The majority of the stream within Bellows AFS typically is not frequented by people, but the stream mouth area near the bay is used for recreational purposes such as fishing, swimming and wading. A variety of aquatic and avian wildlife species use the stream habitats; no rare, threatened, or endangered plant species are known to occur on or near Bellows AFS (EA, January 1997).

As noted in Section 1, Waimanalo Stream is not being evaluated as an OU1 site; however, a risk screening evaluation was conducted to assess whether the stream poses unacceptable risks to human and ecological receptors, and if so, to assess whether the OU1 sites are potentially contributing to those risks. Table ES-1 summarizes the results of the risk screening evaluation based on the specific human health action criteria and ecological risk thresholds. In general, it is concluded that no additional investigation is currently warranted to evaluate impacts on Waimanalo Stream from the OU1 sites, based on the concentrations of chemicals reported in surface water, surface sediment, and fish tissue samples. The following sections briefly summarize the field investigation and risk screening evaluation results by media. "Upstream" and "downstream" refer to the locations of the Waimanalo Stream samples with respect to the OU1 sites.

Surface Water. One volatile organic compound (VOC) (toluene), total petroleum hydrocarbon (TPH) (gasoline), one semivolatile organic compound (SVOC) (di-n-butylphthalate), several pesticides, one herbicide (dalapon), and numerous metals were detected in surface water samples collected from Waimanalo Stream. Based on the human health and ecological risk evaluations, no chemicals of concern (COCs) were retained:

- For human receptors, increased lifetime cancer risks (ILCRs) were below the action criterion of $1x10^{-4}$ and hazard indices (HIs) were well below the action criterion of 1 for each sample location.

- For ecological receptors, representative concentrations of three pesticides (4,4-DDT, endosulfan I, and heptachlor epoxide) and one metal (total lead) exceeded surface water screening levels developed for protection of aquatic life.[1] With the exception of heptachlor epoxide at one sample location, detected concentrations were below reporting limits. These four chemicals were evaluated to assess whether they potentially originated from the OU1 sites. The pesticide 4,4'-DDT was detected above screening levels in groundwater at each of the OU1 sites and is likely a Base-wide issue and not related to site-specific activities (CH2M HILL, September 25, 1998). Endosulfan I and heptachlor epoxide were detected above screening levels in groundwater at Site DP06, however they were both detected infrequently. Heptachlor epoxide was also detected infrequently above screening values at Site LF01 and is not expected to be a contributor to the stream. Lead was detected in soil above screening levels at Site LF01 and was retained as a COC for soil at the site (based on HDOH soil action level [SAL] exceedances and the food-web model). However, lead did not exceed screening levels for groundwater at Site LF01.

Surface Sediment. TPH (diesel and gasoline), one SVOC (di-n-butylphthalate), several PAHs and herbicides, and numerous pesticides and metals were detected in surface sediment samples collected from Waimanalo Stream. Based on the human health and ecological risk evaluations, no COCs were retained:

- For human receptors, ILCRs were below the action criterion of $1x10^{-4}$ and HIs were well below the action criterion of 1 for each sampling location except upstream location WSU. Although the total HI at location WSU was slightly above the action criterion (HI = 1.51), individual HQs for each detected chemical were well below the action criterion of 1. Because the chemicals contributing to the HI of 1.51 at WSU (aluminum, iron, and MCPP) affect different organs following exposure, it is not expected that total chemical exposure would exceed a toxic threshold. In addition, concomitant exposure to both surface water and sediment by both dermal and incidental ingestion routes would still be well below the action criterion of $1x10^{-4}$ and an HI of 1. Lead was detected in sediment samples at concentrations well below the

[1] The screening levels used for the ecological risk evaluation were the most stringent of the following: Hawaii Department of Health (HDOH) Tier 1 action levels (excluding those based on human health risk), National Recommended Water Quality Criteria (64 FR 68357068364, December 10, 1998), or criteria based on lowest observed effects levels (LOELs) or proposed criteria for the protection of aquatic organisms.

