Comments

I4-6 **has not been ascertained. The DEIS also states that not all samples were analyzed for all constituents, further limiting the value of the data obtained in this study. Fifty seven (57) were analyzed for metals and explosives and an unspecified number was analyzed for all parameters. An argument was made that the latter unspecified number of samples represented samples collected during early stages of streamflow, and therefore should represent worse case scenarios. Although the so called "first flush" effect is well known in urban areas with high runoff potential such as**

I4-7 **Honolulu (e.g., De Carlo et al., 2004 and references therein), it has not been as clearly demonstrated for natural groundcover such as exists at MMR. Even if the**

I4-8 **assumption that these samples have the greatest likelihood of containing contaminants were true, good analytical practices require examination of a series of samples covering the duration of the event. Furthermore, only one set of samples from each stream was analyzed for furans and dioxins.**

The DEIS reports using both freshwater acute toxicity standards and also maximum contaminant level (MCL) criteria for drinking water as a comparison basis.

I4-9 Use of the latter is a conservative approach given that no surface water within MMR is used for drinking, but is appropriate as it allows consideration of potential future uses of water resources in MMR that differ from those currently in effect.

Although no freshwater acute toxicity standard was exceeded, certain parameters were found in concentrations that exceeded preliminary remediation goals (PRG) values for tap water, indicating some water contamination. Because PRG are set at values lower than the enforceable MCL, the DEIS claims no concern exists, as measured concentrations were within the human health risk range considered acceptable by EPA

I4-10 This claim would only be valid, however, if the sampling regime to characterize the aquatic environment were adequate, which is not the case. Results of biased sampling during a single event are insufficient to eliminate concern. Some organic contaminants (dioxins, furans) were hypothesized to be associated with suspended sediment rather than present in the aqueous phase. Risks from chlorinated pesticides were approximately 16 times above the 1 per million cancer risk, but within the range considered acceptable by EPA (10E-4 to 10E-6).

Gasoline constituents, the BTEX class, were the most frequently detected compounds, although at concentrations below their respective PRG. The DEIS claims that finding these and other volatile organics in low concentrations is not surprising given the use of gasoline-powered grass cutting equipment at MMR. **These findings are also**

I4-11 **suggestive, however, that gasoline residues may be distributed throughout the MMR area, and the reported findings do not preclude that gasoline residues might be present at considerably higher concentrations in other locations that were not sampled.**

Three other detects (out of the 57 water samples) included compounds associated with explosives (perchlorate, 2-4 DNT), although all were at concentrations below PRG. Four samples from early 2004 contained detectable amounts of RDX, two above the PRG, the other two below. **The latter findings, when combined with observations in**

2

Responses

I4-6
The number of samples and analyses was completed as outlined in the sampling and analysis plan. The samples analyzed allowed for an assessment of potential for off-site contamination.

I4-7
First flush as defined in the sampling analysis plan and Appendix G-1 is the first water to flow from the range during a stream flow event. First flush and peak flow tend to have the highest levels of contamination. Samples from first flush and peak flow were taken at MMR.

14-8
Four sets of samples form each stream flow event was analyzed for furans and dioxins. These were spaced throughout the event, including samples at first flush and peak flow, and thus sound analytical practices were used over the series of the event.

I4-9
The Army thanks you for your comment and appreciates your participation in this public review process. Your comment has been considered and has been included as part of the administrative record for this process.

I4-10
The EIS was prepared in accordance with the National Environmental Policy Act and with applicable federal and Army regulations. Review of the Draft EIS by the US Environmental Protection Agency found the document to be adequate.

I4-11
The sampling scheme, as described in the sampling analysis plan, provided a representative assessment of potential gasoline residues. A review of these data showed there is no impact to off-site receptors.

Comments

I4-12 **ground water and in lysimeter water samples described below, indicate that RDX contamination, albeit low based on existing data, has not been quantified statistically or reliably and appears sufficiently common within MMR to be investigated further.**

Iron (Fe) and thallium (Tl), both non-carcinogens, were measured at concentrations above the PRG, but not considered deleterious. High concentrations of Fe are common in Hawaiian soils, and suspended particles likely caused the Fe levels observed in water. A variety of other compounds were identified at concentrations below PRG, therefore were considered by the DEIS to be of no significant concern. Compounds associated with explosives, although found, were also at levels substantially

I4-13 below PRG. **These results, however, need to be considered with the caveat that they derive from an investigation that did not include a statistically defensible sampling frequency and/or event coverage.**

Total metal concentrations, except lead (Pb) and arsenic (As), were positively correlated with suspended solids, indicating that most metals were associated with soil particles **(this is an expected finding based on a large body of literature published over the years)**. Pb and As, however, were very infrequently detected according to the

I4-14 DEIS. The lack of correlation between the concentrations of the latter two elements and suspended solids is puzzling because both of these elements are highly particle reactive and are typically associated with iron oxides, some of the more abundant phases in Hawaiian soils (e.g., Hayes and Leckie, 1978; Irving, 1998: De Carlo and Anthony, 2002: De Carlo et al., 2004). The lack of correlation between Fe and As and suspended solids

I4-14 may indicate the presence of these elements in a different form, such as an organic compound or some uncharacterized complex.

Within pages 3-81 to 3-92, the Coastal Water quality section deals with nutrient and sedimentation effects on reefs. It discusses one incident of sediment discharge in 1976 that may have been associated with runoff from the OB/OD area and the measures

I4-15 taken since to prevent further runoff. The section refers to a 1977 study that describes recovery of the reef after the event. No significant details are provided otherwise.

Review of the section entitled: 2002-2003 Hydrogeologic Investigation. This section discusses the hydo-geologic setting of nine new groundwater wells and one rehabilitated well (from the 1994 Halliburton study) for water quality testing. It is stated on page 3-87 that six rounds of water sampling took place between Dec 2002 and January 2004.

Results of analysis of water samples collected between 2002 and 2004 indicates that a few compounds are present at concentrations above tap water PRG or EPA primary drinking water standards. RDX was found above the PRG once in December 2002 in well ERDC-MW-4A (0.62µg/L) and slightly below (0.48µg/L) the PRG in the following sampling. The explosive compound 2,4,6 TNT was also found, although below the PRG. Benzene was found in well ERDC-MW-3B at concentrations 3 times above the PRG but more five times below the MCL. Repeated sampling found benzene again at similar

3

Responses

I4-12
The sampling protocols were designed to sample the most likely mechanisms of contaminate dispersion in the areas of concentrated training activity. That results coupled with background samples indicate that there is no widespread explosive contamination at MMR.

