Deep Seabed Mining
Final Programmatic Environmental Impact Statement
Volume II - Response to Comments

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of Ocean Minerals and Energy
September 1981
COMMENT LETTERS RECEIVED ON THE
DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

This volume includes the full text of the 29 letters received on the
draft Programmatic Environmental Impact Statement (PEIS). Some letters dealt
with both the draft PEIS and the proposed regulations. For ease of reference,
each commenter is listed below along with the page number on which the comment
begins. Major points regarding the draft PEIS are underscored and numbered,
the numbering system beginning anew with each commenter. NOAA's response
appears on the right side of each page. Each response takes the form of either
a note further explaining NOAA's position or a reference to a page on which
the text has been changed to reflect concurrence with the commenters idea.
NOAA's response on the regulations is in the preamble to the final regulations.

<table>
<thead>
<tr>
<th>Comment</th>
<th>Commenter and Affiliation</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Federal Agencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Env. Protection Agency</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Dept. of Labor - Mine Safety and Health Administration</td>
<td>11</td>
</tr>
<tr>
<td>3.</td>
<td>Dept. of Commerce - Maritime Administration</td>
<td>12</td>
</tr>
<tr>
<td>4.</td>
<td>Dept. of the Interior - Bureau of Mines</td>
<td>14</td>
</tr>
<tr>
<td>5.</td>
<td>Dept. of the Air Force</td>
<td>15</td>
</tr>
<tr>
<td>6.</td>
<td>Dept. of the Interior - Office of the Secretary</td>
<td>16</td>
</tr>
<tr>
<td>7.</td>
<td>Dept. of the Army - Corps of Engineers</td>
<td>17</td>
</tr>
<tr>
<td>Comment</td>
<td>Commenter and Affiliation</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------</td>
<td>------</td>
</tr>
<tr>
<td>8.</td>
<td>Nuclear Regulatory Commission</td>
<td>18</td>
</tr>
<tr>
<td>9.</td>
<td>General Services Administration</td>
<td>19</td>
</tr>
<tr>
<td>11.</td>
<td>National Oceanic &amp; Atmospheric Administration - Oceanic and Atmospheric Services</td>
<td>21</td>
</tr>
<tr>
<td>13.</td>
<td>Department of Energy</td>
<td>25</td>
</tr>
</tbody>
</table>

B. State Agencies

<table>
<thead>
<tr>
<th>Comment</th>
<th>Commenter and Affiliation</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>State of Washington - Department of Ecology</td>
<td>26</td>
</tr>
<tr>
<td>2.</td>
<td>State of Washington - Department of Ecology</td>
<td>28</td>
</tr>
<tr>
<td>3.</td>
<td>Florida - Office of the Governor</td>
<td>29</td>
</tr>
<tr>
<td>4.</td>
<td>Florida - Department of Veteran and Community Affairs</td>
<td>31</td>
</tr>
<tr>
<td>5.</td>
<td>Texas - Office of the Governor</td>
<td>34</td>
</tr>
</tbody>
</table>

C. U.S. Congress

<table>
<thead>
<tr>
<th>Comment</th>
<th>Commenter and Affiliation</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>U.S. Senate - Daniel K. Inouye</td>
<td>35</td>
</tr>
</tbody>
</table>

D. Environmental Groups

<table>
<thead>
<tr>
<th>Comment</th>
<th>Commenter and Affiliation</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>The Oceanic Society</td>
<td>82</td>
</tr>
<tr>
<td>3.</td>
<td>Friends Committee on National Legislation</td>
<td>83</td>
</tr>
<tr>
<td>Comment</td>
<td>Commenter and Affiliation</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>E. Academia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Texas A&amp;M University</td>
<td>84</td>
</tr>
<tr>
<td>2.</td>
<td>Woods Hole Oceanographic Institution</td>
<td>85</td>
</tr>
<tr>
<td>3.</td>
<td>University of Hawaii at Manoa</td>
<td>86</td>
</tr>
<tr>
<td>F. Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>American Mining Congress</td>
<td>88</td>
</tr>
<tr>
<td>2.</td>
<td>Ocean Mining Associates</td>
<td>99</td>
</tr>
<tr>
<td>G. Professional Organization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>American Society of Mechanical Engineers</td>
<td>100</td>
</tr>
<tr>
<td>H. Individual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Raymond W. Jenkins</td>
<td>101</td>
</tr>
</tbody>
</table>
Mr. Robert W. Knecht  
Director  
Office of Ocean Minerals and Energy  
2001 Wisconsin Avenue, N.W.  
Washington, D.C. 20235

