Fact Sheet:

Draft Response Action Memorandum

Hickam Communities Remedial Action Site
Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i

Introduction. A remedial action to address soil impacted by organochlorine pesticides is being implemented under the Hawai'i State Contingency Plan (SCP) at four residential neighborhoods within the property leased by Hickam Communities LLC (HC) at Joint Base Pearl Harbor-Hickam (JBPHH), O'ahu, Hawai'i. The Remedial Action Site consists of four military residential neighborhoods named Hale Na Koa I-1, Earhart I-2, Earhart I-3, and Onizuka II-1, which total approximately 132 acres at JBPHH (the "Site"). Residential property at JBPHH, including the Site, was conveyed to Hickam Communities LLC under the terms of a 50-year ground lease with the US Air Force (USAF) in 2005. In the process of developing the Site, HC discovered the presence of organochlorine pesticide-impacted soil that required remedial action. For this remedial action: (1) a Remedial Investigation of organochlorine pesticide impact to soil and Environmental Hazard Evaluation (EHE) was completed for the Site; (2) three removal actions were conducted to remove soil considered to be potentially hazardous to the human health and the environment; (3) a Remedial Alternatives Analysis was performed to evaluate cleanup options for organochlorine pesticides remaining in Site soil; and (4) a draft Response Action Memorandum (RAM) was prepared by the Hawai'i Department of Health (HDOH) to present for public comment the proposed final remedy selected for the Site. The remedial action is being performed under a Voluntary Agreement between HDOH and HC. This purpose of this fact sheet is to provide a summary of the work completed for the Site and current environmental conditions, and to present the proposed final remedy.

Site Background. As part of the Department of Defense Military Family Housing Privatization Initiative, the USAF selected Lend Lease (US) Public Partnerships (Lend Lease; legacy Actus Lend Lease LLC) to develop, design, and construct new homes and to renovate existing homes at JBPHH and manage the homes and communities under a 50-year ground lease with the USAF. The project company, Hickam Community Housing LLC (HCH) was created in 2005 to develop and manage the residential property at JBPHH under the 50-year ground lease. The project company HCH changed its name to Hickam Communities LLC (HC) in 2010. As the lessee, the project company has overall responsibility for the project sites under the terms and conditions of the ground lease. The USAF, as lessor, maintains a review and coordination role for all activities conducted at the project sites. The dates of the ground lease are February 1, 2005 through July 31, 2057.

Organochlorine Pesticides. Organochlorine pesticides were used to control termites from the 1940s until the late 1980s. Since they are toxic, bioaccumulative (the chemical may be taken up and retained by plants, animals, or people), and persistent in the environment, these pesticides were banned by the US Environmental Protection Agency (EPA) by 1989. Soil at the Site is primarily impacted by the organochlorine pesticides aldrin, chlordane, and dieldrin. Only minor concentrations of DDT-series organochlorine pesticides have been detected. These pesticides were introduced into the soil by termitcide application by the USAF prior to the EPA ban and HC assumed responsibility for the Site. The application method was likely a combination of spraying soil surfaces prior to the construction of concrete slab foundations, and subsequent injection through utility openings in the foundations, and along foundation perimeters following construction of the homes.

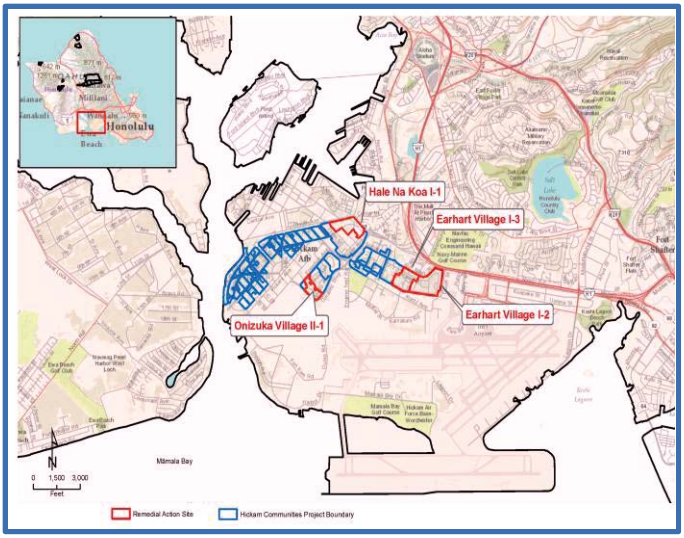

Figure 1. *Site Location. Red boundaries show the Hickam Communities Remedial Action Site.*

