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PRESENTATION AND AGENDA FOR RESTORATION ADVISORY BOARD MEETING HELD 19 JUNE 1997 NSY PORTSMOUTH ME

6/19/1997

PORTSMOUTH NAVAL SHIPYARD

RESTORATION ADVISORY BOARD AGENDA

Date	June 19, 1997
Place	Holiday Inn, Portsmouth, NH
Time	7 p.m.- 9 p.m.

Introduction

Status of work

Weight of Evidence Approach to Offshore Ecological Risk Assessment

RAB membership/community co-chair elections

Other issues if required

Using the Weight of Evidence to Characterize Ecological Risks

Presentation for the
Restoration Advisory Board
Portsmouth Naval Shipyard, Kittery Maine

by
Robert K. Johnston
Marine Environmental Support Office
Naval Command, Control, and Ocean Surveillance Center

June 19, 1997

Key Messages

1. **Ecological Risks Were Characterized by the Weight of Evidence.**

2. **Ecological Risks in the Areas of Concern were Determined.**

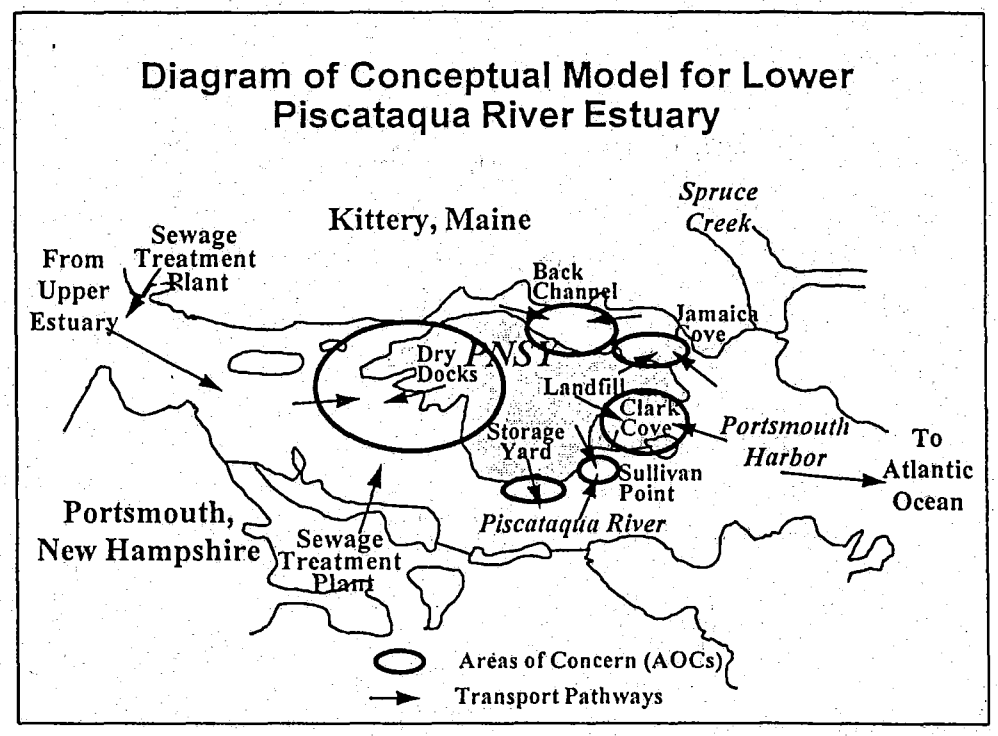
3. **Chemicals that May be Responsible for the Risks and which could be Linked to SWMUs were Identified.**

Using the Weight of Evidence to Characterize Ecological Risks

Introduction
- Conceptual Model

Risk Characterization
- Weighing the Evidence of Risk
  - Assigning Endpoint Weights
  - Weighing the Results
  - Developing Conclusions About Risk
- Identifying Risk Drivers

Summary and Conclusions



This diagram shows the conceptual model that was used to guide the risk assessment. It represents our understanding of how the estuary works.