Dear Mr. Knecht:

In accordance with our responsibilities under Section 309 of the Clean Air Act, EPA has reviewed the Draft Programmatic Environmental Impact Statement (EIS) and Proposed Rules for Exploration Licenses for Deep Seabed Mining. EPA is pleased that these documents reflect the ongoing coordination between our agencies with respect to our future responsibilities associated with deep sea mining activities. Our comments on these documents are enclosed. This letter supersedes our comment letter dated May 29, 1981.

The Deep Seabed Hard Mineral Resources Act requires that applicants for deep seabed mining licenses also apply to EPA for National Pollutant Discharge Elimination System (NPDES) permits pursuant to Section 402 of the Clean Water Act. In making future NPDES permit decisions associated with Deep Seabed Mining operations in compliance with guidelines under Section 403 of the Clean Water Act, EPA must determine whether the proposed discharge will cause unreasonable degradation of the marine environment. Much of the data required to make these permit decisions are of the type gathered during the Deep Ocean Mining Environmental Studies (DOMES) research effort. EPA agrees with NOAA's assessment that "because the tests were pilot-scale and brief, it is essential that these findings be validated..." before commercial mining is permitted (EIS, p. 75). We suggest that in order to validate the previous DOMES research results, further research and monitoring efforts should include investigation of all identified potential impacts, not just those impacts which have preliminarily been classified as significant.
EPA fully supports NOAA's Five-Year Research plan which focuses on the development of the capability to assess, predict, prioritize and monitor the potential environmental impacts associated with deep seabed mining. We are concerned, however, that the draft EIS does not clearly explain the interrelationships between the Five-Year Research effort and the monitoring activities described in the EIS. Inclusion of such an explanation in the Final EIS should serve to remove any confusion which may have arisen with respect to the impact characterizations made in Tables 12 and 15 and the undisputed need for additional data to verify those characterizations.

In addition to NPDES permits, other EPA authorities may be involved in deep seabed mining operations. Many of the activities associated with the mining and processing of nodules both at sea and onshore will require EPA to exercise regulatory responsibilities under the Clean Air Act, the Resource Conservation and Recovery Act (RCRA) and Marine Protection, Research and Sanctuaries Act. As provided under RCRA, the disposal of wastes from the processing of nodules is an area of particular concern to EPA.

RCRA also promotes the development of resource recovery plans. A large proportion of the minerals now being mined on land were once considered wastes or spoils. However, with the depletion of high grade ores these spoils have now become more economically feasible to recover. This resource recovery would have been less costly had plans for recovery been developed concurrently with the mining of the higher grade ores. To avoid a similar situation from occurring within the deep seabed mining industry, we suggest that the permittees be required to prepare and submit procedures designed to prevent unwanted generation of waste. The permittees should also develop contingency plans which would identify proposed methods to recover the wastes (spoil) generated from the processing of deep seabed hard mineral resources.

Due to the uncertainty of the impacts associated with Deep Seabed Mining Operations and the recognized need for additional ocean research to support the assessment of mining activity impacts, EPA has rated this Programmatic EIS ER-2 (environmental reservations - insufficient information). A copy of our rating system is enclosed.
As in the past, EPA looks forward to working closely with NOAA in the development of the Deep Seabed Mining licensing scheme. If you have any questions concerning our comments please contact Margaret Schneider (755-0770) of my staff.