U.S. Environmental Protection Agency (EPA) Region IX residential soil preliminary remediation goal (PRG).

- The exceedances of NOAA effects-range-low (ERL) concentrations in sediment in Waimanalo Stream include 4,4'-DDE, 4,4'-DDT, phenanthrene, cadmium, chromium, copper, and nickel (nickel also exceeded the NOAA effects-range-median [ERM] concentrations). The pesticide 4,4'-DDT was detected above screening levels in groundwater at each OU1 site. Historical data suggest that the presence of 4,4'-DDT in groundwater at the OU1 sites is likely a Base-wide issue and not related to site-specific activities (CH2M HILL, September 25, 1998). Dissolved copper was detected above screening levels at two OU1 sites (DP06 and SD22). Dissolved copper was only detected in one location at each of these sites at concentrations only slightly exceeding the criterion. It was not detected in surface water in the stream. Dissolved nickel was detected above screening levels at each OU1 site. However, nickel was detected infrequently at the OU1 sites and was detected at higher concentrations in the upper reaches of the stream (above the OU1 sites). Therefore, it appears that the OU1 sites are not contributing to nickel concentrations in the stream.

Fish Tissue (Tilapia) Results. Numerous pesticides, one polychlorinated biphenyl (PCB) (PCB-1260), and numerous metals were detected in whole-body fish tissue samples collected from Waimanalo Stream. Whole fish tissue results were used for both the human health and ecological risk evaluations. Based on the results of the OU1 EE/CA field investigation, four pesticides (4,4'-DDE, 4,4'-DDT, alpha-chlordane, and dieldrin), and numerous metals were detected in fish fillet tissue samples collected from Waimanalo Stream. Fish fillet tissue results were only used for the human health risk evaluation. Based on the human health and ecological risk evaluation, no COCs were retained:

- Ecological HQs associated with selenium concentrations in whole-body fish tissue and sediment calculated as part of the Hawaiian Stilt food-chain model were slightly above the action level of 1. The elevated HQs result from elevated concentrations in fish tissue samples; selenium was not detected in sediment. However, assuming that wading birds would ingest some proportion of bottom-feeding (i.e., sediment-feeding) invertebrates, having concentrations of selenium that are likely to be lower than those observed in fish tissue, the food-chain model (which assumes 90 percent of their diet is fish) may overestimate actual risks to these birds. Therefore, selenium was not retained as a COC for whole-body fish tissue.

- The calculated risk-based consumption limits for fish fillets and whole fish tissue indicate that none of the fish tissue samples contain concentrations resulting in an exceedance of the action level of less than one-half meal per month (8-ounce meal) at a target ILCR of 10^{-4} or a noncancer HI of 1. Lead was detected in tissue samples at concentrations well below the action level. Therefore, no chemicals detected in fish tissue were retained as COCs.

Recommendations. The purpose of investigating Waimanalo Stream was to evaluate whether the OU1 sites are contributing unacceptable risks to human and ecological receptors. Based on the conclusions presented above, no additional investigation to evaluate impacts on the stream from the OU1 sites is currently warranted for Waimanalo Stream.