I4-13
Environmental samples were collected in the areas of concentrated training activities, and therefore represent the most likely areas to contain substantial levels of contaminates.

I4-14
These metal compounds are at levels below PRGs, and therefore do not require further evaluation. Metal concentrations are common in soils in Hawaii.

I4-15
The EIS was prepared in accordance with the National Environmental Policy Act and with applicable federal and Army regulations. Review of the Draft EIS by the US Environmental Protection Agency found the document to be adequate. The Draft EIS listed all available and existing information about the study.

Comments

levels. Other fuel constituents, although detected at least once in all the wells, were at concentrations two orders of magnitude below the PRG.

Page 3-88 lists other compounds (organochlorine pesticides or dioxin/furan type compounds) found either below their respective PRG or between the PRG and the MCL. The DEIS mentions that, in the case of dioxins/furans, the compounds may have been associated with particles because the water samples were unfiltered and may have been introduced during well construction (the latter is something difficult to ascertain, suggesting further sampling is necessary). The next few paragraphs show that a variety of compounds (organic pesticides, plasticizers, perchlorates) were found repeatedly in the groundwater well samples… albeit at very low concentrations. A detection of toluene in several well samples was thought suspect because of its detection also in rinsate samples. Further clarification regarding the nature of the rinsate, its purpose within the quality assurance and quality control plan, and its chemical composition should be incorporated into the DEIS to assist in evaluating the significance, or lack thereof, of the detection of toluene.

I4-16

I4-17

Arsenic (As) was detected in samples from four wells during the first round of sampling, at concentrations 4 times below to just under the MCL. The lack of As detection in subsequent samplings was cited as a reason for suspecting this element was introduced into the groundwater during well construction. This, again, is difficult to ascertain or discredit without further sampling.

I4-18

Thallium (Tl) was detected repeatedly (i.e., during several sampling rounds) but generally in different wells. Only during the first sampling was Tl found above the MCL.

This section of the DEIS summarizes groundwater sampling as characterized by sporadic detects of various compounds/elements but not at concentrations that pose human health risks. The DEIS claims that the source of these substances is uncertain and may be recent introduction rather than transport of contaminated groundwater. It further states that continued monitoring will be performed to further reduce uncertainties. **It is important to point out that the extent of sampling carried out under this task is very limited and that extrapolation of the results described above to all of MMR is neither a scientifically prudent nor acceptable approach. Clearly what is necessary is more (areally and spatially) extensive monitoring!**

I4-19

Vadose Zone monitoring (page 3-90). The DEIS describes ground borings and installations of lysimeters in only three locations to monitor the vadoze (unsaturated) zone and evaluate potential downward migrations of contaminants. Two lysimeter locations were in the OB/OD area (B-1 and B-2) and one in the Junk Car pit (B-3). Sampling depths were 30 and 42 feet at B-1, and 30 and 45 feet at B-2. The depth of sampling at B-3 was 19 feet. Porewater samples were collected in April and June, 2003. Concentrations of RDX at B-1 were 4.8 mg/l at 30 feet and 2.9 mg/l at 45 feet, whereas concentrations at the B-2 were about one order of magnitude lower (0.027 mg/l at 30 ft, 0.033 mg/l at 42 ft). HMX (1.4 mg/l) was also found in the deeper lysimeter at B-1.

4

Responses

I4-16
Dioxin levels in groundwater samples are very low. Low levels of dioxin are common in the environment in Hawaii, as indicated by the results of the off-site sampling (Appendix G-1, Section 3.6). Additional sampling for dioxins is not warranted given the results.

I4-17
The QA/QC plan (in Appendix G-1) describes in details the rinstate procedures and methods and significance of a given analyses detection.

I4-18
Six rounds of ground water sampling were conducted on the Makua Water wells. Any significant concentrations of arsenic would have been detected in the subsequent sampling round.

I4-19
The results of the hydrogeologic investigation showed a high degree of consistency across the site. The purpose of the investigation was to establish the baseline conditions and the potential for off-site contamination. The sampling results adequately characterized the site.

Comments

I4-20 **Because only two episodes of lysimeter sampling were undertaken to acquire porewater, evaluation of the temporal variations in organic compounds within the unsaturated zone is clearly not possible.** Additionally, according to the DEIS, some lysimeters contained either no or insufficient water to allow the complete suite of analyses to be conducted, thereby further limiting the information obtained. Of the reported results, only carbon tetrachloride, chloroform, RDX and HMX were detected above EPA Region IX tap water RPG. Lysimeter samples from the OB/OD showed (not surprisingly) the highest concentrations of RDX and HMX. 2,4 DNT and tetryl were also detected in OB/OD area lysimeter samples. The DEIS summarizes the results to indicate that explosives have migrated at least 50 feet below the surface of the OB/OD area but claims that this area is not representative of Makua in general because the OB/OD area has been used extensively for detonation, whereas the rest of Makua has not. Furthermore, the DEIS claims that the composition of the soil below the OB/OD area is such that extensive migration at depth is unlikely. Lower concentrations of explosives in the "junk car" area are used in the DEIS to support the contention that the OB/OD area is not representative of Makua as a whole. Yet, the lack of deeper lysimeters precludes any

I4-21 reasonable evaluation of the potential for migration of materials throughout the rest of the unsaturated zone. Given that RDX and HMX are rather insoluble in water, the fact that detectable amounts of these compounds were found within the lysimeters (as well as in other samples described in earlier sections) suggests a potentially widespread distribution and that more elevated concentrations may occur within the ground at MMR.

