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NSY LONG BEACH
SSIC NO. 5090.3.A

DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

5090
Ser 06CA.AT/0755
September 18, 2000

Ms. Sue Hakim:
California Environmental Protection Agency
Department of Toxic Substances Control
5796 Corporate Way
Cypress, CA 90630

Dear Ms. Hakim:

This is to acknowledge that our Command received the comments for the Draft Feasibility Study of IR Sites 9, 12, and 13 from Regulatory Agencies. We reviewed the comments and enclosure (1) are the Navy responses. If you have any concerns or would like to discuss further the Navy responses, we would like to meet with you to discuss these concerns. We would like to get your concurrence to the Navy's responses by October 2, 2000, before we proceed to the development of the Draft Final Feasibility Study.

Thank you for your guidance and involvement in this project. If you any questions or need additional information, please feel free to contact Mr. Tony Tactay, Remedial Project Manager (RPM) at (619) 532-0954 or fax 619-532-0940.

Sincerely,

THOMAS MACCHIARELLA JR.
BRAC Environmental Coordinator
By direction of the Commander

Encl: (1) Navy response to the Agency comments on the Draft Feasibility Study (September 18, 2000)

Copy to:
Mr. Martin Hausladen
U.S. Environmental Protection Agency
75 Hawthorne Street, Suite 200
San Francisco, CA 94105

Ms. Ana Veloz-Townsend
California Regional Water Quality Control Board
Los Angeles Region
320 West Fourth Street, Suite 200
Los Angeles, CA 90013

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Ms. Cristine Houston
Mr. Tom Johnson
Port of Long Beach
925 Harbor Plaza
Long Beach, CA 90802

RESPONSE TO COMMENTS
DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

Comments by: Ana M. Townsend CRWQCB – Los Angeles Region **Date:** 02 May 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 03 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
COMMENTS:	***RESPONSES:***
1. Page ES-2, the first bullet item, indicates that for Installation Restoration Program (IRP) Site 12, remedial action objectives (RAO) were developed to prevent exposure of current and future industrial workers to PAHs, carbazole, and arsenic in soil at concentrations presenting a cumulative excess lifetime cancer risk (ELCR) in excess of 10^{-4}. Please list all chemicals of concern for IRP Site 12, including the other metals and PCBs detected at this site.	1. The contaminants listed in the referenced RAO are the only COCs identified in the human-health risk assessment for IRP Site 12, AOC 1, soil as the "risk drivers." The identification of risk drivers was performed on the basis that the risk associated with these contaminants, when considered separately or in combination with other COPCs, is sufficient that the cumulative ELCR for AOC 1 as a whole exceeds 10^{-4}. The other metals and PCBs reported in soil of this AOC had associated risk less than 10^{-6} and therefore were not identified as risk drivers for AOC 1. The referenced RAO has been revised to clarify this point: • For IRP Site 12, prevent exposure of current and future industrial workers to the COCs that control risk (PAHs, carbazole, and arsenic) in soil at concentrations presenting a cumulative ELCR in excess of 10^{-4}.
2. The 1995 California Ocean Plan is referenced in various sections and Tables in the draft report. Please update the report using the 1997 California Ocean Plan. Also update the groundwater plume maps, conclusions and recommendations as appropriate.	2. The references to the use of the 1995 California Ocean Plan (COP) during the RI and SGI are correct. The 1997 COP criteria were used to evaluate the groundwater for the draft FS Report and in development of the remediation goals. It is therefore not necessary to revise the groundwater plume maps, conclusions, or recommendations presented in the draft FS Report. Page 3-6 of the draft FS Report Section 3.5 explains the difference in criteria for PCE and 1,1-DCE between the 1995 and 1997 COPs.

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DRAFT FEASIBILITY STUDY REPORT
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COMMENTS:	***RESPONSES:***
3. Table 1-3, *Screening Criteria for VOCs in Groundwater of the Upper Interval in the Vicinity of IRP Site 9*, lists the screening criteria for MTBE as 45,700 µg/L. Please revise this screening level to 13 µg/L. Also update conclusions and recommendations in the report as appropriate.	3. The screening criterion given in Table 1-3 for MTBE was the one used during the SGI. Changing the screening criterion to a lower value at this point in time would not alter the conclusions or recommendations reported in the SGI Report (BNI 1999), and summarized in the draft FS Report Section 1.3.3.3, page 1-40, third bullet. This text has been revised to more clearly summarize the discussion of MTBE in the RI and SGI reports: • Methyl-tert-butyl ether (MTBE): MTBE was reported on the west side of GWAOPC 1 associated with low levels of isopropylbenzene; n-propylbenzene; benzene, toluene, ethylbenzene, and xylenes (BTEX)-group compounds; and sec-butylbenzene. This location is downgradient of a reported paint waste release from an underground storage tank (UST) situated on the west side of Building 210. This occurrence appears to have an off-site source not related to IRP Site 9 activities or releases. This groundwater plume was recommended for a separate investigation in the RI and SGI report, and is not a part of the scope of work for this FS.
4. The report indicates that groundwater underlies the site in an upper and lower water bearing interval. However, it is unclear at what depth the lower interval occurs. Please revise the draft report to clarify the above.	4. The boundaries of the upper and lower (coarse-grained) water-bearing intervals are defined in the discussion of IRP Site 9 stratigraphy, Section 1.3.3.1 Site Characterization, page 1-28. The lower water-bearing interval at IRP Site 9 extends from the water table to approximately 30 to 40 feet bgs, the top of the fine-grained, water-bearing interval. The upper water-bearing interval extends from the bottom of the fine-grained, water-bearing interval,

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	at approximately 55 to 60 feet bgs, down to 87 feet bgs, which is the top of the second fine-grained interval. The site conceptual model provided in Figure 1-5 shows this relationship; the upper and lower water-bearing intervals separated by the first (the Bellflower Aquiclude) fine-grained interval, and the second fine-grained interval defining the base of the lower water-bearing interval.
5. Figure 1-10, Site Map Showing Groundwater Plumes in the Vicinity of IRP Site 9, does not illustrate the location of the shallow benzene/TPH plume located near Dry Dock No. 1. The benzene detected at GWAOPC 1, while related to another site and deferred to another investigation, is within the boundaries of the study area and must be identified in the draft report. Please clearly identify this plume on Figure 1-10 and update the text to clarify when it will be addressed.	5. Figure 1-10 only illustrates the location of groundwater plumes related to IRP Site 9 in the upper groundwater-bearing interval. The title of the figure has been revised to read, "Site Map Showing Groundwater Plumes – Upper Groundwater Interval, IRP Site 9". Benzene and TPH in the vicinity of Drydock No. 1 were reported in the lower groundwater interval, GWAOPC 3, not the upper groundwater interval. The few small and scattered occurrences of benzene reported in groundwater of GWAOPC 1 are not considered to constitute a separate plume, and in some cases are within a chlorinated-VOC plume recommended for remediation. The nature and extent of the benzene plume in GWAOPC 3 is presented in detail in the SGI report (BNI 1999). The investigation of this benzene plume was officially separated from IRP Site 9, and hence the FS, in a meeting of the BRAC Cleanup Team on 05 May 1999.
6. The benzene detected at GWAOPC 3, while deferred to another investigation, is within the boundaries of the study area and should be identified on a plume map and discussed in the draft report. Please revise the report accordingly.	6. See response to Comment No. 5.

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LONG BEACH, CALIFORNIA

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COMMENTS:	***RESPONSES:***
7. Table 1-5, Screening Criteria for VOCs Reported in Groundwater Area Northwest of Building 128 Vicinity of IRP Site 9, Upper Interval, lists the screening criteria for trichloroethene under the California Ocean Plan Criteria (1997) column as 2,727 µg/L. Please revise the screening criteria to 27 µg/L.	7. The referenced screening criteria for trichloroethene in Table 1-5, page 1-81 has been revised to read "27" µg/L.
8. Figure 1-18, which shows the sampling locations and analytical results from the groundwater investigation activities completed underlying Building 128 is missing from the draft report. Please insert this figure accordingly.	8. Figure 1-18 should be located on page 1-75 of the draft FS Report, the page following the first reference to the figure, which occurs on page 1-74. An errata sheet with a copy of Figure 1-18 will be issued to assure that each copy of the draft FS Report is complete.
9. Section 3.1.3, IRP Site 12, AOC 1, indicates that fate and transport modeling completed predicts that the COCs in soil do not contribute to groundwater contamination such that the nearest SCE groundwater extraction well exceeds regulatory levels; thus, off-site movement of contaminants from the vadose-zone soils is not a concern. The fate and transport modeling should show that the COCs in soil do not contribute to groundwater contamination above the groundwater screening criteria. If fate and transport modeling demonstrate that the groundwater screening criteria will be exceeded, further action for the contaminated soil should be considered. Please revise the report accordingly.	9. The results of vadose zone leaching screening analysis and transport modeling for IRP Site 12, AOC 1, is summarized on page 1-64, Fate and Transport subsection of FS Section 1.3.4.2. It states that specific COPC metals and organic compounds may leach from the vadose zone and reach the groundwater beneath AOPC 1 at concentrations exceeding the background for groundwater and the COP criteria, which were the screening criteria for groundwater. A point of potential exposure to the soil COPCs that were contributed to groundwater does not exist until the groundwater passes through the SCE extraction wells and is discharged into the marine environment of the Back Channel and waters of the harbor. Since the screening criteria would not be exceeded by the time the groundwater reached the SCE extraction wells, the pathway of exposure was not complete and no COCs were identified with regard to potential impact to the marine environment. The groundwater gradient and flow rate present at IRP Site 12

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COMMENTS:	***RESPONSES:***
	are too low to overcome the rate of attenuation of the COPCs in groundwater. The referenced Section 3.1.3 text has been revised to better reflect this. Even though this condition is true, the remedial alternatives proposed for the soil of IRP Site 12, AOC 1, do address the potential for leachate development, in the process of soil removal or capping. Under the removal alternative, human-health risk necessarily drives the excavation and off-site disposal of the soil exhibiting COC concentrations above the RBCs. Under the capping alternative, an impermeable layer is proposed to preclude surface water infiltration. Redevelopment of the Shipyard as an overseas shipping container terminal for the Port of Long Beach will include the addition of several feet of fill soil and thick pavement to the surface of the IRP sites, further limiting the potential for surface water infiltration and leachate development.
10. Section 3.5, Remediation Goals, indicates that the remediation goals for groundwater are based on reducing the potential for site-related contaminants to reach the SCE dewatering wells at concentrations that are not protective of the environmental receptors. Groundwater remediation goals should also consider the potential for the site-related contaminants to reach the harbor and/or surface water pathways. The more conservative value shall be used as remediation goals. Please revise this section in the draft report accordingly.	10. The pathway of exposure for the marine environment of the harbor and local surface water is through the groundwater extraction wells of the SCE Dewatering System. The groundwater flow direction in the upper water-bearing interval is inland to the northeast. The extraction of groundwater from this interval by the SCE Dewatering System represents the largest local influence on the flow direction downgradient on the IRP sites. The water extracted by the dewatering system is discharged to the Back Channel of the harbor area. As discussed in Section 3.5 and shown in Tables 3-1 and 3-3, the COP criteria were included in evaluating criteria for development of the remediation goals for groundwater. For IRP Site 9 groundwater, risk-based