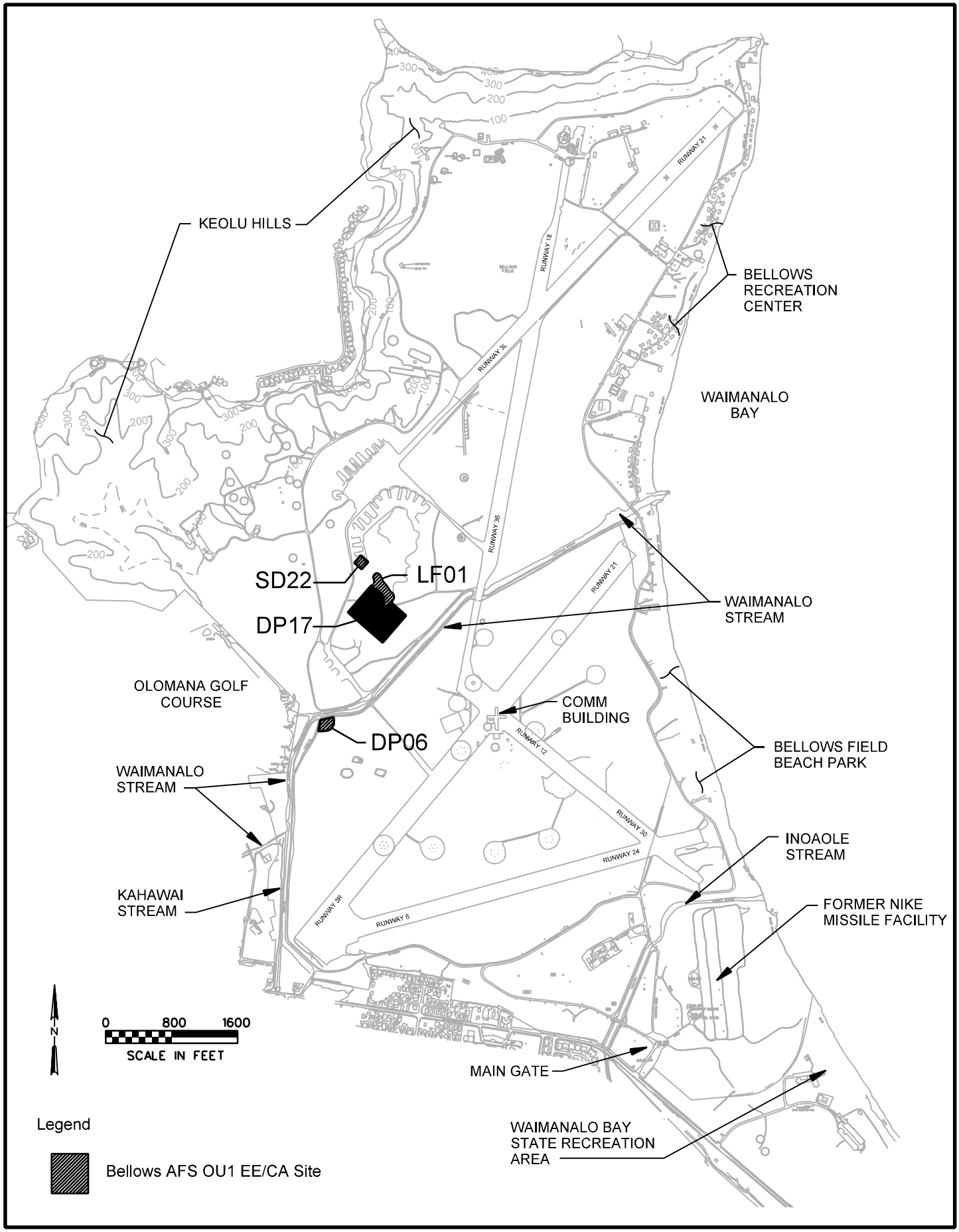

Figure ES-1

Bellows AFS OU1 EE/CA Site Locations

Bellows AFS OU1 EE/CA

Table ES-1

Summary of Human Health and Ecological Risk Screening Evaluation Results for Waimanalo Stream

