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DRAFT
COMMENTS ON DRAFT EXTENDED SITE INSPECTION, INACTIVE LANDFILL
NAVAL TRAINING CENTER, SAN DIEGO
CTO-0056

GENERAL COMMENTS

Written on 6 November 1995
From Claire Trombadore, U.S. EPA Remedial Project Manager
To Thomas Macchiarella

COMMENT 1: The information presented in this document does not meet the objective stated in the last paragraph of the introduction. There are multiple data gaps. A major data gap is the lack of information on groundwater and soil beneath the Inactive Landfill. The thickness of fill is only known around the perimeter of the landfill and along the sewer line down the center of the landfill. Fill thickness also influences settlement and gas generation rates.

According to the Final Work Plan (Section 4.6.3) the base of the artificial fill was identified as a potential migration pathway. The elevation of the base of the landfill will need to be determined to evaluate this migration pathway.

Seasonal variation in groundwater flow patterns was not determined. Groundwater analytical data does not exist for large portions of the interior of the landfill. Groundwater analytical data for the interior of the landfill would help determine the extent of groundwater contaminant plumes, especially on the north end of the landfill, and the extent of leachate generation.

Another data gap is the extent of landfill gas (LFG) production. The northern half of the least tern area and the southern half of the Inactive Landfill have not been adequately characterized for LFG.

RESPONSE 1: As discussed in the meeting at NTC on 30 November 1995 and as outlined in the ESI work plan, the intention of the ESI was not to characterize the landfill wastes or the soils or groundwater directly beneath it. The soil and groundwater was assessed to the extent necessary to make decisions about the landfill regarding potential impact to the boat channel and San Diego Bay. The ESI addresses the risk of the Inactive Landfill in its current condition (e.g., undisturbed), based on the presumptive remedy approach of containment and monitoring. The concerns listed on page 1-1 and the data gaps identified were based on this approach, and therefore did not include characterization within or beneath the landfill.

Also, as discussed in the 30 November meeting, the geologic data indicated that no clear migration pathway could be identified across the site at the base of the artificial fill because 1) at some drilling locations, the base of the artificial fill has been interpreted to lie below the water table, and 2) the base of the fill was sometimes difficult to distinguish from the underlying estuarine deposits due to the similarities in soil types. Therefore, no sharp boundary exists to form a vadose barrier to vertical migration. A brief discussion of these findings will be added to Section 6 (Results) of the ESI.

Seasonal variations in groundwater flow patterns will be partially evaluated in accordance with the groundwater monitoring plan, dated September 1995, which includes two groundwater sampling events subsequent to the ESI. A long-term interim groundwater monitoring plan will be developed in the future.

The landfill gas (LFG) sampling was intended to assess potential off-site migration of LFG based on the Air SWAT data. The Air SWAT sampling locations were designed to focus on areas of concentrated waste based on geophysical data. For the purposes of the ESI, the LFG has been adequately characterized.

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SPECIFIC COMMENTS (Section 2)

COMMENT 1: Figure 2-1. Include the location of the study area on the location map.	**RESPONSE 1:** The location of the study area is shown on Figure 2-2 and will be identified more clearly.
COMMENT 2: Section 2.3.2, last paragraph, p.2-7. Support is not provided for the conclusion that contamination in groundwater under the proposed drill field site does not require remediation. According to the description of the Recruit Barracks Enlisted Quarters Subsurface Investigation and Figure 2-4 groundwater samples were not collected in the Inactive Landfill area during or prior to the investigation. Please provide additional discussion to support this conclusion.	**RESPONSE 2**: It is true that groundwater samples were not collected in the Inactive Landfill area during or prior to the Recruit Barracks Investigation. During the Recruit Barracks Investigation, soil samples were collected in the landfill area and groundwater samples were collected under the proposed barracks site, however, which is west of the Inactive Landfill. The sentence regarding the conclusions should read "The investigation concluded that the contamination of the water under the proposed barracks site and the soil at the proposed drill field site was not at concentrations ....." This conclusion was stated by Law/Crandall in the Recruit Barracks investigation. The sentence will be corrected in the ESI. The figure will also be revised to clarify this distinction.
COMMENT 3: Section 2.3.5, Paragraph 2, p. 2-11. Please expand on how the North Metro Interceptor Sewer (NMIS) project report came to the conclusion that "soil and groundwater quality would not be adversely impacted ... if proper safety procedures were followed." The statement implies that the NMIS project would be a source of contamination. Specify the type of safety precautions that would prevent soil and groundwater contamination.	**RESPONSE 3**: The sentence regarding the conclusions should read "The study concluded that due to the infrequency and relatively low levels of detected contaminants, soil and groundwater quality conditions can be handled and treated if necessary during installation of the tunnel...." The sentence will be corrected in the ESI. If there is concern regarding the type of safety precautions used during the tunnel installation, the NMIS report by Woodward-Clyde should be reviewed. Summary and/or discussion of such precautions for tunnel installation are not part of the ESI.
COMMENT 4: Section 2.3.6, p. 2-11. The text in the first bullet is ambiguous about the depth of the soil borings and CPT borings. Please clarify. The text states that four soil borings and two CPT borings were advanced.	**RESPONSE 4:** The depths of the soil borings and CPT borings are correct. The 26 to 28 foot depths refer to the depths of soil samples collected from each soil boring. The description will be clarified in the text.

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However, Figure 2-4 shows the location of only one soil boring (B6) and one CPT (CPT-2, N and M) that were part of Phase II of the NMIS investigation. Add the missing sample locations to Figure 2-4.	Boring B6 was drilled by Woodward-Clyde (Section 2.3.5). The four soil and two CPT borings referred to in Section 2.3.6 were drilled by Ninyo and Moore. Two of the four Ninyo and Moore soil borings will be added to Figure 2-4. One CPT boring is already shown. The other two soil borings and the other CPT boring are located at least 1000 feet north of the landfill and are not considered relevant to the ESI investigation. This information will be provided in the text.
COMMENT 5: Section 2.3.6, Paragraph 2, p. 2-12. Identify the two monitor wells sampled during Phase II of the NMIS investigation.	**RESPONSE 5**: These monitoring wells were installed by Ninyo and Moore. One of the wells (MW-2) will be added to Figure 2-4. The other well (MW-1) is located approximately 2000 feet (0.4 mile) north of the landfill and is not considered relevant to the ESI investigation. This information will be provided in the text.
SPECIFIC COMMENTS (Section 3)	
COMMENT 1: Figure 3-1. If possible, please include a map which shows the topography of the area surrounding the site (the area within 1 to 2 miles of the site should be included). This would help the reader understand whether runoff from nearby areas impacts the site, or whether surface runoff from the site could impact other areas.	**RESPONSE 1:**. Figure 3-1, the topographic map, was primarily intended to show areas of ponding at the site. With the possible exception of the 15 foot fill on part of Lindbergh field property to the west, the site and surrounding area at NTC, MCRD, and Lindbergh field is flat and runoff from and/or to the site is anticipated to be very minor. The boat channel provides a natural separation from runoff from higher ground to the west and northwest. Although in many cases a topographic map would be useful, due to the flat topography in the area surrounding the landfill, a topographic map showing the area requested would be at a scale that would likely show very few or no topographic contours at and in the vicinity of the site.
COMMENT 2: Section 3.4, Paragraph 4, p. 3-3. The description of artificial fill only discusses areas adjacent to the landfill. The report does not include any information on the vertical extent of municipal waste, types of waste observed within the landfill, or the "stratigraphy" of the fill within the landfill zone. A complete description of artificial fill within the landfill zone should include this information.	**RESPONSE 2:** As stated in the response to General Comment 1, investigating the stratigraphy within or beneath the landfill and the depth of the landfill waste was not part of the scope of work or objectives described in the approved Work Plan. However, partial characterization of stratigraphy was made using the CPT data obtained from within the landfill during the North Metro Sewer Investigation. Based on this data and the perimeter data obtained during the ESI, the general stratigraphy was projected to continue beneath the landfill, as depicted in the conceptual site model.

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	Information on the types of waste which may be present in the landfill is summarized in Sections 2.2 and 2.3.1. Waste types could not be identified during the photo review described in Section 6.1.1.
COMMENT 3: Section 3.4, p. 3-4. It is not clear whether the Bay Point Formation consists of rock or unconsolidated sediment. The Bay Point Formation is described in this section as unconsolidated sediment. In the geology section the Bay Point Formation is described as a sandstone (rock). Explain how these sediments were correlated to the Bay Point Formation.	**RESPONSE 3**: In the second paragraph on page 3-4, the Bay Point Formation is described as a "..predominantly marine, poorly consolidated, pale brown, fine- to medium-grained, fossiliferous sandstone." This description is that of Kennedy (1975). By definition, sandstone is a sedimentary rock, therefore, it is not incorrect to refer to the Bay Point Formation as sediments. The materials beneath the site were correlated to the Bay Point Formation based upon similarities in geologic descriptions and spatial geologic relationships. This will be clarified in Section 3.4.
COMMENT 4: Section 3.5, p. 3-4. The local and regional hydrogeological setting of the area should be discussed. Identify any current or past uses of groundwater in the area, particularly deep groundwater aquifers. Does the City of San Diego use any deep sources of groundwater in the area for its municipal supply? The two groundwater zones present beneath the site are not discussed in this section. Expand the discussion to include information from the field investigation for this report. Include information on the effect of the boat channel and bay on the groundwater hydrology and the differences in groundwater flow direction in the two groundwater zones. Even though a detailed description of the hydrogeology is presented in subsequent sections, this section should at least summarize the present state of knowledge about the hydrogeology of the site.	**RESPONSE 4:** As discussed in the 30 November meeting, and as referenced in Section 3.5, the RWQCB water quality control plan for the San Diego Region classifies the groundwater in the area including NTC as nonbeneficial use, which is primarily due to its salinity. Therefore, none of this groundwater is considered to be a groundwater source, and none is used for municipal supply. The city of San Diego obtains municipal water from the Colorado River, and local runoff into reservoirs. This will be clarified in the text and the reference for nonbeneficial use will be cited. The intention of this section is to summarize the knowledge of the hydrogeology at the site prior to the ESI investigation. Section 6 (Results) and Section 9 (Conclusions) will be expanded to more fully describe the geology and hydrogeology at the site as a result of data obtained during the ESI.
GENERAL COMMENT (Section 4) This section does not discuss the need for information to evaluate the base of the fill beneath the Inactive Landfill as a potential migration pathway. This was listed as a data gap in the Final Work Plan. Another data gap listed in the Final Work Plan but not mentioned in this section is the need to identify monitor wells that should be abandoned. These data gaps should be explained in Section 4.	The potential migration pathway data gap will be added to Section 4. A discussion of results as they pertain to this data gap will be included in Section 6 as described in the response to General Comment 1. A section will be added in Section 4 identifying the wells to be destroyed. The seven wells whose screen intervals were interpreted to cross both aquifer zones

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	(SMW-2 through SMW-8) were destroyed in mid-October 1995, in accordance with the interim groundwater monitoring plan, dated September 1995. The well destruction will be discussed in a future groundwater monitoring report.
SPECIFIC COMMENTS (Section 5)	
COMMENT 1: Table 5-1, p. 5-2. Add a footnote or text explaining the significance of the Land Survey Report.	**RESPONSE 1**: The land survey report was included in the table to identify those supporting objectives and corresponding methodologies to which surveyed sample/well locations and/or elevations were used to help address the general objective. A footnote will be added to the table to clarify this.
COMMENT 2: Section 5.3, p. 5-2. The logs in Appendix B indicate that a hand auger was used at the sample locations. However, this paragraph and Appendix C state that a posthole digger was used. Change the text or logs to eliminate this discrepancy. The text states that fewer locations than planned were sampled because the 16 locations sampled were sufficient for characterizing the cover soil. However, according to Table 5-1, determining the landfill cover thickness was an objective of the investigation. An examination of the boring logs in Appendix B showed that at most only five of the borings fully penetrated the landfill cap. Furthermore, the statistical validity of the sample location selection methodology described in Appendix C appears questionable since sample locations were dropped in the field. It appears that the landfill cap was not sufficiently characterized. Please include a brief explanation in the text as to why all of the original, planned sample locations were not sampled.	**RESPONSE 2**: A posthole digger was used to advance the borings. The corrections will be made on the boring logs. The sampling method described was judgmental (authoritative), not random. Sample locations were chosen to cover the areas where the highest concentration of wastes were expected. The sample location selection method as it appears in Appendix C is invalid, and that portion of the appendix will be removed. As discussed in the 30 November meeting, it was the intention of the ESI to obtain the data necessary to make decisions regarding the adequacy of the cover soils, and not to completely characterize them. The decision was made in the field to exclude additional sample locations because the information obtained was sufficient to conclude that the cover soil thickness was as little as 1.5 feet thick and therefore possibly inadequate. This will be noted in the text for clarification.
COMMENT 3: Section 5.10, p. 5-15. The section does not explain how the *in situ* groundwater samples were collected from the CPT borings. Describe the equipment and methodology used to collect the *in situ* groundwater samples or reference Appendix C.	**RESPONSE 3**: The *in situ* samples were collected using a HydroPunch™ sampling system. This will be stated in Section 5.10, and Appendix C (Section C.10) will be referenced for further explanation.
COMMENT 4: Section 5.14, paragraph 1, p. 5-23. Add a discussion of the methodology for installing temporary vapor points to Appendix C.	**RESPONSE 4**: The discussion of the methodology is presented in Appendix C, part C.14, Landfill Gas Sampling, fourth paragraph. Appendix C will be referenced in Section 5.14.