Sincerely yours,

William W. Hebenman, Jr.
Director
Office of Federal Activities

Enclosures
A. COMMENTS ON THE PEIS

II.A.1.2.2 Lower Water Column and Seafloor

As the PEIS describes, the diversity of the lower water column and seafloor is extremely high. While the factors and processes which interact to produce this rich deepsea ecosystem are not fully understood some discussion of these factors is possible. For example, a discussion of the significance of the stable, little varying conditions of the deepsea (e.g. temperature and sedimentation rates) over evolutionary time and how organisms have adapted to these conditions is essential to evaluating potential environmental impacts from mining activities.

II.C.3 Information to be Required from the Industry

EPA, to process the required NPDES permit, will require information in addition to that currently described in this section. Since Section II.C.5 discusses these additional requirements the two sections of the EIS should be cross-referenced.

II.C.5 National Pollutant Discharge Elimination System Permit Considerations

NPDES permits are issued under Section 402 in compliance with guidelines pursuant to Section 403 of the Clean Water Act. These NPDES permit requirements are applicable to any point source discharges of pollutants, whether it be surface or benthic.

Factor 2 - EPA, to process the required NPDES permit, will require information on the characteristics of the surface plume based on actual operating conditions. This data should include: plume dispersion rates, rates for formation of upper and lower plume, and the distribution and concentrations of soluble and particulate components. To ensure compliance with applicable marine water quality criteria, sampling of the plume for conventional, non-conventional, and toxic pollutants may be required. The description provided in Section II.C.3.1 and II.C.4 does not provide sufficient information to determine whether or not the monitoring program described will be adequate for NPDES permit compliance. More detail is required in this discussion.
Factor 10 - We request the deletion of the statement, "criteria will be developed by EPA." Factor 10 requires that EPA identify conventional, non-conventional, and toxic pollutants in the discharge to be permitted and establish that the numeric limits in applicable marine water quality criteria will be met with permit limitations in place. These criteria require an analysis of the concentrations of discharge components, with application of a mixing zone. The analysis should indicate that the concentration of pollutants in the discharge will be reduced to levels below the numeric limits set in the marine water quality criteria.

Applicable marine water quality criteria are contained in the EPA publication, "Quality Criteria for Water" (the "Red Book"), and in the water quality criteria for toxic pollutants published November 28, 1980 at 45 FR 79318-79370.

Conclusion:

The conclusion drawn from the review of the 10 factors that demonstrate-scale mining tests are unlikely to cause unreasonable degradation of the marine environment should not be interpreted as EPA's conclusion with respect to NOAA's permit decisions. Such a conclusion can be drawn only after evaluation of the appropriate factors at the time of permit review.

II.D.1.1 Issues where alternatives have environmental consequences

2 - Proximity of Mining Sites

EPA recommends that NOAA's preferred alternative to avoid a linear alignment of mining sites be followed at both the license and permit stages.

II.D.1.2 Issues where alternative approaches have little or no environmental consequence

6 - The mine site size could be a significant environmental issue and should be discussed in the Programmatic EIS.

III Impacts of Onshore Facilities

The potential direct and indirect sources of air pollutants associated with the onshore processing of nodules should be discussed. The direct and indirect sources of air pollutants

10. Adopted. See revision, on PEIS page 124.

11. Agreed. PEIS text revised; NOAA will work with EPA to assess all applicable data in order to assist in this determination.

12. Not adopted. Because of the uncertainty over the extent and significance of the concern that underlies this issue, and because mining sites are likely to be much smaller than license sites, NOAA believes that a swath of mineable areas that would preclude re-colonization is almost impossible at the license phase, so it is unnecessary to impose such a constraint on industry. Further, other mitigation measures could be just as effective should the blanketeting of benthic fauna turn out to be a substantial problem. See PEIS page 107.