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COMMENTS:	***RESPONSES:***
	values that are more conservative than the COP criteria became the remediation goals for seven of the eight COCs; for the remaining COC, the COP criterion was more conservative and became the remediation goal. For IRP Site 12 groundwater, the COP criterion for the one COC, arsenic, was lower than the background value for arsenic in the groundwater. Since remediation of groundwater to below-background concentrations is infeasible, the background value became the remediation goal.
11. Please revise section 4.2.1.9, Disposal (Groundwater Discharge), to reflect that a National Pollutant Discharge Elimination System (NPDES) permit and Waste Discharge Requirements would need to be obtained from this Regional Board if treated groundwater is discharged to surface water, including if treated groundwater is discharged to the storm drains.	11. The requirements for discharge of treated groundwater to surface water or a city of Long Beach storm drain is more completely discussed in Section 5 for the proposed remedial alternatives that may include this disposal option. According to the NCP, a point-source discharge to a nearby storm drain or drainage slough is considered an "on-site action" for remediation conducted under CERCLA. Such actions must meet *substantive* requirements of an NPDES permit, which would include discharge limitations and monitoring requirements, but would not require an NPDES permit. The text of the third paragraph of page 4-26 has been revised as follows: "Disposal of treated groundwater to surface water under RWQCB waste discharge requirements was also considered. Possible on-site discharge locations include the nearest storm drain or runoff slough. Prior to discharge, water quality, volume limits, monitoring, and other substantive requirements for a National Pollutant Discharge Elimination System (NPDES) permit would have to be met; the permit itself would not be required. An NPDES permit for stormwater runoff,

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DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

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COMMENTS:	***RESPONSES:***
	which may be acquired for the proposed terminal by the Port of Long Beach, would have to allow for contribution to the permitted volume by the discharge of treated groundwater."
12. The Regional Board does not concur with the Navy's conclusion that air sparging will not eliminate the source of reducing conditions or the contaminant itself as indicated on Table 4-1, Screening of Remedial Technologies and Process Options for Groundwater. It is our experience that air sparging in combination with a vapor extraction system have been very effective in eliminating sources from the underlying groundwater at VOC contaminated sites and should be further considered for this site.	12. Air sparging in combination with a vapor extraction system is effective in eliminating VOCs from groundwater at VOC-contaminated sites under conditions suited to its use. The discussion of air sparging as it appears in the "Description" and "Effectiveness" columns of Table 4-1 was included in error; it is the discussion for potential relevance to IRP Site 12/13 groundwater, not IRP Site 9 groundwater. The intended text for this entry is as follows: "Compressed air injected into the lower part of the contaminated aquifer percolates up through the saturated zone, causing the transfer of dissolved VOCs from the groundwater to the soil vapor, thereby lessening or eliminating VOC concentrations in the groundwater." "Effectiveness depends on the homogeneity in permeability of saturated and vadose zones, rate of injection, and length of time the system is in operation. This does not eliminate potential sources of groundwater contamination (e.g., DNAPL)." Air sparging was eliminated from further consideration based on implementability and higher cost than GAC.

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DRAFT FEASIBILITY STUDY REPORT
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LONG BEACH, CALIFORNIA

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COMMENTS:	***RESPONSES:***
13. It is unclear whether the monitoring program described on pages 5-19 thru 5-21 is in addition to the quarterly groundwater monitoring currently being conducted at IRP Sites 9, 12 and 13. Please revise the report to clarify the above.	13. Groundwater monitoring is a necessary part of all remedial alternatives proposed for groundwater with the exception of Alternative 1 (No Action). The current quarterly groundwater monitoring program will be amended as appropriate during the remedial design phase to accommodate the needs of the preferred remedial alternative. If Alternative 2 – Monitored Natural Attenuation were selected as the preferred remedy, after state and public comments are taken into consideration, the necessary groundwater quality parameters specific to the alternative would be added to the sample analyte list for groundwater collection. Any additional existing or newly constructed monitoring wells proposed for the remedial alternative would also be added to the sampling schedule for the monitoring program.
14. Groundwater monitoring must be conducted quarterly for a minimum of 2 years for any remedial alternative chosen prior to considering reducing the sampling schedule to an annual or semi-annual basis. Please revise all the appropriate sections, including cost estimates for each remedial alternative, as appropriate.	14. Groundwater monitoring has been underway at IRP Sites 9 and 12/13 since April 1999. The current groundwater monitoring program includes quarterly sampling and analysis for COCs and selected water quality parameters to monitor contaminant plume migration and degradation. The current program will be amended as appropriate during the remedial design phase to accommodate the needs of the preferred remedial alternative. For those alternatives that rely on active remediation processes to achieve cleanup (Alternatives 3 and 4), quarterly groundwater monitoring will be conducted for a minimum of 2 years after implementation. This is reflected in the alternative descriptions and cost estimates presented in the draft FS Report, with the exception of IRP Site 12/13 Alternative 3, which currently includes 1 year of quarterly monitoring. The FS Report will be updated to

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COMMENTS:	*RESPONSES:*
	include a second year of quarterly monitoring for IRP Site 12/13 Alternative 3 as recommended by the reviewer. For those alternatives that rely on natural processes to achieve cleanup (Alternative 2, MNA), annual groundwater monitoring is proposed. Since natural biological processes occur slowly over long periods of time, it is unlikely that discernible or meaningful changes in contaminant concentration and/or water quality parameters would be observable on a quarterly basis. In addition, by the time the alternative is selected and formally implemented at either site, 2 years of quarterly monitoring will have been conducted under the current groundwater monitoring program. Data collected under the current program is sufficient to assess whether attenuation of contaminant concentrations is continuing at the site under existing conditions. Without any new influences these conditions will remain the same during implementation of the alternative. Specific parameters to monitor the progress of natural attenuation over the longer term would be added to the program upon implementation of the alternative.
15. The report states, on page 5-19, that "Monitoring would be limited to the collection and analysis of groundwater samples from wells placed within and along the downgradient migration pathways of each contaminant plume in the upper water-bearing interval in the vicinity of IRP Site 9." Additional groundwater monitoring wells located within each groundwater plume will also need to be monitored during the ground-water monitoring program, in order to confirm that natural attenuation is occurring. Please revise the draft report to reflect the above.	15. The necessary punctuation has been added to the referenced sentence on page 5-19 so that the sentence more clearly conveys that the intent of the sentence was the same as that requested. The sentence now reads: "Monitoring would be limited to the collection and analysis of groundwater samples from <u>wells placed within, and along the downgradient migration pathways of, each contaminant plume</u> in the upper water-bearing interval in the vicinity of IRP Site 9."

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LONG BEACH, CALIFORNIA

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COMMENTS:	***RESPONSES:***
16. Dry Docks appear to be influencing both the shallow groundwater flow direction and VOC plume migration, which may cause the plume to come in contact with or discharge into the harbor. Please discuss this further, primarily how each remedial alternative may be effected by this occurrence and what precautions, if any, will be taken to prevent this from occurring.	16. Drydock No. 1 is the only drydock considered capable of influencing the local groundwater gradient, and then only in the lower water-bearing interval. Because of its size, Drydock No. 1 was provided with an active hydrostatic pressure relief system (HPRS) to reduce buoyant forces in the lower water-bearing interval that could contribute to failure of the drydock under certain seismic loading conditions. The active HPRS consists of extraction wells that withdraw water only from the lower water-bearing interval and discharge the water to the harbor. A passive HPRS of sand drains in the surficial intervals connects them with the lower water-bearing interval to further dissipate hydrostatic pressure in the vicinity of the drydock. These drains were not connected to the drydock nor did they otherwise discharge to the harbor. The active HPRS at Drydock No. 1 was shown not to affect the groundwater gradient and flow direction in the upper water-bearing interval through potentiometric groundwater surface elevation contour mapping for the SGI. The smaller drydocks (Drydock Nos. 2 and 3) only had the passive HPRS, since the buoyant forces presented by the upper water-bearing interval alone are adequately compensated for by the dead weight of the drydock structures themselves. Without active pumping from one of the water-bearing intervals there is no pathway for impacted groundwater to migrate to a drydock and be discharged into the harbor. Although it is unlikely that the passive HPRS at Drydock Nos. 2 and 3 could have an effect on local groundwater gradient when the active one at Drydock No. 1 has been shown not to, the POLB is in the process of filling in and capping these drydocks as part of the

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DRAFT FEASIBILITY STUDY REPORT
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LONG BEACH, CALIFORNIA

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COMMENTS:	***RESPONSES:***
	redevelopment project for the shipyard. This would eliminate any potential for an effect these drydocks might have had on the local groundwater gradient. The groundwater flow directions in the upper and lower water-bearing units as reported in the RI and SGI reports are nearly opposite, with the fine-grained portion of the upper water-bearing interval acting as an aquiclude. The groundwater flow direction in the upper water-bearing unit is northeast from IRP Site 9 and almost due north from IRP Site 12/13. The extraction wells of the SCE facility dewatering system draw groundwater from this interval and are the greatest influence to the local groundwater flow direction besides incursion of seawater. In the lower water-bearing unit, the groundwater flow direction is south and southeast, respectively, and locally most affected by Drydock No. 1. This information is summarized in the draft FS Report, on page 1-31 (Site 9 Hydrogeology), and is presented in full on pages 3-129 through 3-134 of the SGI Report (BNI 1999). The interpretation of groundwater elevations from the current groundwater monitoring program at IRP Sites 9 and 12/13 has been revised based on the information regarding the drydocks.
17. Waste discharge requirements would also need to be obtained from this Regional Board if reinjection of treated groundwater is chosen as a possible discharge option as part of any remedial alternative. Please revise all sections of the draft report to reflect the above, where reinjection is considered.	17. Based on the revision made to Section 4.2.1.9 Disposal (Groundwater Discharge) per response to Comment No. 11, other references to reinjection of treated groundwater have been reviewed and revised, where necessary, in the draft FS Sections 4 and 5. Each case is discussed below.

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LONG BEACH, CALIFORNIA

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	• The third paragraph on page 4-11, discussing Hydraulic Controls as a technology and reinjection of extracted groundwater as an option, has been modified to read: "Extraction of impacted groundwater along the downgradient plume margin would necessitate installation of a groundwater treatment system. The treated water could be injected back into the shallow aquifer or perhaps discharged to surface water. Either case would require a prior concurrence from the RWQCB on a waste discharge plan developed for the discharge in compliance with appropriate regulations (see Section 4.2.1.9 Disposal [Groundwater Discharge]). It is anticipated that it would be difficult to obtain regulatory agency authorization for on-site reinjection in accordance with applicable waste discharge requirements, even under the provisions of CERCLA." • The last paragraph of page 5-29, discussing the Hydraulic Containment alternative for IRP Site 9 and reinjection of groundwater as an option, has been modified to read: "Reinjection may also be considered during the remedial design phase. Reinjection may be desired to create a groundwater 'mound' at the downgradient margin of the plumes, thus controlling potential migration. Another reason for considering reinjection is because the groundwater will only be treated to remove chlorinated VOCs; TDS and other inorganics in the extracted water may be too

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DRAFT FEASIBILITY STUDY REPORT
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LONG BEACH, CALIFORNIA

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COMMENTS:	***RESPONSES:***
	high to meet water quality limits for other potential discharge areas. In either case, the treated groundwater would likely have to be injected into areas with similar TDS and inorganics in order to meet waste discharge requirements obtained from the RWQCB. Reinjection would be conducted in accordance with a waste discharge plan, developed during the remedial design phase to meet these requirements, and preapproved by the RWQCB."
18. Natural attenuation may not be an appropriate remedial alternative for the arsenic contaminated groundwater plume underlying IRP Site 12/13. The report indicates that dissolved arsenic concentrations in the groundwater may remain above the site background and California Ocean Plan criteria for several decades. Also, under some conditions, natural processes can dissolve metals and increase the hazard they pose. Please provide information on whether this is occurring and revise the report accordingly.	18. The time required to achieve the remediation goals with monitored natural attenuation alone as a remedial alternative depends on a number of site-specific factors. A shallow groundwater gradient, low groundwater flow rate, little to no evidence of contaminant plume migration, and an incomplete groundwater exposure pathway are site conditions considered indicative that sufficient time would be available for monitored natural attenuation to be effective. The time necessary for natural attenuation to achieve the remediation goals may exceed the 30-year period of groundwater monitoring included in the cost estimate. Natural processes causing degradation of petroleum hydrocarbons below the water table have been proposed in the draft FS as indirectly linked to the dissolution of oxide minerals and adsorbed arsenic at IRP Site 12/13. A natural process that would further deplete oxygen or otherwise increase the reducing conditions in the groundwater could increase dissolved arsenic. The measurement of Eh or oxidation/reduction potential (ORP) is included among the water quality parameters measured during sample collection for the current groundwater monitoring program (final work plan, BNI 1999).