PESTICIDE-IMPACTED SOIL CRITERIA

- Soil is defined as "pesticide-impacted" when concentrations of organochlorine pesticides, specifically aldrin, chlordane, and dieldrin, exceed the risk criteria established for HC.
- These risk criteria include site-specific Environmental Action Levels (EALs) which are used to evaluate the cumulative risk posed by concentrations of all of the organochlorine pesticides detected in a soil sample.
- The initial risk criteria were developed in 2006 by Tetra Tech and are presented in the HC Pesticide-Impacted Soil Investigation and Management Program Manual. The risk criteria were revised in 2010 and 2011 and are presented in the EHE developed for HC.

Soil Management During Construction. During due diligence activities conducted at HC, the presence of soil impacted by organochlorine pesticides (referred to as "pesticide-impacted soil") was detected under concrete slabs

slabs and foundations and underground surface within a 3-foot perimeter of these foundations. As a result, HC developed and implemented a pesticide-impacted soil management program for investigation and management of pesticide-impacted soil during construction and renovation activities at HC in concurrence with HDOH. Using site-specific soil management plans prepared for each HC project site, pesticide-impacted soil is managed using specific management methods: (1) placement of soil under hardscapes (new foundations, roads, parking lots) and/or under a minimum 1-foot thick clean soil cap within an HC project site, as (2) backfill for some utility trenches (a practice no longer in use at HC), and (3) permanent management in burial pits and a soil berm at specific locations on HC property. Use of a layer of geotextile fabric beneath the clean soil caps in neighborhoods, at the burial pits, and at the berm, was adopted at HC in 2010 to create a barrier and to mark the top of where pesticide-impacted soil is known or assumed to be present.

Remedial Action Site. The remedial action process was conducted under the Voluntary Agreement for Environmental Response Actions (Voluntary Agreement) established between HDOH and HC in February 2011. Under the Voluntary Agreement, the HC Remedial Action Site is defined as the Hale Na Koa I-1, Earhart I-2, Earhart I-3, and Onizuka II-1 neighborhoods. A formal investigation with HDOH oversight was conducted after HC conducted initial post-construction confirmation soil sampling and discovered levels of pesticides in open areas above specified Environmental Action Levels (EALs). It is believed that pesticide-impacted soil generated from excavating footprints of former concrete slabs and foundations was improperly placed or graded into open areas, and not subsequently covered by hardscapes. This pesticide-impacted soil was not detected until after construction at the Site was completed or nearing completion.

Remedial Investigation (RI) – 2010. The pesticide-impacted soil was first detected in soil at the Hale Na Koa I-1 neighborhood in 2007, and the Earhart I-4 neighborhood in 2010. This soil was subsequently managed in two separate actions by removal of pesticide-impacted soil followed by placement of a 1-foot thick clean soil cap in 2007 at Hale Na Koa I-1 and in 2010 at Earhart I-4. Based on the detection of pesticide-impacted surface soil within Earhart I-4 in 2010, confirmation soil sampling was conducted at the Earhart I-2, Earhart I-3 Onizuka II-1 neighborhoods in 2010. These neighborhoods were divided into 4 to 5 acre-sized sampling areas called decision units (DUs) and sampled using multi-incremental (MI) soil sampling methodology, which involves collecting 30 to 50 individual soil samples (or "increments") from points spread out across the DU. These increments are then composited into one sample for analysis. The results of the confirmation sampling indicated that pesticide-

REMEDIAL INVESTIGATION DECISION UNITS (DUS)

- 330 DUs at Earhart I-2.
- 180 DUs at Earhart I-3.
- 21 DUs at Onizuka II-1.
- DU areas were calculated using exposed surface areas (no hardscapes).
- The DUs were developed to include front yards, back yards, play areas, and common areas used by HC residents.