13. Not adopted. The environmental issue is the size of area affected by the sweeping action of the collector, plus the benthic plume. Appendix 3 explains that about 900 km² will be swept each year, using first generation mining technology, in a 3 million tonnes per year operation. Thus, a twenty year first generation mine site is likely to be at least 18,000 km² in area. However, the 18,000 km² is not likely to be continuous; this is the sum of the areas of numerous relatively small sub-areas of mineable seafloor. The sub-areas are very likely to be separated by areas of seafloor that are not mineable due to such limitations as topographic constraints and low density of nodules. A mine site consisting of widely separated mineable sub-areas of necessity will be larger than one of closely spaced sub-areas. Regardless, NOAA estimates that approximately 900 km² will be swept by the collector annually. Aside from environmental issues, area will be considered because NOAA must make a statutory finding concerning the area of a logical mining unit with due regard for protection of the environment [the Act, §103(a)(2)(E)].
associated with onshore facilities should be qualified and quantified for worst case conditions. Ambient air quality levels before and during construction and operation of the nodule processing plants should be included in subsequent EISs. It should be noted that mitigation measures designed to minimize air quality impacts will be required to be sufficient to guarantee Reasonable Further Progress (RFP) towards attainment of the National Ambient Air Quality Standards (NAAQS).

Further, the EIS's should discuss the applicable State and Federal regulations, including RCRA, which control generation, transportation, and disposal of toxic wastes. For example, the release of hazardous materials as a result of facility flooding and seismic activity (item 12, Table 19) are regulated under RCRA. RCRA also regulates such potential environmental impacts as aquifer contamination, and containment/treatment of liquids (item 3.1, Table 20).

Appendix 3 Projected Deep Seabed Mining Systems and Processes for First Generation Development

Table 30 - It should be noted that tailings ponds may be required to use liners to prevent groundwater contamination and may also need protection from flooding. Landfills may also need to be lined.

Sections 3.3.4.3.4 and 3.3.4.4 - It should be noted that the requirements for an NPDES permit, pursuant to the Ocean Discharge Criteria, are applicable to both the mining ship discharges and to the ocean outfall discharges resulting from onshore mineral processing.

The ocean dumping of tailings and nodule process wastes from onshore facilities by either barge or transport vessels will require an ocean dumping permit pursuant to Section 106 of the Marine Protection, Research and Sanctuaries Act. All waste materials proposed for such ocean dumping must be evaluated for their potential ecological impact on the marine environment according to the ocean dumping regulations (40 CFR 220-230). It is incorrect to conclude that the waste will be permitted for dumping before the assessments to determine the acceptability of a particular waste for ocean dumping have been made.
B. COMMENTS ON THE REGULATIONS

970.103(a)

The regulations should distinguish more fully between the exceptions to prohibitions (970.103(a)(2)(ii) and (iii)) on the definition of "exploration" (970.101(i)).

970.206(b)

In addition to Form 2C EPA may require additional application information pursuant to Section 403 (Ocean Discharge Criteria) of the Clean Water Act. The type of information submitted to NOAA under Section 970.204 of these regulations (including any that is detailed in NOAA's technical guidance document) would approach the type required by EPA.

In summary, the following information will be required to make a determination under Ocean Discharge Criteria Guidelines:

- a description of the exploration area - physical, chemical, and biological. This should include seasonal variations, water column dynamics, and a thorough assessment of any biological community [i.e. not only what might be there, but whether the area is a migratory or spawning area, commercial fishery, etc.].
- a full description of the discharge (which should be satisfied by completing EPA's Forms 1 and 2C).
- the potential pathways or transport routes for components of the discharge to reach biota of concern.
- an analysis of the susceptibility of the biota of concern to the above components.

970.701(b)(i)

If research has revealed that only a limited number of the effects from exploration activities have potential for significant adverse environmental impact, they should be described. Section 970.701(b)(2) describes commercial recovery impacts - if the impacts of exploration activities are identical, that should be stated.
MAY 29 1981

Mr. Robert W. Knecht
Director, Office of Ocean Minerals and Energy
National Oceanic and Atmospheric Administration
Department of Commerce
Room 410
2001 Wisconsin Avenue, N.W.
Washington, D.C.