The DEIS claims that soils from the boreholes in which the lysimeters were installed did not contain the explosives found in the lysimeter samples and implies that it is likely the compounds were not found because they are water soluble and little water

I4-22 exists in the dry soils of Makua. This implication is rather puzzling considering the relative insolubility of these compounds in water. The Merck Index of organic compounds states that RDX is relatively insoluble in water, whereas HMX is slightly soluble in water. **Given the detection of RDX in a variety of water samples from different sources, further sampling of soils should be undertaken to ascertain the**

I4-23 **accuracy of the alleged absence of these compounds within soils It is likely their distribution is highly heterogeneous, thereby requiring more extensive sampling.**

I4-24 The DEIS provides an example calculation of how much of the compounds in question would be found in (dry) soil with 3000 ppb RDX. The calculation assumes that about 1% water would occur in the soil, and subsequently assumes that the water in question would contain 3000 ppb RDX yielding a result of 30 ppb RDX in the soil as a

I4-24 whole. This calculation is rather naïve as it assumes that all the RDX in the soil itself would be associated with water. Because RDX is relatively insoluble in water, this (and similar compounds such as HMX) is (are) much more likely to be associated with the

I4-24 solid phase than with the aqueous phase. Hence although the 30 ppb calculated in the DEIS may be a value that is below the detection limit for RDX in soil, this calculation is flawed and misleading. The discussion shifts to how RDX-type compounds would bind to soils with a high organic content. Although RDX and HMX are more likely to have a high affinity for organic compounds than water, this alone has little bearing on the potential mobility of any RDX/HMX in the subsurface of MMR. The DEIS then claims

5

Responses

I4-20
It is common practice to collect groundwater samples over one year to evaluate the seasonal impacts from basinwide groundwater flow. The impact to the vadose zone by seasonal variation is limited; therefore, two rounds of sampling are acceptable to evaluate the vadose zone contamination that could potentially impact off-site receptors.

I4-21
RDX and HMX are not detected in the downgradient monitoring wells. The two boreholes B-1 and B-2 were placed in the regions shown from geophysical data to have the greatest potential for having been trenched. These areas would most likely contain the highest concentrations of RDX and HMX. Also, retardation rates of RDX and HMX in the vadose zone is well documented (ERDC, 2002) to occur the further from the source area that the RDX travels in solution. In order for the RDX and HMX to be of a concern, there has to be an impacted receptor. There is no known impacted receptor.

I4-22
The presence of these compounds in the lysimeter samples suggests that they are sufficiently soluble to be carried by water to the depths of the lysimeters. Lysimeters collect soil moisture by creating soil suction pressures lower than the surrounding soil.

I4-23
The sampling of all environmental media (including air, sediment, soil, surface ground water) present at MMR can be used to scientifically evaluate training (both historic and present) and the likelihood of contaminates being transported off MMR. The sampling of environmental data are reported in Appendix G-1.

I4-24
The calculations are made using practical worst case scenarios to evaluate the potential impacts to off-site receptors. Even using these practical worst case scenarios, impacts of RDX to off-site receptors due to surface water was found to be less than significant.

Comments

that, because of the affinity of RDX/HMX for organic matter and the fact that the abundance of organic matter decreases sharply with depth, relatively little RDX is expected to leave the surface and migrate downward in the OB/OD area. **This is**

I4-25 **nonsense, as in the absence of organic matter any RDX type compound would have a lesser tendency to bind to soils and should migrate more readily (potentially considerable distances/depths). Although the DEIS claims that there is no evidence that RDX (and presumably HMX) has (have) migrated to the groundwater aquifer, based on its absence in well MW-5 closest to this area, the occurrence of these compounds in lysimeter porewater under the OB/OD area suggests that it does indeed migrate downward. The significance or extent of RDX migration within or**

I4-26 **out of MMR, simply cannot be ascertained without analysis of a broader (temporal and spatial) suite of lysimeter samples collected throughout Makua.** Finally, the absence of RDX/HMX in water from well MW5, the well nearest the OB/OD area, is also used in the DEIS as evidence that these compounds have not migrated to the depth of the aquifer. Again, the absence of a compound in a given sample says absolutely nothing about any past or future conditions, it only indicates that the compound in question was not present at the particular time of sampling in that particular location. It is possible that preferential flow paths may exist in the soil at MMR and carry these compounds to other unsampled locations. Because activity in the OB/OD area has varied over time, it follows that the source of contaminants to the area also varied, and it is quite possible that higher concentrations of RDX/HMX occur below the two deepest lysimeters at B-1 and B-2.

I4-27 **This alone contradicts the Draft EIS assumption that concentrations of contaminants measured at B-1 and B-2 decrease below the deepest lysimeters.**

Section 3.8: Geology.

The DEIS states that "it is not appropriate to rely on individual sample results for comparison to the PRG's; a better approach is to use a set of samples collected over an area of exposure, or over a period of time, to evaluate the average concentrations to which people may be exposed." The DEIS further states that "EPA recommends using a statistical sample and comparing the calculated 95% upper confidence limit (UCL) of the sample set to the PRG's." **These statements indicate that the authors of the DEIS are**

I4-28 **clearly aware of the need to obtain sufficiently large data sets in order to have significant confidence in the results obtained from their investigation. This also supports our contention that more extensive sampling of various media (soils, water, etc.) in MMR is necessary to arrive at any statistically valid conclusion that no**

I4-29 **danger exists (or alternatively that danger does exist). The water sampling described in the sections prior to Section 3.8, however, fails miserably in this consideration alone.**

I4-30 Page 3-103: There is an **error** in the conversion between pounds and kilograms. The DEIS states that 113 lbs/yr/acre is equal to 250 kg/yr/acre (in parentheses); this is reversed. One kilogram equals 2.2 lbs;therefore, 250 lbs/yr/acre is approximately equal to 113 kg/yr/acre.

6

Responses

I4-25
Retardation rates of RDX and HMX in the vadose zone is well documented (ERDC, 2002) to occur the further from the source area that the RDX travels in solution. In order for the RDX and HMX to be of a concern, there has to be an impacted receptor. There is no known impacted receptor.

I4-26
The distribution of monitoring wells was designed to sample groundwater flowing from MMR that could potentially impact off -site receptors. Even assuming another contaminated site other than the OB/OD area or impact area, the monitoring well network would have evaluated impacts to off-site receptors due to ground-water flow. Therefore, additional lysimeters are not warranted.

I4-27
Please see response to Comment I4-26.

I4-28
The EIS was prepared in accordance with the National Environmental Policy Act and with applicable federal and Army regulations. Review of the Draft EIS by the US Environmental Protection Agency found the document to be adequate. Sampling and testing were conducted at MMR to evaluate the potential impacts to off-site receptors. The representative sampling scheme was performed and data analysis showed no potential for contamination to impact off-site receptors.

I4-29
Please see response to **Comment I4-28**.

I4-30
The text in Section 3.8.3 of the EIS has been revised.

