

**COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN II)
Northern and Central California, Nevada, and Utah
Contract Number N62474-94-D-7609
Contract Task Order 112**

Prepared For

**Lisa Hunt, Remedial Project Manager
DEPARTMENT OF THE NAVY
Engineering Field Activity West
Naval Facilities Engineering Command
San Bruno, California**

**FINAL
OFFSHORE ECOLOGICAL RISK ASSESSMENT FOR
NAVAL FUEL DEPOT POINT MOLATE
RICHMOND, CALIFORNIA**

November 24, 1999

Prepared By

**ENTRIX, INC.
590 Ygnacio Valley Road, Suite 200
Walnut Creek, California
(925) 935-9920**

**TETRA TECH EM INC.
135 Main Street, Suite 1800
San Francisco, California
(415) 543-4880**

Jennifer Holder, Ph.D.
Task Manager

Gary Miller, P.G.
Project Manager

EXECUTIVE SUMMARY

Prior to the transfer of the Naval Fuel Depot Point Molate (NFD Point Molate) facility, the Navy is evaluating risk to ecological resources potentially affected by exposure to petroleum-related compounds as a result of historical site use. This report presents the results of the assessment of risk to ecological receptors associated with the offshore environment at NFD Point Molate. Potential human health risks and terrestrial ecological risks will be evaluated in separate reports.

The results of this offshore ecological risk assessment (ERA) indicate no risk to the benthic invertebrate community, larval fish community, or shorebird community from sediments at NFD Point Molate. The results also conclude that no further data is required to make risk management decisions for the offshore sediments.

NFD Point Molate is a former bulk storage and transfer facility located on Richmond Point in San Francisco Bay. The facility, which is no longer operational, had more than 40 million gallons of fuel storage capacity. The Navy and the City of Richmond have entered into a cooperative agreement for caretaker services.

The overall objectives of the offshore ERA are to evaluate the exposure and effects on aquatic receptors and to characterize risk to these aquatic receptors of historic petroleum-related releases from NFD Point Molate. To meet these objectives, the EPA risk assessment framework (“Ecological Risk Assessment Guidance for Superfund: Process for designing and conducting ecological risk assessments. Interim Final. EPA 540-R-97-006”; EPA, 1997) was used in conjunction with a weight-of-evidence (WOE) approach developed specifically for NFD Point Molate.

A conceptual site model (CSM) and food web were developed for the offshore sediments at NFD Point Molate. These were used to select assessment endpoints (AEs) (i.e., representative of those ecological resources selected for protection) and measurement endpoints (MEs) (i.e., environmental measurements collected to evaluate risk to an assessment endpoint) to evaluate the potential risk posed by site constituents of potential ecological concern (COPECs). Based on historical practices at the site, total petroleum hydrocarbons (TPH) and its constituents [e.g., polynuclear aromatic hydrocarbons (PAHs)] are considered COPECs for this investigation and sediments are considered the current source of contamination.

The following assessment and measurement endpoints represent ecological resources selected for protection at NFD Point Molate:

1. (AE) Protection of the benthic invertebrate community associated with NFD Point Molate offshore sediments.
 - (ME) Measure the toxicity of sediments to an infaunal amphipod using a bulk sediment bioassay protocol.
 - (ME) Measure the toxicity at the sediment-water interface (SWI) to an epibenthic invertebrate.
 - (ME) Potentially determine the correlation between benthic species composition and abundance and constituent concentrations at sampling locations.

- (ME) Measure and compare PAH concentrations to ambient threshold criteria to evaluate whether sediments at NFD Point Molate are potentially contaminated.
2. (AE) Protection of the larval fish community associated with the eelgrass beds off NFD Point Molate.
- (ME) Measure the toxicity at the SWI to fish embryos.
 - (ME) Measure and compare PAH concentrations to ambient threshold criteria to evaluate whether sediments at NFD Point Molate are potentially contaminated.
3. (AE) Protection of the shorebird community that utilizes the intertidal habitat of NFD Point Molate as a foraging area.
- (ME) Compare the estimated site-specific doses (based on measured PAH body burdens in Asian clams) that could be ingested by foraging shorebirds to avian toxicity data associated with reproductive impairment in birds.
 - (ME) Measure and compare PAH concentrations to ambient threshold criteria to evaluate whether sediments at NFD Point Molate are potentially contaminated.

