

## Executive Summary

This Informal Technical Information Report (ITIR) for Site LF01 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.<sup>1</sup> A field investigation was conducted at Site LF01 to collect the data necessary to support one of three decisions: (1) proceed with preparation of an EE/CA Report, (2) proceed to a No Further Response Action Planned (NFRAP) designation for the site, or (3) acquire additional site characterization data to refine the conceptual exposure model.

Site LF01 is a former landfill located in the west-central portion of Bellows AFS, approximately 700 feet northwest of Waimanalo Stream and 3,300 feet west of Waimanalo Bay. The site is located within a former coral borrow pit excavated during World War II to provide fill for Bellows AFS expansion. Various sources (i.e., historical documents and drawings, environmental reports, and former Bellows AFS personnel) indicate that landfilling occurred at Site LF01 from World War II through the 1970s. The site is generally inaccessible to the public, but is within an area of Bellows AFS that is owned by the U.S. Marine Corps and used for military field training exercises (Marine Corps Training Area Bellows). A variety of terrestrial avian and mammalian wildlife species use the site habitats (second-growth forests and shrublands) for foraging, nesting, and cover.

A previous investigation of Site LF01 conducted by Harding Lawson Associates (HLA, September 1992) included a geophysical survey to define the approximate extent of the landfill and to characterize site soil and groundwater. Concentrations of one polynuclear aromatic hydrocarbon (PAH) (phenanthrene) and several metals detected in soil, and of several dissolved metals detected in groundwater, exceeded risk-based screening criteria. EA Engineering, Science, and Technology (EA) later conducted soil sampling (EA, July 1996) as part of a multi-drum removal at the former Site DP17A, which is adjacent to and partially overlaps Site LF01 (and is included as part of Site LF01 in this ITIR). The results of this sampling effort indicated that a variety of chemicals (PAHs, pesticides, metals, and one polychlorinated biphenyl [PCB]) exceeded soil screening criteria in the areas of the former drums.

An EE/CA pre-survey of Site LF01 was conducted in July 1998 to better define the landfill extent (by clearing site vegetation and conducting a geophysical survey) and to redevelop

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<sup>1</sup> Under the Installation Restoration Program (IRP), the U.S. Air Force conducted 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 was conducted for Waimanalo Stream to assess whether the OU1 sites have potentially affected the stream.

existing groundwater monitoring wells (from the previous HLA investigation) for use in the EE/CA investigation. The subsequent EE/CA investigation, beginning in October 1998 and concluding in December 2000, included a passive soil gas (PSG) survey; exploratory trenching to characterize the landfill contents; collection and analysis of surface soil, subsurface soil, and groundwater samples to evaluate whether chemicals detected in these site media pose unacceptable risks to human and ecological receptors; and analysis of PCB wipe samples from three abandoned transformer casings near the landfill. The EE/CA investigation results are summarized as follows:

- **PSG Survey.** The PSG survey indicated very little contamination in soil gas throughout Site LF01. Therefore, the PSG results were not used to direct soil or groundwater sampling.
- **Trenching.** A longitudinal north-south trench through the landfill encountered predominantly Recreation Center-type waste (soda, beer, and liquor bottles), along with construction/demolition waste (concrete, steel rebar, timbers, barbed wire, metal and plastic piping, and sheet metal) and vehicle waste (partially burned truck bodies, tires, fenders, and other metal). The northern half of the trench encountered predominantly construction/demolition waste, one segment of the trench (in the north-central portion of the landfill) included mostly vehicle waste, and the southern half of the trench encountered predominantly Recreation Center-type waste. A pressurized gas cylinder discovered in this trench was vented and disposed of as nonhazardous solid waste. A drum remnant with a small amount of tar-like material was also found and packed in an overpack drum and disposed of in accordance with the waste management plan. A transverse trench encountered Recreation Center-type waste and a propellant canister from a Mark 15 steam-powered torpedo. The torpedo canister was found to contain no explosives. The canister was vented (and found to contain no pressurized gas) and placed back in the trench. Further trenching was suspended upon discovery of the torpedo canister.
- **Soil and Groundwater Sampling.** Surface soil samples were collected from 42 locations, subsurface soil samples were collected from 10 locations, and groundwater samples were collected from 18 locations at Site LF01. These data were combined with the historical data from DP17A, and a risk screening evaluation was performed to evaluate whether chemicals detected in these media pose unacceptable risks to human and ecological receptors. Table ES-1 and the following text summarize the results of the risk screening evaluation based on the specific human health action criteria and ecological risk thresholds:
  - **Surface Soil.** Chemicals detected in surface soil included diesel-range total petroleum hydrocarbons (TPH-diesel), 5 semivolatile organic compounds (SVOCs), 20 pesticides, 5 PCBs, 15 PAHs, 23 metals, and 4 herbicides. Low levels of dioxins and furans were also detected at seven locations targeted for these analyses. In the human health risk evaluation, only lead was retained as a chemical of concern (COC)

for surface soil at Site LF01, based on comparison to the EPA Region IX PRG for the industrial exposure scenario.<sup>2</sup> However, in the ecological risk evaluation, maximum concentrations of three metals (lead, mercury, and zinc) exceeded a hazard quotient (HQ) of 1 using a food-chain model, and these metals were retained as ecological COCs. Uncertainties associated with inclusion of the historical data in the ecological receptor (pueo) food-chain model (which is inherently conservative) may overestimate risk to ecological receptors; metals concentrations in the Site DP17A samples were significantly elevated compared to those in EE/CA samples, possibly because of biased sampling design or data quality issues. Conversely, uncertainties associated with the absence of rejected pesticide data may underestimate risk, but the detected pesticide concentrations were well below levels that would result in unacceptable ecological risk.