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GENERAL COMMENTS (Section 6)

COMMENT 1: This section does an adequate job of presenting the geology and the results of the analytical sampling. However, no attempt is made to define the extent of contamination. The extent of contamination must be discussed. There appear to be two main areas of organic groundwater contamination, near the boat channel in Zone B and west of the Inactive Landfill in Zones A and B. However, the extent of contamination in these areas has not been defined. Additional groundwater sampling farther to the west and underneath the Inactive Landfill may be required to adequately define the extent of contamination. At a minimum, these potential data gaps should be discussed in the ESI.

Zone-specific groundwater plume maps or maps with posted data should be produced. Both *in situ* and monitor well groundwater data should be posted on the same map. This will clarify both the extent of groundwater contamination and data gaps.

RESPONSE 1: As discussed in the response to General Comment 1, the intent of the ESI was not to characterize the extent of contamination in groundwater beneath the landfill, but to obtain the data necessary to make decisions about the landfill and the potential impact to the boat channel and San Diego Bay. Discussions of the sampling results are presented in Section 6.5, however, as agreed to in the 30 November meeting, additional explanation of the relationships between groundwater sample results and groundwater flow will be added to Section 6. The explanations will include interpretations regarding contaminant extent, as appropriate.

The information on Figures 6-18, 6-19, and 6-23, will be combined to create zone-specific maps showing organics results from both the wells and *in situ* samples.

COMMENT 2: A leachate plume may be present beneath the landfill based on the presence of elevated TDS concentrations in groundwater. There is no discussion of a leachate plume or the origin of the elevated TDS concentrations in the text. This is a data gap in the analysis of groundwater conditions and must be addressed.

RESPONSE 2: In a freshwater aquifer, significantly higher TDS at a landfill likely indicates a leachate plume. However, at this site the aquifers have high TDS due to their proximity and hydraulic connection to saline ocean water, which has a typical TDS of approximately 34,000 mg/L. Comparison of Figure 6-20 (Distribution of TDS in Groundwater) to Figure 6-23 (Organic Constituents in Groundwater Monitoring Wells) indicates that there is no clear correlation between higher TDS, landfill waste locations, and detected organics in groundwater.

There is a discussion in Section 6.5.2.1 indicating some possibilities for the variations in the observed TDS concentrations. It is considered likely that the lower TDS concentrations in the Zone A wells is due to freshwater infiltration from the surface. Hydrogeologic data from well ES-10S indicate that this well is not in good hydraulic communication with other parts of the aquifer; therefore, the higher TDS may be due to "stagnation" of the water. In Zone B, the lower TDS in wells ES-11D and ES-01D relative to the others may be due to greater hydraulic communication between the two zones in the vicinity of

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	these wells. The relatively low TDS overall in both ES-11D and ES-11S may be due to infiltration of landscape irrigation water around the Fleet Anti-Submarine Warfare Training Center.
COMMENT 3: One of the specific goals of this study was to determine groundwater flow direction and gradient. However, there are still some uncertainties with these determinations as presented in the ESI. Additional rounds of water level measurements should clarify flow direction. The vertical and horizontal hydraulic gradients should also be calculated.	**RESPONSE 3**: Due to the generally flat gradient across the entire site, even minor, localized influences on water level elevations can result in significant influence on the groundwater flow direction and gradient. These include infiltration of water due to irrigation, localized hydrogeologic conditions, and the effects of the nearby San Diego Bay. It is not unexpected, therefore, that localized variations in the gradient and flow direction exist. As described in the interim groundwater monitoring plan dated September, 1995, results from the groundwater monitoring round planned for the fourth quarter 1995 will further evaluate flow direction and gradient. As agreed in the 30 November meeting, horizontal and vertical gradients will be calculated and included in Section 6.4.3.3 and 6.4.3.4. Specific Comment 8 (Section 6), addresses this response in detail.
COMMENT 4: Section 6.2.4, Background, needs to be revised to clearly lay out the evaluation process and supporting documentation. EPA is particularly concerned that the BCT was not involved in determining background for this site. Background concentrations are included in the risk assessment calculations and therefore the BCT needs to be in full agreement with the background concentrations for the inactive landfill and NTC overall. Since the primary risk driver for the landfill appears to be the LFG, not the cover soils, background may not be as significant an issue in this case. But, at a minimum, this section of the ESI must be detailed, defensible and agreed upon by the State and EPA.	**RESPONSE 4**: As agreed in the 30 November meeting, this response will be prepared once the Navy and DTSC have discussed the approach for determining background.
SPECIFIC COMMENTS (Section 6)	
COMMENT 1: Section 6.1.2 and Figure 6-1, p. 6-2. The results of the magnetic survey as presented in Figure 6-1 should match the extent of debris presented in Appendix D figures. The interpreted landfill perimeter in Figures 4b and 4c and Figures 5b and 5c of Appendix D do not match Figure 6-1. Please correct this discrepancy.	**RESPONSE 1:** Portions of the interpreted landfill debris extent for Areas 1 and 2 are slightly different from those shown on Figures 4b, 4c, 5b, and 5c from the geophysical report. The discrepancies will be corrected on Figure 6-1.

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COMMENT 2: Section 6.2.3, paragraph 1, p. 6-6. Figure 5-3 does not show the locations of the 17 surface soil samples collected within the cover soil or the 3 samples collected outside the landfill boundary. Provide the correct figure reference for the surface soil sample locations.	**RESPONSE 2**: The reference should be to Figure 5-4. This will be corrected in the text.
COMMENT 3: Section 6.3.2.1, paragraph 1, p. 6-21. Discuss trends in the thickness of fill across the Inactive Landfill. Please provide a fill isopach map or a contour map of the fill/estuarine deposits contact to illustrate how fill thickness varies across the site.	**RESPONSE 3**: As discussed in the response to Specific Comment 2 (Section 3), the intention of the ESI was not to characterize the stratigraphy beneath landfill, which would include the fill thickness within the landfill. However, as discussed, the CPT data from the North Metro Sewer Investigation was used to partially characterize the geology beneath the landfill. The ESI subsurface investigation focused on the perimeter of the landfill. In several of these borings, the similarities between the fill and estuarine deposits prevented identification of a distinct contact. Therefore, an isopach or contour map would be difficult to generate.
COMMENT 4: Section 6.3.4, p. 6-25 and Table 6-6, p. 6-37. Appendix C indicates that the geotechnical analysis of soil cover samples included *in situ* permeability and Atterburg limits. Add the results of these analyses to Table 6-6 or, if the analyses were not performed, remove them from Appendix C.	**RESPONSE 4**: Atterburg limits and *in situ* permeability analyses were not performed as part of the geotechnical analyses. Reference to these analyses will be removed from Appendix C.
COMMENT 5: Figure 6-12. The hydrostratigraphic section should be reexamined to make sure that monitor well screen intervals and contacts between zones are accurately depicted. Inconsistencies between the boring logs and this figure were noted and need to be corrected.	**RESPONSE 5**: The aquitard contacts depicted in the figure will be checked, and any discrepancies with the boring logs will be corrected. However, three points should be noted about the aquitard contacts: 1) the contacts were based on an interpretation of both the soil boring logs and the CPT data and, therefore, may not exactly correspond to the fill/estuarine deposits/Bay Point Formation contacts shown on the boring logs; 2) while the lower contact (between the estuarine deposits and the Bay Point Formation) is fairly well defined, the upper contact (between the fill and estuarine deposits) in many cases could not be clearly defined;, therefore, the upper contact is only approximate; and 3) since the shaded area represents the interpreted aquitard (low-permeability zone), it does not necessarily correspond exactly to the fill/estuarine deposits/Bay Point Formation contact depicted on a particular boring log.

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COMMENT 6: Section 6.4.3.2, p. 6-43. Explain how mean water level elevations were calculated from the tidal data. Also, state if there are any other wells in the area from which water level data could be included in future water level studies.	**RESPONSE 6:** Average water levels were calculated using water levels recorded in 10-minute increments (using transducers) for a 25-hour period for each well. The data used for these calculations is presented in Appendix G. This explanation will be added to Section 6.4.3.2. The two wells drilled by Ninyo and Moore and referred to in Specific Comment 5 (Section 2) are not appropriate for monitoring since the screened interval of these wells spans both aquifer zones A and B. To our knowledge, there are no other wells located on Navy property between the landfill and the boat channel or bay, nor are any wells located nearby the landfill to the east on Lindbergh Field property.
COMMENT 7: Section 6.4.3.3, p. 6-43. The inactive landfill site is located in a transitional groundwater flow regime. Groundwater contour maps in transitional areas can be confusing because variations in flow direction can occur in relatively short distances. Regionally, groundwater appears to be discharging to the northwest and west towards the Boat Channel and to the south towards West Basin (San Diego). Recharge to shallow groundwater comes from surface infiltration and from areas north and east of the site. Recharge to deep groundwater appears to come from shallow groundwater and from the west. The groundwater contour maps should be constructed from the water level data but also be consistent with regional groundwater flow patterns. A discussion of how the local and regional groundwater flow regime influences the landfill site should be included in the text. State the depth of nearby marine water bodies, in particular, the boat channel.	**RESPONSE 7**: Localized variations in groundwater flow at this site are not unexpected, as discussed in the response to General Comment 3 (Section 6). The effects of tidal fluctuations from both the boat channel and bay likely add to the variations. Although, in general, groundwater contour maps might be expected to be consistent with regional data, this often is not the case due to any one of many potential localized conditions that can occur in the subsurface. As discussed in the 30 November meeting, an expanded discussion will be provided in Section 6 (Results) and Section 9 (Conclusions) of the ESI regarding groundwater flow (gradients and discharge points) and its relationship to the boat channel.
COMMENT 8: Section 6.4.3.4, p. 6-44. Vertical gradients can and should be calculated for adjacent well pairs. Use the midpoint screen elevations to calculate vertical gradients. EPA is particularly interested in the calculation of vertical gradients should there be a leachate plume moving downward potentially impacting deeper groundwater sources.	**RESPONSE 8**: As mentioned in Section 6.4.3.4, due to the large 5- to 15-foot screened lengths relative to the distance between the screened intervals, using the midpoint of the screen elevations to calculate the vertical gradient might produce an erroneous number. Vertical gradients will be calculated using well pairs, and a table will be provided in the text that presents the data. The vertical gradient will be estimated assuming that nearly all of the hydraulic head loss occurs through the