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DRAFT FEASIBILITY STUDY REPORT
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LONG BEACH, CALIFORNIA

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	On review of the available ORP measurements for IRP Site 12/13 wells for the last two quarters of the monitoring program, no change in the reducing conditions could be discerned from ORP data reported for the monitoring wells in the SGI Report (BNI 1999). The June 2000 annual report of the quarterly groundwater monitoring program for IRP Sites 12 and 13 concluded that the majority of dissolved arsenic concentration trends in groundwater for the wells sampled are uncertain or could not be evaluated.
19. The Regional Board has not yet completed our review of Appendix A, Applicable or Relevant and Appropriate Requirements. Our attorney is currently reviewing the draft appendix the Navy submitted in electronic format. Once comments are received from our attorney, those will be forwarded to you along with any additional comments we may have, to incorporate into the draft report.	19. Comment noted.

RESPONSES TO COMMENTS
DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

Comments by: John Hart/Mark Berscheid Engineering Services Unit (ESU) Department of Toxic Substances Control Date: 17 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
GENERAL COMMENTS (CONCLUSIONS)	*RESPONSES TO GENERAL COMMENTS*
1. The FS has properly followed the evaluation process to develop relevant remedial action objectives (RAO) that are protective of human health and the environment and used these RAOs to define general response actions (GRA) necessary to attain the specified RAOs for both soil and groundwater at Sites 9, 12, and 13. Using these GRAs, the FS has, based on remedial investigation (RI) information and assumptions within the FS document, identified, screened, and evaluated all the relative remedial technologies within each type of GRA for soil and groundwater to provide the most applicable remedial alternatives as candidates for detailed analysis. I concur with the FS screening process and feel the FS has provided the most applicable treatment technologies to address soil and groundwater contamination at Sites 9, 12, and 13 based on FS assumptions.	1. Comment noted.
2a. The FS has analyzed the risk present at each soil and groundwater areas of potential concern (AOPC) to determine how each area should be classified. The FS has developed five group classifications to address the soil and groundwater AOPCs. Group 1 areas require remediation, AOPCs in Group 2 require institutional controls to insure levels of risk exposure are maintained, and AOPCs in Groups 3,4,and 5 require no further action (NFA). In reviewing the description of the risk determination used to define the group assignment for each AOPC, it is unclear if the risk associated with each area is reflective of an individual contaminant of concern (COC) or is the accumulative risk of all AOPC COCs. The determination of the need for site remediation should be based on the accumulative risk of all AOPC COCs and this cumulative risk should not exceed 1×10^{-4}.	2a. The risk associated with each AOPC is reflective of the cumulative risk of all COPCs evaluated for the AOPC. The risk evaluation included both risk of potential carcinogenic as well as noncarcinogenic (toxic) effects of the COPCs. This is reflected in the definition of an AOC that is given in the second paragraph of page 1-27, Section 1.3.2.2 of the draft FS: "An AOPC became an area of concern (AOC) when the total ELCR (equivalent to the incremental lifetime cancer risk [ILCR] used in the RI Report [BNI 1997b]) for all of the COPCs reported was greater than 10^{-4} or when the chronic HI was greater than unity (1)." The need for site remediation due to human-health risk is therefore based on the cumulative cancer risk or noncancer toxic risk that identified the AOC within an AOPC.

RESPONSES TO COMMENTS
DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

Comments by: John Hart/Mark Berscheid Engineering Services Unit (ESU) Department of Toxic Substances Control Date: 17 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
GENERAL COMMENTS (CONCLUSIONS)	*RESPONSES TO GENERAL COMMENTS*
	The text of Section 1.3.2.2 has been reorganized, and revised where necessary, so that the significance of the risk associated with individual contaminants and COCs is discussed first, and significance of the cumulative risk and AOCs in the risk assessment is discussed second, to clarify the point raised in this comment. The revised text is provided in Attachment 1 of this Response to Comments.
2b. The FS indicates that Group 3 consists of groundwater areas of potential concern (GWAOPC) that are not related to IRP Sites 9, 12, or 13 releases and are to be addressed by a separate investigation. I feel the GWAOPCs in Group 3 should be investigated and evaluated in the same manner as other GWAOPCs at these sites. The issue of possible off-site migration as a source of groundwater contamination at these sites should be addressed outside this FS but existing on-site groundwater contamination should be addressed by the FS.	2b. Please see response to Specific Comment 4b.
3a. The FS has supplied supporting information in the form of FS appendices that provide added detail to the information supplied in the FS or define the methods used to derive the information found in the FS. My review indicates the following: **Appendix A – ARARs – Adequately identifies the potential ARARs that may be pertinent to IRP Sites 9, 12, and 13 and compares the ARARs for stringency to identify the controlling ARARs.**	3a. Comment noted.
3b. Appendix B – Cost Development Summaries – Documents the development of order of magnitude cost estimates for these IRP sites. The FS indicates the cost estimates used in the detailed analysis of alternatives are based on the use of RACER cost estimating software. The FS indicates that software version 3.2 was used to provide the majority of cost line items. Costs for site-specific or unique line items	3b. Comment noted.

RESPONSES TO COMMENTS
DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

Comments by: John Hart/Mark Berscheid Engineering Services Unit (ESU) Department of Toxic Substances Control Date: 17 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
GENERAL COMMENTS (CONCLUSIONS)	*RESPONSES TO GENERAL COMMENTS*
were based on vendor quotes. I concur with this method of cost estimating. The Engineering Services Unit has used this software, specifically the latest software version 3.2, to provide relevant cost estimates for a number of customers. Review of the methods used and resultant cost estimates indicate the resultant data can be used for FS comparison purposes.	
3c. Within Appendix B, the FS describes the material layers of the cap for Alternative 2. The FS indicates the layer of the cap that would prevent infiltration of surface water would consist of imported fill sand mixed with bentonite/portland cement. I feel the application of an impermeable layer to prevent infiltration made up of these materials would be of limited value over time as the cement layer settles and cracks allowing infiltration of surface water.	3c. Please see response to Specific Comment No. 6.
3d. Appendix C – Arsenic Solubility – Discusses the concept of redox potential and arsenic speciation along with the geochemical behavior of arsenic in a soil-water system. Would appear to support the use of the innovative technology of funnel and gate to remediate arsenic at Site 12/13.	3d. Comment noted.
3e. Appendix D – Volumes of Soils Exceeding Risk-Based Criteria – The appendix describes the methods used to compute the volume of soil exceeding risk-based criteria. I concur with the methods used to compute the volumes of soil that would require remediation and then be used as input data for cost estimation. However, these volumes are based on a concentration of a COC in soil that exceeds a risk-based concentration (RBC). The RBC is developed based on human-health risk assessment which is based on the type of usage foreseen for these sites. The FS indicates the assessment is based on an industrial worker type scenario that is dependent on the development plans documented in the FS.	3e. Comment noted.

RESPONSE TO COMMENTS
DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

Comments by: John Hart/Mark Berscheid Engineering Services Unit (ESU) Department of Toxic Substances Control Date: 17 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
GENERAL COMMENTS (CONCLUSIONS)	*RESPONSES TO GENERAL COMMENTS*
3f. The FS discusses soil and groundwater data (i.e., Total organic content, anion concentration, pH, etc.) in multiple places of the FS text to support assumptions regarding the evaluation of treatment technologies such as natural attenuation or treatment of arsenic in groundwater by funnel and gate. The FS does not, however, supply a summary of this form of data in an appendix such as those described above.	3f. Please see response to Specific Comment No. 7.
SPECIFIC COMMENTS (RECOMMENDATIONS)	*RESPONSES TO SPECIFIC COMMENTS*
4a. I recommend the review of the health based risk assessment for IRP Sites 9, 12, and 13 by Department of Toxic Substances Control toxicologists to insure that all AOPCs fall within the groups defined in Table 1-7 of the FS.	4a. Comment noted.
4b. I recommend GWAOPC #1 and #3 of Site 9 be evaluated as part of this FS.	4b. All of the groundwater plumes reported as a part of IRP Site 9, GWAOPC 1 are evaluated in the draft FS for remedial action, with the exception of the MTBE plume. This plume is not commingled with the groundwater plumes that are actually related to IRP Site 9 activities, and therefore, need not be considered within IRP Site 9, GWAOPC 1 as defined for the purposes of remedial action. The MTBE plume was recommended for a separate investigation in the SGI Report (BNI 1999) because the likely potential source areas were identified as off-site and unrelated to IRP Site 9 activities. The investigation of the benzene plume reported in GWAOPC 3 was officially separated from IRP Site 9, and hence the FS, in a meeting of the BRAC Cleanup Team on 05 May 1999. Table 1-7 and the associated text of the draft FS, Section 1.6 have been revised with new descriptions of these two groundwater plumes to reflect that they are no longer considered part of IRP Site 9, and do not belong in a GWAOPC identified for the site. Please see Attachment 2 for the revised Table 1-7.

Comments by: John Hart/Mark Berscheid Engineering Services Unit (ESU) Department of Toxic Substances Control **Date:** 17 March 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
SPECIFIC COMMENTS (RECOMMENDATIONS)	***RESPONSES TO SPECIFIC COMMENTS***
	Although these groundwater plumes are not included in the scope of the IRP Sites 9, 12, and 13 FS, they can be addressed separately in a similar manner. The DON will provide an update on the progress of the investigations of the MTBE plume and the deep benzene plume when it becomes available.
5. The FS provides a comparative analysis of potential remedial action alternatives in Section 6 in which alternatives are measured against the evaluation criteria made up of two threshold criteria, five primary balancing criteria, and two modifying criteria. I would recommend the FS provide a table summarizing this comparison and the FS apply a value (i.e., 0 - low, 1- moderate, 2 - high) relating to the potential remedial action alternative for each evaluation criteria such that a comparative score is attained for each alternative.	5. A qualitative version of the summary table requested, Table ES-3, can be found on page ES-5 in the Executive Summary of the draft FS Report. In this table, remedial alternatives are evaluated against the two threshold and five primary balancing criteria. However, a comparison against the two modifying criteria, state acceptance and community acceptance, will not be possible until the results of the respective review and comment periods are known. Also, no comparative score is given for each of the proposed remedial alternatives in Table ES-3, in part for the reason just given. A quantified version of this table, substituting the numbers 1 through 5 for the qualitative terms currently used, will be included in the Proposed Plan/Draft Remedial Action Plan (Draft RAP). That version of the table will include the comparison against the two modifying criteria and individual remedial alternative total scores for comparative purposes.
6. I recommend the modification of the existing cap alternative or addition of another cap alternative that includes a high-density polyethylene barrier to prevent infiltration of surface water.	6. A more impermeable layer than the one proposed is not considered warranted based on the results of the vadose zone leaching screening analysis and transport modeling for IRP Site 12, AOC 1 and the materials that would be added to the surface of the area during anticipated (now current) redevelopment of LBNSY by the Port of Long Beach (POLB). If the capping alternative is selected, the actual cap design chosen during the remedial design phase will take these factors into account. The leaching analysis indicated that specific metals and organic compounds might leach from the vadose zone and reach the groundwater beneath IRP Site 12, AOPC 1 at concentrations exceeding the COP criteria. However,