- **Subsurface Soil.** Three distinct subsurface soil types were evaluated: landfill materials, native soil beneath the landfill, and native subsurface soil outside the landfill. Chemicals detected in subsurface soil included 8 volatile organic compounds (VOCs), TPH-diesel and -gasoline, 2 SVOCs, 9 pesticides, 3 PCBs, 12 PAHs, 22 metals, and 4 herbicides. Based on the conceptual exposure model, the human health pathway for subsurface soil was not evaluated.<sup>3</sup> In the ecological risk evaluation, no chemicals were retained as ecological COCs. Concentrations of butylbenzyl phthalate,  $\alpha$ -chlordane, beta-BHC, Aroclor-1242, Aroclor-1260, and lead exceeded soil action levels (SALs) developed for protection of aquatic life in surface water. However, with the exception of lead, these chemicals were infrequently detected, were below reporting limits, and were generally similar in landfill materials, native soil beneath the landfill, and native soil outside the landfill. Lead was detected in groundwater but at concentrations lower than screening levels for the protection of aquatic organisms. Uncertainties associated with the absence of rejected pesticide and herbicide data may underestimate risk; however, in many cases, chemicals with rejected data had no screening levels and, with the exception of alpha-chlordane (for all subsurface soil types) and beta-BHC (for native soil outside the landfill), the pesticides did not exceed screening levels for subsurface soil. In addition, several pesticides were detected only in native soil outside the landfill.
- **Groundwater.** Chemicals detected in groundwater included TPH-diesel, TPH-gasoline, 11 pesticides, 2 PAHs, 19 metals, 7 herbicides, one SVOC, and 2 VOCs.

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<sup>2</sup> For human receptors, excess lifetime cancer risks were below the action criterion of  $1 \times 10^{-4}$  and hazard indices (HIs) were well below the action criterion of 1 for all sample locations. Calculated dioxin/furan toxicity equivalency quotients (TEQs) were orders of magnitude below the residential PRG of  $1 \mu\text{g}/\text{kg}$ , and, the calculated blood-lead level of 6.8 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ) was below the target level of  $10 \mu\text{g}/\text{dL}$ .

<sup>3</sup> U.S. Marine Corps (USMC) personnel who use Bellows AFS for military field training are directed not to perform excavations of any kind in order to avoid potentially disturbing buried archaeological features. Therefore, exposure to subsurface soil by military personnel is not considered an exposure pathway of concern.

Based on the conceptual exposure model, the human health pathway for groundwater was not evaluated.<sup>4</sup> In the ecological risk evaluation, no chemicals in groundwater were retained as COCs. Seven pesticides (4,4'-DDT, gamma-chlordane, endosulfan II, endrin, heptachlor, heptachlor epoxide, methoxychlor) exceeded groundwater screening levels developed for protection of surface water. With the exception of gamma-chlordane and endrin (each with only one detected "estimated" concentration), all pesticide concentrations were below reporting limits. In addition, with the exception of 4,4'-DDT (detected twice), heptachlor (detected five times), and heptachlor epoxide (detected seven times), each pesticide was only detected once in groundwater. Uncertainties associated with the lack of screening levels for several detected chemicals, and with the rejection of results for several pesticides and herbicides, could underestimate risk; however, the concentrations of these chemicals are not likely to cause adverse effects on aquatic organisms. Finally, based on an evaluation of a potential interconnection between the landfill and the stream, the weight of available information (on groundwater flow, physical chemical properties, and the nature and extent of chemicals detected in various media at Site LF01 and in the stream) does not support the conclusion of an interconnection between the site and the stream. As a result, it can be concluded that the potential for chemicals to migrate from Site LF01 to the stream is minimal or nonexistent.

- **PCB Wipe Test Sampling.** None of the individual Aroclor PCBs were detected in the wipe test samples collected from the three abandoned transformer casings. Therefore, no special disposal requirements are necessary.

In summary, based on the risk-screening evaluation conducted at Site LF01, three metals (lead, mercury, and zinc) in surface soil have been identified as COCs, posing potential risks to current and future human and ecological receptors. Lead in surface soil slightly exceeded the industrial PRG, and ecological HQs associated with lead, mercury, and zinc slightly exceeded the action level of 1. In the absence of other factors, these exceedances would not warrant further action. However, Site LF01 in its current condition also presents potential risk to occupational receptors (i.e., personnel involved in military training exercises) in the form of physical hazards that include broken glass, metal, and other debris at the surface, and potentially dangerous materials (e.g., pressurized canisters) in the landfill materials. Therefore, the marginal ecological HQ exceedances combined with the physical hazards present at the site are sufficient cause for further action at Site LF01. An EE/CA Report is being prepared that evaluates several remedial alternatives for Site LF01.

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<sup>4</sup> Groundwater occurs at a depth of approximately 10 to 30 feet below ground surface (bgs) beneath Site LF01, is somewhat saline, and is not suitable as a drinking water source or for other domestic uses. In addition, groundwater is not likely to be used for industrial purposes based on the current and reasonably anticipated future use of Site LF01. Therefore, future incidental contact with chemicals in groundwater is not expected unless excavation or other construction activities occur that may put workers in direct contact with groundwater.