Comments

2002-2003 field investigation by USACOE: 102 surface soil samples (18 subsurface), 11 streambed, 20 muliwai sediment samples, 6 reference soil samples were collected for analysis. **The collection of only 18 subsurface samples is clearly inadequate. One objective of the DEIS is to examine subsurface contamination not just surface contamination (although the latter is more likely to move NOW, subsurface contamination can also be mobilized upon erosion of the overlying surface soils). The 18 subsurface samples are additionally BIASED towards areas the Army expected contamination. This is scientifically unacceptable, although the intention was likely to present a potentially worse case scenario.**

I4-31

I4-32

The DEIS used "industrial soil" PRG in a comparison with the 95% UCL of sample results. This approach is deemed conservative as the upper (i.e., higher concentration) observed values are compared to PRG for industrial sites. The PRG for industrial sites are values below existing criteria for the given contaminants, and values towards which cleanup efforts should strive. The DEIS claims PRG for industrial sites represent conservative criteria, as it is assumed that "industrial workers" who would be exposed to the PRG levels of contaminants during a normal work-week for 30 years are unlikely to suffer any ill effects.

I4-33

On page 3-108, the DEIS reports concentrations of DNT (a component of explosives and also a breakdown product of TNT) ranging from 0.28 to 76 mg/kg (ppm). This represents a range of concentrations spanning three orders of magnitude and, although the DEIS states that this and other explosive compounds were always at concentrations below the industrial PRG, the occurrence of such a wide range of concentrations suggests that the distribution of explosive type compounds is highly variable within the sampling area. **Hence there is a significant probability that the area has not been adequately characterized or that hot spots of high concentrations exist but have not been identified.**

I4-34

I4-35

The comparison of metal concentrations in soil samples collected from MMR to those reported by Halbig (1985) for Big Island soils poses potential problems. Although the DEIS states that (natural) concentrations may vary between Oahu and Hawaii, it claims that the data provided by Halbig for the Big Island "may provide an indication of the normal range in soils derived from Hawaiian basalts." This is only partially true, because rocks and soils from the Big Island are much younger than those on Oahu, therefore soil pedogenesis associated with weathering of basaltic material has occurred to a much lesser extent there than on Oahu. Volcanic rocks from Oahu, especially the older rocks of the Waianae range, have weathered for much longer period of time, hence, metals may have leached out more extensively, possibly resulting in a lower background for Oahu than Hawaii. Additionally, it is imprudent for the USACOE to use data that are more than 20 years old when data are available from a substantial number of more recent investigations of trace elements in the Hawaiian environment, especially given that some of these studies were carried out on Oahu. The DEIS further states that 95% UCL of arsenic (As), lead (Pb) and selenium (Se) exceeded the background ranges reported by Halbig (1985). Of these three elements, As also exceeded PRG values based on a carcinogenic endpoint. Although the DEIS reports that As is used commonly in

I4-36

I4-36

I4-37

I4-38

7

Responses

I4-31
Sampling and testing were conducted at MMR to evaluate the potential impacts to off-site receptors. The representative sampling scheme was performed and data analysis showed no potential for contamination to impact off-site receptors.

I4-32
Please see response to Comment I4-31.

I4-33
The Army thanks you for your comment and appreciates your participation in this public review process. Your comment has been considered and has been included as part of the administrative record for this process.

I4-34
The environmental sampling plan was designed to sample all media that are likely to have contamination, i.e. air, soil, sediment, ground water and surface water. Further, samples were collected in the areas of concentrated training, as well as background areas to identify potential "hot spots". The representative sampling scheme was performed and data analysis showed no potential for contamination to impact off-site receptors.

I4-35
The Army thanks you for your comment and appreciates your participation in this public review process. Your comment has been considered and has been included as part of the administrative record for this process. In addition, the reference study was provided to support the discussion for background concentrations.

I4-36
Please see response to Comment I4-35.

I4-37
Please see response to Comment I4-35.

Comments

I4-38 rodenticides (it is also used in other pesticide preparations) and should be expected to be present at more elevated concentrations than background owing to the extensive development of Oahu, no reference supporting these arguments is presented. In reality the background for As in the fine fraction (< 63 μm) of uncontaminated stream sediments from forested areas of Oahu is only about 1.5 mg/kg (De Carlo, Tomlinson and Anthony, Applied Geochem, 2005), although concentrations in areas impacted by agricultural activities can be two orders of magnitude higher. Given that MMR has not been subjected to a high degree of development and that it is not downwind/downstream of highly

I4-39 developed or agricultural areas, concentrations of As in soils should be expected to be quite low, if no contamination has resulted from activities at MMR.

The DEIS states clearly on Page 3-110 that dioxins have been found in many surface soil samples and represent "a potential group of chemicals of concern." Equivalent toxicities, in terms of the 2,3,7,8-TCDD isomer, are calculated to allow comparison with the EPA Region IX industrial soil PRG. The average for the 102 surface soils collected is 0.00266 μg/kg with a 95% UCL of 0.00743 μg/kg. According to the DEIS, however, the 95% UCL represents a 4.64 $X10^{-7}$ cancer risk, which is considered acceptable for part time occupational exposure to these soils. Because dioxins are widely distributed throughout the environment and are derived from sources such as the burning of plastics, the DEIS claims that there is no evidence of a significant on-site source of contamination with respect to dioxins. **Although the source of the dioxins cannot be**

I4-40 **ascertained, it remains equally uncertain that there is no on-site source of these compounds. Owing to the frequent occurrence of burning in the OB/OD fires in other areas of MMR, it seems likely that the dioxins could, in fact, be locally derived, rather than atmospherically deposited. A means of evaluating this**

I4-41 **possibility would be to conduct dioxin analyses in suites of soil samples collected from various depths in areas that are known to have been disturbed (e.g., dug up for burning operations) and determine whether these samples contain higher concentrations of dioxins than observed on average at MMR.**

Although it is likely, as stated in the DEIS, that past activities at MMR have contributed to low levels of contamination with the various persistent organic compounds described in the section on "other chemicals of potential concern", the inadequacy of soil

I4-42 sampling and analysis does not allow a statistically defensible evaluation of the extent of contamination by such substances, irrespective of their original sources. Hence it remains impossible to reliably evaluate any potential impacts of these materials on the environment.