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	aquitard, and using the aquitard thickness as the distance value (which implies that flow within the two aquifer zones is mainly horizontal).
COMMENT 9: Section 6.4.4, p. 6-44. This section should also include a discussion of aquifer discharge areas.	**RESPONSE 9**: Section 6.4.4 will be modified to include a brief discussion of discharge areas.
COMMENT 10: Table 6-8, p. 6-47. The average groundwater elevations in this table are not always consistent with the water level elevations provided in Appendix G. Also, values for Well ES-06D are listed three times. Please explain or correct.	**RESPONSE 10**: The water level elevations shown on Table 6-8 (and the corresponding figures) are correct. The elevations shown on the sheets in Appendix G will be corrected as appropriate. The values for well ES-6D are for three different time periods during the tidal study. This information will be provided in the text.
COMMENT 11: Section 6.5, p. 6-53. The discussion focuses on why *in situ* inorganic data cannot be used for contouring. However, *in situ* data can provide valuable information for contouring organic analytical data. For instance, cis-1, 2-DCE and TCE were detected in HP-22 and in several nearby wells. The discussion is misleading and should be reworded.	**RESPONSE 11**: *In situ* sampling is generally used as a screening tool, for the various reasons presented in the first paragraph of Section 6.5. The general agreement between the *in situ* and well sample organics results indicates that it is appropriate to include the *in situ* and well data for organics on one figure. The data will be combined as mentioned in the response to General Comment 1 (Section 6). As stated in Section 6.5, the *in situ* samples represent concentrations from a limited portion of the aquifer that may not represent conditions within the portion of the aquifer yielding most of the water, as monitoring well samples do. Therefore, combining the two sample types for contouring, would not be appropriate. The section will be reworded to clarify that neither metals nor organics from the *in situ* sampling should be used for contouring.
COMMENT 12: Section 6.5.2.1, p. 6-54. It would be useful to evaluate the Ca/Mg and Na/K ratios to assist with identification of the origin of evaluated TDS concentrations (i.e., marine, leachate, or brine?).	**RESPONSE 12**: Based on the discussion presented in the response to Specific Comment 2 (Section 6) regarding TDS, it is not anticipated that evaluation of Ca/Mg and Na/K ratios would provide additional insight into the origin of the higher TDS concentrations.
COMMENT 13: Figures 6-18 and 6-19, pp. 6-67 and 6-69. Indicate sample locations where none of the analytes posted were detected (i.e., label "ND" locations).	**RESPONSE 13**: Only those wells and CPT locations where organic analytes were detected were indicated on the figures. This was done to emphasize those locations where organics were detected. A note will be added to the figures

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	stating that only those organic analytes that were detected are included. Complete analytical results are presented in Table 6-10.
COMMENT 14: Paragraph 1, p. 6-73. TDS concentrations of greater than 40,000 mg/L are reported in three wells in Zone B. This is 5,000 to 10,000 mg/L greater than the TDS concentrations typically found in seawater. Explain the process or mechanism by which brine is being formed in Zone A and B. It is unlikely that these elevated TDS levels can be explained by the fact that the area was historically salt marsh as the TDS levels would more than likely be equivalent to seawater not significantly higher. This data suggests that a leachate plume from the landfill exists in Zone A and extends into Zone B and may be discharging to the boat channel.	**RESPONSE 14**: Refer to the response to General Comment 2 (Section 6). As discussed in the 30 November meeting, an expanded discussion will be provided in Section 6 (Results) of the ESI regarding groundwater flow and its relationship to the boat channel.
COMMENT 15: Paragraph 3, p. 6-73. In addition to the high TDS described above, the distribution of iron and manganese in the groundwater appears to be consistent with the generation of leachate from the landfill. Again, EPA is particularly interested in the possibility of a downward moving leachate plume which may contain contaminants potentially impacting deeper groundwater sources.	**RESPONSE 15**: In well ES-1S, the high iron/manganese ratio appears to correspond to the area with the highest LFG concentrations and higher organics in groundwater. However, the highest iron is found in the southeast portion of the landfill. There appears to be no consistent correlation between higher TDS, higher iron, landfill waste locations, and detected organics in groundwater. In addition, as discussed in response to Specific Comment 4 (Section 3), deeper groundwater sources of beneficial use water do not exist at this site due to the nonbeneficial use designation.
COMMENT 16: Section 6.5.2.3, paragraph 4, p. 6-74. The statement that the contamination near the boat channel does not appear to be connected to the landfill is not adequately supported. EPA also has concerns about the possibility of a downward moving leachate plume which may contain contaminants potentially impacting deeper groundwater sources. Two *in situ* samples (HP-22 and HP-12), located between the wells next to the boat channel and the Inactive Landfill also contained TCE and cis-1,2-DCE. No wells are present within the landfill area southeast of the *in situ* sample locations, so the landfill remains a potential source. The possibility that the groundwater contamination in this area is associated with the landfill should be included in this discussion.	**RESPONSE 16**: Only HP-22, located between the wells next to the boat channel and inactive landfill, was reported to have organics above the detection limit; HP-12 results were nondetect for all organic analytes. Based on further evaluation of the sample concentrations and well/HydroPunch locations, the referenced paragraph will be revised to state that although no clear plume can be identified, the organics in groundwater in wells nearest the boat channel may be related to the landfill. The reference to a possible additional minor source related to former buildings in the area will remain. There are no data that clearly rule out either the landfill or former buildings as potential sources. As mentioned in the response to Specific Comment 4 (Section 3), deeper beneficial groundwater sources are not considered to exist at this site, since the groundwater is designated by the RWQCB as non-beneficial use.

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COMMENT 17: Figure 6-20, p. 6-75. Add a note to the figure indicating the date for the interpreted groundwater flow direction. The Zone B data should be recontoured without the TDS value for DMW-8. DMW-8 has a filter pack that spans both Zones A and B (see Appendix I).	**RESPONSE 17**: The interpreted groundwater flow direction was based on data obtained from April 24 through 29, 1995. This will be noted on the figure. The depth of the top of the filter pack for DMW-8 as reported is presumed to be in error. According to the well log from Jacobs Engineering, the top of the filter pack for DMW-8 is at a depth of 5 feet, while the top of the screen is at 23.5 feet. The well is a deep well. The filter pack likely begins below 20 feet in depth, based on the construction of the other deep wells. Therefore, the well is likely to be completed only in the deeper Zone B, which would not require recontouring the data.
COMMENT 18: Figure 6-22, p. 6-79. Several of the Zone A sample locations have more than one value. Also several of the values are not posted next to wells. Please correct these discrepancies. The Zone B data should be recontoured without the iron/manganese ratio for DMW-8. DMW-8 has a filter pack that spans both Zones A and B (see Appendix I).	**RESPONSE 18**: The Zone A values will be checked and any discrepancies or omissions corrected. See the response to the previous comment, Specific Comment 17 (Section 6).
COMMENT 19: Table 6-14, p. 6-84. Bold type is not used consistently to denote concentrations exceeding the detection limit. All concentrations exceeding the detection limit should be in bold type or the significance of bold type must be explained.	**RESPONSE 19**: All concentrations exceeding the detection limit should have been shown in boldface type. Table 6-14 will be corrected as necessary.
COMMENT 20: Figure 6-23, p. 6-85. Produce figures showing both monitor well and *in situ* results for a single zone. These figures would be much more useful for visualization of the extent of contamination. A symbol or font difference could be used to distinguish between the two data sets with a footnote that emphasizes the difference in data quality (see Section 6, General Comments). Wells and CPT locations where no organic analytes were detected should be labeled ND.	**RESPONSE 20:** As stated in the response to General Comment 1 (Section 6), Figure 6-23 will be eliminated and the results will be combined with Figures 6-18 and 6-19. As stated in response to Specific Comment 13 (Section 6) above, only those wells and CPT locations where organic analytes were detected were indicated on the figures. This was done to emphasize those locations where organics were detected. A note will be added to the figures stating that only those organic analytes that were detected are included. Complete analytical results are presented in Table 6-14.

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COMMENT 21: Section 6.5.2.5, paragraph 1, p. 6-87. Change the reference from Table 6-17 to Table 6-18.	**RESPONSE 21:** The correction will be made in the text.
COMMENT 22: Section 6.6.1, paragraph 2, p. 6-92. LFG-19 and LFG-22 are located south of LFG-15 and LFG-16. Change the location description.	**RESPONSE 22:** The text refers to locations LFG-19 through LFG-22, which collectively are located west and south of LFG-15 and LFG-16. This correction will be made in the text.
COMMENT 23: Figure 6-25, p. 6-97. Add a note to Figure 6-25 that describes the "integrated surface sample".	**RESPONSE 23:** A note will be added indicating that the integrated surface sample was a composite ambient air sample collected at approximately 3 inches above the landfill cover soil across the area indicated.
COMMENT 24: Section 6.6.2, p. 6-99. This section states that a "limited area of the fill contains organic waste that is decomposing anaerobically." However, the northern half of the least tern area and most of the southern half of the Inactive Landfill were not sampled for LFG. Change the statement to indicate that other areas of the Inactive Landfill may contain organic waste that is decomposing anaerobically.	**RESPONSE 24:** The discussion in the text will be changed to state "...indicate that at or near the landfill perimeter, a limited area of the fill contains organic waste that is decomposing anaerobically." A statement will also be made in the text that other areas within the landfill that were not sampled may also contain organic waste that is decomposing anaerobically. However, landfill gas probes were located in areas where the highest concentrations of landfill wastes were identified, based on the geophysical data. These areas would be expected to have the highest levels of LFG. The landfill gas probes were also located to cover the only area determined to be emitting VOCs during the 12/1/93 screening of the landfill with an OVA as required under an interim variance from the SDCAPCD Rule 59. (Air SWAT Response to Comments on Air SWAT Protocol).
GENERAL COMMENTS (Section 7 and Appendix F)	
COMMENT 1: The data validation reports lack detail. Exceedances of quality control criteria (calibration response factors, surrogate recovery, matrix spike recovery, etc.) are discussed only in general terms. Specific surrogate compounds, matrix spiked compounds, magnitude of QC criteria exceedances and analytes affected are not presented in validation reports.	**RESPONSE 1:** The summary case narratives from the validation reports were included in Appendix F, Part I. The more detailed individual narratives from the validation reports will be added.
COMMENT 2: Water samples and soil/sediment samples with analyte concentrations less than five times the quantitation limit normally do not have	**RESPONSE 2:** All results that are within five times the quantitation limit will be eliminated from the tables.

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relative percent differences calculated and are not considered in the review of comparability of duplicates. Justify using these types of results in the duplicate comparison.	
COMMENT 3: Final validated data summary sheets were not included. Because of this omission, reviewers cannot determine if data qualifiers described in validation memoranda were appropriately applied to sample results. Will summary sheets be included in the final ESI?	**RESPONSE 3:** The final validated data summary sheets will be included in Appendix F, Part I.
SPECIFIC COMMENTS (Section 7)	
COMMENT 1: Table 7-1. For note "e", µg/L should be described as micrograms per liter.	**RESPONSE 1:** Note "e", ug/L, in Table 7-1, will be corrected to read micrograms per liter.
COMMENT 2: Section 7.4.1.2, last paragraph and Table 7-3, p. 7-7. Both tentatively identified compounds (TIC) and target analyte list (TAL) compounds were rejected (R) due to samples concentrations being less than five times the blank concentration. TIC compounds can be either rejected or qualified as undetected (U), but TAL compounds are usually qualified as undetected (U)[1]. Explain why these samples were qualified as rejected. [1] U.S. Environmental Protection Agency. U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. February 1994.	**RESPONSE 2:** All of the rejected (R) data listed in Table 7-3 will be changed to undetected (U) and corresponding text will be revised.
COMMENT 3: Section 7.4.1.3, last paragraph, p. 7-9. See first specific comment.	**RESPONSE 3:** Note "e", ug/L, in Table 7-1, will be corrected to read micrograms per liter.
COMMENT 4: Section 7.4.1.4, p. 7-9. In this section, sample results for tentatively identified compounds that were less than five times the blank concentration were qualified as undetected (U). However, results for rinsate and field blanks were qualified as rejected using the same criteria. Data qualifiers should be applied in a consistent manner. Reconcile this inconsistency.	**RESPONSE 4:** All of the rejected (R) data listed in Table 7-3 will be changed to undetected (U) and corresponding text will be revised.

Comments from Claire Trombadore

SPECIFIC COMMENTS (Section 8)

EPA previously identified a few issues in the work plan that were not addressed in the draft ESI:

COMMENT 1: Section 8.2, p. 8-2. Vinyl chloride (a known human carcinogen) has been detected in landfill gas and this data must be used to evaluate the risk associated with the landfill. Vinyl chloride has such a high vapor pressure that it is prone to move vertically more than to migrate laterally off of the landfill surface, which may be why it wasn't detected in downwind samples. In general, it is expected that the concentrations of landfill gases would be higher on the surface of the landfill than they would be downwind. As presented, the screening approach only addresses off-site, not on-site exposures.