The results of the confirmation sampling indicated that pesticide-impacted soil was present in surface soil within some of these DUs. As a result, meetings between HDOH and HC were held in July 2010, and a Remedial Investigation (RI) was initiated to further evaluate the extent of pesticide-impacted surface soil in these three neighborhoods. For this RI, to better evaluate areas where remaining areas of pesticide-impacted soil were present at the Site, the neighborhoods were subdivided into smaller DUs of up to 0.12 acre (5,500 square feet) representing front and back yards of individual buildings, common areas, and playgrounds. The RI was conducted between August and October 2010, and soil in each of these smaller DUs was sampled using MI soil sampling methodology, with a MI soil sample collected from the 0 to 6 and 6 to 12-inch depth intervals. Over 1,500 MI soil samples (including triplicates for quality assurance) were collected and analyzed for organochlorine pesticides. The analytical results indicated that some of DUs in the Earhart I-2 and Earhart I-3 neighborhood contained pesticides in the shallow soil at concentrations higher than the 2006 risk criteria in place at HC at the time of the RI. At five of these DUs detected concentrations of organochlorine pesticides warranted immediate action to reduce residential exposure to the pesticides in shallow soil.

Removal Actions (ROs) – 2010 through 2011. Based on the preliminary results of the RI, the Removal Action (RO) process was initiated by HC, in agreement with HDOH. Three ROs were implemented between October 2010 and August 2011 to address the immediate potential risk posed by pesticide-impacted surface soil detected at the Earhart I-2 and Earhart I-3 neighborhoods.

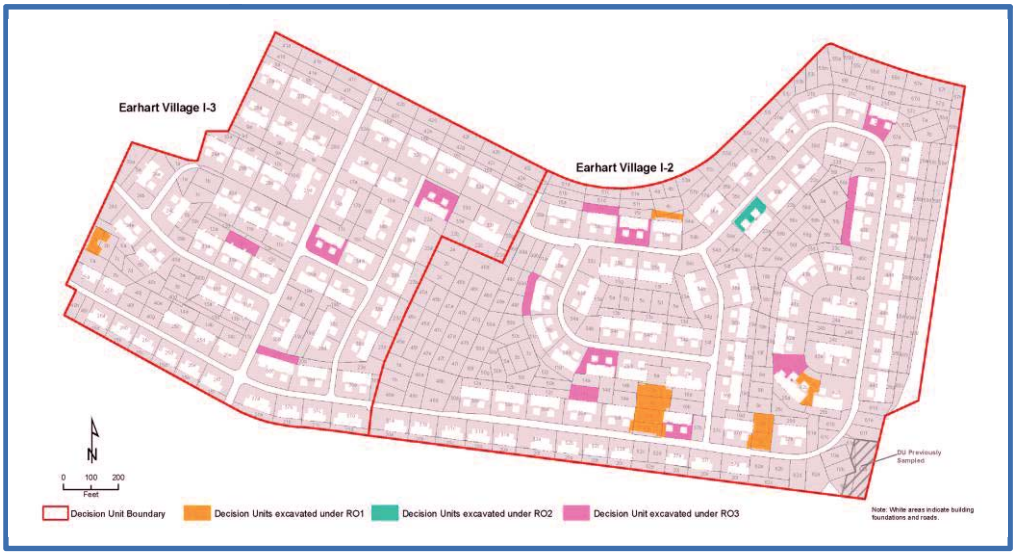

Figure 2. *Decision Units and Removal Actions Conducted at Earhart I-2 and Earhart I-3 in colored areas. Dark grey lines indicate DU boundaries, and white areas are building foundations and roadways.*

No DUs requiring action in any of the three ROs that were identified at the Onizuka II-1 neighborhood. The first RO (RO #1) was conducted from October through December 2010, and was designed to replace shallow soil from DUs where the short-term risks from pesticide-impacted soil were considered to be potentially hazardous to HC residents. For RO #1, four DUs in the Earhart I-2 neighborhood, and one DU in the Earhart I-3 neighborhood met these criteria, and the soil was excavated to 1 foot below grade. In addition, HC also decided to replace soil in some parts of DUs adjacent to the priority DUs. For all of the excavations conducted during the ROs, the excavations were backfilled with clean soil, with an orange geotextile fabric barrier placed below the clean soil to mark the top of the pesticide-impacted soil, and the surface soil reseeded. During the soil excavation activities, HC implemented all required measures (e.g. dust control) and monitored the air quality within the excavation areas and at the upwind and downwind perimeters of the excavation areas. The air quality monitoring data confirmed that the dust control measures were effective. To address additional potential exposure risks, a second RO (RO #2) was implemented from January through March 2011 to address DUs not excavated during RO #1. As part of RO #2, the soil in fifteen landscaping strips was replaced, and areas of exposed surface soil at twenty DUs were reseeded to prevent potential contact to soil. The third and final RO (RO #3) was implemented from July through August 2011 to address remaining shallow soil that exceeded revised risk criteria. For RO #3, six DUs were excavated to a depth of 9-inches below grade and replaced with clean soil over a geotextile fabric barrier. The pesticide-impacted soil excavated during the ROs was managed on HC property; either in Burial Pit No. 6b at the Onizuka II-3 neighborhood (RO #1 and RO #2) or the soil berm at Earhart I-2 (RO #3).