- Well flushed estuarine system.
- Major inputs in lower estuary from Shipyard and Sewage Treatment Plants
- Up-Estuary sources for some contaminants as well

So depostional areas, especially areas around the shipyard - like Clark Cove, will accumulate contaminants from all sources.

Goals of the Ecological Risk Assessment were:

Determine if there are ecological risks in the areas of concern

If risks are present, determine what may be causing the risk

If contaminants of concern (COCs) from the shipyard are risk drivers, determine if there is a linkage back to the Solid Waste Management Units (SWMUs) on the shipyard.

ASSESSMENT ENDPOINTS

- ASSESSMENT ENDPOINTS EVALUATED
  - Pelagic Species
  - Epibenthic Species
  - Benthic Community
  - Salt Marsh Community
  - Eelgrass
  - Avian Consumers

Risk Characterization For PNSY

In order to characterize risk, two types of information are required (U.S. EPA 1992, 1996):

(1) Data on the exposure in environmental media (river water and sediments)

(2) Data that relate exposure levels (dose) to measurable effects.

A Weight-of-Evidence Approach was Applied to Systematically Evaluate the Data and Develop Conclusions About Risk

Weight-of-Evidence Approach

Weight-of-Evidence Approach Was Used
(Applied from Menzie et al. 1996)

- Measures Were Assigned An Endpoint Weight
  - (High, Medium, Low)
  - Evaluates measures' ability to assess effects to the assessment endpoint
- Terms and Interpretations Were Defined
- Scatter Plots Were Used to Summarize WOE results
- The ecological risks associated with environmental media in each AOC were identified.

Menzie, C., M.H. Henning, J. Cura, K. Finkelstein, J. Gentile, J. Maughan, D. Mitchell, S. Petron, B. Potocki, S. Svirsky, and P. Tyler, 1996. Special report of the Massachusetts Weight-of-Evidence Workgroup: A weight-of-evidence approach for evaluating ecological risks. Human and Ecological Risk Assessment, Vol 2:2, pp 277-304

Weight-of-Evidence Approach Cont.

Endpoint Weight (High, Medium, Low) was based on:

- Data Quality
- Strength of Association to the Assessment Endpoint
- Study Design

The Endpoint Weight Reflects the Measures' Ability to Infer Harm to the Assessment Endpoint

Assigning Endpoint Weights

Assessment Endpoint: Pelagic Community

	Measure: Estuarine Water Chemistry
Data Quality	**High** All Data Quality Objectives were met
Strength of Relationship	**Medium**: Can be related to Water Quality Criteria but not capable of predicting effects.
Study Design	**Medium**: Sampling program provided good coverage of the study area but the frequency of sampling was low (3 cruises in Fall 1993)
Overall Weight	**MEDIUM**

Assigning Endpoint Weights Cont.

Assessment Endpoint: Pelagic Community

	Measure: Sea Urchin Toxicity
Data Quality	**Medium**: Exceeded holding time
Strength of Relationship	**High**: Direct relationship between toxicity and affects to pelagic community
Study Design	**Medium**: Toxicity assessment conducted at impacted and reference sites but only on one occasion.
Overall Weight	**MEDIUM**

Interpretation of Effects Data

OUTCOME	INTERPRETATION
Similar to Reference or Below Threshold	No Effect
Worse than Reference But Not Statistically Significant	Potential Effect
Signigicantly Worse Than Reference or Control	Probable Effect

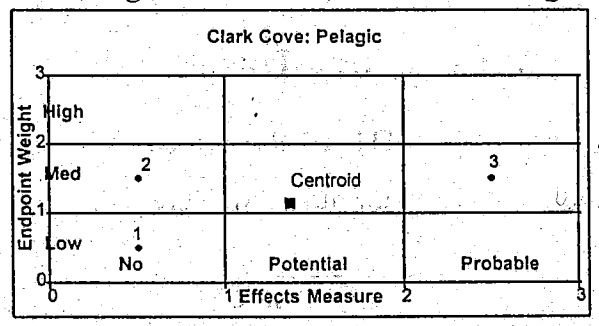
Interpretation of Exposure Data

OUTCOME	INTERPRETATION
≤ Reference or Below Benchmark Concentration	Negligible Exposure
> Qualitative Screening Level	Low Exposure
Statistically > Reference	Elevated Exposure
> Conservative Benchmark (ER-L)	High Exposure
> Nonconservative Benchmark (ER-M)	Adverse Exposure