RESPONSE 1: As stated by D. Byrnes of the APCD in the 30 November meeting, APCD studies of the use of the recommended air sampling techniques in the conduct of Air SWATs indicate that integrated surface sampling and upwind-downwind ambient air data are not reliable, and he recommended using appropriate mathematical models to estimate vapor emission and dispersion rates. Farmer's model will be used to estimate the emission rate of vinyl chloride and other VOCs found in soil gas samples through the landfill surface (U.S. EPA, 1988 Superfund Exposure Assessment Manual. EPA/540/1-88/001 OSWER Directive 9285.5-1. pg. 16). The emission rates will be based on the highest measured concentrations of the compounds in the soil gas samples. In turn, the emission rates will be used to estimate the atmospheric concentrations of the VOCs in the air above the landfill. If the estimated risk presented by chemicals in the air above the landfill exceeds 10^{-6}, chemical concentrations in the air at several points along the "downwind" boundary of the landfill will also be calculated. A box model will be used to estimate the concentration of the VOCs in the air above the landfill. The SCREEN model will be used in the area source mode to estimate the concentrations of the VOCs at the landfill boundary. The ratio of the predicted concentrations and U.S. EPA Region IX PRGs will be used as a measure of potential risk.

COMMENT 2: Section 8.4, p. 8-6. The final step in the screening assessment must be the summation of risk/hazards for all media.

RESPONSE 2: The summation of risk/hazards for all media will be added to the screening assessment.

COMMENT 3: Section 8.5.3, p. 8-12. The air evaluation must utilize landfill gas data and data from the landfill surface. In addition, the approach of subtracting upwind concentrations from downwind concentrations may not be appropriate if the prevailing wind speed is not sufficient to prevent migration of contaminants in what was established as the "upwind" direction.

RESPONSE 3: See response to Specific Comment 1(Section 8) above.

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COMMENT 4: Section 8.5.2, p. 8-12. A table should be prepared showing the comparison of groundwater COPCs to the California Enclosed Bays and Estuaries human health water quality objectives.	**RESPONSE 4:** Table 6-18, which compares the groundwater results to the California Enclosed Bays and Estuaries human health water quality objectives will be expanded to include the Federal Ambient Water Quality Criteria. In addition, a table will be prepared for Section 8 that compares the groundwater COPCs to the California Enclosed Bays and Estuaries objectives and the Federal Ambient Water Quality Criteria.
COMMENT 5: Section 2.1.7.1, paragraph 1, p. E2-10. EPA comment on the ESI Work Plan not addressed. Clarify how the number of (17) soil samples was determined to be adequate for the risk evaluation. Also explain how the number of (3) soil background samples was determined to be adequate to identify background concentrations.	**RESPONSE 5:** As discussed in the 30 November meeting, the 17 surface soil samples were chosen to cover the areas where the highest concentration of wastes was expected. Seventeen soil samples were considered to be adequate to accomplish this objective. The three soil "background" samples and the 16 soil samples taken from the soil borings and monitoring well locations of the Water SWAT (all outside landfill trench areas) were used to calculate background statistics. The three "background" samples were intended to be used in addition to the Water SWAT samples to identify background. This will be clarified in the text. As stated in the response to General comment 4 (Section 6), the Navy and DTSC are discussing the approach for determining background.
GENERAL COMMENTS (Ecological Risk Assessment)	
COMMENT 1: The site description is lacking sufficient detail. Lists of species (mammals, plants, birds, etc.) at the site should be included. A map detailing what habitats are at the site should be included. The observations on potentially affected areas and site contamination should be organized by location at the site and/or put on a map.	**RESPONSE 1:** As agreed in the 30 November meeting, the design of the biological survey and observations made will be described in greater detail in the final ESI. Justification for selecting the least tern as the assessment endpoint will be provided.
COMMENT 2: The exposure of receptors to secondary sources through such activities as the ingestion of plants or other invertebrates should be addressed on a receptor specific basis. Modeling of contaminant concentrations is not necessary since this is a screening assessment; however, 100% bioavailability and biotransfer should be assumed for all secondary sources in the screening.	**RESPONSE 2:** The approved work plan states that food web transfer of the COPCs will not be evaluated.

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SPECIFIC COMMENTS (Ecological Risk Assessment)

COMMENT 1: Section 8.6, p. 8-14. The objective stated for the ecological risk assessment are not the same as those outlined in the Work Plan document. The risk assessment does not fulfill its original intent as a screening assessment. Inadequate evidence was presented to make any inferences on whether a more comprehensive assessment is needed.

RESPONSE 1: As discussed in the 30 November meeting, the purposes and procedures used in the ecological risk assessment will be explained in more detail.

COMMENT 2: Section 8.6.1, p. 8-14. The problem formulation should include a discussion on environmental settings and habitats and identification of contaminants and fate and transport potentials (i.e., potential for migration of contaminants at and off the site). This would include a site visit to document the presence or absence of exposure routes, habitat, species, and contamination. Documentation should be made through observations and notes using maps or aerial photographs. The assessment of the risk to the California least tern as shown in the ESI is not sufficient. This section further states that indirect exposure (e.g., food web) was not considered. However, ingestion is the most important exposure pathway for receptors and; therefore, food chain impacts must be evaluated.

RESPONSE 2: The landfill currently has a soil cover, which is being maintained as well as improved. A biological survey was conducted, and the results showed that the landfill (least tern nesting area excepted) is not a suitable habitat for vertebrates and plants because the cover is regularly graded and filled. This activity destroys plant communities and the burrows of animals that may inhabit the area between grading operations. Beach sand has been placed over the soil cover in the least tern nesting area, and vegetation has been cleared to make it more attractive to the least tern, which is the only organism of concern that uses the landfill. The air pathway was the only pathway believed to be complete for the least terns. The presence of beach sand on the landfill cover protects the birds from being exposed by soil ingestion and dermal contact with soil. Although the biological survey indicated that the least terns are the only species of concern at the site, other species will be evaluated that may occasionally forage in the area. The risk to additional potential receptors will be evaluated using the rabbit, ground squirrel, and robin as representative species. The risk associated with soil ingestion and inhalation of vapors will be estimated for these additional species.

It is understood that the terns as well as other fish-eating birds that frequent the area may eat fish potentially contaminated with chemicals from the landfill. However, because the landfill is not the only potential source of chemicals entering the boat channel and San Diego Bay as well as other factors, the fish consumption pathway was not evaluated. The risk assessment work plan made it clear that the ecological risk assessment would not include the evaluation of indirect pathways such as food.

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COMMENT 3: Section 8.6.2, p. 8-15. The information presented in the procedures section is unclear. Sections on exposure assessment and effects should be included here. Points to address include the following:	**RESPONSE 3:**
• Fish, as the major food component for the least tern should be addressed if surface water and/or sediment adjacent to the site are subject to site-related contamination. Also incidental soil/sediment ingestion should be addressed, as appropriate, as part of the least terns daily diet. Information should be obtained to determine if soil/sediment is needed for daily digestion in the least tern as well. This is common in gallinaceous birds such as quail, chickens, etc. and can add significant amounts of contamination to their diets.	• See response to Specific Comment 2 (Ecological Risk Assessment) above.
• Extrapolation of effects values in screening assessments are presented in the screening assessment and verified or validated in a subsequent phase. Extrapolation of effects values from mammals to birds, as in the ESI, are generally accepted with adequate discussion of uncertainties. Please include a discussion of the uncertainties associated with this method.	• A discussion of uncertainties with extrapolation of effects values will be included in the report.
• Qualitative assessments of species and/or habitat should be included in a habitat assessment section.	• Qualitative assessments of relevant species will be included.
COMMENT 4: Section 8.6.3, p. 8-17. The results section is inadequate. The following are specific items which must be addressed:	**RESPONSE 4:**
• The assessment of hazards to the least tern are incomplete as previously discussed. The identification of contaminants was never discussed or referenced and should include a complete list of all analytes that were detected at the site.	• The COPCs are identified in Section 8.2 Those specific to the least tern will be identified.
• Descriptions on the habitat and least tern populations should be included in a habitat assessment section as discussed previously.	• The existing description will be expanded.
COMMENT 5: Section 8.7, p. 8-19. The conclusions for the ecological assessment are based on methods not well supported and/or explained, as comments above note. In general, the evaluation performed was appropriate for a screening level assessment, however, verification and validation should follow.	**RESPONSE 5:** Although the biological survey indicated that the least terns are the only species of concern at the site, other species will be evaluated that may occasionally forage in the area. The risk to additional potential receptors will be evaluated using the rabbit, ground squirrel, and robin as representative species. The risk associated with soil ingestion and inhalation of vapors will be

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In addition, human health and ecological risk assessment conclusions are grouped together and tend to confuse one another. When the draft final risk assessments are prepared results of the two should be presented separately.	estimated for these additional species. It is believed, however, that the least tern is the only organism of concern that may be exposed to chemicals in the landfill. Although the quantitative assessment of risk suggests that the least tern may be affected by chemical vapors rising from the landfill, several years of observations do not bear this out. Further validation and verification is considered to be unnecessary. As a protected species, the least tern cannot be captured for chemical analysis. Even if its tissues could be analyzed for chemicals, the landfill is only one of several possible sources of the kinds of chemicals found in the landfill, groundwater, and air. Therefore, finding a COPC in the eggs or flesh of the tern or in their food (fish from the boat channel or San Diego Bay) would not constitute verification or validation of exposure or effect due to landfill chemicals. The conclusions for the human health and ecological risk assessment will be presented separately in the final ESI.
SPECIFIC COMMENTS (Section 9)	
COMMENT 1: Section 9.1.3, p. 9-2. This section was not completed. No realistic evaluation of groundwater impacts to San Diego Bay or Boat Channel were included in this report.	**RESPONSE 1:** As discussed in the 30 November meeting, an expanded discussion will be provided in Section 6 (Results) and Section 9 (Conclusions) of the ESI regarding groundwater flow (gradients and discharge points), chemistry, and the relationship/potential impacts to the boat channel.
COMMENT 2: Section 9.1.2.3, p. 9-2. Discuss the extent of contamination observed in surface soil. Also, discuss the possible sources for the contaminants. For example, PCB-1254 and PCB-1260 were detected across the least tern area. Was the Zone A sand contaminated before it was added to the site?	**RESPONSE 2:** The detected organics were found sporadically throughout the cover soils, and do not seem to indicate any particular distribution, or "hot spots." Also, the presence of organics in the least tern sands, which were imported more recently and placed on top of the cover soils, supports this possibility. Therefore, it is possible that cover soils were contaminated prior to being imported to the site. In addition, one would not expect chemicals with low volatility and mobility, such as PCBs, to migrate upwards from within the landfill. An expanded discussion of the extent of contamination in surface soils and possible sources will be included in Section 9.
COMMENT 3: Section 9.1.3.2, last paragraph, p. 9-4. The last sentence of the paragraph is misleading since the detection limit for copper and nickel in	**RESPONSE 3:** Clarification will be added to the text to state that the detection limits for copper and nickel in these samples were above the water quality

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the ES-3S sample were greater than the water quality criteria. Furthermore, the concentration of copper exceeded the water quality criteria in a sample collected from ES-5S, which is located close to the boat channel. Please discuss these results and explain why the Navy believes that groundwater with concentrations of copper and nickel that exceed water quality criteria will not impact the boat channel. In addition, please discuss how the future groundwater monitoring program will address this issue.	criteria. The discussion of the potential impact on the boat channel and San Diego Bay will be revised and expanded. Continued groundwater sampling is designed to further assess this issue. The interim groundwater monitoring plan, dated September 1995, which outlines two quarterly sampling events, includes sampling and analysis for copper, nickel, and mercury. A long-term groundwater monitoring plan will be developed to further assess the potential impact to the boat channel by monitoring these metals as well as other constituents present in the groundwater.
COMMENT 4: Section 9.1.3.2, Zone B, p. 9-4. The lack of detectable concentrations of cis-1,2-DCE in wells between ES-3D and SMW-10 is not necessarily evidence that a plume originating in the landfill does not exist. Several *in situ* samples collected in Zone B between ES-3D and the Inactive Landfill had detectable concentrations of cis-1,2-DCE and TCE. No deep wells exist southeast of ES-3D towards the landfill. A map with posted *in situ* and monitor well sample results, including locations where contaminants were not detected, for Zone B would show this. Therefore, these contaminants may not be isolated and this paragraph should be changed.	**RESPONSE 4:** The text in Section 9.1.3.2 will be changed as appropriate to reflect the changes as discussed in the response to Specific Comment 16, (Section 6) In addition, as mentioned in response to General Comment 1 (Section 6), the *in situ* and monitoring well results will be combined on figures by groundwater zone.
COMMENT 5: Section 9.1.3.2, paragraph 2, p. 9-5. This paragraph is misleading since the detection limits for copper and nickel in the ES-3D and ES-4D samples were greater than the water quality criteria. Furthermore, the concentrations of copper and nickel exceeded the water quality criteria in samples collected from the next closest wells to the Boat Channel (DMW-8 and ES-6D). Change the paragraph to state that groundwater with concentrations of copper and nickel exceeding the water quality criteria may enter the bay.	**RESPONSE 5:** Refer to the response to Specific Comment 3 (Section 9).
COMMENT 6: Section 9.1.4, paragraph 4, p. 9-5. If available, the areas with VOC emissions identified during routine monitoring by NTC should be indicated on a map. This would help identify potential problem areas.	**RESPONSE 6:** Walkover surveys by CH2M Hill/Radian Corporation were performed for routine monitoring in accordance with APCD requirements. However, no specific monitoring points, such as vapor probes or utility vaults, were utilized. The surveys identified very localized areas of VOC emissions, generally from cracks in the soil located in the western-central portion of the landfill. These areas roughly correspond to the findings of the ESI and Air SWAT data, and were used in the placement of Air SWAT probe locations.