Figure 3. *Backfilling clean soil on a geotextile barrier at an excavated DU at the Earhart I-2 neighborhood.*

Environmental Hazard Evaluation (EHE). An EHE was conducted from 2010 to 2011 to evaluate the potential risk to human health and the environment posed by contamination present at the Site. The Conceptual Site Model (CSM) developed for the Site in 2011 by Tetra Tech identified that the primary environmental hazard for current and future HC workers and residents would be from direct exposure to pesticide-impacted soil. The CSM identified three ways in which HC workers or resi- dents could be directly exposed to pesticide-impacted soil. These are: incidental ingestion of soil; dermal contact with soil; and inhalation of airborne particulates. Concurrent with development of the CSM, a Human Health Risk Evaluation (HHRE) Work Plan was produced in 2011 by Tetra Tech and approved by HDOH, and the EHE was undertaken to: (1) assess the toxicity of organochlorine pesticides present in soil at HC and develop site-specific soil EALs protective of HC workers and residents; (2) evaluate potential carcinogenic and non-carcinogenic risks to HC workers and residents, and (3) evaluate potential environmental hazards associated with the remaining pesticide-impacted soil not addressed during the ROs. The site-specific EALs were developed based on parameters specific to people living and working in military residential housing at HC, such as an average expected residence time at HC of 6 years. These EALs are used to assess the presence of pesticide-impacted soil, and to support current and future soil management at HC.

SITE-SPECIFIC EALs

- Since the organochlorine pesticides of concern in HC soil present potential carcinogenic and non-carcinogenic risk to humans, the EHE presented EALs that were developed at both the carcinogenic and non-carcinogenic endpoints.
- Final soil cleanup levels applied to a site are always the most conservative (or lowest) EALs.

For HC, the most conservative site-specific EALs for the primary organochlorine pesticides are the non-carcinogenic EALs:

- 12 mg/kg for aldrin;
- 38 mg/kg for chlordane; and
- 9.8 mg/kg for dieldrin.

Pesticide-impacted Soil Remaining at the HC Remedial Action Site. At the conclusion of the Remedial Action process, pesticide-impacted soil identified at the Site has been managed. Residual pesticide-impacted soil is known or presumed to be present beneath clean soil caps and hardscapes, as well as in safely managed on-site management areas; however, management practices developed in agreement with HDOH are employed to mitigate or prevent potential exposures to residents and workers.

Remedial Alternatives Analysis (RAA). An RAA was completed with HDOH approval, to evaluate and recommend the best remedial action to address potential hazards to HC workers and residents from the pesticide-impacted soil remaining at the HC Remedial Action Site. The RAA provides a comparative evaluation of potential remedial strategies and alternatives that may be appropriate for addressing the environmental hazards identified in the EHE, and from the pesticide-impacted soil remaining at the Site following the completion of the ROs conducted at Earhart I-2 and Earhart I-3 neighborhoods at the Site. In the RAA process, remedial alternatives for a site are identified in order to meet the project

Remedial Action Objectives (RAOs) identified in the RI. Once a range of viable remedial alternatives are selected, they are further evaluated using the principal considerations of effectiveness, implementability (i.e. technological and administrative feasibility), and cost. These considerations are used to identify a preferred alternative, and a proposed remedy is selected for the Site. Based on the RAOs for the site, four remedial alternatives were identified for the Site ranging from "no action" to complete removal of all pesticide-impacted soil at the Site. The four alternatives evaluated were: (1) No action; (2) Cleanup to unrestricted use with management of removed soil on-site (within HC property); (3) Cleanup to unrestricted use with off-site disposal of removed soil on-site; and (4) No further action. with institutional controls.