Comments by: John Hart/Mark Berscheid Engineering Services Unit (ESU) Department of Toxic Substances Control **Date:** 17 March 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
SPECIFIC COMMENTS (RECOMMENDATIONS)	***RESPONSES TO SPECIFIC COMMENTS***
	transport modeling results indicated these COPCs will not reach the extraction wells of the SCE Dewatering System at concentrations that would exceed the COP criteria. Migration of COPCs in groundwater downgradient from these extraction wells is the only pathway identified for potential impact to surface water and the harbor and marine environment. Therefore, COCs for groundwater as a result of leachate development were not identified. The groundwater gradient and the flow rate are too low to overcome the rate of degradation and dispersion of the COPCs in groundwater. Redevelopment of former LBNSY as an overseas shipping container terminal would include the addition of several feet of fill soil and thick pavement to the surface of the IRP sites. Regardless of the remedial alternative selected for IRP Site 12, AOC 1 these materials will provide the site surface with greater elevation, positive drainage, and lesser permeability, further limiting the potential for surface water infiltration and leachate development.
7. I recommend the development of an additional appendix to the FS that would provide soil and groundwater supporting data, from the RI or other sources, that is used to help evaluate the alternatives (i.e., natural attenuation, arsenic treatment).	7. The draft FS Report was developed in accordance with U.S. EPA, CERCLA, and Navy IR guidance, and as a result is not designed to be a stand-alone document. To make the document practical to produce and use, the draft FS references recommendations, conclusions, data summaries, and more detailed discussions regarding soil and groundwater provided in detail in the investigation reports. The references to these documents have been reviewed and, where possible, have been revised to be more specific so that the supporting data can be more readily found in the investigation reports. In particular, Tables 3-8 and 3-10 in Section 3.3.2.3 Groundwater Quality of the SGI Report (BNI 1999) provided water quality values measured in groundwater of the upper water-bearing interval.

Comments by: John Hart/Mark Berscheid Engineering Services Unit (ESU) Department of Toxic Substances Control Date: 17 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
SPECIFIC COMMENTS (RECOMMENDATIONS)	*RESPONSES TO SPECIFIC COMMENTS*
	General information from U.S. EPA and industry sources was also used and cited in providing basic descriptions of and cost estimates for the remedial alternatives evaluated in the FS. The description of remedial alternatives for *in situ* and *ex situ* treatment of arsenic in groundwater (draft FS Sections 5.4.3.1 and 5.4.4.1) includes a discussion of innovative use of standard *ex situ* wastewater treatment technology and new materials in GAC-type *ex situ* treatment systems, respectively. Innovative use of reactive gate technology is supported by recent U.S. EPA full-scale or pilot-scale field tests for remediation of chlorinated solvents, arsenic, chromium, and other metals in groundwater provided by the U.S. EPA Remedial Technologies Development Forum (RTDF), and more specifically, the Permeable Reactive Barriers Action Team (www.rtdf.org/public/permbarr/default.htm). In either the *in situ* or *ex situ* treatment alternatives bench-scale or pilot studies would be necessary to further determine the actual materials and technology to be employed successfully for the site-specific applications.

RESPONSES TO COMMENTS
DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control **Date:** 13 March 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
1. The Report references several documents in which recommendations for no further action have been proposed for the various areas of potential concern (AOPCs) and groundwater areas of potential concern (GWAOPCs). The BRAC Cleanup Team (BCT) should make determinations on the AOPCs and GWAOPCs so that the Report can accurately discuss the status of the sites.	1. The draft FS cites recommendations or conclusions from three previous investigation documents with regard to the most current determination of site status, the RI Report (BNI 1997), the SGI Report (BNI 1999), and the IRP Site 14 EE/CA (Battelle 1998). The status of NFA for the AOPCs and groundwater plume areas within the GWAOPCs was generally recommended on the basis that no COCs were identified in human-health risk assessment or fate and transport analysis. The cited reports are final documents and the conclusions and recommendations therein regarding the nature and extent of contamination, risk assessment, vadose zone leaching analysis and transport modeling, and recommendations for NFA status, have been reviewed and accepted by regulatory agency personnel and the BCT. The comments gathered in review of these documents during their development and in their final form have been addressed and are a matter of record.
2. GSU recommends that the Report provide additional information on the methodology, geologic/hydrogeologic parameters and results of the fate and transport modeling. The Report states that the modeling does not indicate that chemicals of potential concern (COPCs) will migrate either from the soil to groundwater or from the groundwater to the base boundary at levels that will pose a health risk. It would be helpful if the Report would provide the estimated time for the COPCs to impact the media or point of compliance. For example, the Report should discuss the estimated time for the plume(s) to reach the Southern California Edison dewatering well and the predicted contaminant concentration(s).	2. With regard to the request for the inclusion of additional information, please see ESU Comment No. 7. A detailed discussion of the fate and transport analysis methodology is not presented in the draft FS Report, but can be found in Section 5.7.1.4 Soil COPC Leaching and Transport of the Final RI Report (BNI 1997), pages 5-165 through 5-175. The vadose zone leaching screening analysis was performed using the Summers Model discussed in the U.S. EPA document, Determining Soil Response Action Levels Based on Potential Contaminant Migration to Groundwater: A Compendium of Examples (1989). The leaching and transport analysis was performed based on the results of the screening analysis, using VLEACH and AT123D computer modeling. Table 5.7-15, Summary of Soil Leaching and Transport Analyses Results, in the final RI Report is reflected in the discussion of fate and transport for each AOPC of IRP Sites 9, 12, and 13 in Section 1 of the draft FS.

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control **Date:** 13 March 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
	The follow information was calculated and used in the leaching and transport analysis: IRP Site 9 — Location in Draft FS groundwater flow rate: 40 to 60 feet/year — page 1-31, paragraph 2 nearest SCE well: 1,200 feet — page 1-31, paragraph 2 depth to groundwater: 7 to 11 feet bgs — page 1-31, paragraph 2 IRP Sites 12 and 13 groundwater flow rate: 4 feet/year — page 1-52, paragraph1 nearest SCE well: 2,000 feet — page 1-51, last paragraph depth to groundwater: 16 to 20 feet bgs — page 1-51, paragraph 7 IRP Sites 9, 12, and 13 unpaved infiltration rate: 1.15 inch/year (10 % annual precipitation) — (not previously provided) This information can be used to calculate the time it would take for water to infiltrate the subsurface soil to the water table and for groundwater beneath the site to flow to the SCE extraction wells. The actual time it would take for COPCs to migrate to groundwater or through the groundwater to the SCE extraction wells can be assumed to be longer than for water. Potential contaminants dissolved in groundwater migrate by both advection and dispersion. In sand aquifers such as those identified at IRP Sites 9, 12, and 13, the dominant factor in the migration of dissolved contaminants is advection of the solutes due to bulk motion of flowing groundwater. The unpaved infiltration rate estimate has been added to the text of the draft FS where the fate and transport results for IRP Site 9 and IRP Sites 12 and 13 are discussed for the first time; on page 1-36 (Section 1.3.3.2) and page 1-64 (Section 1.3.4.2), respectively.

RESPONSES TO COMMENTS
DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control Date: 13 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
GENERAL COMMENTS	*RESPONSES TO GENERAL COMMENTS*
3. GSU recommends that the Report clarify whether fate and transport modeling was conducted for each AOPC or GWAOPC individually or as a group within the IRP site. Although the risk posed by each AOPC or GWAOPC may be low, GSU is concerned that the combined contaminant contribution from all areas of concern within a IRP site may pose a health risk.	3. The vadose zone leaching screening analysis (Summers Model) considers the concentration of the COPC already in the groundwater in addition to the concentration of the COPC contributed in the potential leachate from an AOPC. The groundwater COPC concentrations already include the contributions of any leachate from upgradient source areas. As requested in the comment, this information has been added the text of the fate and transport discussions for soil AOPCs on page 1-36 for IRP Site 9, and page 1-64 for IRP Sites 12 and 13, to clarify the issue. This method of evaluation is more accurate than adding up projected contributions from upgradient AOPCs since it is the result of actual contributions and the attenuation of contaminant concentrations over the migration distance. Groundwater elevations measurements collected during the quarterly groundwater monitoring program and the calculated groundwater gradient have not indicated that seasonal variations in the groundwater flow direction occur. Therefore, there is no mechanism by which COPC concentrations predicted in potential leachate from all AOPCs of a site would be able to impact the same body of groundwater in a directly additive manner. It should be reiterated here that the fate and transport analysis evaluated only the potential for soil COPCs to impact groundwater and to impact surface water of the Back Channel and Long Beach Harbor. The evaluation used COP criteria for risk to marine organisms, and to human health due to consumption of these organisms only. The human-health risk assessment evaluated the potential risk from the other possible pathways of exposure (inhalation, skin contact, and incidental ingestion) for the industrial and maintenance/utility worker. No AOPC or GWAOPC was encountered where the risk to human health by exposure to both the soil and the groundwater COPCs exceed the allowable range; only one media or the other was found to drive the risk for the area. This condition occurred because for one of the media: (1) no exposure pathway existed, (2) no COCs were present, or (3) the COCs present did not constitute an unallowable total risk.

RESPONSES TO COMMENTS
DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control **Date:** 13 March 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
4. The Report should provide sufficient evidence to demonstrate that biodegradation is occurring. A description of the lines of evidence needed to demonstrate natural attenuation can be found in the "Technical Protocol For Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater," jointly prepared by Parsons Engineering Science, Inc., U.S. Environmental Protection Agency, and the Air Force Center for Environmental Excellence (November 1996). The methodology in this document should be followed for data collection and analysis to support any claims of biodegradation or natural attenuation. The data should demonstrate that biodegradation processes will reduce the concentrations of the contaminants to levels below regulatory standards before potential receptor exposure pathways are completed. Based on this technical evaluation, the Report should include an estimate of the time for contaminant reduction to occur.	4. Chlorinated VOCs other than those anticipated for IRP Site 9 based on reported releases and the history of site activities were found. Biodegradation of chlorinated VOCs is known to produce these compounds in transformation (please see Attachment 3, the revised draft FS Figure 1-11 from page 1-49). In Figure 1-11 please note that abiotic chemical transformations (marked with an "a") of chlorinated VOCs under anaerobic conditions are few in comparison to those that involve biological activity (unmarked). The biological transformations include the breakdown of primary chemicals reported for IRP Site 9 to other primary chemicals (e.g., PCE to TCE) as well as the breakdown of primary or resulting secondary chemicals to other secondary chemicals (e.g., TCE to 1,1-DCE, and then 1,1-DCE to vinyl chloride). Further, carbon disulfide was reported at various locations within IRP Site 9, GWAOPC 1 (pages 1-48 and 1-50). This organic compound has been identified as a product of biodegradation of aromatic hydrocarbons in the subsurface in which available oxygen in the environment is depleted, resulting in reducing conditions. The values reported for groundwater quality parameters of temperature, pH, oxidation/reduction potential (ORP), dissolved oxygen (DO), sulfide, sulfate, iron (II), and nitrate, in the SGI Report (BNI 1999) were also reviewed and considered indicative of reducing conditions favorable to reductive dehalogenation of the chlorinated VOCs, according to U.S. EPA protocols. The references cited in the draft FS Report with regard to lines of evidence of the presence of natural attenuation and biodegradation are closely related to the reference recommended by the reviewer: • Section 4.2.1.4 Monitored Natural Attenuation, page 4-7 "Guidance for Evaluating Remediation by Natural Attenuation of Chlorinated Solvents in Groundwater, Draft-Revision 0" (SWDIV 1996).

