State of California

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MARE ISLAND
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Memorandum

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Date: January 11, 2007

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Subject: **Draft Final Investigation Area F2 (IR04) Remedial Investigation, Mare Island, Vallejo, California for the former Mare Island Naval Shipyard, Solano County (SITE # 201208).**

The California Department of Fish and Game, Office of Spill Prevention and Response (DFG-OSPR) appreciates the opportunity to review the subject Draft Final Investigation Area (IA) F2 (IR04) Remedial Investigation (RI) at the former Mare Island Naval Shipyard. This document was received electronically by DFG-OSPR on December 19, 2006, although it was dated September 1, 2006. Comments were requested by October 2, 2006.

Background

The former Mare Island Naval Shipyard is in Solano County, about 25 miles northeast of San Francisco. Reuse plans for this area include industrial redevelopment, open space, and wetlands. IA F2, also known as Installation Restoration (IR) Site 04 (IR04), is a 20-acre site in the southeastern portion of Mare Island. The area was formerly tidal wetland that has been covered with imported upland fill and dredge material. IA F2 was divided into four subareas: the Building 1300 (0.7 acres), volatile organic compound (VOC, 0.24 acres), sandblast material (SBM, 14.9 acres), and other upland subareas. Since the 1950s, the area was used for sandblasting off paint from ship and submarine components, re-painting them with anti-corrosive and anti-fouling paint, and disposing of SBM and paint wastes. Spent SBM was dumped directly onto the ground in both upland and wetland areas and into Mare Island Strait. Originally, disposal of paint wastes into the storm sewer system occurred, followed by discharge into the industrial waste water system. Three paint-can disposal pits were also found in the VOC subarea. Electrical substations and transmission towers are present in IA F2.

The DFG is the State's trustee for fish and wildlife resources pursuant to Fish and Game Code section 711.7 and is also designated to act on behalf of the public as trustee for natural resources pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 107 (f)(2)(B). DFG-OSPR did not receive or review the draft version of this document, which was dated April 2003.

General Comments

1. The ecological risk assessment (ERA) should be revised to address the comments below. These issues include the need for additional receptors and revisions to proposed exposure factors, the inappropriate use of bioavailability adjustments, modifications to the Mare Island tissue data, the further evaluation of chemicals for which the low toxicity reference value (TRV) based hazard quotient (HQ) exceeds one, and the need to incorporate available TRVs, benchmarks, and bioaccumulation models.

    a. The more recent ecological soil screening levels (Eco-SSLs) for terrestrial plants and soil invertebrates (http://www.epa.gov/ecotox/ecossl/) should be considered in addition to the Oak Ridge National Laboratory (ORNL) benchmarks.

    b. The T20 concentrations from the logistic regression models for amphipod toxicity (Field et al. 2002) would also be applicable sediment benchmarks for benthic invertebrates.

    c. Both a small mammal and insectivorous bird receptor for the upland habitat should be added. The upper trophic level receptors address the bioaccumulative compounds and, although they generally have larger home ranges, a site use factor (SUF) of one was used for all receptors in both the screening-level ERA and the Step 3A risk refinement. However, many of the chemicals of potential ecological concern (COPECs) are metals for which small mammals with higher incidental soil ingestion and insectivores may be at greater risk. In addition, the California ground squirrel, due to its burrowing activities, could be exposed to VOCs in burrow air and to soil contaminants over a greater depth range. The Northern Harrier and gray fox forage in wetland habitats in addition to using uplands. Therefore, these two receptors should be evaluated in the ERA for both habitat types. The table below summarizes the current and recommended receptors by habitat type.