Interpretation of Risk from Exposure and Effects Data

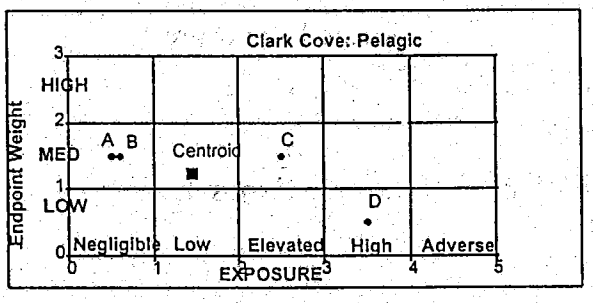
Evidence of Effect	Evidence of Exposure				
	NEGLIGIBLE	LOW	ELEVATED	HIGH	ADVERSE
NO	Negligible	Negligible	Low	Low	Intermediate
POTENTIAL	Negligible	Low	Intermediate	Intermediate	High
PROBABLE	Low	Low	Intermediate	High	High

Weight of Evidence of Risk to Pelagic Receptors in Clark Cove



Phytoplankton Biomass 1
Deployed Mussel 2
Arbacia (Sea Urchin) Toxicity 3

Potential Effect/ Medium Weight



Surface Water A
Deployed Mussel 1 (PHASE I) B
Deployed Mussel 21 (PHASE I) C
Seep D

Low Exposure/ Medium Weight

Outcome Summary Table

Portsmouth Naval Shipyard
Assessment Endpoint Information Summary

Table Prepared by Ken Finkelstein, NOAA

Assessment Endpoint/Location Pelagic/Clark Cove (includes seeps)

	Measurement Endpoint	DATA QUALITY	STRENGTH OF ASSOCIATION	STUDY DESIGN	ENDPOINT WEIGHT	OUTCOME	INTERPRETATION	ISSUES
Effects	Phytoplankton Biomass	H	L	L	L	No difference from reference	No effect	Very low endpoint weight Monthly sampling 9/91-6/92.
Expos	Water Benchmark E S	H H	M L	M L	M L	Well below AWQC Cu, Ni, and Zn exceed AWQC	Negligible exposure High exposure at seep locations	Phase 1 data quality is poor, thus it is not considered. Only 1 seep sampled. Dilution of seep water. Correlates with mussel exposure
Effects	Arbacia Tox. Test	M	H	M	M	Statistically different from control	Probable effect	Holding time exceeded. Response low but several stations.
Effects	Deployed Mussel Condition - SFG	H	M	L	M	No difference from reference	No effect	Sta. 15 shows excellent SFG but no mussels