Dear Mr. Knecht:

This letter constitutes comment of the Mine Safety and Health Administration (MSHA), Department of Labor, concerning proposed rules regulating exploration licenses for deep seabed mining, 46 FR 18448-475 (Tuesday, March 24, 1981), and the draft Programmatic Environmental Impact Statement (PEIS) "Deep Seabed Mining" issued in March 1981.

MSHA has no substantive comments on either the proposed rules or the draft PEIS. However, we would like to take this opportunity to re-emphasize our statement of jurisdiction and expertise as set forth in our letter dated August 6, 1980, from Mr. Robert R. Leach, Assistant Secretary for Mine Safety and Health, to Mr. Richard L. Frank, Administrator, National Oceanic and Atmospheric Administration. Again, we offer assistance in areas of our jurisdiction and expertise toward successfully implementing the Deep Seabed Hard Mineral Resources Act.

It would be much appreciated if we could receive a copy of the final PEIS and regulation when they become available.

Please do not hesitate to contact me if any further information is required from MSHA. I look forward to working with you in the future.

Sincerely,

[Signature]

Thomas J. Kepich
Acting Deputy Assistant Secretary for Mine Safety and Health

cc: Martin H. Belsky, Assistant Administrator for Policy and Planning, National Oceanic and Atmospheric Administration

1. Adopted. NOAA recognizes MSHA's jurisdiction over safety and health standards related to certain mining activities, pursuant to the Federal Mine Safety and Health Act of 1977, and its expertise in providing assistance concerning working conditions of employees engaged in mining activities. MSHA was inadvertently omitted from Section V, page 183, of the draft PEIS; it has since been added.
May 27, 1981

Mr. Robert W. Knecht
Director, Office of Ocean Minerals and Energy
National Oceanic and Atmospheric Administration
Room 410, Page 1 Building
2001 Wisconsin Ave., N.W.
Washington, D.C. 20235

Dear Mr. Knecht:

The Maritime Administration (MarAd) has reviewed the Draft Programmatic Environmental Impact Statement on Deep Seabed Mining and the proposed rulemaking published in the Federal Register of March 24, 1981. MarAd offers the following comments on the draft programmatic environmental impact statement (DPEIS).

Vessel Pollution, pg. 71

Discussion:

It is stated in the discussion on Intergovernmental Maritime Consultative Organization (IMCO) that IMCO is currently considering training, manning requirements and watch rules.

Comments:

The improvement of crew standards and training was the subject of the International Conference on Training and Certification of Seafarers which was held in London in June of 1978. At the Conference seventy two nations agreed on the text of the World's First International Convention establishing basic requirements on training, certification and watchkeeping for masters, officers and crews of seagoing merchant ships. The new treaty, the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, has the stated purpose "to promote safety of life and property at sea and the protection of the marine environment." This treaty should be included in the DPEIS.

1. Adopted. An appropriate addition has been made on PEIS page 75.
Transportation to Shore, Fuel, pg. 225

Discussion:
It is stated that American ships have almost all been steam boiler and turbine powered, and burn heavy Sunker C or residual fuel oil, slightly cheaper than diesel fuel but consumed at a greater rate.

Comment:
Due to increased fuel costs most new vessels being built for U.S. flag operation are being equipped with diesel propulsion. Any new mineing and transport ships constructed will most probably be diesel powered. This should be reflected in the PEIS.

Thank you for giving us the opportunity to review the Draft Programmatic Environmental Impact Statement. We would appreciate receiving two copies of the final statement.