	Herbivorous / Omnivorous Small Mammal	Insectivorous/ Invertivorous Bird	Carnivorous Mammal	Carnivorous / Piscivorous Bird
Upland	*California vole* *Ornate shrew* *California ground squirrel*	*Meadowlark* *Sparrow* *Finch*	Gray fox	Northern Harrier
Wetland	Salt marsh harvest mouse	Killdeer	*Gray fox*	*Northern Harrier*
Intertidal Mudflat	*Raccoon*	Killdeer	River otter	*Osprey*
Subtidal open water	May not be necessary	Surf Scoter	River otter	*Osprey*

Recommended additions are in italics and current receptors are in normal font. In the case where multiple species are listed in a single cell, these are examples of potential species that could be selected to represent this feeding guild.

2. The RI speculates about the presence of many fish and wildlife species that may be important in ERA and the selection of suitable DFG ARARs for IA F2 for consideration in the Feasibility Study (FS). Additional focused surveys may be necessary to characterize terrestrial and aquatic habitats at IA F2 prior to the FS.

Specific Comments

Main Text

1. Page ES-6. One of the items in the Conclusions and Recommendations section addresses total petroleum hydrocarbons (TPH) contamination. A brief explanation of the CERCLA authority for petroleum would be helpful with respect to the petroleum exclusion. It appears that some of the TPH contamination that is referenced here may be subject to CERCLA, if hazardous substances were added to refined oil products. This should be clarified. Also, the reference to the concentrations of TPH decreasing over time from natural attenuation should be substantiated and a relative time frame added.

2. Pages 1-26 to 1-28, Section 1.2.4.5.

    a. Two active Osprey nests were seen by DFG-OSPR personnel during a site visit in April 2005. These were on man-made structures at south Mare Island near Mare Island Strait. These were incidental sightings and it is possible that other active nests for this species may also be present near IA F2.

    b. Plant species present likely include the Mason's lilaeopsis (*Lilaeopsis masonii*), state listed as Rare and a California Native Plant Society List 1B species. This minute, turf-forming, perennial plant has been documented in the Napa River estuary and may be found at F2 in intertidal areas.

    c. Species of crabs likely present at least seasonally in the offshore areas include the dungeness crab (*Cancer magister*).

    d. The reference to steelhead entering Mare Island Strait is correct and this species spawns in tributaries of the Napa River.

    e. The state and federally endangered salt marsh harvest mouse and California Clapper Rail are likely present in the tidal wetlands at F2, as well as the state threatened California Black Rail. The statement on Page 1-25 that the Clapper Rail is not found at F2 should be substantiated.

3. Page 1-30, Section 1.2.5. The list of potential contaminant sources should include the electrical transformers as mentioned later under potential contaminants. Also, prior to 1972, paint wastes discharged into the sanitary sewer system were treated to the standards of the time, and then discharged as treated effluent into San Pablo Bay. In addition, combined storm water and

wastewater overflows occurred episodically and discharged untreated flows into the strait. Therefore, storm water and sanitary sewage effluent should be considered potential sources to the tidal wetlands, mudflats, and open water of IA F2.

4. Page 1-32, Section 1.2.5. Exposure pathways to ecological receptors should include ingestion of surface water and inhalation, particularly for VOCs and burrowing animals.

5. Page 1-32, Section 1.3.2 and Table 1-5. Step Two of the data quality objectives (DQOs) should include surface water as well.

6. Page 1-33, Section 1.3.4 and Table 1-5. Step Four includes depth of exposure for wildlife as 2.25 feet. That depth does not address known burrowing depths for ground squirrels or plant root depths (Hampton 2006) and state ERA guidance on exposure depths to 6 feet (DTSC HERD 1998). The potential for burrowing by ground squirrels and other mammals deeper than 2.25 feet was also evaluated recently with respect to design of biotic barriers at the Mare Island IA H1 landfill cap.

7. Page I-40, Section 1.4.5. The definitions of surface and subsurface soils as used on the subsequent tables should be included. The addition of a column on each summary table that enumerates the number of samples exceeding the 95th percentile Mare Island artificial fill ambient value for each chemical would be helpful.