E=Estuarine Surface Water; S=Seep Water

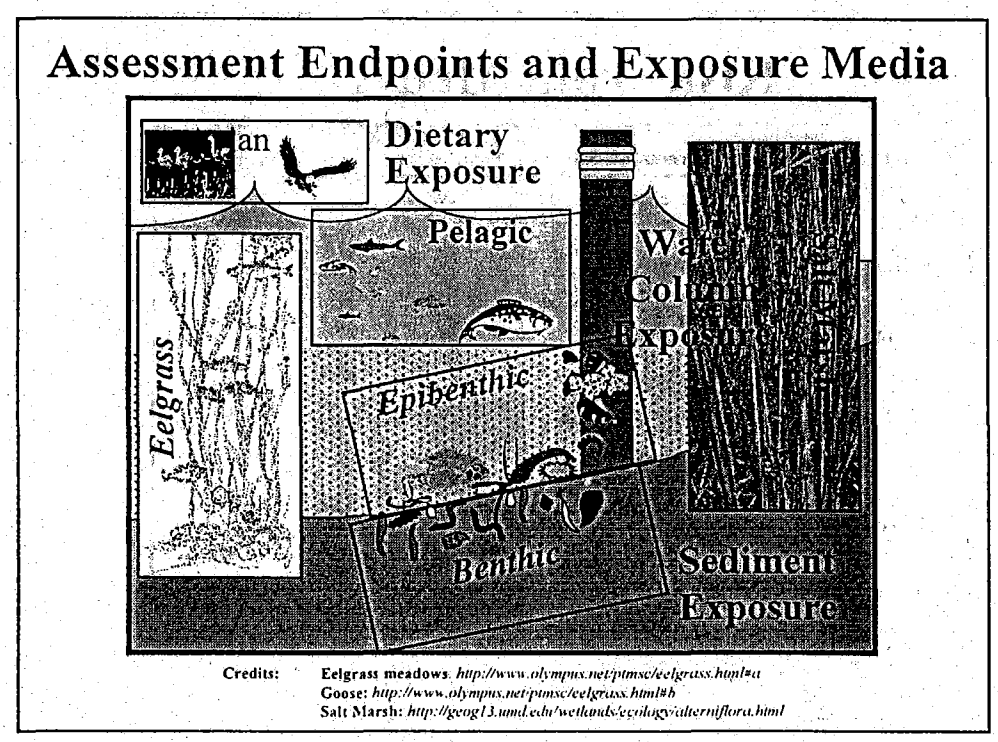
Summary of Risk to Assessment Endpoints in Clark Cove

Assessment Endpoint	[1] Evidence of Effect	[2] Evidence of Exposure	[3] Magnitude of Risk	[4] Confidence In Conclusions
Pelagic	Potential/M	Low/M	Low	Medium
Epibenthic	No/M	Elevated/M	Low	Medium
Benthic	No/H	Elevated/M	Low	High[5]
Eelgrass	Potential/M[6]	Elevated/M	Intermediate	Medium
Salt Marsh	No/M	Elevated/M	Low	Medium

[1] Entries from Scatter plots: Effects Measure/Endpoint Weight
[2] Entries from Scatter plots: Exposure Measure/Endpoint Weight
[3] Magnitude of risk from risk interpretation table
[4] Confidence in Conclusions from Endpoint Weights
[5] High confidence due to high concordance in highly weighted measures
[6] Eelgrass only present at one station in Clark Cove

The information from the scatter plots was transcribed into a statement about risk to the assessment endpoints for each area of concern

e.g. "There is high confidence of low risk to benthic receptors in Clark Cove"



Because different assessment endpoints relate more information about exposures from surface water or sediment, weights were assigned to each assessment endpoint to assist in relating evidence of risk back to the exposure media.

For example, the Benthic Assessment Endpoint provides more information about sediment exposure than does the Pelagic Assessment Endpoint;

The Eelgrass, Epibenthic, and Salt Marsh Assessment Endpoints provide information on both sediment and surface water exposure.

The Risk from Media (Surface Water and Sediment) was calculated as a weighted average of the risks to the assessment endpoints.

Credits:
Eelgrass meadows: *http://www.olympus.net/ptmsc/eelgrass.html#a*
Goose: *http://www.olympus.net/ptmsc/eelgrass.html#b*
Salt Marsh: *http://geog13.umd.edu/wetlands/ecology/alterniflora.html*

Risk from Media

Area of Concern	Environmental Medium	Magnitude of Risk From Medium	Confidence In Conclusions
Clark Cove	Surface Water[1] Sediment[3]	Low[2] Low	Medium High
Sullivan Point	Surface Water Sediment[3]	Low Intermediate	Medium High
DRMO[4]	Surface Water[1]	Negligible	Medium
Dry Docks[5]	Surface Water[1] Sediment[3]	Low Intermediate	Medium High
Back Channel	Surface Water[1] Sediment	Low Intermediate	Medium High
Jamaica Cove	Surface Water[1] Sediment[3]	Low Low	Medium High
Portsmouth Harbor[6]	Surface Water[1] Biota[7]	Low Negligible	Medium Medium