On page 3-226 of section 3.11.4 (Hazardous materials and wastes) the DEIS describes procedures for the disposal of excess propellant/charges remaining after completion of exercises and how the incinerated wastes (containing Pb, DNT, benzene and cyanide) are collected and disposed of. The DEIS states that these materials are treated as hazardous wastes, that samples of the hazardous wastes are sent out for characterization and that when storage containers are full, these are disposed of in accordance with hazardous wastes procedures. These procedures appear to be environmentally sound BMPs. It should be noted, however, that on the following page (3-

8

Responses

I4-38
The commentor notes that background arsenic concentrations in forested areas of Oahu are in the range of 1.5 milligrams per kilogram. However, the area in which soil samples were collected is not forested. The Affected Environment sections of the EIS describe past uses of Makua Valley that included agriculture and ranching. Concentrations above presumed background levels, or scattered elevated concentrations may be attributable to these past uses. Arsenic is also used as an herbicide, and it is possible that organic arsenical herbicides may have been applied in the past, but there are no records of such uses. Arsenic is found in numerous inhabited or agricultural areas throughout Oahu at concentrations above natural "background" levels. Arsenic, however, is not a significant constituent of military ordinance, and therefore arsenic concentrations are not expected to increase as a result of the project.

I4-39
In fact, prior to military use, as indicated in the EIS, Makua Valley was used for agriculture. Some of the non-military related compounds likely derive from that period of use.

I4-40
Dioxins have been demonstrated to be present outside Makua Valley at concentrations similar to those found in Makua Valley. It is widely accepted that dioxins have been deposited over great distances, and that some quantity of dioxins is derived from combustion from many sources. The evidence indicated no unusual concentrations of dioxins in samples from Makua Valley that would suggest an onsite source.

I4-41
The results of the hydrogeologic investigation indicate that additional dioxin analysis is not warranted at this time.

Comments	Responses
	(Cont.) I4-42 The EIS was prepared in accordance with the National Environmental Policy Act and with applicable federal and Army regulations. Review of the Draft EIS by the US Environmental Protection Agency found the document to be adequate. Sampling and testing were conducted at MMR to evaluate the potential impacts to off-site receptors. The representative sampling scheme was performed and data analysis showed no potential for contamination to impact off-site receptors.

Comments

227), the DEIS states that munitions residues and shell casings are often left on-site for extended periods of time and that these may leach out metals including Pb, Sb, Ni, and Fe into soils and water. Although most other residues (explosives, propellants) associated with these munitions are expected to be incinerated during firing and detonation, it is also possible that minor amounts remain and that these would be introduced into the environment at MMR. The DEIS is straightforward in identifying this potential contamination risk, although it is not quantified. The Army should incorporate within the DEIS any available findings from studies of post-detonation residues. Such information should be used to predict and estimate the levels of these contaminants that would result from the activities proposed by the Army.

I4-43

I4-44

The DEIS notes on page 3-230 (section on Chemicals of Concern Used in Training) a relatively widespread occurrence of compounds associated with explosives (e.g., DNT, TNT, HMX, RDX, etc.). Locations where these substances have been found include the OB/OD area, berms at Objective Deer, the weather station pan burn area, streambed sediments of Makua stream, the demo pit, and Objectives Wolf, Deeds, and Badger, although it is reported that none of the occurrences was at a concentration above the PRG.

Because Pb (and antimony, Sb) is (are) a common component(s) of ammunition rounds, and because mercury (Hg) fulminate is widely used as an initiator for explosives, it is anticipated that these substances might be more abundant at MMR than in other areas where munitions are not used. Backdrops of firing ranges are particularly prone to accumulation of these materials, although the highly volatile nature of Hg and its compounds suggests that it might be transported away (after firing/detonation) from the training site by predominating winds. The other two elements are much less volatile than Hg although both are relatively volatile when compared to elements such as Ni, Fe, and Cu. Therefore vaporization of some Pb and Sb is also anticipated, although impact of rounds on backdrops typically causes partial melting and fragmentation that typically lead to the accumulation of the materials in the soil. As a result of the above and the potential for these materials to subsequently leach and transport from soils, it is imperative that regular maintenance (and monitoring) be performed to ascertain that contamination not become an issue. The DEIS states that the presence of Pb can result in noncompliance with the Safe Drinking Water Act (SDWA) and/or Section 7003 of the Resource Conservation and Recovery Act (RCRA), although it also states that the US Army claims that such environmental authority does not reach active ranges. As a personal opinion, however, I would argue that legality is not an issue here and that the US Army should be obliged to evaluate impacts to the human environment as part of the EIS process. The DEIS also states that it is the position of the US Army that "prevention is the best course of action in an uncertain regulatory environment", and that guidance documents have been developed (USAEC, 1998) to provide "range managers and military and environmental personnel with management practices that minimize adverse effects to human health and the environment from small arms range operations." The DEIS further states that results of the hydrogeologic investigations reveal that the abundance of Pb throughout the MMR area is less than might have been anticipated. **Although this may be true as stated, it should be borne in mind that the sampling**

I4-45

I4-46

9

Responses

I4-43
The Army considered that some explosives would not detonate properly, and explained how unexploded ordnance from training activities is managed. The quantitative estimates of explosives residue take these conditions into account. See Appendix G-2. Minor amounts of explosive may be introduced into the environment, but based on existing studies cited in the Draft EIS, it is unlikely that any additional minor residues would have significant environmental impacts.

I4-44
These studies are cited in the impacts analysis and calculations are presented in Appendix G.

I4-45
This issue is captured by directly sampling the soil for lead and antimony. The results indicate the concentrations were within the acceptable range.

I4-46
The EIS was prepared in accordance with the National Environmental Policy Act and with applicable federal and Army regulations. Review of the Draft EIS by the US Environmental Protection Agency found the document to be adequate.

Comments

I4-47 **plan for soils/sediments, unsaturated zone water, and groundwater at MMR was inadequate and biased and that results are, therefore, not statistically valid.**

I4-48 **Furthermore, it cannot be ascertained by the aforementioned hydrogeological study that Pb contamination at MMR is indeed not migrating.** A vast body of peer reviewed scientific literature and technical reports describing studies conducted in a wide variety of environments, however, do support the contention that migration of Pb, a highly insoluble and particle-reactive element is unlikely in an environment such as that present at MMR (e.g., Hayes and Leckie, 1986, Irving, 1998; De Carlo and Anthony, 2002; De Carlo et al., 2004, 2005; Beltran and De Carlo, 2005). Should Pb, however, be present as a mobile organic complex, or should the soil be shown to be highly porous and allow

I4-49 penetration of fluids containing colloidal and fine particulate matter, or should erosional transport of particles by surface water be considerable, Pb might be removed from site. The likelihood of any of these possibilities should be considered. The above discussion clearly does not apply to other substances such as propellants and explosives, which have chemical properties that differ substantially from those of Pb.