8. Page 1-50, Section 1.7.2.4. Exposure pathways for vertebrates should include ingestion of surface water.

9. Page 1-50, Sections 1.7.2.5 and 1.7.3. DFG-OSPR supports the protection of wildlife as both individuals and populations and it is our opinion that protection of an individual of a species from the toxic effects of a chemical contaminant(s) is protective of the population. Apart from plants, invertebrates, and perhaps fish, we know of no acceptable adverse effects level or criterion that is unequivocally protective of mammal and bird populations. Therefore, protection of the individual, as implied by use of the no adverse effect TRV, is the most protective or conservative means of assuring animal populations are not adversely affected by chemical contaminants.

10. Page 1-50, Sections 1.7.2.5 and Table 1-5. This section and the DQO table should list out the specific ecological receptors evaluated for each subarea and the feeding guilds for which they are surrogates (*e.g.*, salt marsh harvest mouse for herbivorous small mammals in the tidal wetland subarea).

11. Page 1-53, Section 1.8. DFG-OSPR has not received a request for Applicable or Relevant and Appropriate Requirements (ARARs), but can provide them upon request.

12. Page 2-6, Section 2.3.6 and Pages 2-7 and 2-8, Section 2.4.

    a. In addition to TPH as motor oil, TPH as diesel, chromium, and semi-volatile organic compounds (SVOCs) exceeded the screening criteria for soil in the Building 1300 subarea (Section 2.3.3.1). Furthermore, all detected chemicals were evaluated in the screening level ecological risk assessment (SLERA). Therefore, this section should describe the results of the SLERA including any chemicals for which low TRV based HQ exceeded one. In addition, the frequency of exceedance (at least three locations) should not be used to eliminate further consideration of these hotspots for other chemicals.

    b. The evaluation of foraging range relative to site size should include a small mammal receptor as well, which typically have a much smaller home range than the gray fox or Northern Harrier. For example, the California vole that is known to occur in the uplands of IA F2 has a home range of 0.021 to 0.029 acres based on a Richmond field station study (Ostfeld 1986). This species is an expected prey item for both the gray fox and the Northern Harrier.

13. Table 2-1. As listed on the table, only two surface soil samples were collected for metals analysis. Since the depth range considered "surface soil" is not defined, it is unclear whether this is due to the limited soil on top of or in cracks in the pavement or limited sampling directly underneath the pavement. However, given the number of surface soil samples analyzed for other chemical groups (up to 16 samples), this may be a data gap for metals at Building 1300 subarea, particularly given the extensive use of metal-containing paint and dip-tank solutions.

14. Page 3-2, Section 3.1.3. The text in this section states that the excavation at the paint can disposal area continued until confirmation results were below the industrial preliminary remediation goals (PRGs). However, Section 3.3.3.1 describes results from three surface soil samples located at the perimeter of the excavation with VOC concentrations above the industrial PRGs. This discrepancy should be addressed.

15. Page 3-3, Section 3.3.2.1. Please describe the source and sampling results for the clean fill used to backfill the excavation at the paint can disposal pits.

16. Page 3-5, Section 3.3.3.1. If available, the 0 to 0.5 foot and 2-foot or deeper sample results for lead at location 04GB044, where lead was 5,740 mg/kg at 1.5 foot depth, should be added to the table. If not available, this deficiency may be a data gap given that the concentration may be higher at the ground surface and the vertical extent is not bounded. In addition, the general location of and the presence of SBM, scrap metal, or paint chips in the soil boring from this location should be described.

17. Page 3-6, Section 3.3.3.2. Given the high lead hit described above, the presence of SBM, and the use of metal-containing paint in this subarea, the lack of metals analysis for any groundwater samples should be identified as a data gap.

18. Page 3-9, Section 3.3.6. Burrowing animals can be exposed via inhalation to VOCs in burrow air. Furthermore, this pathway can and should be evaluated as illustrated by the work done at Edwards Air Force Base (Spring et al. 2004).