1 Evidence of bioaccumulation in mussels is probably related to surface water exposure.

2 Sediment resuspension may be influencing surface water risks.

3 Evidence of bioaccumulation in juvenile lobsters may be related to sediment exposure.

4 No sedimentary, eelgrass, or salt marsh habitat at DRMO.

5 No salt marsh habitat in Dry Dock area of concern.

6 Only pelagic, epibenthic, and avian assessment endpoints were evaluated for Portsmouth Harbor focus area.

7 Biota evaluated as dietary exposure to avian receptors.

Identifying Potential Risk Drivers

- A Qualitative Analysis Was Performed to Determine The Level of Risk (Weight of Evidence)

- An Analysis Was Performed to Identify Chemicals Potentially Causing Risk
  - Identify Chemicals That Are Most Likely to Be Above Benchmark Concentrations
  - Determine Whether Exposure Levels Above Benchmarks Are Greater in Areas of Concern Than in Reference Areas (Ambient Conditions)

Potential Risk Drivers

- Chemicals that Probably Would Exceed Effects Thresholds
  - A greater chance of exceeding benchmarks within the AOCs than for Reference Areas (Ambient)
- Incremental Risk Used
  - Assumptions apply for both reference and AOCs
  - Means that there is a higher chance of an effect than expected from ambient conditions
  - Not possible to attain cleanup below ambient levels

Potential Risk Drivers

AOC	Estuarine Surface Water	Seeps	Sediment	Biota
Clark Cove		Cu, Ni, Hg, Zn	Cr, Ni, tPCB, DDD	DDD, tDDx
Sullivan Point		Cu, Hg, Zn	Cu, Hg, Ni, DDD, DDE, DDT	PHEN, DDT, DDx
DRMO		n/a	n/a	Pb, DDT, tDDx
Dry Docks		n/a	Cu, Hg, Ni, Zn, tPCB, PHEN, PYRENE, DDT	PHEN, DDE, DDT
Back Channel		n/a	Hg, PHEN, FLUOR, ANTH, DDD, DDT	DDD, DDE, DDT, tDDx
Jamaica Cove		Cu, Ni, Pb, Zn	DDT	Pb, DDT, tDDx

Potential Linkages to SWMUs

For the Potential Risk Divers:

- Is a SWMU a Potential Source for the Chemical?

- Is there (or was there) a plausible route for the chemical to be released from the SWMU into the river?

If Yes, Then a Link to the SWMU was **Assumed**.

Summary of Risk and Potential Risk Drivers With Link to SWMUs

AOC	Media	Magnitude of Risk	Confidence in Conclusion	Potential Risk Drivers with link to SWMUs
Clark Cove	Surface Water Sediment	Low Low	Medium High	seeps[1],Cr, Ni, tPCB
Sullivan Point	Surface Water Sediment	Low Intermediate	Medium High	seeps[2], Cu, Hg, Ni, PHEN
Dry Dock	Surface Water Sediment	Low Intermediate	Medium High	Cu, Hg, Ni, Zn, tPCB, PHEN, PYRENE
Back Channel	Surface Water Sediment	Low Intermediate	Medium High	Hg, PHEN, FLUOR, ANTH
Jamaica Cove	Surface Water Sediment	Low Low	Medium High	seeps[3], Pb

1. Chemicals exceeding water quality criteria in the seep sampled in Clark Cove were Cu, Ni, Hg, and Zn.

2. Chemicals exceeding water quality criteria in seeps sampled from Sullivan Point were Cu, Hg, and Zn.

3. Chemicals exceeding water quality in seeps sampled in Jamaica Cove were Cu, Ni, Pb, and Zn.

Summary of Risks

The Weight-of-Evidence Analysis Showed:

- Intermediate Risk from Sediment Exposure in Some Areas
- Low Risk from Surface Water Exposure in Most Areas
- Negligible Exposure to Water Fowl and Birds of Prey
- No High Risk in Any Area

Potential Risk Drivers Were Identified

GLOSSARY OF TERMS

(ANTH) Anthracene, a PAH compound.