Comments from Claire Trombadore

COMMENT 7: Section 9.2, p. 9-5. Several data gaps still exist and should be discussed in Section 9. A major data gap is the lack of information on the thickness of the landfill. The thickness of fill is only known around the perimeter of the landfill and along the sewer line down the center of the landfill. Fill thickness also influences settlement and gas generation rates.

According to the Final Work Plan (Section 4.6.3) the base of the artificial fill was identified as a potential migration pathway. The elevation of the base of the landfill will need to be determined to evaluate this migration pathway.

Seasonal variation in groundwater flow patterns was not determined. Groundwater analytical data does not exist for large portions of the interior of the landfill. Groundwater analytical data for the interior of the landfill would help determine the extent of groundwater contaminate plumes, especially on the north end of the landfill, and the extent of leachate generation.

Another data gap is the extent of LFG production. The northern half of the least tern area and the southern half of the Inactive Landfill have not been adequately sampled for LFG.

RESPONSE 7: Refer to the response to General Comment 1. The conclusions will be modified as appropriate to reflect the changes in earlier sections.

RECOMMENDATIONS FOR POSSIBLE FUTURE WORK

- Additional deep wells may need to be installed to determine if a leachate plume and solvents are present in groundwater directly beneath the site. At a minimum, the Navy should determine if there are any deep, regional drinking water aquifers potentially being impacted by downward migration of a possible leachate/solvent plume originating from the landfill.
- Future groundwater samples should be analyzed for a complete suite of groundwater quality parameters (both anions and cations) to evaluate the chemical nature and origin of the leachate plume. Field parameters including temp, pH, dissolved oxygen and redox should be measured.
- Additional rounds of water levels in monitor wells should be collected to evaluate seasonal differences in groundwater flow patterns.
- Sampling for LFG should be conducted at several areas on the landfill.
- Groundwater monitoring along the boat channel should continue to confirm that groundwater exceeding water quality standards (for copper and nickel) is not discharging into the boat channel. In addition, a simple water budget should be calculated for the site to estimate recharge-discharge relationships to groundwater and leachate production.

COMMENTS TO RECOMMENDATIONS FOR POSSIBLE FUTURE WORK: Refer to Specific Comment 4 (Section 3), General Comment 2 (Section 6), and General Comment 1.

The final ESI will state that the site warrants further action under the removal action process. A long-term groundwater monitoring plan will be developed.

21 December 1995

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GENERAL COMMENTS

Written on 2 November 1995
From Alice Gimeno
Remedial Project Manager
To Phillip Dyck

COMMENT 1: The main concern regarding NTC-Site 1, inactive landfill are the emissions of landfill gases (LFG) from the site and the potential health risks the LFG may have on future on-site workers. The risk assessment completed for the ESI does not adequately address the LFG for on-site workers. High levels of vinyl chloride were detected in the LFG but were not used in the risk assessment. Air monitoring data collected at the boundary of the site was used for the risk assessment. Since future land use at this site will include on-site workers, it is necessary to include an on-site scenario with potential vinyl chloride exposure in the risk assessment. If LFG emissions are shown to be a risk, options for reducing this risk should be evaluated such as additional air sampling prior to on-site activities, and additional and continued landfill cover maintenance and monitoring for this site. Detailed comments from our office of Scientific Affairs are attached in memo form. For potential future on-site activities, a health and safety plan must be implemented with procedures including, but not limited to, routine air monitoring by an industrial hygienist to ensure a safe breathing environment and to check for potential explosive LFG levels. Routine construction activities such as welding, drilling or hammering may act as ignition sources if explosive LFG levels exist.	**COMMENT 1:** As discussed in the 30 November meeting, the ESI addresses the risk posed by the Inactive Landfill in its current condition (i.e., undisturbed). The presumptive remedy approach of containment and monitoring has been assumed. Risks posed by other future uses or activities at the Inactive Landfill must be assessed once those specific future uses are identified. As agreed in the 30 November meeting, a modeling approach will be used to assess the human health risk of LFG above the Inactive Landfill.
COMMENT 2: Background levels for metals should be re-calculated. See attached memo from DTSC's Office of Scientific Affairs.	**RESPONSE 2:** As agreed to in the 30 November meeting, the Navy will evaluate the memo and discuss with DTSC.
COMMENT 3: Summary tables providing sampling results from previous studies should be included in the ESI.	**RESPONSE 3:** The results from previous studies are included in the ESI where appropriate. Additional results from any of the previous studies can be found in the referenced documents.

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Comments from Alice Gimeno

SPECIFIC COMMENTS

COMMENT 1: Page 2-8, Section 2.3.4, Air Quality Solid Waste Assessment Test, second paragraph: Vinyl chloride, not methylene chloride, should be noted in the first sentence.	**RESPONSE 1:** The correction will be made.
COMMENT 2: Page 2-12 and 2-13, Section 2.4, Regulatory History: The referenced Water SWAT and APCD letters should be included in the appendix.	**RESPONSE 2:** The referenced letters will be included in the appendix.
COMMENT 3: Page 5-2, Section 5.3: It states "...16 locations were considered sufficient to characterize the cover soil based on field observation." Please expand on "field observation" in the text.	**RESPONSE 3:** Sample locations were chosen to cover the areas where the highest concentration of wastes were expected. As discussed in the 30 November meeting, it was the intention of the ESI to obtain the data necessary to make decisions regarding the adequacy of the cover soils, not to completely characterize the cover soils. The decision was made in the field to exclude additional sample locations because the information obtained was sufficient to conclude that the cover soil thickness was as little as 1.5 feet thick and, therefore, possibly inadequate. This will be noted in the text for clarification.
COMMENT 4: Page 5-16, top paragraph: Please state the laboratory used for analysis.	**RESPONSE 4:** The CPT groundwater samples were analyzed by Lockheed Analytical Services. This will be stated in the text.
COMMENT 5: Page 6-1, Section 6.1.1, second paragraph: The text states that a large hole was excavated and wastes were dumped in. Is it known what types of wastes were dumped?	**RESPONSE 5:** Mr. Garcia, the groundskeeper from whom this information was obtained, did not have knowledge regarding the type of wastes. The initial assessment study, referenced in Section 2.3.1, contained information on the potential types of wastes dumped in the landfill. Recent inquiries to appropriate personnel at MCRD regarding any documentation have not yielded any additional information.
COMMENT 6: Page 6-3, Figure 6-1: The map would be easier to read with color.	**RESPONSE 6:** Figure 6-1, along with several others that appeared in black and white, will be color in the final ESI.
COMMENT 7: Page 6-11, Figure 6-2: Please provide a little more detail on the "J" laboratory validation qualifier.	**RESPONSE 7:** The "J" laboratory qualifier denotes an estimated value and will be noted on Figure 6-2 and other relevant figures. Additional validation summary sheets will be added to Appendix F, which will allow for evaluating the specific reasons for the assignment of any particular "J" qualifier.

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GENERAL COMMENTS

Written on 27 October 1995
From Michael J. Wade, Ph.D., DABT and Brian K. Davis, Ph.D.
Toxicologists
To Alice Gimeno

COMMENT 1: In its current form the Extended Site Investigation document is unsatisfactory. The limited air sampling conducted for the landfill is inadequate, especially considering the landfill is actively generating methane gas. Additional soil gas monitoring is required and emissions of volatile chemicals must be mathematically modeled according to U.S. EPA and California Air Resources Board guidance. Information concerning evaluation of landfill gas emissions can be found in the document " The Landfill Testing Program: Data Analysis and Evaluation Guidelines" (CAPCOA, 1990). Modeling of emissions from landfills is also discussed on page 19 of the Superfund Exposure Assessment Manual (US EPA, 1988) and this document should be consulted as well. The soil gas around the perimeter of the landfill should be monitored and monitoring should then be expanded outward to determine if there is lateral migration of landfill gas. Additionally, it may be useful to monitor emissions from a flux chamber situated on the surface of the landfill. Special monitoring using Suma canisters may also be required in nearby buildings to measure intrusion of landfill gas.

RESPONSE 1: As agreed to in the 30 November meeting, modeling of LFG will be performed and the results used to revise the risk assessment. Farmer's model will be used to estimate the emission rate of vinyl chloride and other VOCs found in soil gas samples through the landfill surface. The emission rates will be based on the highest measured concentrations of the compounds in the soil gas samples. In turn, the emission rates will be used to estimate the atmospheric concentrations of the VOCs in the air above the landfill. If the estimated risk presented by chemicals in the air above the landfill exceeds 10^{-6}, chemical concentrations in the air at several points along the "downwind" boundary of the landfill will also be calculated. A box model will be used to estimate the concentration of the VOCs in the air above the landfill. The SCREEN model will be used in the area source mode to estimate the concentrations of the VOCs at the landfill boundary. The ratio of the predicted concentrations and U.S. EPA Region IX PRGs will be used as a measure of potential risk.

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COMMENT 2: The primary source of contamination in the area appears to be the landfill itself. This is illustrated by a comparison of the reported contaminants in surface soil, ground water and air. Eleven chemicals were found in surface soil (Table 8-1), eight were found in ground water (Table 8-2), and five were found in air (Section 8.2.3, page 8-3). There is not a single chemical overlap in these three lists. This demonstrates that the source of ground water contamination and the source of air contamination is the landfill material itself, as would be expected, rather than the soil covering. Evidently, significant levels of contaminants are moving from the landfill. The ground water sampling tells us that chemicals have leached from the landfill in the past, but we have no idea what is currently leaching and what will leach in the future. This issue should be addressed by a geologist from one of the regulatory agencies.	**RESPONSE 2:** The fact that there is no overlap in chemicals found in cover soil, groundwater, and air would suggest that the sources are not the same. It is quite possible that cover soils were contaminated prior to being imported to the site. The organics that were detected in the cover soil were found sporadically and do not seem to indicate any particular distribution, or "hot spots." Also, the presence of organics in the least tern sands, which were imported recently and placed on top of the cover soils, supports this possibility. As stated by D. Byrnes of the APCD in the 30 November meeting, the results of the ambient air sampling performed in the Air SWAT are representative of ambient air in the San Diego area. Future monitoring of LFG and groundwater are planned to aid in the assessment of any potential future migration of chemicals from the landfill. Refer to comments submitted by other agencies for a more extensive response to these concerns.
COMMENT 3: We assume any sampling of environmental media, analytical chemistry data, and quality assurance procedures described and summarized in the document reviewed by OSA were adequately reviewed by Office of Military Facilities regional staff. Deficiencies in characterizing the landfill and air contaminants are discussed in our comments # 1 and 2 above.	**RESPONSE 3:** Comment noted. As discussed in the meeting at NTC on 30 November 1995 and as outlined in the ESI work plan, the intention of the ESI was not to characterize the landfill wastes or the soils or groundwater directly beneath it. The soil and groundwater was assessed to the extent necessary to make decisions about the landfill regarding potential impact to the boat channel and San Diego Bay. The concerns listed on page 1-1 and the data gaps identified were based on this approach and, therefore, did not include characterization within or beneath the landfill.
COMMENT 4: The document was reviewed for scientific content. Minor grammatical or typographical errors that do not affect the interpretation have not been noted. However, these should be corrected in the final version of the document.	**RESPONSE 4:** Comment noted. The ESI will be reviewed for errors prior to issuing the final document.
COMMENT 5: Future changes in the document should be clearly identified. This may come in several ways: by submitting revised pages with the reason for the changes noted, by the use of strikeout and underline, by the use of shading and italics, or by cover letter stating how each of the comments here has been addressed.	**RESPONSE 5:** The response to comments document is intended to clearly identify specific changes to be incorporated into the final ESI.