RESPONSES TO COMMENTS
DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control **Date:** 13 March 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
	• Section 4.2.1.6 *In Situ* Remediation, Bioremediation, page 4-12 "Draft Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater, Revision 1" (AFCEE 1996). The methodology provided in most current version of this technical protocol would be used in the first few years of groundwater monitoring in order to collect data to show whether or not natural attenuation is occurring. The effectiveness of monitored natural attenuation (MNA) could be evaluated by the fifth year of monitoring under the remedial alternative, as part of the CERCLA review process. At that time, sufficient data may be available to provide the rate at which contaminant reduction is occurring and the projected date of achieving the remediation goal.
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
1. Section 1.3.3.2 Areas of Concern - Soil, Fate and Transport, Page 1-36 **This section includes a statement which in part says, "A vadose zone leaching screening analysis indicated soil concentrations at these AOPCs would affect groundwater at or below California Ocean Plan criteria, therefore transport modeling was not performed. As a result, AOPCs 1, 2, and 3 were not considered potential source soils for COPCs in groundwater of GWAOPCs." It is not clear what this statement means. If the vadose zone modeling indicates that COPCs currently in the soil can migrate to the groundwater, then there is a good likelihood that past releases have impacted the groundwater. Therefore, these AOPCs should be considered sources of contamination to groundwater.**	1. The leachate screening analysis predicted COPC concentrations for leachate developed from AOPCs 1, 2, and 3 soil would not exceed COP criteria on reaching groundwater. Therefore, these concentrations could not migrate to the SCE wells (and the bay) and remain at or above the COP criteria. Screening out leachate results that are too low to have an impact on groundwater at or above water quality criteria upon migration to potential receptors is the purpose of the Summers Model (U.S. EPA 1989) used in the analysis. There is no evidence indicating whether or not these specific AOPC soils were a potential source area for groundwater in the past. It is evident that the original releases have already leached to groundwater and the concentrations remaining in the soil do not represent an ongoing future source of contamination to groundwater in excess of COP criteria.

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control Date: 13 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
2. Section 1.3.3.3 Areas of Concern - Groundwater, Nature and Extent of Contamination, GWAOPC 1, Page 1-40 **The section contains a statement that only three of four plumes were recommended for further action, but it does not identify the three plumes.**	2. The referenced text on page 1-40 has been revised to read: "GWAOPC 1. Within GWAOPC 1, four chlorinated VOC plumes were defined during the SGI. The results for these plumes are summarized below and their location is shown in Figure 1-10. The plume north of Building 128 was recommended for no further action (NFA) status."
3. Section 1.3.3.3 Areas of Concern - Groundwater, Nature and Extent of Contamination, GWAOPC 2, Page 1-47 **a. The section contains a statement that only one of the two plumes were recommended for further action, but it does not identify the plume.**	3a. The referenced text on page 1-47 has been revised to read: "GWAOPC 2. Two chlorinated VOC groundwater plumes in the vicinity of GWAOPC 2 were identified and delineated during the SGI and RI (Figure 1-10). The plume south of Building 131 was recommended for NFA status."
b. This section states in part, "The observed distribution of the organic compounds in the plume reveals a very substantial attenuation, dominated by biodegradation, under reducing conditions." The Report cites the variation in vinyl chloride concentrations between nearby sample locations HP-SGI-17 and MW-SGI-17 as an example of attenuation of vinyl chloride in the groundwater. There are many factors that must be evaluated to make a case that biodegradation is occurring. Variations in contaminant concentrations is only one factor and may not be a reliable indicator in this case. The groundwater samples from HP-SGI-35 and MW-SGI-17 were collected on different dates, from different depths, and used different sample collection methods.	3b. The referenced last sentence in the text of the first bullet on page 1-47 has been deleted.

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control **Date:** 13 March 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
4. Section 1.3.3.3 Areas of Concern - Groundwater, Fate and Transport, Page 1-48 **The Report states that vinyl chloride detected in groundwater samples may be a degradation product of other chlorinated solvents such as TCE and PCE. The Report does not provide sufficient weight of evidence to demonstrate that biodegradation is causing a reduction of constituents of concern (COCs) to a level protective of human health and the environment. GSU is concerned that the concentration of vinyl chloride is increasing in the groundwater, volatilizing out of the groundwater into the vadose zone, and migrating to the surface.**	4. See response to GSU General Comment No. 4. The chlorinated VOC transformation pathways shown in the revised Figure 1-11 indicate that under reducing conditions vinyl chloride can form from biological processes acting on other chlorinated VOCs and, in turn, break down to other VOCs through a similar process. Other biological transformation pathways are shown for the other chlorinated VOCs reported for IRP Site 9. Natural processes including biodegradation are known to be effective under certain conditions in reducing VOC concentrations in groundwater if given sufficient time to proceed. The fate and transport discussion addresses only the potential for impact posed by COPC concentrations migrating to the SCE extraction wells and the potential receptors of the marine environment, for which the COP criteria are applicable. There is no other pathway to surface water. As a result, no COCs were identified by the fate and transport analysis for the marine environment. The baseline human-health risk assessment evaluated the potential risk to site workers due to exposure to COPCs from both soil and water combined. The results identified that the risk to the industrial worker at IRP Site 9 is driven by the VOCs present in groundwater through the vapor inhalation pathway. The COCs for IRP Site 9 groundwater were identified on this basis. It should be noted that the buildings that occupied IRP Site 9 have been removed and no new ones are proposed for construction in the redevelopment of the former LBNSY. Therefore, the exposure levels predicted for the workers at the site will not be reached again under the future use planned for the site. Vinyl chloride is quite volatile and dissipates in air readily. Without structures in which vinyl chloride might be concentrated after leaving the groundwater and reaching the ground

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control Date: 13 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
SPECIFIC COMMENTS	*RESPONSES TO SPECIFIC COMMENTS*
	surface where human receptors could be exposed, the projected risk level for the future use of the site is reduced. Because planned future use of the site as a paved overseas shipping container storage yard will involve limited human occupation, an outdoor setting, and little potential for excavation, the potential human-health risk presented by inhalation of vinyl chloride would be significantly less than that predicted for the maintenance utility worker. The quarterly groundwater monitoring program for IRP Sites 9, 12, and 13 reported in June that no trend in vinyl chloride concentrations has been identified since the inception of the program in 1999 (BNI 2000). Statistical evaluation of the groundwater data was performed using the Mann-Kendall trend test described in the U.S. EPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/G-9, QA97 version (U.S. EPA 1998). This test is used to evaluate concentrations of individual VOC analytes reported in groundwater for trends for each monitoring well. Overall, none of the 17 wells monitored exhibited statistically increasing trends for any of the IRP Site 9 analytes (COPCs reported above the detection limit three or more times).
5. Section 1.3.4.1 Site Characterization, Hydrogeology, Page 1-51 **The Report states that groundwater gradient in the upper interval was calculated from three wells in November 1994. Was this the only time the groundwater gradient was measured? Has groundwater flow direction been measured for seasonal changes?**	5. The referenced text in the last paragraph on page 1-51 gave the results for IRP Sites 12 and 13 monitoring wells included in the facilitywide groundwater investigation conducted to establish the groundwater flow patterns in the upper water-bearing interval. Tidal influences on groundwater levels at IRP Sites 12 and 13 were recorded in two events during the SGI, July – August 1997 and October 1997. The groundwater gradient and flow direction that was calculated during these events was 0.006 (foot per foot) toward the north. The flow direction throughout the former LBNSY was anticipated to vary according to the operation of the local dewatering systems. The dewatering system local to IRP Site 12/13 is the SCE facility, north of the site. A sentence regarding this information

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control **Date:** 13 March 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
	from the SGI Report (BNI 1999) has been added to supplement the text on page 1-51 of the draft FS. The paragraph now reads: "A groundwater gradient in the upper interval of 0.006 was calculated from three wells in November 1994. The flow direction was toward the north, in the general direction of the regional gradient and the SCE dewatering system, north-northeast of the sites. A groundwater gradient of 0.006 and northward flow direction were also calculated for IRP Sites 12 and 13 during two tidal influence study events that occurred between July and October 1997. The SCE well closest to IRP Sites 12 and 13 is approximately 2,000 feet away." Monthly groundwater level measurements in IRP Site 12/13 monitoring wells were collected between March 1999 and February 2000 as a part of the quarterly groundwater monitoring program. Hydrographs presenting the change in groundwater elevation over time were prepared for each monitoring well. Generally, the hydrographs are flat, indicating 0.4 foot or less in fluctuation over the four quarters of the year (BNI 2000). A groundwater elevation contour map for the upper water-bearing interval was produced from data collected on 18 February 2000. At that time, the groundwater gradient was calculated at 0.007 to 0.01, toward the north-northwest to north-northeast.
6. Section 1.3.4.2 Areas of Concern, Nature and Extent of Contamination, AOPC 1, Page 1-55 **It does not appear that the extent of contamination at AOPC 1 was adequately defined. Sample location SB-12-09 was used to define the northern non-detect boundary, but the sample location is located almost**	6. See the beginning of the discussion of IRP Site 12 AOPCs on page 1-52. The original four AOPCs were investigated during the RI and the soil AOPCs were redefined based on a comparison of the RI results with the preliminary screening criteria to identify COPCs. This allowed the grouping of areas with similar chemical and physical characteristics for further analysis, including COC identification. As a result, the boundaries

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control **Date:** 13 March 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
150 feet from the AOPC 1 boundary line shown on Figure 1-13. Except for sample location SP-12-03, the other sample locations that were used to establish the AOPC1 boundary are located a distance away from the proposed AOPC 1 boundary line.	of AOPC 1 shown in the draft FS Figure 1-13 were not defined based on successive step-out soil borings. These boundaries were defined by the distribution of COPCs, and include the site area half the distance to nearest boring in which the COPCs were not detected. It should be noted that IRP Site 12, AOPC 1 is located entirely within the boundaries of AOPC 2. The results of the investigation not included for evaluation in AOPC 1 are automatically included in the evaluation performed for AOPC 2. This evaluation included the same methods as for AOPC 1, including a baseline human-health risk assessment and fate and transport analysis.
7. Section 1.3.4.2 Areas of Concern - Soil, Nature and extent of Contamination, AOPC 2, Page 1-56 **The numerous COCs detected in samples collected within AOPC 2, especially at sample location HP-12-32, detected at elevated concentrations that warrant further investigation to determine the mass and extent of the contaminants.**	7. The Nature and Extent subsections of the draft FS discuss only the chemicals reported for soil and the soil COPCs identified at an AOPC, based on the preliminary screening of soil analysis results against background threshold values (metals only) and industrial soil PRGs (for organic compounds). The referenced discussion of IRP Site 12, AOPC 2 on page 1-56 incorrectly identifies the COPCs and the two bullets involved have been revised as follows: • "VOCs, pesticides, PCBs, and organotins were reported sporadically in soil for the site area at concentrations below industrial soil PRGs. None of these ~~COPCs~~ compounds persisted below 10 feet bgs. SVOCs appear to be relatively evenly distributed in shallow soil on- and off-site, with low concentrations throughout. • Metals above background threshold values and PAHs exceeding industrial soil PRGs and reported for soil in the north and west of IRP Site 13 (HP-12-29 and HP-12-22, respectively) and west of IRP Site 12 (SB-12-03, HP-12-26 and HP-12-32) (Figure 1-13). <u>The specific occurrences of these COPCs are discussed in detail below.</u>"

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control Date: 13 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
SPECIFIC COMMENTS	*RESPONSES TO SPECIFIC COMMENTS*
	The elevated total PAH result for soil at 2 feet bgs in boring HP-12-32 was attributed to a discolored soil interval at 1 foot and reportable results did not persist below 5 feet bgs. The lateral extent of PAHs and metals in boring HP-12-32 was defined by results for shallow soil samples from the north, northeast (PAHs), southeast, south (metals), and west (metals). No COCs were identified for AOPC 2 through human-health risk assessment or the fate and transport analysis, discussed on pages 1-69 and 1-70, respectively.
8. Figure 1-14, Lateral Extent of Soil in IRP Sites 12/13 With Concentrations Above Risk-Based Criteria, Page 1-59 **The Report does not provide adequate justification for reducing the area of AOPC 1 to AOC 1 (See Figure 1-14). It does not appear that sufficient sampling was conducted to characterize the horizontal extent of the contamination detected around the "hot spot" contamination at location SB-12-04. Figure 1-14 does not indicate any sample locations near the proposed north and east boundary of AOC 1. In addition, sample HP-12-34 is located approximately 75 feet away from the proposed western boundary of AOC 1.**	8. The boundaries of IRP Site 12, AOC 1 were defined during the RI based on the total risk associated with all COCs identified for AOPC 1 in the human-health risk assessment. In the RI Report (BNI 1997) it was recommended that the boundaries of AOC 1 as shown in the referenced Figure 1-14 be expanded to include all the original AOPC 1 for remedial action. This point may not be clear in the discussion of the risk assessment results for AOPC 1 soil presented in the last bullet on page 1-70 of the draft FS Report. The text of this bullet has been revised as follows: "The analytes posing risk are present at concentrations greater than RBCs at a risk of 10^{-6} and are, therefore, considered COCs. In addition to these analytes, an SVOC, carbazole, is present at concentrations greater than the RBC and is also considered a COC. Therefore, the part of AOPC 1 containing these COCs is reclassified as AOC 1 (Figure 1-14). However, the boundaries of AOC 1 were reexpanded to the extent of the former AOPC 1 in recommendations for remedial action (BNI 1997)."