Area of Concern (AOC): A specific contiguous area consisting of nearshore, intertidal, and subtidal habitats defined to evaluate whether ecological impacts are present.

The Areas of Concern defined around the Shipyard are:

Clark Cove: The embayment formed by Seavey Island, Jamaica Island, Clark's Island, and the Clark's Island causeway and connecting to Portsmouth Harbor.

Sullivan Point: The area located directly offshore of Sullivan Point and along the Piscataqua River side of the Clark's Island causeway.

The Defense Reutilitzation and Marketing Office (DRMO) Storage Yard: The area directly offshore of the DRMO Storage Yard.

Dry Docks: The nearshore areas surrounding the dry docks and industrial areas on the western side of Seavey Island.

Back Channel: Nearshore and bottom sediment areas of the Back Channel adjacent to Seavey Island and extending from the back gate to the entrance of Jamaica Cove.

Jamaica Cove: The embayment formed by Seavey Island and Jamaica Island and connecting to the Back Channel.

Assessment Endpoint: A component of the ecosystem which can be protected. Since the Assessment Endpoints could not be measured directly, impacts were evaluated by measures of exposure and effects.

Avian Consumers: Birds of prey and water fowl which feed on prey from the estuary (ducks, geese, gulls, and osprey).

Benthic Community: Community of organisms which spends the majority of their life living within the bottom sediments (worm, clam).

Contaminants of Concern (COC): Chemicals that were identified as having the potential to cause ecological impacts.

Conceptual Model: A picture of understanding.

(Cu) Copper

(Cr) Chromium

DDD: metabolic breakdown product of DDT
DDE: metabolic breakdown product of DDT
DDT: pesticide compound
tDDx: Total DDT and metabolites (sum of DDT, DDE, and DDD)

Eelgrass: A submerged aquatic plant which can form meadows (eelgrass beds) that are capable of trapping sediment and providing habitat for a variety of birds, fish, and invertebrates.

Endpoint Weight: A value reflecting the usefulness of a measure of exposure or effect to infer harm.

Environmental Media: Components of the environment that can accumulate contaminants (water, sediment, and biota).

(FLUOR) Fluorene a PAH compound

(Hg) Mercury

Epibenthic Species: The community of organisms which spend the majority of their life attached to or in close proximity to the bottom (lobster, mussel).

(Ni) Nickel

(PAH) Polycyclic Aromatic Hydrocarbons.

(Pb) Lead

Pelagic Species: The community of organisms which spend the majority of their life floating or swimming in the river water (fish, plankton).

(PHEN) Phenanthrene, a PAH compound.

(PYRENE) Pyrene a PAH compound

Risk Characterization: A determination of the likelihood that ecological impacts have or will occur.

Risk Definitions:

Negligible Risk: Very little evidence of exposure and effects. No impacts were suggested.

Low Risk: Evidence of exposure and effects but no correlation between exposure and effects measures. Limited impacts were suggested.

Intermediate Risk: Evidence of localized impacts but weak correlation between exposure and effects measures. Potential impacts were suggested.

High Risk: Evidence of large and persistent impacts with a high degree of correlation between exposure and effects. Probable impacts were suggested.

Risk Drivers: Chemicals that may be responsible for causing elevated risk.

Salt Marsh Community: Community of organisms living within a salt marsh (cord grass - Spartina, snails)

Solid Waste Management Unit (SWMU): an area designated in the Shipyard's Hazardous Waste Permit where hazardous materials may have been stored, treated, or released.

(tPCB). Total polychlorinated biphenyls

Trophic Transfer: The process by which contaminants are accumulated in the food chain.

(Zn) Zinc

PORTSMOUTH NAVAL SHIPYARD
INSTALLATION RESTORATION PROGRAM

STATUS OF WORK
June 19, 1997

A. FEASIBILITY STUDY

PURPOSE - Develop, evaluate and screen remedial alternatives.