Sincerely,

KENNETH W. FORBES
Chief, Division of Environmental Activities
Office of Shipbuilding Costs

Maritime Administration

2. Adopted. An appropriate addition has been made on PEIS page 235.
May 4, 1981

Mr. Laurence J. Aurbach
Office of Ocean Minerals and Energy
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
Room 410
2007 Wisconsin Avenue, NW
Washington, D.C. 20230

Dear Mr. Aurbach:


The strategic stockpile goal for chemical and metallurgical grade manganese is 1,500,000 short tons of manganese content, and the inventory is 1,586,581 short tons. Accordingly, there would not appear to be justification for further major government expenditures. Nevertheless, any mineral material that is in process should be carefully considered for long-term conservation and toward this end the Bureau of Mines has included in its budget for Fiscal Year 1982 a research project aimed at developing techniques to recover manganese in usable form from tailings from nodules processing. Further details may be obtained from Mr. Ralph Kirby, Director, Division of Minerals Resource Technology (phone 202-234-3736).

Sincerely yours,

John D. Morgan
Chief Staff Officer

cc: R. Kirby

1. Adopted. The Bureau of Mines research project has been noted on PEIS pages xxiv and 139.
Mr. Robert W. Knecht  
Director  
Office of Ocean Minerals and Energy  
Office of the Administrator  
National Oceanic and Atmospheric Administration  
United States Department of Commerce  
2000, Wisconsin Avenue, NW, Room 410  
Washington, DC 20230  

Dear Mr. Knecht,

Thank you for the opportunity to review the proposed regulations for and the Draft Programmatic Environmental Impact Statement on Deep Seabed Mining.

The Air Force has no specific comments on either document, but would like the opportunity to review applications for deep seabed mining as provided in 15 CFR Part 970.33. These reviews should minimize potential interference with activities in the Eastern, Gulf, and Western test ranges and other military training areas.

We do not require either the final programmatic impact statement or the final rules.

Sincerely,

HARRY P. DIETMAN  
Associate Director  
Directorate of Engineering and Services
Mr. Robert W. Knecht  
Director, Office of Ocean Minerals and Energy  
National Oceanic and Atmospheric Administration  
Washington, D.C. 20230

Dear Mr. Knecht:

We have reviewed the draft programmatic environmental statement for Deep Seabed Mining, sent to us March 20, 1981. The document adequately reflects consultation and coordination that has taken place between various Interior bureaus and NOAA as this program was developed.

The Bureau of Mines is currently engaged in a cooperative effort with NOAA to review mining and processing technology of nodules and to conduct research on the character of the manganese-bearing rejects that might be expected from a "three-metal" deep seabed operation. Any additional studies, as proposed on page 124, should be coordinated with this ongoing effort.

1. The dispersion model for the surface discharge plume defines areas of 1 ppm (approximately one part per billion) over ambient (p. 63, para. 1). Such fine measurement is meaningless without some threshold of effect for comparison.

2. Coastal zone management programs are viewed as a possible influence on location, design and impact of mined area terminal and processing facilities (p. 126). However, due to possible cutbacks or elimination of Federal funding, continuation of these programs may be uncertain at best.

We appreciate the opportunity to review this statement and look forward to continuing to work with you in development and implementation of this program.

Cecil G. Hoffman  
Special Assistant to the Secretary

1. Adopted. An appropriate addition has been made on PEIS pages xxii and 139.

2. Agreed. The discussion on PEIS page 66 concerns measurable physical factors; additional research is planned to determine their biological significance.

3. Current information (June, 1981) indicates that Federal funding for the coastal zone management program will be continued for a time. In any event, state and local authority to manage coastal areas including the application of the statutory Federal consistency requirement, will continue regardless of the status of Federal funding of the coastal zone management program.
Mr. Robert W. Naeacht, Director
Office of Ocean Minerals and Energy
National Oceanic and Atmospheric Administration
2001 M Street NW, Room 410
Washington, D.C. 20235

Dear Mr. Naeacht:

We have reviewed the Draft Programmatic Environmental Impact Statement (PEIS) on the Proposed Deep Seabed Mining Program and offer the following comments:

1. Agreed. NOAA appreciates the comments by the Corps.

2. The Corps will receive a copy of the final PEIS and regulations.

Sincerely,

George R. Robertson
Colonel, Corps of Engineers
Deputy Director of Civil Works
Mr. Robert H. Knecht, Director
Office of Ocean Minerals and Energy, NOAA
2001 Wisconsin Avenue, NW
Room 400
Washington, DC 20235

Dear Mr. Knecht:

This is in response to your request for review and comments on the proposed implementing regulations and the draft programmatic environmental impact statement relating to the Deep Seabed Hard Minerals Resources Act.

