

**REVIEW COMMENTS AND RESPONSES 2/27/06**  
**Remedial Investigation Report, Bellows Hardfill (LF23), Bellows Air Force Station (January 2006)**  
**Reviewer: Steven Mow, Hawaii Department of Health**

ITEM	PAGE	SECTION	COMMENT	CONTRACTOR RESPONSE
1	5-7	5.2.6.1 Soil	The removal of the 4,907 ppm value detected at BH-11 seems rather arbitrary and no justification was given for its removal. Given the large distance between sampling points (~150 feet), there is no way to justify omitting the value as an outlier. Please indicate why this value was removed.	<p>Concur. For the screening level assessments, the maximum detected lead concentration of 4,907 ppm was compared to the appropriate screening levels. The recommendations for future actions in Section 6.2 recommend a limited soil removal action in the vicinity of BH-11, where the 4,907 ppm concentration was detected. The purpose of calculating the site-wide concentration without the 4,907 mg/kg is to demonstrate that, if a limited soil removal action were to be conducted, the site lead concentration would be below its soil screening level. In order to clarify the point, the following changes will be made to Section 5.2.6.1;</p> <p>Other soil samples reported lead at concentrations above the screening level (for example 427 mg/kg at a <b>depth of 5 feet</b> bgs at BH-05; 283 mg/kg at a <b>depth of 4 feet</b> at BH-11, but the majority of these exceedances were less than 2 times <del>the lead its</del> screening level. <del>A site-wide arithmetic average of the detected lead concentration, without the detection of 4,907 mg/kg (91 mg/kg) is below the screening level.</del></p>
2	5-8	5.2.6.2 Groundwater	Natural processes will not take care of lead nor arsenic anytime within my lifetime so to rely on such processes would not be in the best interests of the environment.	<p>Concur. The text did not intend to imply that natural process at the site would completely eliminate risks associated with lead or arsenic. Section 5.2.6.2, third paragraph will be changed as follows:</p> <p><del>Only a few samples exceeded either the arsenic or lead screening levels.</del> Arsenic was detected in groundwater only 2 out of 21 times at concentrations <b>of 0.0422 mg/L (BH-17) and 0.0205 mg/L (BH-05)</b> (0.0422 mg/L at BH17 and 0.0205 mg/L at BH-05). <del>Lead was detected at an estimated concentration (0.0176 F mg/L at BH-11), above the screening level of 0.0056 mg/L.</del> <b>Arsenic typically exists in one of three oxidation states, -3, +3, and +5, and can be both inorganic and organic (when bonded with carbon). Arsenic is considered insoluble and has a typical distribution (sorption) coefficient (Kd) of 29 mL/g</b></p>

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				<p>(EPA, 2001) to 200 mL/g (DOE, 2002). Arsenic is typically found in the soil and relatively immobile (ASTDR, 2005) but can be leached from soil under reducing conditions. However, because arsenic compounds tend to partition to soil or sediment under oxidizing conditions, leaching does not typically transport arsenic to great depths (ASTDR, 2005). Though arsenic was detected in two wells towards the center of the site, wells located closer to the Waimanalo Stream, the potential discharge point of groundwater beneath the Hardfill, did not have concentrations above the arsenic <del>or lead</del> screening levels. Therefore it is unlikely that the <b>current</b> arsenic <del>and lead</del> concentrations in groundwater detected in the center of the site potentially <b>discharging</b> to the stream would pose a risk to ecological receptors. In addition, the concentrations of <b>arsenic</b> detected in groundwater in the center of the site (BH-17 and BH-05), would be affected by natural process (i.e. sorption, dispersion) prior to reaching the point of exposure and <b>change the concentration measured in the interior wells relative to the point of discharge, where the concentrations would be</b> further diluted in the Waimanalo Stream, therefore slight exceedances in groundwater in the center of the site would likely be reduced to acceptable levels. Since the chemistry of arsenic indicates that it tends to bind to soil, and the detections of arsenic in groundwater are limited to the center of the site with no detections in the downgradient wells, it is unlikely that arsenic in groundwater poses and adverse ecological risk.</p> <p><b>Lead</b> was detected at an estimated concentration (0.0176 F mg/L at BH-11), above the screening level of 0.0056 mg/L. Lead typically exists in one of three oxidation states, +0, +2, and +4, and can be both inorganic and organic (when bonded with carbon). Lead is considered insoluble and has a typical distribution (sorption) coefficient (Kd) of 900 mL/g (DOE, 2002) to 1,830 mL/g (Streng and Peterson, 1989). Lead is typically found in the soil and relatively immobile (ASTDR,</p>