19. Section 3 Figures. A figure showing the distribution of lead sample results similar to Figures 3-1 to 3-3 for VOCs should be included.

20. Table 3-2. The results of a subset of metals are included on this table compared to Table 2-2. The results for aluminum, arsenic, barium, beryllium, mercury, selenium, and thallium should be added.

21. Page 4.2, Section 4.1.3 and Figure 1-5. There is a reference here to a portion of the wetland and tidal mudflat habitats having been regraded as part of the UXO investigation. However, Figure 1-5 only shows the boundary of excavation within the area designated as tidal wetland. Please clarify whether the areas of excavation and regrading are the same. If not, please add the area of regrading onto the figure as well. Both excavation and regrading likely altered the hydrology of these areas, possibly having an effect on fish and wildlife species that may be present, and also the potential for contaminants to move via surface runoff or tidal flow.

22. Page 4-6, Section 4.3.3.1. Please list the location at which the maximum concentration of chromium was detected.

23. Page 4-7, Section 4.3.3.1. A distribution map for lead concentrations would be helpful in evaluating the extent and distribution of lead contamination for ecological risk purposes.

24. Pages 4-13 to 4-20, Section 4.3.6. In the summary tables for each habitat, all chemicals for which low TRV HQs exceed one for vertebrate receptors should be included.

25. Page 4-20, Section 4.3.6.4. Risk to plants was not evaluated for the offshore habitat "because it is not vegetated." Although emergent vegetation is not present in the offshore habitat, risk to aquatic plants and algae such as described on Page 1-26 should be evaluated. For vertebrates, the second paragraph refers to mammals, but the text in the second sentence mentions risk to birds and should be revised.

26. Page 5-9, Section 5.3.6. As described in Section 3.3.6, the VOC Subarea data was evaluated as part of the Other Upland Subarea for the ERA. This information should also be mentioned in Section 5.3.6.

27. Pages 5-9 and 5-10, Section 5.3.6.1. The text states "no chemicals were identified to pose unacceptable risk to vertebrate receptors," but the table includes aluminum with low and high TRV HQs above one for the gray fox. This inconsistency should be corrected.

Appendix H, Statistical Analysis of Soil and Groundwater

28. Page H-2, Section 2.0. In calculation of total concentrations for organic chemical groups such as total polycyclic aromatic hydrocarbons (PAHs), only detected chemicals were included. We recommend non-detected values be included at one-half the method detection limit.

Appendix J, Ecological Risk Assessment

29. Page J-8, Section 2.2.3. Special status species information should be updated periodically with information from the DFG's California Natural Diversity Database (CNDDB). The CNDDB can be accessed via the following site: http://www.dfg.ca.gov/whdab/html/cnddb.html. Data is available through the CNDDB digitally or as hard copy, in addition to the information that is available at that URL. Products include a personal computer application called Rarefind, hard copy graphic overlays at 1:24,000 scale, and printed text reports. Please call (916) 324-3812 with regard to any requests for additional information about the CNDDB.

30. Page J-9, Section 2.3.1 and Page J-34, Section 5.1. The text in these two sections refers to either no surface water or surface water only in Mare Island Strait. Surface water of varying salinity is present in the tidal wetland based on the topography, tidal cycle, and season. Surface water covers the intertidal wetland daily depending on the tides, and is always present in the offshore subtidal habitat. These sections should be revised to address these issues and to specifically include salinity information, as available. Marine bird species, in particular, are known to consume salt water.

31. Page J-12, Section 2.4.2.5. Refer to specific comment 17 above regarding the need to evaluate the inhalation exposure pathway for ecological receptors.

32. Pages J-13 and J-14, Section 2.4.3. Refer to specific comment 7 above regarding the protection of wildlife as individuals and populations.