The DEIS describes the common occurrence of pesticides, primarily herbicides, likely applied by DPW personnel in their efforts to control invasive weeds at MMR. Concentrations of pesticides in analyzed samples, however, are reported to be below the PRG. **Review comments regarding the statistical validity of results, as presented in the paragraph immediately above for heavy metals (e.g., Pb), apply here as well. This is particularly true in light of the report, in the DEIS, of concentrations of pesticides above the PRG in samples collected on 14 February 2003 from Kaiahi Gulch and Punapohaku streams.**

I4-50 On page 3-233, the DEIS refers to the 1994 Haliburton NUS study and the lack of detection in groundwater of a variety of potential pollutants or their detection at levels that were not considered of concern. It should be borne in mind that past review of the Halliburton study has determined that this study was inadequate, and one of the bases upon which the necessity for a full EIS was determined. Hence, although it is acceptable to refer to the study, results of said study cannot be used to support claims that contamination of groundwater does not exist as a result of past activities at MMR. Similarly, reliance on the 1999 Muliwai study conducted by EPA and Hawaii DOH (Baylor 1999) should be avoided, although in this case the study did reveal that concentrations of some metals, notably Cd, Cu and Cr, were above the NOAA Effects Range-low, and Ni, was above the NOAA Effects Range-Medium level. Because concentrations of Cu, Cr, and Ni in the Hawaiian environment are considerably higher than those observed in continental settings where NOAA criteria were developed (e.g., De Carlo and Spencer, 1995, 1997; De Carlo and Anthony, 2002; De Carlo et al., 2004, 2005; and others), the amounts of these metals reported in the Muliwai study are not surprising and have a reasonable probability of being of natural origin and likely pose no significant environmental concern. **The fact that Cd, however, exceeded the NOAA**

I4-51 **Effects Range-low criterion may be of some concern as this element is present in very low concentrations in the uncontaminated Hawaiian environment (e.g., De Carlo et al., 2004; 2005).**

10

Responses

I4-47
Please see response to Comment I4-42.

I4-48
Lead above PRGs was not detected above PRGs or drinking water standards in any of the water samples. If lead were migrating, it would have to show up in at least a few samples collected and analyzed by the laboratory at concentrations of concern. Lead is not a mobile compound in solution, and the EIS' assessment that lead is not a contaminant of concern to off-site receptors is consistent with data from other ranges.

I4-49
Please see response to Comment I4-48.

I4-50
The EIS was prepared in accordance with the National Environmental Policy Act and with applicable federal and Army regulations. Review of the Draft EIS by the US Environmental Protection Agency found the document to be adequate. The 1994 Halliburton NUS study was used as a reference in the EIS for background information and assessment purposes.

I4-51
The comment refers to the results of an EPA investigation of muliwai sediments described in the Affected Environment section of the EIS, and notes that several metals were found at concentrations above the Effects Range-low (ERL) criteron in reference muliwai sites. The Army performed its own investigation of muliwai sediments, which is described in the EIS. The ERL for cadmium is 1.2 milligrams per kilogram. None of the samples collected in the Army's muliwai sediment investigation exceeded the ERL. In fact, the highest detected cadmium concentration was about one-tenth the ERL. Based on these results, it does not appear that cadmium is a contaminant of concern in muliwai sediments downstream of MMR.

Comments

Page 2-234 of the DEIS describes briefly a more recent (2003) study of Muliwai during which 50 samples were collected and summarizes results of analysis. Of immediate concern is the fact that, although all samples were analyzed for metals and

I4-52 explosives, only a subset of ten (10) samples (and two duplicates) was subjected to a full complement of analyses that included organic compounds. The summarized results indicate that concentrations of metals in the Muliwai samples were within the range observed for samples collected in areas considered to represent background conditions but both As and Cr were present at concentrations above EPA Region IX PRG. The

I4-53 presence of Cr above the PRG latter is likely of no concern, given the high abundance (both absolute and relative) of Cr in the Hawaiian volcanic environment, however, exceedance of the As PRG may be of potential concern. Nearly all samples contained BTEX compounds, and a number of other organic compounds were detected in a

I4-54 significant number of the samples. The origin of the contaminants in question, however, remains quite uncertain.

The DEIS states in Section 4.7.3 Summary of Impacts (to water resources) that there is no anticipated (negative) impact of the project alternatives on surface or ground water although uncertainty exists with respect to tap water PRG for RDX. The DEIS further states that the "Army has adopted a conservative approach to evaluating this impact" and intends to conduct monitoring activities to evaluate surface water quality.

I4-55 **Although this might seem, at first glance, to represent good environmental stewardship on the part of the Army, it should be remembered that the current state of evaluation is quite uncertain and that a statistically valid evaluation of whether RDX and similar compounds are widespread and/or have migrated has not been conducted to date. There is, therefore, no current basis for determining that no**

I4-56 **significant impact is anticipated from the proposed activity. This should not be interpreted as an opinion on whether a significant impact is likely, but, rather, an opinion that investigations to date have been insufficient to determine whether contamination of water resources is likely on the basis of the potential for compounds such as RDX to migrate.**

The summary table on page 4-72 indicates that a significant impact, although mitigable to insignificance, may arise from the proposed activities with respect to surface water quality through soil erosion. Although statistical coverage is lacking for both the soil and the water quality sampling programs, the evaluations regarding potential for erosion are likely reasonable. Less than significant impacts to ground water quality are also anticipated under all proposed alternatives according to this summary table**. It is the**

I4-57 **latter entry, which, in our opinion, is potentially inaccurate, because it remains impossible, to date, to ascertain that certain substances do not or will not migrate to ground water resources and pose a contamination threat. The DEIS further states that, should proposed monitoring activities reveal "significant impacts" (which are not clearly defined), mitigation measures would be undertaken. This statement suggests that the Army remains uncertain as to the potential impacts of their**

I4-58 **proposed activities on ground water resources. Therefore further study should be undertaken to ascertain whether any significant impact is anticipated.**

11

Responses

I4-52
All of the samples were analyzed by the laboratory for the most likely chemical constituents of concern (metal and explosives), with a subset that included other possible contaminants of concern. In addition, the surface water sampling and groundwater sampling was analyzed for a full complement of constituents. The data sets (soil, surface water, and groundwater) complement one another, and support the assessment that contamination is not impacting off-site receptors from MMR.

I4-53
Arsenic is not likely to have been introduced as a result of military training. Arsenic concentrations on Oahu are known to be high in agricultural areas, but the source of any introduced arsenic at MMR is not certain. BTEX (benzene, toluene, ethylbenzene, xylene) is likely the result of use of small engines for weed management equipment. The observed concentrations are low and of no environmental significance.