The use of multiple lines of evidence to evaluate ecological risk requires that an approach be developed to integrate potentially inconsistent findings to draw conclusions about risk. At the time the “Ecological Risk Assessment Addendum to the Phase II Remedial Investigation Field Work Plan NFD Point Molate” (Offshore ERA Work Plan) was prepared, a WOE approach had not been identified or developed. The WOE approach described in this document has since been developed specifically to integrate and evaluate the four lines of evidence collected at NFD Point Molate to assess risk based on the association of AEs and MEs.

Remedial investigation and design, removal actions, and closure under the IR program at NFD Point Molate are being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A base closure team (BCT) exists for NFD Point Molate. The BCT is the decision-making body for cleanup activities and consists of the Navy, U.S. Environmental Protection Agency (EPA), and the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB). The Navy is the lead agency for the CERCLA cleanup process. The RWQCB is the lead regulatory agency for oversight of cleanup activities. The BCT management team includes the City of Richmond, community restoration advisory board (RAB), other regulatory agencies, other Navy support staff, and the Navy’s consultants.

The approaches used to conduct the ERA at NFD Point Molate were developed through a series of meetings with involved agencies. The meetings were a collaborative effort to develop the approach and build consensus between the Navy and key agency representatives on technical issues including, but not limited to:

- Selection of AEs and MEs
- Representative avian receptors
- Bioassay test species
- Exposure parameters for the selected avian receptors
- Sampling approach
- Sediment chemistry screening criteria
- Development and use of a WOE approach
- Development of avian toxicity reference values

Results from amphipod bulk sediment bioassays and mysid SWI bioassays indicate that there is no risk to the benthic invertebrate community associated with NFD Point Molate offshore sediments. Results from topmelt SWI bioassays indicate that there is no risk to the larval fish community associated with NFD Point Molate eelgrass beds. At two sample locations, T10-1 and T11-1, ambient threshold criterion for sum PAHs [3.390 parts per million [ppm]] was exceeded in sediment. As ambient threshold criteria are not risk-based, these exceedances alone do not indicate risk at these sampling locations.

Results from the analysis of PAH bioaccumulation by shorebirds clearly indicate that there is no risk to the scaup (*Aythya spp.*) at 6 of the 10 NFD Point Molate intertidal sampling stations where clam tissues were collected (DL-1-1, T3-1-1, T5, T6, T9-1, and T9-2). At these sampling stations, the calculated doses were below the criterion defining negative findings (0.03 milligrams per kilogram per day [mg/kg/day]) indicating no risk to avian receptors based on doses modeled to the scaup and doses calculated to the western sandpiper for all sites. Doses calculated for the remaining sites (T-2, T11-1, T10-1-1, and T11A) fell between the criteria defining negative and positive findings (>0.03 mg/kg/day and <0.5 mg/kg/day). Although the potential risk at these sites is indeterminate based on the MEs, it is concluded that risk to the shorebird community is unlikely due to the conservatism built into both the exposure parameters used for dose calculation and the criteria developed to determine risk findings.

The WOE approach developed for NFD Point Molate summarizes the results in two formats: (1) summary tables and (2) summary bar charts. Both the tables and bar charts are organized to group ME findings by the AEs they represent. This grouping allows evaluation of risk to a particular AE based on all of the ME results associated with that AE. Additionally, overall sampling station risk is evaluated considering all resources selected for protection (i.e., all AEs).

The WOE approach used in this ERA incorporates uncertainty associated with each measurement endpoint into the risk findings. Thus, the conclusions made regarding risk to each of the three NFD Point Molate AEs using the WOE approach can be made with a high level of confidence. For two of the AEs (benthic invertebrates and larval fish), the WOE clearly indicates no risk from offshore sediments at NFD Point Molate to benthic invertebrates and larval fish. The WOE indicates an undetermined risk for shorebirds. However, the conservatism used in evaluating this AE makes it likely that an undetermined finding would become a negative finding using more realistic exposure parameters.

Based on the results presented in this report, the following overall conclusions are made:

- The AEs represent those ecological resources at NFD Point Molate selected for protection.
- The ME results indicate that there is no risk to all of the resources selected for protection (i.e., AEs).
- No further data needs are identified; thus, these results are considered to be sufficient to make risk management decisions.
- The findings of the offshore ERA indicate no risk to ecological resources from offshore sediments at NFD Point Molate.