33. Page J-15, Section 2.4.3 and Table J-8. Please refer to general comment 1 above. The assessment endpoints should be identified by the habitat type(s) for which they will be evaluated. In addition, the screening benchmarks listed for plants specifically apply to terrestrial plants only. The text "for plants" should be changed to "for terrestrial plants."

34. Pages J-36 to J-41, Section 5.2.

    a. For each vertebrate receptor, the term "ingestion rate $_{total}$" should be replaced with "ingestion rate $_{food}$" since it was calculated as a food requirement (Nagy 2001). Incidental ingestion of soil or sediment should not be subtracted from the "total ingestion rate" since it does not provide caloric energy. The row labeled "ingestion rate $_{prey}$" should provide ingestion rates for particular prey items based on diet. For example, the northern harrier table would have a row labeled "ingestion rate $_{small\ mammals}$" with a value equal to the "ingestion rate $_{food}$" and a comment of "assumed diet of 100 percent small mammals."

    b. The text refers to "maximum clam tissue and maximum co-located sediment concentrations." The bioaccumulation factor (BAF) should be calculated as the maximum or median of the individual ratios of co-located tissue and sediment/soil concentrations (both as dry weight).

35. Page J-36, Section 5.2.1. The 90th percentile value of soil in the diet (5.7 percent) estimated for Red-tailed Hawk (U.S. EPA 2005) is more appropriate for the Northern Harrier based on similar diet of small mammals as compared with the largely piscivorous Bald Eagle.

36. Page J-37, Section 5.2.2. For Killdeer, the mean percent of soil in diet for the four sandpiper species (Heijerick et al. 2005) is recommended. The use of the specific value for the Least Sandpiper is not justified unless information is provided that suggests the Killdeer life history is more closely related to that species as compared with the other three sandpipers. For foraging area, specific home range information is preferred to a linear distance between the nest or roosting and foraging locations. Therefore, we recommend the use of the mean home range (95% kernel, 7.73 ± 3.19 km^2) of 24 radio-tagged Killdeer in Willamette Valley in Oregon (Sanzenbacher and Haig 2002).

37. Page J-39, Section 5.2.3. As part of the ERA at Alameda, a Surf Scoter home range based on a 3 km diameter was used. This value was derived from radiotelemetry study in Puget Sound (Takekawa, personal comm.) as mean of two years' mean number of locations (2.5 and 3.9) visited as defined by 1 km diameter areas. We recommend utilizing this value at Mare Island as well.

38. Page J-41, Section 5.2.5. The recommended home range value for the salt marsh harvest mouse (0.213 ha) is the mean minimum convex polygon of males and females radio-tagged and monitored for approximately 8 days each during 1991 to 1992 period at Mare Island (Bias and Morrison, 1999).

39. Page J-42, Section 5.3 An extensive review by Talmage and others (Talmage et al. 1999) and an Army technical report (Kuperman 2003) provide screening ecological benchmarks for many explosives that should be considered. In addition, recent work by the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) includes TRVs (http://chppm-

www.apgea.army.mil/erawg/tox/) and bioaccumulation models (http://el.erdc.usace.army.mil/arams/pdfs/usachppm.pdf) for explosives and other military-associated chemicals that could be used to determine specific risk-based values for Mare Island receptors.

40. Page J-47, Section 5.3.1.2, Page J-51, Section 5.3.2.2, and Pages J-136 to J-140, Section 8.4.3.1. No and/or low observable adverse effect level (NOAEL and LOAEL) TRVs are available for cobalt (http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_cobalt.pdf) and silver (http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_silver.pdf). In addition, TRVs for endrin are also applicable to endrin aldehyde and endrin ketone based on similar physical chemical properties and existing regulations applicable to all three compounds (http://www.atsdr.cdc.gov/toxprofiles/tp89-c7.pdf).

41. Pages J-51 to J-53, Sections 5.4.1 and 5.4.2. COPECs with low TRV HQs greater than one should also be listed as posing "potential risk" in addition to those posing "unacceptable risk" (high TRV HQ above one).