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COMMENTS ON DRAFT EXTENDED SITE INSPECTION, INACTIVE LANDFILL
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SPECIFIC COMMENTS

COMMENT 1: Page 2-1, fifth paragraph: This paragraph indicates pentachlorophenol sludges were deposited in the landfill. Because technical grade pentachlorophenol was sometimes contaminated with chlorinated dioxins during the period the landfill was receiving wastes (1950 to 1970) representative samples should be analyzed for dioxins in surface soil and groundwater.

RESPONSE 1: Available data indicate that wastes disposed at the landfill may have included wastes contaminated with pentachlorophenol sludges. There is no documentation stating that such chemicals were deposited in the landfill.

Groundwater samples from wells and cover soil samples were analyzed for semivolatile organics. Pentachlorophenol was not detected. This suggests that pentachlorophenol sludges, if present, have not impacted the cover soil and have not leached into the groundwater and migrated to any of the sampling locations adjacent to the landfill.

COMMENT 2: Page 2-8, last paragraph: This paragraph is unclear. It indicates that in an earlier study conducted by the Radian Corporation of near surface air and soil gas... "*The test identified benzene and methylene chloride at significant levels in an area of the Inactive Landfill adjacent to the least tern area. The study concluded that even though these compounds were found at high concentrations, there was little evidence that these compounds were impacting the ambient air or the groundwater.*" The logic or calculations for the determination that these contaminants were not impacting the air or groundwater should be provided along with a summary of the results of the Radian study. The results could be provided in an appendix.

RESPONSE 2: The purpose of this section (and the others in Section 2) was to give a brief summary of the key points, findings, and conclusions of previous work performed at the site. The stated conclusion was taken from the Radian report, and is based on Radian's evaluation of their data. The statement should read "The test identified benzene and vinyl chloride ...." This correction will be made. Refer to the Radian report for the logic or calculations employed.

As agreed in the 30 November meeting, modeling of LFG will be performed to estimate the potential risk to humans above the landfill.

COMMENT 3: Page 2-13, last paragraph: We note that the San Diego Air Pollution Control District (APCD) in a letter dated September 7, 1994 stated that it may issue a written Notification for Remedial Action to the Navy requiring installation of a landfill gas (LFG) collection system.

RESPONSE 3: Comment noted. A copy of the letter will be included in an appendix, in response to Specific Comment 2 from Alice Gimeno. As stated in the 11/30 meeting the APCD believes the gas emission rates at the Inactive Landfill are insufficient to support a LFG collection system.

COMMENT 4: Page 3-1, second and third paragraphs: We note the landfill is situated within 300 feet the San Diego boat channel and 700 feet of San Diego Bay. Thus environmental receptors and recreational swimmers could be impacted by landfill leachate migrating into these waters. See also our comment below regarding pages 8-14 to 8-19.

RESPONSE 4: The Bay and Estuaries criteria which were used in the ESI, are based on both the protection of human health and the protection of aquatic life.

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COMMENT 5: Pages 6-13 to 6-17: The text lists three sets of samples which were candidate sources of background data for metals (page 6-13). The first question is whether these data are homogeneous and can be pooled. The plots of the metal concentrations against aluminum concentration (Figure 6-3, page 6-13) and the distribution plots (Appendix __) can be used to address this question. The document should directly make that determination. The separation of the data into two tables (Tables 6-1 and 6-4) and the exclusion of some of the Table 6-1 data from the upper tolerance limit calculations suggest that the authors do not feel that the data are homogeneous. This issue must be confronted and explained explicitly. The use of an upper 95 percent confidence limit of the 95th percentile (upper tolerance limit) to estimate background is unacceptable and contrary to current OSA guidance. There are too few background samples to use the upper tolerance limit. This would be the case even if all 39 samples from Tables 6-1 and 6-4 were included. Small numbers of samples have larger variances which result in higher upper tolerance limits. That is, the estimate of background level is higher, the less reliable the background sampling is. The background value should be revised in conjunction with current OSA guidance which recommends the use of the lower 80 percent confidence limit of the 95th percentile. Appendix A of this memo is a generic explanation of OSA guidance on estimating background concentrations of metals.	**RESPONSE 5:** As agreed in the 30 November meeting, the Navy will evaluate the approach to calculating background and discuss with DTSC.
COMMENT 6: Page 6-43, third paragraph: We note that this paragraph indicates that groundwater on the base is hydraulically connected to the boat channel and bay, thus ecological receptors and recreational users of these waters could be exposed to chemicals emanating from landfill leachate. See also our comment below regarding pages 8-14 to 8-19.	**RESPONSE 6:** See response to Comment 4 above.
COMMENT 7: Page 6-43, last paragraph: Very high levels (820 to 3160 ppb) of vinyl chloride were found in soil gas in the Radian investigation of the Landfill. If an adult were exposed to these levels of vinyl chloride in his breathing space, the associated cancer risk would range from 6×10^{-4} to 2×10^{-6}. Further investigation of landfill gas emissions is necessary. The limited amount of monitoring performed is insufficient to characterize the potential risk from these emissions.	**RESPONSE 7:** As stated by D. Byrnes of the APCD in the 30 November meeting, APCD studies of the use of the recommended air sampling techniques in the conduct of Air SWATs indicate that integrated surface sampling and upwind-downwind ambient air data are not reliable, and he recommended using appropriate mathematical models to estimate vapor emission and dispersion rates. Farmer's model will be used to estimate the emission rate of vinyl chloride and other VOCs found in soil gas samples through the landfill surface

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	(U.S. EPA, 1988 Superfund Exposure Assessment Manual. EPA/540/1-88/001 OSWER Directive 9285.5-1. pg. 16). The emission rates will be based on the highest measured concentrations of the compounds in the soil gas samples. In turn, the emission rates will be used to estimate the atmospheric concentrations of the VOCs in the air above the landfill. If the estimated risk presented by chemicals in the air above the landfill exceeds 10^{-6}, chemical concentrations in the air at several points along the "downwind" boundary of the landfill will also be calculated. A box model will be used to estimate the concentration of the VOCs in the air above the landfill. The SCREEN model will be used in the area source mode to estimate the concentrations of the VOCs at the landfill boundary. The ratio of the predicted concentrations and U.S. EPA Region IX PRGs will be used as a measure of potential risk. These levels of vinyl chloride were found in soil gas samples collected from approximately 5 feet below ground surface. The basis for the ESI is that the landfill will remain in its current condition (i.e., undisturbed); therefore, much lower concentrations would be expected in adult human breathing space above the landfill.
COMMENT 8: Page 8-3, paragraphs 5 and 6: Collection of upwind and downwind air samples on three consecutive days is inadequate for identification of potential air contaminants from a landfill emitting methane.	**RESPONSE 8:** See response to comment 7 above.
COMMENT 9: Page 8-4, table 8-1: The 95 percent upper confidence limit for the 95th percentile estimate of the mean is an inappropriate measure of background and is unacceptable to OSA. See the previous comments for Pages 6-13 to 6-17.	**RESPONSE 9:** As per the 30 November meeting, the Navy and DTSC will discuss the approach to be used for determining background.
COMMENT 10: Page 8-6, paragraph 3: A screening level risk assessment using soil screening levels such as Region IX PRGs does not always overestimate risk. For example, risks could be seriously underestimated by failing to account for exposure pathways such as food chain or soil gas migration into enclosed structures which were not taken into account in the calculation of Region IX PRGs.	**RESPONSE 10:** The statement will be revised to address the level of conservatism at this site.

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COMMENT 11: Page 8-9, Section 8.4.1.2 (Groundwater COPCs): Volatile contaminants in ground water can contribute to risk by acting as a source for soil gas penetrating into enclosed structures. Soil gas can also move laterally from the landfill eventually intruding into nearby structures. These potential exposure pathways should be evaluated in the document.	**RESPONSE 11:** Estimating the risk presented by VOCs in groundwater to people in enclosed buildings requires modeling the lateral, then the vertical movement of VOCs to the floor and through the floor of the buildings, and then estimating the concentration of the VOCs in building air. The latter is simple, but the former requires use of relatively complex transport models. Screening risk assessments are supposed to employ rapid techniques to obtain a first approximation of risk. Use of complex transport models is beyond the scope of the screening risk assessment. Since VOC concentrations are highest in the landfill, the risk estimates obtained via the process described in the response to Comment 1 will provide a conservative estimate of the risk associated with laterally moving VOCs.
COMMENT 12: Page 8-13, Table 8-4: In a screening level risk assessment maximum values are utilized. Instead of averaging values over the three days, the maximum value should be used. In any case, as indicated above, estimation of air emissions from the landfill is inadequate.	**RESPONSE 12:** As stated by D. Byrnes of the APCD in the 30 November meeting, APCD studies of the use of the recommended air sampling techniques in the conduct of Air SWATs indicate that integrated surface sampling and upwind-downwind ambient air data are not reliable and recommended using appropriate mathematical models to estimate vapor emission and dispersion rates. Farmer's model will be used to estimate the emission rate of vinyl chloride and other VOCs found in soil gas samples through the landfill surface. The emission rates will be based on the highest measured concentrations of the compounds in the soil gas samples. In turn, the emission rates will be used to estimate the atmospheric concentrations of the VOCs in the air above the landfill. If the estimated risk presented by chemicals in the air above the landfill exceeds 10^{-6}, chemical concentrations in the air at several points along the "downwind" boundary of the landfill will also be calculated. A box model will be used to estimate the concentration of the VOCs in the air above the landfill. The SCREEN model will be used in the area source mode to estimate the concentrations of the VOCs at the landfill boundary. The ratio of the predicted concentrations and U.S. EPA Region IX PRGs will be used as a measure of potential risk.
COMMENT 13: Page 8-14, top of page: Risk and hazards must be summed over all pathways. This was not done in this document and must be included for the document to be acceptable to OSA.	**RESPONSE 13:** The risk and hazards will be summed over all pathways in the Final ESI.

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COMMENT 14: Pages 8-14 to 8-19: The document notes the importance and size of San Diego Bay (page 3-5) as well as the importance of the nearby terrestrial habitats (page 3-6). The significance of both marine and terrestrial habitats makes the limited ecological risk assessment which was done quite inappropriate. The assessment is 6.5 pages long. It doesn't consider the potential for movement of contaminants to any terrestrial organisms or habitats near the base. It evaluates only one exposure pathway to one organism on the base. Even though that evaluation indicates the potential for harm to the organism, this is dismissed because of successful breeding of the organism. The possibility of harm to other organisms is dismissed because there are "No obvious signs" of it (page 8-16). The California Department of Toxic Substances Control has written two guidance documents which should be useful in revising this ecological risk assessment. They are the "Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities 1994), "Part A: Overview" and "Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities, Part B: Scoping Assessment". These documents set forth logical and rigorous methods for ecological risk assessment.	**RESPONSE 14:** The landfill has a soil cover. The cover helps to minimize the movement chemicals in the landfill to off-site locations via surface water runoff. The only possible mechanisms for off-site transport are air and groundwater. Both pathways were evaluated. The evaluation of the air pathway was limited to on-site receptors where exposure would be highest. Chemicals in the groundwater were evaluated for possible impacts on marine organisms and human health by comparing the concentrations of chemicals in water from wells closest to the boat channel with health and environmental criteria in the Enclosed Bays and Estuaries Plan. The risk assessment was performed using these documents as guidance.
COMMENT 15: Page 8-14, Section 8.6.1: The document must provide a description of the July, 1995 survey which was done. What were the qualifications of the survey personnel? How many days were involved? On what hours was the survey done? What organisms might have been missed because of diurnal or seasonal or other factors?	**RESPONSE 15:** A more thorough description of the July 1995 survey will be included in the final ESI.
COMMENT 16: Pages 8-15 to 8-17, Section 8.6.2: The only terrestrial receptor which was considered is the least tern. Although attention must be paid to special status species, other species should be considered as well. This includes potential receptors on the base and off the base if contaminants can move to those receptors. The assessment includes a quantitative evaluation for the least tern, but the only exposure pathway considered is inhalation. The document fails to note that these methods have clearly underestimated total exposure. Exposure through food ingestion is ignored (page 8-14). This should be	**RESPONSE 16:** The landfill currently has a soil cover which is being maintained as well as improved. A biological survey was conducted and the results showed that the landfill (least tern nesting area excepted) is not a suitable habitat for vertebrates and plants because the soil cover is regularly graded and filled. This activity destroys plant communities and the burrows of animals that choose to inhabit the area between grading operations. Beach sand has been placed over the soil cover in the least tern nesting area and vegetation has been cleared to make it more attractive to the least tern, which is the only organism of value that uses the landfill. The air pathway was the only one believed to be complete for the least terns. The presence of beach sand on the