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control Date: 13 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
SPECIFIC COMMENTS	*RESPONSES TO SPECIFIC COMMENTS*
9. Section 1.3.4.2 Areas of Concern, Fate and Transport, Page 1-64 This section states that "Vadose zone leaching screening analysis and transport modeling was performed for the soil results from AOPCs 1 and 2, for both the paved and the 2-year unpaved scenarios." Was the vadose zone leaching analysis and transport modeling conducted for each AOPC separately or were all the adjacent AOPCs evaluated together as one area of concern? Although an evaluation of each area independently may indicate a low potential for contaminant leaching or transport, an evaluation of the adjacent AOPCs together may show leaching and transport levels that would pose a health risk.	9. The soil sample results for each AOPC were evaluated separately in the fate and transport analysis. In order to predict that impact by potential leachate from the AOPC would exceed the COP criteria before migration to the SCE wells, only the existing groundwater condition for the area beneath an AOPC was taken into account in this analysis. It can be accurately said, however, that the groundwater quality beneath an AOPC is already the sum of all impacts on the groundwater that occurred upgradient of the its present location. In this sense, the actual contribution from the upgradient AOPCs is considered in fate and transport analysis of an AOPC. See the response to General Comment No. 3.
10. Section 1.3.4.2 Areas of Concern, Fate and Transport, AOPC 2, Page 1-69 The boundaries of GWAOPCs 1 and 2, shown in Figure 1-16, encompasses a portion of AOPC 2, shown on Figure 1-14. It is not clear whether the previous investigations assessed the potential impact of COCs leaching from AOPC 2 and combining with the contaminants detected in GWAOPCs 1. The additive effect of leaching and transport of contaminants to the groundwater may pose a human or ecological health risk.	10. See response to Specific Comment No. 9 above.
11. Section 1.3.4.2 Areas if Concern, Fate and Transport, Vadose Zone Soils of GWAOPCs 1 and 2, Page 1-69 This section contains a statement that "A fate and transport analysis of groundwater COPCs was not performed for the potential source soil of GWAOPCs 1 and 2. Please provide an explanation for not conducting a fate and transport analysis for groundwater COPCs for the potential source soil of GWAOPCs 1 and 2.	11. The referenced text in the fourth bullet on page 1-69 is inaccurate and has been revised as follows: • "A fate and transport analysis for GWAOPCs 1 and 2 was not conducted separately. The soil and groundwater of these areas, which also lay within the boundaries of AOPCs 1 and 2, were included in the analysis for these AOPCs discussed above."

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control **Date:** 13 March 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
	The fate and transport analysis of AOPC 1 and AOPC 2 indicated that the existing groundwater quality plus the projected contribution from leachate would not exceed the COP criteria at the SCE dewatering wells. Since these AOPCs contained the highest soil COPC concentrations for the IRP Site 12 and 13 area, a separate evaluation of the soil and groundwater of GWAOPCs 1 and 2 would also not result in groundwater quality that exceeded the COP criteria.
12. Section 1.3.4.2 Areas of Concern, Risk Assessment, AOPC 2, Page 1-70 **Samples collected at HP-12-32 detected elevated concentrations of PAHs (2,307 µg/kg), TRPH (47,000 mg/kg), TPH (32,500 mg/kg), arsenic (2,200 µg/kg), and mercury (6,000 µg/kg). GSU recommends that this location be investigated further to determine the extent and mass of the contaminants.**	12. (Note: The PAH analysis results attributed to HydroPunch boring HP-12-32 in the comment occur on page 1-56. All other soil analysis results are actually discussed for the initial soil boring location, SB-SGI-04, on page 1-63.) The response to Specific Comment No. 7 discusses how the contaminants reported for surface and subsurface soil at HP-12-32 are limited by the contaminant levels reported in the neighboring borings. Further, these data were reported in the RI Report that became a final document in 1997 after addressing regulatory agency review comments. No data gaps were identified for the investigation of IRP Site 12, GWOAPC 1 or AOPC 2 soils, and therefore, none were recommended for further investigation during the SGI. Please refer to response to General Comment No. 1.
13. Section 1.3.4.3 Area of Concern - Groundwater, Nature and Extent of Contamination, Page 1-71 **The section states in part, "In natural environments iron and manganese oxides are concentrated in the surface soils as a result of weathering (leaching of soil constituents and re-precipitation)." Except for desert environments, GSU is not aware of any sampling in Southern California that has shown elevated iron and manganese levels in surface**	13. The statement referenced on page 1-71 has been revised to read "subsurface soil" instead of "surface ." The area of IRP Sites 12 and 13 was noted in historic records to be below sea level until 1938, when dredged sediments added along the shoreline of Terminal Island reached the site area. After the Navy built the seawall, dredged sediments were again used as fill behind it to build Long Beach Naval Complex. This task was completed in the early 1940s. The first

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control Date: 13 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
SPECIFIC COMMENTS	*RESPONSES TO SPECIFIC COMMENTS*
samples versus samples collected at a deeper depth from the same location. It is not clear how long the surface soils in this area were exposed to the effects of weathering. GSU is under the impression that this portion of Long Beach Naval Shipyard was constructed of fill material so the effects or weathering only occurred for a relatively short period of time. The elevated levels of metals more likely originated from fill material containing these metals or a past release.	evidence of subsidence in the area was recorded in 1941, during construction of Drydock No. 1. According to the SGI Report (BNI 1999), page 3-19, subsidence reached a maximum rate of 2.4 feet per year in 1951. The maximum subsidence established for IRP Site 12 is 22 feet. The depression created likely controlled the collection of surface water and potential deposition of oxides in solution until filling of the depression ended in 1956, and the formation was repressurized in 1960. Iron and manganese oxides already present in the dredged sediments below the water table would also have contributed to the deposit, yielding dissolved arsenic under reducing conditions.
14. Section 1.4.4.2 Characteristics of Chlorinated COPCs in Groundwater, Page 1-80 This section includes a statement that says in part, "... it is expected that concentrations of vinyl chloride will remain within the generally acceptable range of risk and will not present cause for consideration of remedial action." The Report should provide additional data to support this recommendation. The Report should include sufficient weight of evidence to demonstrate that the concentration of vinyl chloride is not increasing in the groundwater or vadose zone.	14. See response to Specific Comment No. 4 for a discussion of potential increasing vinyl chloride concentrations and exposure. Additional data supporting the conclusion referenced regarding changing vinyl chloride concentrations over time will be provided by the reports of the quarterly groundwater monitoring program and the monitoring program implemented under the preferred remedial alternative. As stated in response to RWQCB Comment No. 14, the current quarterly groundwater monitoring program will be amended during the remedial design phase with the addition of analytes to the existing analyte list that are specific to the remedial alternative selected for implementation. At that time, analytes such as nitrate, sulfide, sulfate, iron (II), methane, ethene/ethane, dissolved organic carbon, hydrogen, and others that would provide an indication of the degree of the reducing environment present in the groundwater, and the potential rate of anaerobic dechlorination will be added for monitoring of groundwater quality.

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control Date: 13 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
SPECIFIC COMMENTS	*RESPONSES TO SPECIFIC COMMENTS*
15. Section 1.4.4.4 Migration of COPCs in Groundwater, Page 1-80 **It does not appear that sufficient data has been collected and evaluated to determine whether biodegradation is occurring. Has there been a study to determine whether vinyl chloride is migrating into the soil?**	15. See response to General Comment No. 4. A study has not been performed to determine whether and at what rate vinyl chloride may be partitioning from groundwater to vadose zone soil. The human-health risk assessment performed for the industrial scenario conservatively estimated the risk from exposure through the inhalation pathway of vinyl chloride concentrations present in the groundwater. An estimate of rate at which vinyl chloride may be migrating from groundwater will be performed, if necessary, as part of the remedial design phase for the selected remedial alternative.
16. Section 1.4.5.1 Conclusions, Page 1-83 **Due to the shallow groundwater table, there appears to be a potential exposure pathway for vinyl chloride in the groundwater to migrate to the surface. Additional investigation is warranted to determine whether biodegradation of vinyl chloride is occurring and/or vinyl chloride concentration is increasing in the groundwater or vadose zone.**	16. See response to General Comment No. 4, and Specific Comment Nos. 14 and 15.
17. Section 1.5 Evaluation of AOPC N-1, Page 1-86 **The Report does not provide adequate information to support the conclusion that AOPC N-1 is not a potential source for the plume southwest of Building 128. COCs identified in the groundwater were detected in soil samples at AOPC N-1. The rationale that existing concentrations of COCs do not pose a groundwater risk does not eliminate the potential that contaminants have impacted the groundwater in the past. The residual concentrations of COCs in the soil may indicate that the bulk of the COCs have already migrated to the groundwater. The soils at AOPC N-1 could still be a source of contamination to the groundwater.**	17. See response to Specific Comment No. 1. Although PCE, TCE, and 1,2-DCE were reported as COPCs for AOPC N-1 soil and for the groundwater of the chlorinated VOC plume southwest of Building 128, their occurrence in the soil does not now constitute COCs for groundwater protection. The original concentrations of these COPCs in the soil cannot be determined based on existing information, and therefore, cannot be said to have been a source soil area in the past. To determine whether current COPC concentrations in the soil could impact groundwater the following information was considered. 1) The COPCs were not reported at significant concentrations in the soil below 1 foot bgs. The depth to groundwater is approximately 8 feet bgs.