I4-54
Pleas see response to Comment I4-53.

I4-55
Sampling was conducted of soil, surface water, groundwater with no pattern of contamination impacting off-site receptors shown. If there was widespread RDX or any other compound migrating to off-site receptors, some portion of the samples analyzed by the laboratory would have contained levels of these compounds; this is not the case.

I4-56
Please see response to Comment I4-55. The EIS describes the basis for the conclusion that RDX would not have significant impacts on the environment. There are several lines of reasoning used:

Comments	Responses
	(Cont.) I4-56 the quantity of RDX residue remaining after detonation of explosives containing RDX is low; this is supported by the observed lack of detectable RDX in soils or other media; the chemical behavior of RDX (soil water partitioning, low water solubility); the hydrogeologic environment of the site, which is characterized by a thick sequence of fine-grained soils overlying a confined aquifer beneath the impact area; lack of explosives detected in either surface water or groundwater samples; and hydrologic flow and transport modeling results. I4-57 See response to Comment I4-56. The evidence obtained from the baseline studies conducted at MMR, in light of the similarity of past training to future training conditions provides sufficient basis for the conclusions. I4-58 The EIS was prepared in accordance with the National Environmental Policy Act and with applicable federal and Army regulations. Review of the Draft EIS by the US Environmental Protection Agency found the document to be adequate. Moreover, the evidence available from the hydrogeologic investigation suggests that the impacts would be less than signficant.

Comments

Comments in the DEIS regarding potential for surface water contamination in the event of overland runoff (associated with high rainfall) are only reasonable if it is assumed that material transported and delivered by said runoff has a composition comparable to uncontaminated background soils/sediments. Within the context of MMR as a relatively dry area, where significant runoff events occur at relatively low frequency, the Army appears to reasonably portray the probability of infrequent runoff to streams, streambed sediments, muliwai and the ocean. **Unfortunately, any storm of sufficient intensity to cause widespread erosion and soil runoff at MMR would transport substantial quantities of materials. Therefore it is important to assess accurately the extent of any existing contamination at MMR that might be transported during such an event.**

I4-59

The discussion within Section 4.8.1 of the DEIS describes the methodology used by the US Army to assess impacts. The discussion mentions that PRG assigned by the EPA fall into two categories. One is for residential exposure; the other for industrial exposure. The former assumes that people will be exposed to the given concentrations (in the PRG) over their lifetime (childhood through age 70), while the latter assumes people will be exposed to the given concentrations during their working periods (30 years) only. Although I am not familiar with the numerical values of the given PRG for each category, it seems reasonable to assume that residential PRG would be lower than industrial exposure PRG. Therefore comparison of concentrations of potential contaminants in soils at MMR with PRG for industrial workplace exposure has the potential for painting a more optimistic picture than comparison with residential PRG. This arises because the Army uses the PRG as upper limits and claims that there has been little or no impact from their activities at MMR because the concentrations of potential contaminants observed at MMR fall below the PRG. In summary, comparison of concentrations of potential contaminants present at MMR to PRG for industrial exposure does not seem to be as conservative an approach as the DEIS implies it to be. It is appropriate for the Army to continue monitoring activities in order to ensure that unforeseen impacts do not go undetected. The proposed plan for monitoring activities needs to be carefully assessed, however, to ascertain that it is scientifically valid and of sufficient scope to ensure the detection of unanticipated impacts.

I4-60

I4-61

I4-62

Section 4.8.3 of the DEIS correctly summarizes that unmitigable impacts are likely to result from the various alternatives to proposed activities at MMR relative to soil erosion. It should also be noted that anticipated impacts with respect to soil contamination are reported in the same section to be less than significant. **This claim, in my opinion, cannot be made with reasonable certainty, because the sampling plan for soils was inadequate to evaluate soil contamination and does not allow a statistically valid evaluation of the effect of past activities at MMR or of the potential for future contamination.**

I4-63

The DEIS states that the impacts of fires under the "no action" alternative might be more severe owing to the delayed response to a fire (assuming an absence of personnel at MMR) and that more "fuel" would exist on site (assuming a lack of vegetative

12

Responses

I4-59
The hydrogeologic investigation provides an adequate assessment of the extent of existing contamination, and indicates that only minor quantities of explosives residues would be transported off-site.

I4-60
The residential PRG is not applicable or appropriate for comparison at a military installation in which there is only short-term and intermittent exposure, and no residential use.

I4-61
Please see response to Comment I4-60.

I4-62
The Army thanks you for your comment and appreciates your recommendations and will consider them as it moves forward with the NEPA process. Your comment has been considered and has been included as part of the administrative record for this process.

I4-63
Please see response Comment I4-42.

Comments

I4-64 control), but fails to indicate that the likelihood of a fire is lower under the "no action" option than under any of the other alternatives.

On page 4-95 of the DEIS, a claim is made that concentrations of As and Cr in soils, which exceed the EPA PRG, are likely derived from the occurrence of these elements in natural minerals and that the PRG are therefore inappropriate. Although I agree with this assessment as far as concentrations of Cr are concerned, I disagree with respect to As. **The potential sources of As at MMR should be evaluated further through more carefully and thoroughly carried out investigations.**

I4-65

The potential for impacts to coral reef resources by runoff/introduction of sediment or contaminants from MMR is described beginning on page 4-114. Under the no activity option, reference is made to enhanced runoff potential for soils if a rainstorm occurs after an unattended fire at MMR. It should be kept in mind that the Army's "no action" alternative basically assumes that Makua would be abandoned, with no management regime in place, if no training were to take place. This is unrealistic. If the Army ceased training at Makua, the area would be "excessed," either to U.S. Fish and Wildlife for management as a wildlife refuge or to the State. In any case, active management, including control of fires, would undoubtedly continue.

I4-66

The DEIS correctly indicates that a temporary reduction in coral productivity would occur owing to runoff of soils/sediment from land during/after a rainstorm. Because rainstorms are more likely to occur during the winter months and because wave activity is also greater during this period of the year, impacts from sediment inputs to coral reefs associated with the "no action" alternative are anticipated to be relatively minor as wave activity and the concomitant induced currents would quickly disperse sediments. It is likely that enhanced erosion potential under the other activity alternatives might lead to greater sediment input to the nearshore reefs, but given the infrequent occurrence of runoff events on the leeward coast of Oahu, the potential for impact may be less than significant, excluding major flood events. It is important to remember, however, that major flood events can have substantial impacts on coastal resources, although the extent and duration of impacts are dependent on a variety of parameters. What the impact on living coastal resources would be if a large flood event were combined with extensive contamination in the runoff remains uncharacterized.