42. Page J-55, Section 6.4.1. Literature BAFs or regression models could over or under estimate site-specific bioaccumulation depending on many factors including the duration of exposure, exposure media, laboratory or field exposure, and chemical species.

43. Page J-55, Section 6.4.2. See comment on Section 2.4.3 above.

44. Page J-65, Section 8.1. The text mentions that statistical comparisons were done between data for each subarea and for the Mare Island ambient artificial fill. It would be helpful to describe the type of statistical tests that were done. Furthermore, since the Mare Island ambient artificial fill values are the 95th percentiles of the data, the 95th percentile of the site data should be used for comparison, rather than the 95UCL of the mean.

45. Pages J-67 to J-85, Section 8.2.2.

    a. The text in this section repeatedly refers to HQs indicating relative concentrations of site and ambient data when the concentrations are directly comparable. For example, "the HQ_{amb} is greater than the HQ_{avg}, which indicates that the 95UCL for cadmium is less than ambient." A direct comparison between concentrations rather than HQs is preferred. In the example above, revised text could be "as shown on the table on Page J-67, the 95UCL (3.36 mg/kg; or 95th percentile as recommended above) for cadmium is less than Mare Island ambient (5.2 mg/kg)."

    b. The table for each habitat currently has "NA" for any chemical for which the 95UCL could not be calculated due to detection frequency. The maximum concentration should be included in the table instead with a footnote noting the distinction as on Page J-102.

c. The use of benchmarks for soil contaminants and terrestrial plants should be applied cautiously to wetland plants and sediment for which specific benchmarks are not generally available. This issue should also be addressed in the uncertainty section.

46. Pages J-67 to J-75, Section 8.2.2.1 and Page J-89, Section 8.2.4. The maximum and 95UCL exposure point concentrations (EPCs) as well as the concentrations in over half the individual samples for cobalt, copper, and lead exceed both the ORNL and Eco-SSL plant benchmarks. Therefore, we recommend these chemicals be evaluated further for potential risk to upland plants (SBM subarea).

47. Pages J-75 to J-81, Section 8.2.2.2 and Page J-89, Section 8.2.4. The maximum and 95UCL EPCs as well as the concentrations in over half the individual samples for copper exceed both the ORNL and Eco-SSL plant benchmarks. Therefore, we recommend copper be evaluated further for potential risk to wetland plants (SBM subarea).

48. Page J-89, Section 8.2.3. Several recent reviews (Greenberg 2003;Efroymson et al. 2004;Kapustka 2004) discuss PAH and TPH toxicity to plants and this information should be incorporated into the text.

49. Pages J-90 to J-121, Section 8.3. Please refer to general comment one above. The text in this section repeatedly refers to HQs indicating relative concentrations of site and ambient data when the concentrations are directly comparable. A direct comparison between concentrations rather than HQs is preferred.

50. Pages J-91 to J-94, Section 8.3.1.1 and Page J-107, Section 8.3.2. The text states, "the toxicity of antimony to invertebrate species is not well studied...It is therefore impossible to make a risk determination." The Eco-SSL for soil invertebrates is 78 mg/kg for antimony and is above the maximum soil concentration for this habitat. Therefore, we concur with no further evaluation, but request that the text for this discussion be revised to incorporate more recent research and available benchmarks.

51. Pages J-94, Section 8.3.1.1 and Page J-120, Section 8.3.4. The maximum and 95UCL EPCs as well as the concentrations in over half the individual samples for zinc exceed both the ORNL invertebrate benchmark. A review of zinc toxicity to soil invertebrates also indicates these concentrations may exceed no observable effect concentrations (NOECs) for some invertebrate species (Lock and Janssen 2001). Therefore, we recommend zinc be evaluated further for potential risk to soil invertebrates (SBM subarea).