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				<p>2005) but can be leached from soil under acidic conditions. The downward movement of elemental lead and inorganic lead compounds from soil to groundwater by leaching is very slow under most natural conditions except for highly acidic situations (ASTDR, 2005). Lead was not detected in groundwater above the MRL at the Hardfill. The lone detection above the screening criteria was an estimated concentration. Groundwater wells downgradient from the detection did not show concentrations above the MRL. Since lead is insoluble and tends to bind to soil, and the downgradient concentrations are below the MRL, it is unlikely that the estimated concentration of lead detected in the groundwater sample from BH-11 poses an adverse ecological risk.</p>
3	5-11	5.3.6.1 Soil	See Item #1.	Concur. Please see response to comment 1.
4	5-11	5.4 Uncertainty Analysis	The first bullet states that the EPC takes the max concentration of the chemical detected and results in an overestimation of the concentration on site. By removing the 4,907 ppm value for lead, you have already biased the data and may have potentially resulted in an underestimation of the true concentration at the site.	Concur. As described in the response to comment 1, the removal of the 4,907 ppm was only in reference to the recommended limited removal action. The lead maximum concentration of 4,907 ppm was included and used as the EPC in the screening risk assessment (see Tables 5-4 and 5-7).
5	5-12	5.4 Uncertainty Analysis	If the method reporting limit is greater than the screening level, acceptable data to determine an exceedance quantitatively is not possible. Reporting limits need to be below the screening level to prove that the concentrations obtained are accurate. Any situation where the MRL > screening level needs to be re-evaluated. It should be noted that the levels for dioxins and certain PAHs are quite low and in these specific cases the MDL may be used as the screening level when appropriate.	<p>Concur. HODOH guidance addresses this situation that in cases where a screening level for a specific chemical is less than the MRL it is generally acceptable to consider the MRL in place of the screening level. Potential examples include the action levels for dioxin and some pesticides in soil and groundwater and action levels for carcinogenic volatile chemicals in indoor-air. (vol. 1, page 2-11). Section 5.4, third bullet will be changed as follows:</p> <ul style="list-style-type: none"> <li>• The MRLs for some samples collected were above the screening levels, such as the dioxin/furan congeners in groundwater. In some instances, soil samples were reported as non-detects (i.e. U-qualified), but the MRL was above the screening level. For example, surface soil sample locations</li> </ul>

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				<p>BH-19 (31.1 mg/kg) and BH-05 (20.7 mg/kg) contained U-qualified concentrations of arsenic that would have exceeded the ecological screening criteria of 20 mg/kg. It is unknown if these samples truly contain arsenic at concentrations above 20 mg/kg, although considering the concentration of BH-05, it is highly unlikely that an exceedence would exist. The analytical methods used were conventional EPA-approved methods that provide the lowest possible MRLs. It is not unusual for the risk-based screening levels to be lower than the best available MRL for the approved methods. <b>HIDOH guidance states that it is acceptable to consider the MRL in place of the screening level.</b></p> <ul style="list-style-type: none"> <li>• <b>Natural attenuation or dispersal of the COPECs or COPCs was not taken into account, which likely resulted in an overestimation of the EPC at the point of exposure for ecological receptors.</b></li> </ul>
6	6-1	6.2 Recommendations	You cannot say No Further Action and then say that LUCs (a selected remedy) will be in place at the site. Either it's a Category III NFRAP or it's a LUC ROD. Please indicate which direction you wish to proceed.	<p>Concur. Section 6.2 will be changed as follows:</p> <p>A Category III No Further Response Action Planned (NFRAP) is recommend for the Bellow Hardfill. <del>And that material be managed in place with Land Use Controls (LUCs)</del></p>
7	General		More information needs to be provided to indicate why certain decisions were made (e.g.- removal of 4907 ppm lead hit) and how accurate and appropriate the conceptual site model is for both ecological and human receptors.	<p>Concur. Please see response to comment 1 regarding the handling of the lead detections. The high lead detection was not removed in the exposure calculations. The conceptual site model (CSM) was developed using the best available information, which included site-specific information such as the facility and contaminant history, physical features of the site such as hydrology, hydrogeology, and topography, the results of an ecological survey and a site visit, and land use. Each of these elements are described in detail in Section 2 and again in Section 5.</p>