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control Date: 13 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
SPECIFIC COMMENTS	*RESPONSES TO SPECIFIC COMMENTS*
	2) The maximum concentrations reported for PCE and TCE in the soil do not exceed soil RBCs developed for a comparable Long Beach Naval Complex site for the protection of the groundwater. 3) The maximum concentrations reported for PCE and TCE in the soil also do not exceed the 1997 COP criteria. Therefore, these soil COPCs cannot impact groundwater at concentrations above the COP criteria if leached. 4) 1,2-DCE was reported in only one soil sample at AOPC N-1 and at a concentration equivalent to the screening criteria for groundwater in the upper water-bearing zone.
18. Section 1.6 Summary of IRP Site Status, Page 1-90 **It is not clear whether the BCT has determined the status of various AOPCs and GWAOPCs. Table 1-7 should be revised to include the names of the decision documents or notations that the BCT has agreed on the proposal for further action or no further action. Section 1.6 Summary of IRP Site Status, Page 1-90**	18. See response to General Comment No. 1, and the revised Table 1-7 presented in Attachment 2. No further information is available with regard to BCT agreement dates for site areas not considered within the scope of this FS.
19. Section 4.2.1.4 Monitored Natural Attenuation, Page 4-7 **The "Technical Protocol For Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater" specifies a 6-step bioattenuation screening process as follows:** **1. Determine if biodegradation is occurring using geochemical data;** **2. Determine groundwater flow and solute transport parameters;** **3. Locate source(s) and receptor exposure points;**	19. The technical protocols presented in the comment will be instrumental during the remedial design phase in modifying the quarterly groundwater monitoring program to collect the remaining data necessary to further evaluate the potential for and rate of biodegradation, if MNA is selected as the preferred remedial alternative. It should be noted that changes in water quality effected by natural processes might not be sufficiently evident over a 1-year period to estimate the biodegradation rate. However, sufficient data to estimate this rate are expected to be available by the first CERCLA 5-year review period.

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control Date: 13 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
SPECIFIC COMMENTS	*RESPONSES TO SPECIFIC COMMENTS*
4. Estimate the biodegradation rate constant; 5. Compare the rate of transport to the rate of attenuation; and Determine if screening criteria are met. The Report does not provide sufficient lines of evidence to demonstrate that the biodegradation is taking place at a rate that will reduce the concentration and toxicity of the COCs. Various sections of the Report contains statements that biodegradation "appears" to be occurring or concludes that biodegradation is occurring based on a limited number of geochemical parameters. Additional investigation is warranted to demonstrate that biodegradation is occurring. As stated in the Technical Protocol, "Of particular interest to the regulators will be proof that natural attenuation is occurring at rates sufficient to meet regulatory compliance levels at POC (point of contact) and to protect human health and the environment. The regulators must be presented with a "weight-of-evidence" argument in support of this remedial option."	The following text has been added to the discussion in the draft FS Report of MNA on the page referenced: "The potential for natural attenuation of chlorinated VOCs in groundwater by biodegradation should be evaluated against technical protocols provided in appropriate federal, state and/or DON guidance. The protocols consist of the following steps and constitute a screening process to determine the potential effectiveness of biodegradation over time: 1. Determine if biodegradation is occurring using geochemical data. 2. Determine groundwater flow and solute transport parameters. 3. Locate source(s) and receptor exposure points. 4. Estimate the biodegradation rate constant. 5. Compare the rate of transport to the rate of attenuation; and determine if screening criteria are met."
20. Section 4.2.1.6 In Situ Groundwater Treatment, Bioremediation, Page 4-12 See comment number 19.	20. See response to Specific Comment No. 19. Unlike the evaluation of biodegradation as a process of MNA, bioremediation is not solely dependent on the natural conditions present to determine whether or not it will be an effective remedial alternative. Moisture, oxygen, and nutrient content are frequently altered to produce the necessary environment favorable to the existing microorganisms in order to induce remediation, or a more suitable microorganism population itself may be introduced into the aquifer materials. In these cases, the evaluation provided by application of the technical protocols would help determine baseline conditions, and be used later to evaluate effectiveness of the steps taken to induce remediation.

Comments by: Ron Okuda/Joe Hwong Geological Services Unit (GSU) Department of Toxic Substances Control Date: 13 March 2000 Responses by: Bob Schilling, Doug Peeler BNI Date: 02 August 2000	CLEAN II Program Contract No. N68711-92-D-4670 CTO-0176 File Code: 02221
SPECIFIC COMMENTS	*RESPONSES TO SPECIFIC COMMENTS*
21. Section 5.3.2.1 Description of Alternative, Page 5-16 One of the breakdown products of TCE and PCE degradation is vinyl chloride. The previous groundwater and soil investigations have not determined whether the suspected chemical degradation of VOCs is proceeding beyond the formation of vinyl chloride. The alternative should evaluate the risk of vinyl chloride in the groundwater volatilizing into the vadose zone and migrating to the land surface.	21. See response to Specific Comment No. 4. Vinyl chloride concentrations in the groundwater at IRP Site 9, as for any other COC, would be tracked under Alternative 2 and the effectiveness of natural attenuation to reduce those concentrations to the remediation goal would be assessed under the long-term monitoring program. However, because the interest in potential increases in vinyl chloride as a result of biodegradation is specific to this remedial alternative, the discussion of Alternative 2 for IRP Site 9 that starts on the referenced page 5-16 has been revised on page 5-18, second paragraph to include: "Alternative 2 also includes long-term monitoring to assess potential impacts to human health or the environment arising from the continued migration of contaminated groundwater in the shallow aquifer. This assessment would include tracking vinyl chloride concentration increases in the groundwater as a by-product of biodegradation and reassessment of the potential risk posed to human health and the marine environment from under the existing industrial scenario and exposure pathways. Monitoring during this period would support detailed evaluations of contaminant fate and transport every 5 years. . . ."

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SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
22. Section 5.3.2.2 Detailed Analysis of Alternative, Pages 5-21 through 5-24 **GSU recommends that additional investigation be conducted to determine the human and ecological health impacts from exposure to vinyl chloride. If the Report is correct that the natural attenuation process is increasing the vinyl chloride concentrations in the shallow groundwater. This would indicate an increase in toxicity of the contaminants and reduce the long-term effectiveness. If the vinyl chloride migrates to the surface, the natural attenuation process could lead to a decrease in the overall protection of human health and the environment.**	22. See response to Specific Comment No. 21. Current site conditions, potential human exposure, and the groundwater monitoring results available to date, do not suggest that the build up of vinyl chloride in groundwater could become a significant factor and should be discussed in the "Overall Protection of Human Health and the Environment" or the "Short-Term Effectiveness" of the MNA alternative analysis. In the discussion of "Long-Term Effectiveness and Permanence," the draft FS Report text as it appears on page 5-22 has been revised to read: "A possible limitation on the long-term effectiveness of Alternative 2, although very unlikely, is its potential need for future remedial actions resulting from the build-up of vinyl chloride in groundwater to levels exceeding those evaluated in the risk assessment and migration of groundwater contamination beyond the base boundaries. Should additional response actions be necessary, close coordination with local agencies and future landowners would be required to prevent or minimize any interference with redevelopment of the former LBNSY property. Groundwater monitoring would enhance the long-term effectiveness of Alternative 2 by providing data for projection of future contaminant distribution. This activity is an integral component of the remedy and would be used to evaluate the impacts of vinyl chloride concentration trend and potential off-base migration to human health and the environment. The monitoring results would also determine the need for and scope of future response actions that might be necessary."

RESPONSES TO COMMENTS
DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

Comments by: John P. Christopher Human and Ecological Risk Division (HERD) Department of Toxic Substances Control **Date:** 18 April 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 August 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
GENERAL COMMENT (CONCLUSION)	***RESPONSE TO GENERAL COMMENT***
The document is well prepared and presented, but a set of crucial comparisons is not included. The Navy must present quantitative estimates of risk reduction for each alternative under examination. The basis for estimates of reduction should be the baseline human health evaluation from the "Final Remedial Investigation Report, Installation Restoration Program Sites 8 Through 13, Long Beach Naval Shipyard, Long Beach, California" (June 1997). In Volume II of the Final Remedial Investigation Report, Tables 6-13 and 6-14 summarize risks and hazards by exposure medium for the construction worker and industrial worker, respectively. The presentation for the Feasibility should parallel these earlier tables.	The quantitative estimates of the risk reduction for each of the remedial alternatives proposed for remediation of IRP Site 9 and Site 12/13 groundwater, and IRP Site 12 soil will be performed as requested and presented in the final FS Report. In each case, a table such as those recommended will present the upper-bound cancer risk and hazard for COPCS detected in paved soil and groundwater for the industrial worker and the utility maintenance worker. Although the utility maintenance worker exposure estimate may not be applicable to the anticipated future industrial land-use scenario, it is proposed for inclusion for comparative purposes. The reason for presenting the risk under paved conditions is based on the planned future land use. Former LBNSY is in the process of being redeveloped as a shipping container storage facility for the POLB. The redevelopment includes the removal of all former structures and the addition of several feet of soil and heavy traffic-rated pavement to the site surface. The construction of new structures at the site is not anticipated.
SPECIFIC COMMENT (RECOMMENDATION)	***RESPONSE TO SPECIFIC COMMENT***
The Navy should present quantitative estimates of risk reduction for each alternative examined in the Draft Feasibility Study.	See response to General Comment.

RESPONSES TO COMMENTS
DRAFT FEASIBILITY STUDY REPORT
FORMER LONG BEACH NAVAL SHIPYARD, IRP SITES 9, 12, AND 13
LONG BEACH, CALIFORNIA

Comments by: Garry Brown Office of Legal Counsel Department of Toxic Substances Control **Date:** April 2000 **Responses by:** Bob Schilling, Doug Peeler BNI **Date:** 02 May 2000	**CLEAN II Program** **Contract No. N68711-92-D-4670** **CTO-0176** **File Code: 02221**
COMMENTS:	***RESPONSES:***
1. I have some of the same concerns that I have always had with the federal ARAR analysis. They always cite the State's Hazardous Waste Regulations as federal ARARs not State, and DTSC always maintains that even if federal, they are also State ARARs.	1. The introduction to ARARs Appendix A states: "State regulations that are a component of a federally authorized or delegated state program are generally considered federal requirements and potential federal ARARs for the purposes of ARAR analysis under CERCLA (55 *Federal Register* 8742). The state of California received approval for the base RCRA hazardous waste management program on 23 July 1992. The state of California Environmental Health Standards for the Management of Hazardous Waste set forth in Division 4.5, Title 22, *California Code of Regulations* (CCR) were approved by U.S. EPA as a component of the federally authorized state of California RCRA program." The state regulations in Division 4.5 of Title 22 CCR are, therefore, a source of potential federal ARARs for the purpose of ARAR analysis. These state regulations would supplant the RCRA regulations in 40 CFR in the ARAR analysis even if evaluated as potential state requirements, because they are "broader in scope" than the corresponding federal RCRA regulations. When this is not the case, the regulations are not considered part of the federally authorized program or potential federal ARARs, but are purely state law requirements and potential state ARARs.
2. It would be useful at this stage to have an indication of the preferred alternative, or proposed preferred alternative, because it would allow a more detailed review of the pertinent data relative to the alternative proposed.	2. The preferred remedial alternatives for remediation of IRP Sites 9 and 12/13 groundwater and IRP Site 12 soil will not be proposed until input from the state comments on this draft FS can be evaluated and included in the selection process. The final FS Report will be produced addressing the comments provided by the state. From that report, the Draft Proposed Plan/Pre-Draft Remedial Action Plan (RAP) will be developed presenting the preferred remedial alternatives for state review. The state comments on this document will be taken into consideration in presenting a preferred remedy

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COMMENTS:	***RESPONSES:***
	for each site to the public, in the Final Proposed Plan/Draft RAP. Upon evaluation of results from the public comment period, a responsiveness summary and the preferred remedies will be presented in the Record of Decision (ROD)/Final RAP.
3. On page A2-4, the Clean Water Act, water quality criteria is listed as TBC, I would consider these criteria to be relevant and appropriate.	3. The DON's position with regard to the AWQCs as potential ARARs is discussed in the text that accompanies this table in the Appendix A, Section A2.2.1.3 Clean Water Act (page A2-17). It states that these criteria are nonenforceable guidelines used by the states to set water-quality standards. The Los Angeles RWQCB noted that in following the requirements of the California Ocean Plan to protect beneficial uses of surface waters, the DON will be in compliance with water-quality standards of the Basin Plan. Only the saltwater acute and chronic criteria and human-health criteria for the consumption of organisms would be potentially relevant and appropriate. These criteria, as TBC, would be used in evaluating concentrations of compounds for which regulatory criteria have not been established. All the COCs identified for groundwater at IRP Sites 9 and 12/13 have applicable regulatory criteria listed in the COP.
4. Under table A2-1, page A2-5 the Federal chemical-specific ARAR list has CERCLA listed at the top of the page, but there is no information provided. Is there some missing information here? Potentially there may be a need for a health risk analysis, per EPA guidelines, requiring cleanup even if hazardous waste levels are not found. Is this discussed somewhere else?	4. The CERCLA heading appearing on page A2-5 is an artifact of an earlier version of the table and has been removed. A baseline human-health risk assessment has been performed during the RI for the existing and likely future industrial scenario for the IRP sites, in accordance with federal and state guidelines. The risk assessment identified the COCs for areas of IRP Site 9 groundwater of the upper water-bearing interval and from IRP Site 12/13 soil where human-health risk to the industrial worker or the maintenance/utility worker was above the allowable range of 10^{-6} to 10^{-4}. The results of the risk assessment are discussed in detail in Chapter 6 of the RI Report (1997), and summarized for each site location and media for the development of RAOs and remediation goals in Chapter 3 of the draft FS Report.