Bellows OU1 EE/CA, Bellows AFS, Hawaii

No.	Action Criterion[1]	Is Action Warranted? Yes	No	Comments
Human Health Risk Screening Evaluation				
1	Action may be warranted if chemical concentrations in surface water present an increased lifetime cancer risk of greater than 1 in 10,000 from incidental ingestion and dermal contact by recreational users of Waimanalo Stream.		X	Based on the maximum representative concentrations at upstream and downstream locations, chemical concentrations in surface water were below those that present an increased lifetime cancer risk of 1 in 10,000.
2	Action may be warranted if chemical concentrations in surface water present a noncancer hazard quotient of greater than 1 from incidental ingestion and dermal contact by recreational users of Waimanalo Stream.		X	Based on the maximum representative concentrations at upstream and downstream locations, chemical concentrations in surface water were below those that present a noncancer hazard quotient of 1.
3	Action may be warranted if chemical concentrations in sediment present an increased lifetime cancer risk of greater than 1 in 10,000 from incidental ingestion and dermal contact by recreational users of Waimanalo Stream.		X	Based on the maximum representative concentrations at upstream and downstream locations, chemical concentrations in surface sediment were below those that present an increased lifetime cancer risk of 1 in 10,000.
4	Action may be warranted if chemical concentrations in sediment present a noncancer hazard quotient of greater than 1 from incidental ingestion and dermal contact by recreational users of Waimanalo Stream.		X	Based on the maximum representative concentrations at upstream and downstream locations, chemical concentrations in surface sediment were below those that present a noncancer hazard quotient of 1.
5	Action may be warranted if chemical concentrations in fish tissue from Waimanalo Stream result in a fish consumption limit of less than one-half a meal per month (an 8-ounce meal) at a target cancer risk of 1 in 10,000.		X	Based on the maximum representative concentrations at upstream and downstream locations, chemical concentrations in fish fillet tissue resulted in a calculated consumption limit below the critical minimum level.
6	Action may be warranted if chemical concentrations in fish tissue from Waimanalo Stream result in a fish consumption limit of less than one-half a meal per month (an 8-ounce meal) at a target noncancer hazard index of less than 1.		X	Based on the maximum representative concentrations at upstream and downstream locations, chemical concentrations in fish fillet tissue resulted in a calculated consumption limit below the critical minimum level.
7	Action may be warranted if lead concentrations in fish tissue from Waimanalo Stream result in a predicted blood lead level exceeding 10 ug/dL in 5 percent or more of the potentially exposed population.		X	Based on the maximum representative concentrations at upstream and downstream locations, chemical concentrations in fish fillet tissue resulted in a predicted blood-lead level below the action level.

Table ES-1

Summary of Human Health and Ecological Risk Screening Evaluation Results for Waimanalo Stream

Bellows OU1 EE/CA, Bellows AFS, Hawaii

No.	Action Criterion[1]	Is Action Warranted? Yes	No	Comments
Ecological Risk Screening Evaluation				
1	Action may be warranted if chemical concentrations in surface water are above both AWQC and reference-area concentrations.		X	Concentrations of 4,4-DDT, endosulfan I, heptachlor epoxide, and lead exceeded marine chronic AWQC in surface water in Waimanalo Stream. These constituents were infrequently detected and were not detected in tissue at concentrations that may cause risk. Therefore, no further action is warranted based on these exceedances.
2	Action may be warranted if chemical concentrations in surface sediment are above both NOAA ERM screening levels and reference-area concentrations.		X	On a sample-specific basis, concentrations of nickel exceeded the NOAA ERM screening level in surface sediment at Waimanalo Stream. The highest concentration was at the upstream location (above OU1 sites). AVS/SEM analysis indicated that divalent metals (e.g., nickel) are not biologically available at any of the locations where nickel exceeded the NOAA ERM. Therefore, no surface sediment COPCs will be carried forward as COCs and no further ecological action is required.
3	Action may be warranted if chemical concentrations in sediment and fish tissue present potential risk to wading birds by exceeding a hazard quotient of 1.		X	The hazard quotient based on selenium concentrations exceeded the action level of 1. However, selenium was not detected in sediment or any of the OU1 sites. The food-chain model assumes that 90 percent of the wading bird's diet is fish; therefore, the model may overestimate actual risk to these birds. Further action is therefore not warranted based on these exceedances.

Notes:

[1]Action criteria for ecological receptors are termed risk thresholds and do not represent cleanup values. These thresholds are designed initially to be conservative, and refined to m

AWQC = ambient water quality criteria; NOAA = National Oceanic and Atmospheric Administration; ERM = effects-range-median.