REMEDIAL ACTION OBJECTIVES

The primary RAO is to reduce the remaining risk from residual pesticide-impacted soil at the Site to acceptable levels. The remedial action alternatives evaluated must address the following RAOs:

- Reduce contaminant concentrations in Site soil;
- Remove direct exposure pathways between contaminants and receptors;
- Prevent migration of contaminants;
- Minimize potential adverse impacts to surrounding communities and the environment; and
- Comply with applicable federal, state and local regulations.

Proposed Final Remedy. The proposed final remedy for the Site is Alternative (4): No further action and institutional controls. The four alternatives identified during the RAA process were thoroughly evaluated by comparing each alternative with respect to effectiveness, implementability, and cost, and were scored based on this comparison. Alternative (4) was selected due to its overall short and long-term effectiveness (institutional controls are already in place, with additional controls including long-term monitoring to be implemented), implementability (minimal to no disruption to residents and/or military mission at JBPHH), and cost (reasonable long-term costs to implement and maintain).

INSTITUTIONAL CONTROLS FOR HC

- HC Resident Guide – no dig policy for residents;
- HC Pesticide-Impacted Soil Program Manual – soil management during construction, soil import, and export;
- Land Use Controls Inventory Document (LUCID) – soil management at HC for routine maintenance and emergencies;
- Environmental Hazard Management Plan (EHMP) – identification of hazards at HC; and
- Long-term Monitoring Program – included as part of the EHMP for long-term monitoring for consistent implementation and effectiveness of institutional controls.

Since the current and additional institutional controls would be implemented and monitored by HC over the period of the 50-year ground lease, this alternative would be protective of current and future HC workers and residents and the environment. Although not anticipated, should any changes in the use of the Site occur (e.g. military decommissioning by the Base Realignment and Closure Commission [BRAC]), the remedy for the Site would be reevaluated based on this change of use.

Response Action Memorandum (RAM). The purpose of the RAM is to present the proposed final remedy selected for the Site. The draft RAM will be provided to the public for review and comment over a 30-day period. The draft RAM provides a summary of the RI results, the corresponding EHE, and the RAA process used to select the proposed final remedy. A public notice has been posted regarding information on the public meeting, which will be held during the comment period. The Final RAM will document the selected final remedy for the Site as approved by the HDOH Hazard Evaluation and Emergency Response (HEER) office. Public comments will be addressed in a Responsiveness Summary in the Final RAM, and incorporated as changes to the selected final remedy as appropriate.

COMMUNITY PARTICIPATION

Hickam Communities, in coordination with HDOH, maintained consistent communications with HC residents throughout the process and continues to keep residents informed. HDOH invites the public to become involved in the process of finalizing the proposed final remedy for the Site. Comments from community residents are valuable and help HDOH determine the final decision for the response action. All public comments will be addressed in the final RAM and HDOH may revise the recommended final remedies based on the public comments or concerns.

There are two ways for you to provide your comments during the **June 11 to July 11, 2012** public comment period. You may send written comments to Mr. Eric Sadoyama at the following address:

Mr. Eric Sadoyama, Remedial Project Manager
Office of Hazard Evaluation and Emergency Response
Hawai'i Department of Health
919 Ala Moana Boulevard, Room 206
Honolulu, Hawai'i 96814
Phone: 808-586-0955 | Fax 808-586-7537
Email: eric.sadoyama@doh.hawaii.gov

Comments may also be provided to HDOH during the public meeting. After the public comment period is over, HDOH will review and consider the comments received before selecting the final remedies.

PUBLIC MEETING
Wednesday, June 27, 2012; 6:00 pm to 9:00 HST

Radford High School
4361 Salt Lake Blvd. Honolulu, Hawai'i 96818
808-421-4200

All documents are available for review Salt Lake-Moanalua Public Library. Contact information is provided below:

Mr. Duane E. Wenzel, Branch Manager
Salt Lake-Moanalua Public Library
3225 Salt Lake Blvd
Honolulu, Hawai'i 96818
Phone: (808) 831-6831

Email: duane@librarieshawaii.org