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justified. Exposure through soil ingestion was said to be insignificant because the least tern eats fish (page 8-16). However, the birds may eat the fish on land. They must bring the fish back to the nests to feed young birds. Hence, soil ingestion seems likely. Exposure through absorption through the skin and the eggs is omitted "because of problems in estimating dose" (page 8-16). In order to avoid overestimating the exposure, the document deliberately underestimates it. These pathways should be included. The document can then include a discussion of the uncertainty in the exposure estimates.	landfill cover protects the birds from being exposed by soil ingestion and dermal contact with soil. Although the biological survey indicated that the least terns are the only species of concern at the site, other species will be evaluated that may occasionally forage in the area. The risk to additional potential receptors will be evaluated using the rabbit, ground squirrel, and robin as representative species. The risk associated with soil ingestion and inhalation of vapors will be estimated for these additional species. The terns as well as other fish-eating birds that frequent the area may eat fish potentially contaminated with chemicals from the landfill. However, because the landfill is not the only source of chemicals entering the boat channel and San Diego Bay, the fish consumption pathway was not evaluated. The risk assessment work plan made it clear that the ecological risk assessment would not include the evaluation of indirect pathways such as food. The text will be revised to clarify these issues.
COMMENT 17: Page 8-17, Section 8.6.3.1. A major concern is the potential movement of contaminants from the landfill into the boat channel and the San Diego Bay. This has not been inadequately addressed in this risk assessment. One of the three objectives of the assessment was said to be to evaluate the potential for the known ground water contaminants to harm marine organisms (Section 8.6, page 8-14). All contaminants are dismissed because they were not listed in the California Enclosed Bays and Estuaries Plan. This is insufficient. The federal Ambient Water Quality Criteria should also be checked. For those contaminants which are not found on either list, the scientific literature should be consulted.	**RESPONSE 17:** In its response to comments on the draft risk assessment work plan, the Navy stated that the potential risk posed by chemicals in groundwater would be assessed by comparing the chemical concentrations with the water quality objectives in the Enclosed Bays and Estuaries Plan. The Federal Ambient Water Quality Criteria will be considered as an additional screening standard, and will be added to Table 6-18. In addition, a table will be prepared for Section 8 that compares the groundwater COPCs to the California Enclosed Bays and Estuaries objectives.
COMMENT 18: Page 8-18, Table 8-5: The assessment derives NOAEL values for the five contaminants which were found in air sampling. We have discussed the inadequacies of the air sampling in previous comments. NOAEL values were derived by adjusting NOAEL values from rodent experiments by the cube root of the ratio of body weights for the rodent and the sandpiper. The justification for this is that there are no inhalation data for least terns and the sandpiper was identified as an appropriate surrogate for the least tern (page 8-16). First, the document should specify that it is the spotted sandpiper which is	**RESPONSE 18:** The analysis of the impacts of body weight differences on the risk estimates will be included in the revised report. The adjusted NOAELs in Table 8-5 are correct. That they are correct is shown below using benzene are an example. The equation presented on page 8-16 is: $NOAEL_{sp} = NOAEL_{ts} (BW_{ts}/BW_{sp})^{1/3}$ The adjusted NOAEL for benzene is reported as 2.4E-02 or 0.024 mg/kg/day. $NOAEL_{ts}$ = 26 mg/kg/day; BW_{ts} is 0.00003 kg; and BW_{sp} = 0.0425 kg. The uncertainty factor is 100.

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being used, since there are several sandpiper species. It should also state that the inhalation and body weight data were derived from data given in the U.S. EPA Wildlife Exposure Factors Handbook. Second, spotted sandpipers are smaller than least terns. The result of this is that the adjusted NOAEL is higher for the sandpiper than it would be for the larger least tern. That is, larger animals appear to be more sensitive to the toxicity of a contaminant. However, the lower body weight of the sandpiper leads to a higher estimate of the dose, which partially compensates for the estimated NOAEL. We checked the calculations based on the equations provided (pages 8-16 and 8-17) and found all adjusted NOAEL values to be ten times higher than those reported in Table 8-5. Therefore, all hazard quotients reported in Table 8-5 are ten times higher than they should be.	$(0.00003 \text{ kg}/0.0425 \text{ kg})^{1/3} = 0.0912$ $0.0912 \times 26 = 2.37$ mg/kg/day 2.37 mg/kg/day/100 = 0.0237 mg/kg/day or 0.024 mg/kg/day rounded up to the nearest 1,000 digit.
COMMENT 19: Page 8-19, Section 8.6.3.2: The fact that the least tern nesting program is successful is useful information which may suggest that there has been little or no harm from the chemical contaminants. This should be strengthened by identifying the "least tern researchers" referred to on page 8-19. It should also be strengthened as described below. The field observations of other species are too superficial to be of any value. Rather than ignoring the quantitative analysis as is done in the assessment, it should be used as a guide for what to look for in the field. It should suggest what chemicals may cause toxicity and what the nature of the toxicity may be. A field study can then focus on the potential effects.	**RESPONSE 19:** The least tern researchers will be identified. If the revised concentration estimates based on air transport modeling of VOCs in the landfill are found to be hazardous to the terns, recommendations for further evaluation will be made.
COMMENT 20: Page 9-5, second complete paragraph: The statement that ground water contaminants do not exceed the aquatic criteria is misleading. The document dismisses the contaminants because corresponding criteria were not found (See the comment regarding page 8-14, Section 8.6). Leachate from the landfill must be fully analyzed and characterized. A geologist from one of the regulatory agencies involved should comment on the issue of movement of contaminated groundwater towards San Diego Bay.	**RESPONSE 20:** In response to a Specific Comment 3 (Section 9) by Claire Trombadore of the U.S. EPA, clarification will be added to the text in Section 9.1.3.2 to state that the detection limits for copper and nickel in these samples were above the California Bay and Estuaries water quality criteria. The text will be qualified to state that based on this situation, it is uncertain if concentrations above the water quality criteria are migrating to the boat channel at this time. The discussion of the potential impact on the boat channel and San Diego Bay will be revised and expanded. As discussed in the 30 November meeting, the intention of the ESI was not to fully characterize the landfill wastes or the soils or groundwater directly beneath it. The soil and groundwater was assessed to the extent necessary to

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	make decisions about the landfill regarding potential impact to the boat channel and San Diego Bay. The ESI was intended to address the risk posed by the Inactive Landfill in its current condition (i.e., undisturbed), based on the presumptive remedy approach of containment and monitoring.
COMMENT 21: Page 9-5, seventh complete paragraph: We disagree with the notion that it can be concluded that there is no significant adverse effect from LFG emissions. The contention remains to be demonstrated. In addition to benzene and carbon tetrachloride emissions discussed in this paragraph, very high levels of vinyl chloride were detected in soil gas. Further characterization and assessment of the potential emissions of toxic gasses from the landfill needs to be carried out, especially regarding potential emissions of vinyl chloride and other gasses into enclosed spaces.	**RESPONSE 21:** As agreed to in the 30 November meeting, modeling to estimate vertical diffusion of LFG into the air, and a revised risk evaluation, will be performed. Prior to the modeling and evaluation, regulatory approval of the approach will be obtained. Farmer's model will be used to estimate the emission rate of vinyl chloride and other VOCs found in soil gas samples through the landfill surface. The emission rates will be based on the highest measured concentrations of the compounds in the soil gas samples. In turn, the emission rates will be used to estimate the atmospheric concentrations of the VOCs in the air above the landfill. If the estimated risk presented by chemicals in the air above the landfill exceeds 10^{-6}, chemical concentrations in the air at several points along the "downwind" boundary of the landfill will also be calculated. A box model will be used to estimate the concentration of the VOCs in the air above the landfill. The SCREEN model will be used in the area source mode to estimate the concentrations of the VOCs at the landfill boundary. The ratio of the predicted concentrations and U.S. EPA Region IX PRGs will be used as a measure of potential risk. Future LFG monitoring will be performed to assess and control LFG emissions.
ERRORS IN NEED OF CORRECTION	
COMMENT 1: Page 3-7, paragraph 1: A reference should be added to replace "(need reference)".	**RESPONSE 1:** The reference will be added.
COMMENT 2: Table 8-5, page 8-18: The body weights are in kilograms, not grams.	**RESPONSE 2:** The correction will be made.
COMMENT 3: Section 8-7, page 8-19: These conclusions include the ecological assessment as well as the human health assessment.	**RESPONSE 3:** These conclusions will be separated into the appropriate sections in the final ESI.

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GENERAL COMMENTS

Written on 17 October 1995
From John L. Turner, Chief Environmental Services Division
To Alice Gimeno

COMMENT 1: In general, the draft report accurately describes the environmental setting, ecology, and species of special concern. The approach and content of the report relative to estimates of exposure and risk to ecological receptors are technically correct, and appear sound in design and interpretation. In reference to the ecological risk assessment, three metals (arsenic, selenium and zinc) and five hydrocarbons (benzene, carbon tetrachloride, methylene chloride, 1,1,1-trichloroethane, and tetrachloroethene) were further subjected to risk evaluation for an ecological receptor, the California least tern. The risk to the least tern by the metals through soil exposure was not further evaluated because of the bird's feeding habits, although there is some evidence that arsenic and selenium might bioconcentrate through indirect exposure (i.e., food web transfers). A qualitative estimate of the general health of the least tern colony at the Inactive Landfill was performed and concluded, from recent increases in numbers of nests, breeding pairs, and offspring survival rates in 1994, that this site was "as good or better than at other nesting areas." It can be noted that the Hazard Quotients (HQs) and Hazard Index (HI) indicate that tetrachloroethene poses a "potential threat to the least tern by inhalation." The report points out that the least tern colony at the landfill appears to be healthy. The nesting population has been increasing annually, and the survival of young birds has been excellent in the area, presumably due to a restoration program that was initiated in 1993.

RESPONSE 1: Comment noted.

COMMENT 2: The recommendations, based upon the report's conclusions, include: 1) increasing the cover soil thickness and continue maintenance of the soil cover, 2) monitoring groundwater for potential impact to waters of San Diego Bay, and 3) routine monitoring of Landfill Gas (LFG). The purpose of these measures is to: 1) eliminate potential exposure of human and ecological receptors to the landfill contents, 2) keep landfill vapor emissions within

RESPONSE 2: Comment noted.

acceptable levels, 3) protect surface waters from groundwater or landfill releases, and 4) provide surface drainage to prevent ponding and infiltration. We agree that these are important actions to continue to protect State fish, wildlife species, biota, and their habitat, potentially affected by soil and groundwater releases from the Inactive Landfill.

SPECIFIC COMMENTS

COMMENT 1: On page 3-7, the report indicates that six nesting pairs of California least terns were observed at NTC San Diego in 1995. On page 8-19, the reports states that there were "ten nests in 1994, and 15 nests to date in 1995." It is not clear from these comparisons that the previous survival rate greater "than 25 to 50 percent" found elsewhere in California is being maintained at NTC San Diego, suggesting some lesser rate of success in 1995, i.e., six nesting pairs in 15 nests. A clearer statement of the ratios and/or success rates would be helpful.

RESPONSE 1: This section of the report will be clarified.

COMMENT 2: On page 8-14, the report indicates that indirect exposure (e.g., food web transfers) was not considered under this assessment (for trace metal accumulation). Literature documentation or study findings should be used to support this decision.

RESPONSE 2: The approved work plan states that food web transfer of the COPCs will not be evaluated. As pointed out in other responses, the food sources for the least tern (the only special-status species) are not directly related to the landfill. Also, the maintenance of the least tern area (grading and vegetation removal) minimizes any potential site-related food sources.

COMMENT 3: On page 8-16, risks presented by chemicals of potential concern (COPCs) in soil to the least tern were not estimated because of the bird's feeding habits. Preening and incidental ingestion were not considered as significant exposure pathways based upon some rationale or reasons and should be stated. During a portion of the nesting, brooding, and juvenile periods, the least terns will be closely associated with the soil surface. Did routes of potential exposure include consideration of drinking water sources of exposure?