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COMMENTS:	***RESPONSES:***
5. Also, referencing #4 above, there is no reference to HSC chapter 6.8 as a potential State ARAR. Same comment as # 4, but in the state context.	5. Please see response for Comment No. 6 regarding HSC Division 20, Chapter 6.5 requirements.
SPECIFIC COMMENTS:	***RESPONSE TO SPECIFIC COMMENTS:***
6. Although there is no discussion of LUCs in the deed restriction/institutional controls context of the alternative summaries, I understand that the DON views these as procedural, not substantive, and LUCs are addressed elsewhere in the FS. However, the DON has agreed that there are substantive portions of Chapter 6.5, article 11, (no hospitals, residences, schools...) and, for example on page A4-62 (3rd bullet point) it says that the uses will be industrial, and industrial means no areas frequented by children. However, there is no proscription here on health clinics, or hospitals, which are also proscribed by the substantive portions of HSC 25232.	6. Institutional controls are included as a part of each remedial alternative proposed for remediation of the site areas and are listed for each remedial alternative in the draft FS, subsection to Section 5 entitled "Description of Alternative." The institutional controls are designed primarily to limit human exposure by prohibiting residential land use, groundwater well installation and groundwater extraction, access to the sites, land use for facilities frequented by children, removal and disposal of contaminated soil or groundwater, and other industrial or commercial uses not consistent with the California Coastal Act. The following sections of state requirements pertaining to Land Use Covenants (LUCs) and institutional controls (deed restrictions) have been added to Appendix A, Table A4-2 (see Attachment 4) and evaluated as potential ARARs: • California Civil Code 1471 (c); • California Health and Safety Code (HSC) 25202.5, 25222.1, 25232(b)(1)(A)-(E), and 25233(c) (with the exception of administrative requirements); and • HSC 25143.2. The supporting text regarding the basis for the ARARs determination has also been added to the appropriate section of Appendix A.

ATTACHMENTS

1.3.2.2 RISK-BASED CRITERIA

Contaminant-specific RBCs are estimates of concentrations considered protective of human health. Human-health RBCs can be used to trigger further investigation, screen contaminants in environmental media, and provide an initial cleanup goal, if applicable. Human-health RBCs are not used as final cleanup goals without comparison against other applicable criteria and evaluation of protectiveness.

In the baseline human-health risk assessment (BHHRA), RBCs were calculated for a specific estimated lifetime cancer risk level for carcinogenic COPCs, or a hazard index (HI) for noncarcinogenic COPCs. The estimated lifetime cancer risk (ELCR) is defined as the portion of the total lifetime cancer risk for a COPC that is above the risk attributed to the natural background concentration of the COPC. The HI is the sum of the individual contaminant hazard quotients (HQs) for the COPCs reported at a site.

The BHHRA was based on occupational exposure of two types of on-site workers:

- The industrial worker – site personnel with potential exposure to soil limited to 0 feet to 3 feet below ground surface (bgs).
- The maintenance/utility worker – site personnel with potential exposure to soil and groundwater from 0 feet to 11.5 feet bgs.

The RBCs used were based on the site-specific industrial conditions. The industrial worker scenario assumed a longer exposure duration than the maintenance/utility worker scenario; therefore, RBCs for the industrial worker scenario were more conservative. The BHHRA identified the exposure pathways to surface soils or groundwater through inadvertent ingestion, dermal contact, and inhalation of vapors and dusts.

Chemical concentrations for all vadose zone soil samples in each AOPC were compared to the background threshold concentrations (metals only) and RBCs discussed in the RI Report (BNI 1997a). If a chemical concentration within an AOPC was above both the background threshold concentration (metals only) and the RBC for an ELCR of 10^{-6}, then the COPC became a "risk driver" among the chemicals of concern (COCs). An AOPC became an area of concern (AOC) when the total ELCR (equivalent to the incremental lifetime cancer risk [ILCR] used in the RI Report [BNI 1997b]) for all of the COPCs reported was greater than 10^{-4} or when the chronic HI was greater than unity (1).

In this manner, AOPCs were evaluated and recommended for remediation as AOCs; for each of the COCs identified as risk-drivers, the RBCs for an ELCR of 10^{-6} and for HQs of unity were proposed as human health-based remediation goals.

Table 1-7
Site Status Summary IRP[a] Sites 9, 12, and 13

IRP Site	Media	AOPC[b]	Previous Recommendation (RI[c] or SGI[d])	Addressed in this Feasibility Study?	Site Status
Group 1					
9	GW[e]	GWAOPC[f] 1, chlorinated VOC[g] plume N of Bldg. 129	Remedial Action	Yes	GWAOCs[h] Remedial action required
9	GW	GWAOPC 1, chlorinated VOC plume SW of Bldg. 128	Remedial Action	Yes	
9	GW	GWAOPC 2, chlorinated VOC plume N of Bldgs. 130 and 131	Remedial Action	Yes	
12	soil	AOPC 1	Remedial Action	Yes	AOC[i] Remedial action required
12/13	GW	GWAOPC 1	Remedial Action	Yes	GWAOC Remedial action required
Group 2					
9	soil	AOPC 1	NFA[j]	Yes	AOPCs Risk assessment performed for industrial land-use scenario only. Remedial action required to limit exposure potential to that determined in the risk assessment
9	soil	AOPC 2	NFA	Yes	
9	soil	AOPC 3	NFA	Yes	
9	soil	AOPC N-1	Further Investigation	Yes	
9	soil	AOPC N-5	NFA	Yes	
9	soil	AOPC S-1	NFA	Yes	
9	soil	AOPC S-2	NFA	Yes	
9	GW	GWAOPC 1, chlorinated VOC plume NW of Bldg. 128	Further Investigation	Yes	GWAOPC Risk screening performed for industrial land-use scenario only. Remedial action required to limit exposure potential to that determined in the risk assessment
12/13	soil	AOPC 2	NFA	Yes	AOPC Risk assessment performed for industrial land-use scenario only. Remedial action required to limit exposure potential to that determined in the risk assessment

Table 1-7 (continued)

IRP Site	Media	AOPC	Previous Recommendation (RI or SGI)	Addressed in this Feasibility Study?	Site Status
Group 3					
Und[k]	GW	MTBE[l] plume W of IRP Site 9	Separate Investigation	No	Separate Investigation Off-site source; not related to IRP Site 9 releases
Und	GW	deep benzene plume NW of Drydock No. 1	NFA on the part of the Navy	No	Separate Investigation (BCT[m], 5 May 1999) Off-site source; not related to IRP Site 9 releases
Group 4					
9	GW	GWAOPC 1, chlorinated VOC plume N of Bldg.128	NFA	No	Not GWAOPCs No action warranted
9	GW	GWAOPC 2, chlorinated VOC plume S of Bldg. 131	NFA	No	
9	GW	GWAOPC 4. 1,1-DCE[n] plume	NFA	No	
12/13	GW	GWAOPC 2	NFA	No	Not a GWAOPC No action warranted
Group 5					
9	soil	AOPC N-2	NFA	No	Not AOPCs No action warranted
9	soil	AOPC N-3	NFA	No	
9	soil	AOPC N-4	NFA	No	
9	soil	AOPC N-6	NFA	No	
9	soil	AOPC N-7	NFA	No	
9	soil	AOPC N-8	NFA	No	
9	soil	AOPC S-3	NFA	No	
12/13	soil	GWAOPC 1 (soil)	NFA	No	Not AOPCs No action warranted
12/13	soil	GWAOPC 2 (soil)	NFA	No	

Notes:
- [a] IRP – Installation Restoration Program
- [b] AOPC – area of potential concern
- [c] RI – Remedial Investigation Report (BNI 1997b)
- [d] SGI – Supplemental Groundwater Investigation Report (BNI 1999)
- [e] GW – groundwater
- [f] GWAOPC – groundwater area of potential concern
- [g] VOC – volatile organic compound
- [h] GWAOC – groundwater area of concern
- [i] AOC – area of concern
- [j] NFA – no further action
- [k] Und – Undesignated
- [l] MTBE – methyl-tert-butyl ether
- [m] BCT – Base Realignment and Closure Cleanup Team
- [n] 1,1-DCE – 1,1-dichloroethene

ATTACHMENT 3 – FIGURE 1-11 FROM PAGE 1-49 OF THE REVISED DRAFT FEASIBILITY STUDY

THIS ATTACHMENT IS NOT AVAILABLE.

EXTENSIVE RESEARCH WAS PERFORMED BY NAVFAC SOUTHWEST RECORDS OFFICE TO LOCATE THE MISSING ATTACHMENT. THIS PAGE HAS BEEN INSERTED AS A PLACEHOLDER AND WILL BE REPLACED SHOULD THE MISSING ITEM BE LOCATED.

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CALIFORNIA CIVIL CODE							
Institutional controls	To do or refrain from doing some act on his or her own land and each act is reasonably necessary to protect present or future human health or safety of the environment as a result of the presence on the land of hazardous materials, as defined in Section 25260 of the Health and Safety Code.	Presence of hazardous materials as define HSC Section 25260.	Civil Code Section 1471(c)		2, 3, 4, S2, S3, G2, G3, G4		Substantive provisions are relevant and appropriate for the imposition of institutional controls. Administrative requirements do not constitute ARARs.
CALIFORNIA HEALTH AND SAFETY CODE*							
Waste recycling	Generation, storage, and transportation of hazardous waste for recycling must comply with requirements of 22 CCR 66266. Regeneration of spent GAC may be regulated if this material is a hazardous waste.	Material must be recycled and reused on site or at another facility owned by the owner of the material.	HSC 25143.2	Not an ARAR			The spent GAC generated by IRP Site 9 groundwater remedial actions, and filter media from *ex situ* treatment of IRP Site 12/13 groundwater, are not likely to be hazardous. Spent GAC from IRP Site 9 would not be owned by DON or recycled at a DON facility. It would be managed entirely by a service contractor. Spent filter media from IRP Site 12/13 will be regenerated at the site, through the remedial system to which it is attached; transportation will not be involved.
Institutional controls	Restrict present and future uses of all or part of the land on which hazardous materials are present	Presence of residual hazardous materials	HSC 25202.5, 25222.1, 25232(a)(1)(A)-(E), and 25233(c)		2, 3, 4, S2, S3, G2, G3, G4		Section 25202.5 restricts "present and future uses of all or part of the land on which the … facility … is located. Section 25222.1 provides a streamlined, alternative procedure for implementing restrictions in 252532(a)(1)(A)-(E) and variance criteria provided in HSC 25233(c).