52. Pages J-97, Section 8.3.1.2 and Page J-120, Section 8.3.4. The maximum and 95UCL EPCs as well as the concentrations in over a third of the individual samples for zinc exceed both the Effects Range-Median (ER-M) and the T20 (94 mg/kg) and T50 (245 mg/kg) concentrations (Field et al. 2002). Therefore,

we recommend zinc be evaluated further for potential risk to benthic invertebrates (SBM subarea).

53. Pages J-99 to J-100, Section 8.3.1.3 and Page J-120, Section 8.3.4. The maximum and 95UCL EPCs as well as the concentrations in 29 percent of the individual samples for chromium exceed both the ER-M and the T50 (141 mg/kg) and T80 (410 mg/kg) concentrations (Field et al. 2002). The maximum and 95UCL EPCs as well as the concentrations in 96 percent of the individual samples for nickel exceed both the ER-M and the T80 (147 mg/kg) concentrations (Field et al. 2002). Therefore, we recommend chromium and nickel be evaluated further for potential risk to benthic invertebrates (SBM subarea).

54. Pages J-107 to J-120, Section 8.3.2. See general comment one above.

    a. Although benchmarks may not be available for barium exposed benthic invertebrates, information is available regarding its overall toxicity to aquatic and/or benthic invertebrates in water (Spangenberg and Cherr 1996) (http://www.who.int/entity/ipcs/publications/cicad/en/cicad33.pdf).

    b. For manganese, toxicity benchmarks are available for soil (Kuperman et al. 2004) and sediment (http://www.ene.gov.on.ca/envision/gp/B1-3.pdf).

    c. Aroclor mixtures and PCB congeners should be evaluated as total PCBs for which an ER-M is available (0.18 mg/kg). Maximum PCB concentrations in the mudflat and wetland habitats exceed the T20 concentration (0.035 mg/kg) for benthic invertebrates.

    d. The maximum concentration of perylene in offshore sediment (0.3 mg/kg) exceeds the T20 concentration (0.074 mg/kg), but not the T50 concentration (0.453 mg/kg). Benthic invertebrate benchmarks are also available for several other PAHs listed for the mudflat habitat.

55. Pages J-122 to 124, Section 8.4.2.1.

    a. The sources of metals in IA F2 included paint (Table 1-1), dip-tank solutions, and SBM. The form and bioavailability of metals in these constituents is likely different compared with metal sources in other areas of Mare Island such as ammunition, scrap metal, and dredge spoils. Therefore, the justification that the waste extraction test (WET) results from other areas of Mare Island are applicable to IA F2 is not substantiated without additional data being provided.

    b. A study of soil lead bioavailability for young swine demonstrated a range of 6 to 105 percent bioavailability depending on lead forms (Casteel et al. 2006). Soil contaminated with paint flakes had relatively high bioavailability (55 to 86 percent depending on tissue sampled) associated with the presence of cerrusite and lead oxide. Overall, the data supported

the EPA's default assumption of 60 percent bioavailability for lead in soils. In the absence of specific data for lead in IA F2 soils, we recommend a bioavailability of at least 60 percent be used.

56. Pages J-124 to J-126, Section 8.4.2.2.

    a. The difference in potential sensitivity between Japanese Quail and American Kestrels (as surrogate for Northern Harrier) includes many factors other than bioavailability such as life history and toxicokinetics. In addition, the Japanese Quail may have more similar sensitivity to the California Quail that also utilizes the upland habitats of IA F2 (Page 1-42). In the absence of any herbivorous, granivorous, or insectivorous bird receptors for the upland habitat, the evaluation of the Northern Harrier should be protective of other bird feeding guilds. Therefore, we recommend that the 5-fold adjustment for bird species be removed.

    b. The form of zinc and nickel in soil and sediment at IA F2 should be addressed in Section 8.4.2.1 and is likely different from the forms in biotic tissue. Furthermore, the statement regarding ambient nickel and serpentine soils at Mare Island does not account for the substantial anthropogenic contribution in IA F2 as demonstrated by the positive relationship between the concentration of nickel in soil and estimates of greensand (Table 1-3).