RESPONSE 3: The landfill currently has a soil cover, which is being maintained as well as improved. A biological survey was conducted and the results showed that the landfill (least tern nesting area excepted) is not a suitable habitat for vertebrates and plants because the soil cover is regularly graded and filled. This activity destroys plant communities and the burrows of animals that choose to inhabit the area between grading operations. Beach sand has been placed over the soil cover in the least tern nesting area and vegetation has been cleared to make it more attractive to the least tern, which is the only organism of concern that uses the landfill. Therefore, it was the only organism considered in the risk assessment. The air pathway was the only one believed to be complete for the terns. The presence of beach sand on the landfill cover

	helps to protect the birds from being exposed by soil ingestion and dermal contact with underlying cover soils. The terns as well as other fish-eating birds that frequent the area may eat fish potentially contaminated with chemicals from the landfill. However, because the landfill is not the only source of chemicals entering the boat channel and San Diego Bay, the fish consumption pathway was not evaluated. The risk assessment work plan made it clear that the ecological risk assessment would not include the evaluation of indirect pathways such as food.
COMMENT 4: On page 8-16, the report concludes that a predominant exposure route for chemicals is probably from food sources, not associated with San Diego NTC. Providing attractive habitat and managing the habitat for "least tern restoration and maintenance" is of obvious importance to the Navy and United States Fish and Wildlife Service (page 3-7). If population responses of the least tern do not continue to show signs that "least tern survival and health at the nesting area are as good or better than at other nesting areas", an evaluation of this potential contaminant source (from San Diego Bay) would be warranted. Also, the figures and calculations on which the conclusion regarding the population response should be included in the report to justify or support the conclusion.	**RESPONSE 4:** A recommendation will be included in the report to evaluate potential contaminant sources if there is an observable decline in the health of the least tern population. The conclusions regarding the health of the least tern population were based upon interviews with biologists studying the least tern population at the Inactive Landfill.
COMMENT 5: On page 9-5, further monitoring of the (potential) risk to least terns from tetrachloroethene is not evident in the recommendations. Direct chemical measurements of tetrachloroethene via the release of LFG might be included with "routine monitoring of LFG". The final report should address that issue. Also, the screening risk assessment of groundwater COPCs indicates that the boat channel (San Diego Bay) does not exceed California Enclosed Bays and Estuaries criteria. That finding must be considered in the context that none of the groundwater COPCs are included in the table of water quality objectives for the protection of marine organisms (page 8-17) or least terns (page 8-15) from the California Enclosed Bays and Estuaries Plan.	**RESPONSE 5:** If the revised concentration estimates based on air transport modeling of VOCs in the landfill are found to be hazardous to the terns, recommendations for further evaluation will be made. The limitations of the Enclosed Bays and Estuaries criteria will be discussed.

DRAFT
COMMENTS ON DRAFT EXTENDED SITE INSPECTION, INACTIVE LANDFILL
NAVAL TRAINING CENTER, SAN DIEGO
CTO-0056

GENERAL COMMENTS

Written on 23 October 1995
From Tamara Zielinski
Waste Management Engineer, Closure and Remediation Branch
To Alice Gimeno

COMMENT 1: In general CIWMB staff are concerned that the document does not adequately evaluate the potential health threats posed by the landfill gas that is being generated at the site. In previous comments provided by CIWMB staff, dated March 16, 1995, staff express concerns about the potential health threats posed by the landfill gas and provided specific standards that included threshold criteria for landfill gas (i.e., Title 14, California Code of Regulations, section 17783), however these standards were not addressed in the ESI.

RESPONSE 1: As discussed in the 30 November meeting, modeling to estimate vertical diffusion of landfill gas into the air and a revised risk evaluation will be performed. Prior to the modeling and evaluation, regulatory approval of the approach will be obtained.

As stated in the 30 November meeting, the Navy will review previous correspondence and request a copy of the referenced letter, if necessary. Future and continued monitoring of LFG will be performed in accordance with APCD and other relevant agency guidelines.

The final ESI will state that the site warrants further action under the removal action process.

COMMENT 2: Staff is specifically concerned about the potentially explosive levels of landfill gas (53 percent methane by volume) and the Class A carcinogens (3,160 parts per billion by volume (ppbv) of vinyl chloride and 8,400 ppbv of benzene) that are being generated by the wastes in the NTC Landfill. The ESI did not evaluate the potential threat posed by the landfill gas to the existing and proposed land uses at and around the NTC Disposal Site as required by 14 CCR 17783.

RESPONSE 2: The levels of methane, vinyl chloride, and benzene cited were found in soil gas samples collected from approximately 5 feet below ground surface. As stated by D. Byrnes of the APCD in the 30 November meeting, APCD studies of the use of the recommended air sampling techniques in the conduct of Air SWATs indicate that integrated surface sampling and upwind-downwind ambient air data are not reliable, and he recommended using appropriate mathematical models to estimate vapor emission and dispersion rates. Farmer's model will be used to estimate the emission rate of vinyl chloride and other VOCs found in soil gas samples through the landfill surface. The emission rates will be based on the highest measured concentrations of the compounds in the soil gas samples. In turn, the emission rates will be used to estimate the atmospheric concentrations of the VOCs in the air above the landfill. If the estimated risk presented by chemicals in the air above the landfill exceeds 10^{-6}, chemical concentrations in the air at several points along the "downwind" boundary of the landfill will also be calculated. A box model will be used to estimate the concentration of the VOCs in the air above the landfill. The SCREEN model will be used in the area source mode

Comments from Tamara Zielinski

	to estimate the concentrations of the VOCs at the landfill boundary. The ratio of the predicted concentrations and U.S. EPA Region IX PRGs will be used as a measure of potential risk. The basis for the ESI is that the landfill will remain in its current condition (i.e., undisturbed). Risks posed by other future use or activities at the Inactive Landfill must be evaluated once those specific activities have been identified.
COMMENT 3: The ESI does contain a risk assessment, but the high concentrations of the Class A carcinogens such as vinyl chloride and benzene detected in the sites landfill gas were not considered as contaminants of concern. This is because ambient air monitoring data collected at the boundary of the site during a previous investigation was used for the risk assessment. CIWB staff believes that this would be a proper procedure if access to the site was restricted at the site boundary, however this is not the case at the NTC landfill.	**RESPONSE 3:** Refer to the response to Comment 2 above.
COMMENT 4: The site is currently being used as an exercise area and endangered species habitat. The site is also surrounded by many structures that could be affected by migrating landfill gas. The cobble, gravel and sand cover material on the site provides a pathway for vertical emissions of landfill gas.	**RESPONSE 4:** The results of the ESI landfill soil gas sampling, which focused on the portion of the landfill with the highest concentrations at the perimeter, indicated that gas migration west of McCain Road or into structures is not occurring. As discussed in the response to Comment 2, vertical emissions of landfill gas will be modeled, and the risk assessment in the ESI will be revised accordingly.
COMMENT 5: Since violations of the Air Pollution Control Districts 500 ppm surface emissions criteria have been noted and sensitive land use activities are occurring and planned on the site, CIWMB staff believe that the landfill gas characterization data that contains the 3,160 ppbv of vinyl chloride and 8,400 ppbv of benzene should be used for the risk assessment. This would ensure that the standard criteria contained in 14 CCR 17783 of ensuring that landfill trace gasses do not poses a potential threat to the public or the environment is adequately addressed.	**RESPONSE 5:** Modeling of the cited samples will be performed, as discussed in the response to Comment 2.
COMMENT 6: An adequate risk assessment at the NTC landfill is essential to ensure that the landfill gas does not pose a potential threat to future land use	**RESPONSE 6:** As discussed in the response to Comment 2, the ESI (and specifically the risk assessment) is intended to address the current landfill

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activities at the site. To ensure that future land use of the site is conducted in a manner that is protective of the public and the environment, new postclosure activities at the site need to be evaluated pursuant to the criteria established in 14 CCR 17796 Postclosure Land Use.	condition, and assumes that it will remain undisturbed. In addition, as discussed in the 30 November meeting, if other future uses of the landfill are to occur, such as construction on the landfill or other activities that will disturb the landfill surface, then additional studies will need to be performed that specifically address the proposed activities.
COMMENT 7: Section 14 CCR 17783, Landfill Gas Monitoring and Control also contains two additional criteria for monitoring of landfill gas, one is for migration at the boundary of the site and the other is for monitoring of on site and adjacent structures. Since ESI did not completely define the boundary of the waste CIWMB staff is concerned that migration of landfill gas at the boundary of the site was not fully evaluated and adjacent structures were not evaluated for the presents of landfill gas.	**RESPONSE 7:** The monitoring of on-site structures and for landfill gas migration was focused on the area of high landfill gas concentrations based upon the results of the air SWAT study. As D. Byrnes of the APCD discussed in the 30 November meeting, the Air SWAT was designed in part to address the issue of landfill gas migration. The Air SWAT study gas probes were placed in locations most likely to have the highest landfill gas concentrations (in the area of the waste trenches and where monitoring, required under a waiver to SDCAPCD Rule 59, detected VOC emissions). The four areas where the landfill boundaries were not completely defined are located away from the trenches and near Air SWAT gas probes in which concentrations of landfill gas were not detected.
COMMENT 8: Enclosed in our March 16, 1995, letter CIWMB staff provided the Title 14 applicable standards for the closure and postclosure maintenance for solid waste disposal sites. After reviewing the ESI it appears that additional guidance would be beneficial to ensure that these standards are addressed in a manner that is protective of public health and safety and the environment. CIWMB staff will be forwarding a copy of the Title 14, Closure and Postclosure Standards to you under a separate cover. Staff is also available for guidance.	**RESPONSE 8:** Comment noted. The final ESI will state that the site warrants further action under the removal action process.

Table 6-18
Comparison of Maximum Detected Groundwater Results for Monitoring Well and *In Situ* Samples with Water Quality Objectives

Analyte Name	Numerical Objective (µg/L[a])	Maximum Detection in Monitoring Well Samples (µg/L)	Maximum Detection in *In Situ* Samples (µg/L)
Arsenic	36	11.9	15.8
Cadmium	9.3	ND[b]	**14**[c]
Copper	2.9	**19.8**	**115**
Chromium	50	9.2	71.9
Lead	5.6	2.9	**37.8**
Nickel	8.3	**11.7**	**101**
Selenium	71	8.2	58.6
Zinc	86	50.2	**86.2**
Beryllium	0.13	ND	**3.1**
Mercury	0.025	**1.1**	ND
Silver	2.3	ND	1.7
Benzene	21	2.2	2.2
Chlorobenzene	4,500	ND	2.8
Toluene	300,000	6.3	ND
1,2-DCA[d]	130	ND	0.7
PCE[e]	6.9	ND	5.2
TCE[f]	92	38	25
Vinyl chloride	34	ND	2.0
Naphthalene	2,350[g]	31	NA[h]
Phenol	5,800[g]	13	NA
Ethylbenzene	430[g]	22	14
Dichlorobenzenes	1,970[g]	67	89

Except as noted, water quality objectives obtained from the California Enclosed Bays and Estuaries Plan (SWRCB 1993). The numbers represent the most conservative (lowest) value from the human health, protection, and saltwater aquatic life protection objectives.

Notes:
[a] µg/L – micrograms per liter
[b] ND – not detected
[c] bold type represents results that exceed water quality objectives
[d] DCA – dichloroethane
[e] PCE – tetrachloroethene
[f] TCE – trichloroethene
[g] Water quality objectives obtained from federal ambient water quality criteria for marine acute exposure (1987update). The value is the lowest observed adverse effect level because insufficient data was available to develop criteria.
[h] NA – not analyzed

Table 8-
Comparison of Maximum Detected Groundwater Results for Monitoring Wells ES-3S, ES-3D, and ES-4D with Water Quality Objectives

Analyte Name	Numerical Objective (µg/L)[a]	Maximum Detection in Monitoring Well Samples (µg/L)
Toluene	300,000	1.4
TCE[b]	92	38
Aluminum	none[c]	121
Barium	none	47.1
Cobalt	none	13.1
Vanadium	none	30.9
cis-1,2-DCE[d]	none	47

Table contains sample results only for those analytes that were detected and that have a corresponding water quality criteria.

Water Quality objectives obtained from the California Enclosed Bays and Estuaries Plan (SWRCB 1993). The numbers represent the most conservative (lowest) value from the human health, protection, and saltwater aquatic life protection objectives.

Notes:
[a] µg/L – micrograms per liter
[b] TCE – trichloroethene
[c] *none* – *no criteria* listed in the California Bays and Estuaries Plan (human health, protection, and saltwater aquatic life) or the federal ambient water quality criteria (marine exposure)
[d] DCE – dichloroethene