I4-67

TIME CONSTRAINTS NECESSITATED STOPPING AT SECTION 4.11 HAZARDOUS WASTES.

REFERENCES

Beltran, V.L. and De Carlo, E.H. Variability of particulate metal concentrations during storm events in streams of a subtropical watershed. Chapter 15 in "Environmental Chemistry", E. Lichtfouse, S. Dudd, S. Robert, Eds. (Springer Verlag), 2005, 153-176.

Responses

I4-64
Section 4.14 of the Draft EIS found the wildfire ignition potential to be less than significant for the No Action Alternative. However, should a fire start, the impacts to environmental resources could be severe. The level of management and onsite staff is directly related to the level of activity at MMR. If no training or other activities are planned, there would be no need for permanent staff. Other human activity in the vicinity of MMR would contribute to the risk of fires. Campfires at the public area on Makua Beach are a significant potential source, as are cigarettes tossed from cars, and arson.

I4-65
Arsenic in soil at or below 20 milligrams per kilogram is considered background by the State of Hawaii Department of Health. Levels of arsenic in soil in all but one samples were below 20 milligrams per kilogram. Arsenic levels in water, also low, with only a few samples above drinking water PRGs. Arsenic is common in the background in Hawaii and many other states; levels reported by the laboratory were not above expected background levels.

I4-66
The Draft EIS represents the level of management that the Army expects to provide in the absence of training at MMR. Because future disposal of the property is not proposed at this time and identifying subsequent uses would be speculative, those actions are not considered components of the No Action Alternative. In addition, any actions beyond those addressed in this EIS would be assessed in a separate NEPA document, as stated on Page 2-8 of the Draft EIS.

I4-67
The model simulates suspended sediment discharge and stream discharge for the 100-year storm event. The EIS identifies soil erosion and sedimentation as a significant impact, that could result from out of control fires.

Comments	Responses
	(Cont.) I4-67 As discussed in response to previous comments, the evidence from the hydrogeologic investigation suggests that there would be no significant impacts from chemical contamination if live-fire training continued.

Comments

De Carlo, E. H. and Spencer, K.J. Sedimentary records of anthropogenic inputs of heavy metals to the Ala Wai a small man-made estuary in Honolulu, Hawaii. Pacific Science, (1995) 49(4), 471-491.

De Carlo, E.H. and Spencer, K.J., Retrospective analysis of anthropogenic inputs of lead and other metals to the Ala Wai Canal, Oahu, Hawaii. Applied Organometallic Chemistry, (1997) 11(4):415-437.

De Carlo, E.H. and Anthony, S.S. Spatial and temporal variability of trace element concentrations in an urban subtropical watershed, Honolulu, Hawaii. Applied Geochemistry (2002), 17:475-492.

De Carlo, E.H., Beltran, V.L., and Tomlinson, M.S. Composition of water and suspended sediment in streams of urbanized subtropical watersheds in Hawaii. Applied Geochemistry, (2004) 19(7):1011-1037. doi:10.1016/j.apgeochem.2004.01.004

De Carlo, E.H., Tomlinson, M.S., and Anthony, S.A. 2005. Trace elements in streambed sediments of small subtropical streams on Oahu, Hawaii: Results from the USGS NAWQA Program. Applied Geochemistry, **In press**

Hayes, K.F., Leckie, J.O. 1986. Mechanism of lead ion adsorption at the goethite-water interface. In: Davis JA, Hayes KF (eds) Geochemical processes at mineral interfaces. ACS, pp 114-141.

Irving, M.M. 1998. An investigation of reactions among heavy metals and naturally occurring minerals in synthetic and natural stream waters. Ph.D., Dissertation, Department of Chemistry, University of Hawaii at Manoa, Honolulu.

Responses

Letter I5

Comments

FROM: FREDERICK A. DODGE, MD
86-024 GLENMONGER ST.
WAIANAE, HI 96782

TO: ARMY CORPS OF ENGINEERS

RE: MAKUA DRAFT EIS 10-6-05 PAGE 1

I5-1 In spite of all the effort and expense that went into this draft, it is inadequate and fails in at least the following areas.

I5-2 1. You did not adequately explore alternatives to training at Makua. The military's use of Makua is a convenience rather than a necessity. For example Schofield could be used. The expense of setting this up would be offset by the savings in the cost of transportation of troops, equipment, munitions, etc. The EIS lacks adequate cost analyses in general.

I5-3 2. You failed to complete contamination studies required under paragraph 6a of the Settlement Agreement of October 4, 2001. Hydrological investigations are incomplete. There is no testing of biological receptors in the valley, muliwai and ocean. The Makaha Valley aquifer must be tested for the
I5-4 chemicals of concern, including RDX and HMX, Dioxin, PCB's, Thallium, lead, aluminum, chromium (including chromium 6), iron, arsenic, benzene, and pesticides, especially Heptichlor

I5-5 3. You failed to complete the surface and subsurface Archeological surveys as required under the Settlement Agreement—and as requested by the community during scoping.

I5-6 4. The relationship between the Stryker Brigades, transformation, and Makua needs to be elucidated in detail. This must include but is not limited to the effect of the Stryker vehicle on Makua and on our roads.

Responses

I5-1
The EIS was prepared in accordance with the National Environmental Policy Act and with applicable federal and Army regulations. Review of the Draft EIS by the US Environmental Protection Agency found the document to be adequate.

I5-2
The EIS considered other alternatives in Section 2.5. The EIS now includes evaluation of an alternative in which training proposed for MMR would be conducted at the Pohakuloa Training Area, island of Hawaii (See Chapter 2 for a description of this alternative). This alternative was added in response to public comments received on the Draft EIS. Use of MMR, however, remains the preferred alternative.

I5-3
The Army conducted additional field work in August 2006 and completed the marine resources study in January 2007. A copy of this report is included in the EIS as Appendix G-8. Based on the results in the 2007 report, it does not appear that training activities at MMR contribute to contaminants detected in the marine resources.

I5-4
A review of the results of the hydrogeologic investigation (Appendix G-3) shows that groundwater beneath the training area in Makua Valley is moving to the west, away from Makaha Valley. Because Makaha Valley is not downgradient of the training area, it could not be impacted by activities in Makua Valley.