STATUS -
OU 3 (SITES 8, 9 & 11) - The Feasibility Study for JILF, Hg Burial Vaults and Waste Oil Tanks will take into account the results of the groundwater modeling efforts to determine the need for and type of groundwater remedial actions. An Engineering Evaluation and Cost Analysis (EE/CA) is being prepared for the removal action at Mercury Burial Vault I.

OU 2 (SITE 6 & 29) - (DRMO & Incinerator Site) A treatability workplan is being developed for a soil solidification and/or stabilization alternative at these sites. If appropriate, this alternative would be included in the feasibility study for this area. Additionally the groundwater modeling effort is intended to determine the need for and type of groundwater remedial actions at this site. Additional field investigation has been funded for this area.

SITE 10 - (Battery Acid Tank) Additional field work is funded to determine if the extent of soil contamination is greater than previously expected.

SITE 27 - (Berth 6 Industrial Area, formerly known as Fuel Oil Spill Area) The Draft Phase I Contaminant Fate & Transport Modeling indicates the site is not currently transporting contaminants to the off shore, nor is it expected to transport contaminants to the off shore in the future. However, comments are still being resolved on this report.

GEOGRAPHIC INFORMATION SYSTEM (GIS) - To incorporate the on-shore and off-shore data into a single geographical based data management system to provide better data management and interpretation.

NEXT ACTIONS -
Resolve comments on Groundwater Fate and Transport Modeling Report
Coordinate JILF Feasibility Study with groundwater modeling efforts.
Complete workplan for treatability study.
Respond to workplan comments on Sites 10 and 29.

B. NO FURTHER ACTION DECISION DOCUMENTS

PURPOSE - The proposed no further action decision documents for sites 12, 13, 16, 23 and 21 (soils) will serve to document these decisions.

STATUS - No additional comments received.

NEXT ACTION -
Sign the no further action decision documents.

C. GROUNDWATER INVESTIGATION

PURPOSE - Monitoring of existing groundwater monitoring wells to provide additional data on the potential release and movement of contaminants from several of the sites. Low flow sampling techniques will be used, partially to help determine a better baseline of information for use in the groundwater modeling effort. This information will also help judge the effectiveness of any future remedial actions and provide monitoring for any current releases. A pilot study has been conducted to ensure sampling methods are able to be completed as proposed.

STATUS -
The first and second rounds of sampling occurred in December, 1996 and April, 1997, respectively.
The data package for the December, 1996 package was submitted April, 1997.
The third and fourth rounds of sampling are scheduled for August, and November, 1997.

NEXT ACTIONS -
Submit data package for the April, 1997 sampling event.
Perform the August, 1997 sampling event.

D. SEEP SAMPLING

PURPOSE - Seeps around the Jamaica Island Landfill and in the back channel area will be sampled to provide information on the trends of contaminant concentrations and the fate and transport of contaminants of concern.

STATUS -
The first and second rounds of sampling occurred in December, 1996 and April, 1997, respectively.
The data package for the December, 1996 package was submitted April, 1997.
The third and fourth rounds of sampling are scheduled for August, and November, 1997.

NEXT ACTION -
Submit data package for the April, 1997 sampling event.
Perform the August, 1997 sampling event.

E. OFFSHORE MIGRATION MODELING

PURPOSE - To evaluate current onshore contaminant migration to the offshore environment. Results will be used to determine the need for remediation and the type of remediation required for sites with existing groundwater contamination.

STATUS -
Responded to comments on Draft Phase I Contaminant Fate and Transport Modeling Report.

NEXT ACTION -
Schedule technical meeting to resolve comments on Draft Phase I Contaminant Fate and Transport Modeling Report.

F. STUDY AREAS

STATUS - Through historical research of disposal practices at the Shipyard, we have become aware of five potentially new study areas. Currently, PNS has conducted additional historical research into these sites. This effort has been completed for the Galvanizing Plant (Bldg 184), the Oil Gasification Plant (Bldg 62), Topeka Pier, and West Timber Basin.

Preliminary field investigations have been funded and are planned for three of these sites Galvanizing Plant (Bldg 184), the Oil Gasification Plant (Bldg 62), Topeka Pier, and West Timber Basin within the coming year. The fifth site, Incinerator Site, has been combined with the DRMO and is scheduled for additional field investigation which has also been funded.