57. Pages J-126 to J-140, Section 8.4.3 and Pages J-141 to J-156, Section 8.4.4.

    a. These sections and the associated tables should be revised based on the recommendations regarding bioavailability adjustments above.

    b. Although a SUF of one was used in the risk refinement, the determination of further evaluation includes a qualitative evaluation of foraging range. For example, "based on the foraging range of this receptor (576 acres), it seems unlikely that the Killdeer is feeding primarily within this habitat area." If foraging range is being used to exclude chemicals from further evaluation, it should be done in a quantitative way by using a SUF of site size divided by receptor foraging range.

    c. Statements that high TRV HQs less than one indicate negligible risk even when low TRV HQs exceed one (e.g., Page J-129) are not appropriate and inconsistent with the general terminology that low TRV HQs greater than one indicate potential risk.

    d. Based on the current risk calculations for birds, we recommend the following chemicals be retained for further evaluation: copper (Killdeer, wetland and mudflat), lead (Northern Harrier, upland SBM; Killdeer, mudflat; Surf Scoter, mudflat), nickel (Killdeer, wetland and mudflat), zinc (Killdeer, wetland and mudflat).

e. The risk calculation tables appear to be incomplete for gray fox in upland habitat of SBM subarea (Table J-21) and river otter in mudflat habitat (Table J-24). For example, neither table includes antimony or nickel, although the results are discussed in this section.

f. It is unclear why average dose calculations were not done for salt marsh harvest mouse exposed to cobalt in wetland using the 95UCL from Table J-4 (19.8 mg/kg).

g. Based on the current risk calculations for mammals, we recommend the following chemicals be retained for further evaluation: antimony (gray fox, upland SBM; SMHM, wetland; river otter, mudflat), cobalt (SMHM, wetland), copper (SMHM, wetland), lead (gray fox, upland SBM; SMHM, wetland), nickel (SMHM, wetland), vanadium (gray fox, upland SBM and other; river otter, mudflat and offshore), and zinc (gray fox, upland SBM and other; SMHM, wetland).

58. Pages J-157 to J-158, Sections 8.4.5 and 8.5. This section should be revised based on the recommended changes above.

59. Tables J-9 to J-14.

a. The Mare Island BAFs should be modified as was done for the IA H1 RI (Appendix J Tables J2-13 to J2-19 of Weston, 2005), particularly the use of BAFs for individual locations or composited areas depending on species mobility, the mean of multiple soil depth data for a single location, and the 95UCL rather than median.

b. It is unclear why Mare Island aquatic invertebrate data was converted from dry weight to wet weight for Table J-10 (footnote b), and then converted back to dry weight for the risk calculations (Table J-17 and J-18, footnote d).

c. Bioaccumulation data from a study of arsenic, cadmium, copper, lead, and nickel in plants, arthropods, and house mice from Wetland X should also be considered (Torres and Johnson 2001).

d. Individual Aroclor mixtures should be combined into total PCBs prior to calculation of BAFs. DDT and its metabolites should be similarly combined into total DDTs.

60. Table J-10. Recommended benthic invertebrate bioaccumulation models for metals and PCBs (Bechtel Jacobs Company LLC. 1998;USACHPPM 2004) should be utilized as available. Available information for benthic invertebrates should be preferentially selected over bivalve data, even if site-specific, given their higher abundance in the Killdeer diet and their higher exposure to sediment.

We appreciate the opportunity to comment on the document. If you have any questions regarding this review or require further details, please contact Beckye Stanton regarding contaminants (916-327-0916, bstanton@ospr.dfg.ca.gov) or contact Frank Gray regarding other issues (916-327-9961, fgray@ospr.dfg.ca.gov).

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