NEXT ACTION -
Receive and respond to comments on draft site screening plan for sites 30, 31, and 32.

G. OFF-SHORE ECOLOGICAL RISK ASSESSMENT

PURPOSE - Evaluate the potential for adverse effects from contaminants that may have migrated from Shipyard's IR Sites.

STATUS - The Revised Draft Final ERA was submitted by the this month. Revisions to the Revised Draft Final document are based on resolution of regulatory comments received on a previous draft, Assessment Endpoint papers developed by the EPA Biological Technical Assistance Group (EPA, NOAA, USFWS), and incorporation of a weight of evidence approach to evaluate the information gathered. Several conference calls and meetings have been held in efforts to resolve these comments.

NEXT ACTION -
Provide comments on Revised Draft Final ERA.

H. OFF-SHORE MONITORING

PURPOSE - Monitoring of the offshore environment surrounding PNS will provide information on trends in contamination levels over time. The contaminant trends can be used to assist in assessing the effectiveness of any remedial decisions.

STATUS - Brown and Root Environmental has been contracted to prepare the off-shore monitoring workplan. Development of the draft workplan is on hold pending resolution of the Offshore Ecological Risk Assessment to ensure monitoring is necessary at this time and that it will address the right areas.

NEXT ACTION -
On hold pending finalization of the ERA and determination of the next appropriate action.

I. FEDERAL FACILITY AGREEMENT

PURPOSE - To establish the roles and responsibilities of the Navy, EPA and MEDEP and serve as an Interagency Agreement (IAG) for the completion of all necessary remedial actions at PNS. Includes development of a Site Management Plan to be used as the schedule for the IR Program at the Shipyard. CERCLA requires an IAG to be in place within 180 days after a Record of Decision (ROD) is signed.

STATUS - Model language has been develped and agreed upon by the Navy and EPA.

STATUS - The Navy, EPA and MEDEP have developed a generic schedule which will serve as a basis for individual site schedules which in turn has been applied to OUs 2 and 3.

NEXT ACTION -
Update schedules for OUs 2 and 3 and complete schedules for remaining sites.

K. HISTORICAL RADIOLOGICAL ASSESSMENT

PURPOSE - Conduct a review of existing information in order to prepare a Preliminary Assessment pursuant to CERCLA to determine if there have been any releases of radionuclides at PNS which should be further investigated or remediated.

STATUS - Preparation of the Draft Historical Radiological Assessment (HRA) is nearing completion. This document will summarize the extensive body of pertinent historical information. It will be presented in two volumes: one for radioactivity associated with the Naval Nuclear Propulsion Program; and one for general radioactivity. The extensive data review is complete and the report development process is progressing well.

NEXT ACTION - Submit the Draft HRA in Summer, 1997.

PORTSMOUTH NAVAL SHIPYARD
INSTALLATION RESTORATION PROGRAM

STATUS OF WORK
June 19, 1997

Document Schedule

Phase I/Phase II Human Health Comparision	
Draft Phase I/II Human Health Comparison	7/25/97
Comments Due	9/7/97
Navy Response to Comments	10/21/97
Comments Due	11/19/97
Draft Final Phase I/II Human Health Comparison	12/18/97
Final Phase I/II Human Health Comparison	2/16/98
DRMO/Incinerator and Site 10 Site Workplan	
Navy Response to Comments	6/22/97
Comments Due	7/22/97
Draft Final Workplan	8/21/97
Final Workplan	10/20/97
DRMO Treatability Workplan	
Draft DRMO Treatability Workplan	
Comments Due	
Final DRMO Treatability Workplan	
Engineering Evaluation/Cost Analysis (EE/CA) for MB 1 Removal	
Public Comment Period	6/20/97 to 7/21/97
Action Memorandum/Work Plan for MB 1 Removal	
Comments Due	7/21/97
Off-Shore Ecological Risk Assessment	
Comments Due	8/22/97