We have reviewed these documents and determined that the proposed action has no significant radiological health and safety impact nor will it adversely impact any activities subject to regulation by the Nuclear Regulatory Commission.

Since we made no substantive comments, you need not send us the Final Programmatic Environmental Impact Statement, when issued.

Thank you for providing us with the opportunity to review these documents.

Sincerely,

Daniel R. Mullor, Assistant Director
for Environmental Technology
Division of Engineering
MAY 27 1981

Mr. Robert W. Knecht
Director
Office of Ocean Minerals and Energy
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
3301 Wisconsin Avenue, NW
Washington, DC 20235

Dear Mr. Knecht:

Thank you for the opportunity to review the proposed regulations and draft programmatic environmental impact statement (PEIS) in connection with the Deep Seabed Hard Mineral Resources Act.

We have no suggested changes to make in the documents.

Please send us copies of the final PEIS and regulations when they become available later this year.

Sincerely,

(Signed) May Ellis
Deputy Administrator

1. GSA will receive a copy of the final PEIS and regulations.
To: Robert W. Knecht, Director
Office of Ocean Minerals and Energy

From: F/MC - William Aron, Director

Subject: Review of PEIS on Deep Sea Mining

We have no specific comments on the Draft Programmatic Environmental Impact Statement on Deep Sea Mining. Recommendations submitted by us on three earlier working versions were largely incorporated in this Draft PEIS. We appreciated the opportunity to review this Draft and would like to receive a copy of the final PEIS when it becomes available.

1. The Northwest and Alaska Fisheries Center will receive a copy of the final PEIS.
TO:  ONE - Robert W. Knecht
FROM:  JEA - Richard E. Hallgren
SUBJECT:  OAS Review of the Deep Seabed Mining Proposed Regulations and Draft Programmatic EDIS

Thank you for allowing us the opportunity to review and comment on the subject documents. We offer the following comments for consideration.

GENERAL

The PEIS covers nearly every aspect of environmental impacts involved in this type of activity. Potentially adverse factors and alternatives, from site to shore, are covered adequately.

There are several potential long-term effects which are not clearly understood and are difficult to measure during the short mining tests.

1. Not adopted. There is no significant long-term impact of a short-discharge passing. The short-discharge time and the impact of the benthic fauna which could reintroduce toxic trace metals into the water column; these concerns should be carefully studied. The document also includes environmental impacts be carefully studied. The document also includes environmental impacts.

2. Not adopted. Trace metals such as found on p. 92 associated with wide-track mining collectors (20 meters as found on p. 92), associated with wide-track mining collectors.

3. Not adopted. The potential impacts of other types of collectors

There are points in the regulations that concern me, which deal with a possible impact for EDIS. Under Sub-part G, Environmental Effects, it is stated that the licensee will monitor the environmental effects and that information will be submitted to the NOAA Administrator. However, there is no statement regarding the monitoring data. Which groups within NOAA, if any, will be responsible for maintaining the different types of data, or will the data remain the property of the originators? As a minimum, EDIS (NOOC) should acquire water column data; and, with the new emphasis on pollution monitoring, should acquire trace metal data in the food web. These monitoring data should be submitted to EDIS in the appropriate format.

4. Agreed. The unresolved concern of the surface discharge accumulating at the pycnocline will be studied through future research and the monitoring of industry test mining as discussed on PEIS pages 91-92 as well as Technical Guidance Document Sections 2.3.1.3, 2.3.1.4, 3.4.1.3, 3.4.1.4 3.4.1.6, 3.4.1.7, and 3.4.2.5 and the Research Plan.

2. Not adopted. The potential for the benthic plume reintroducing toxic trace metals into the lower water column has been judged to be a low probability concern without the potential for significant or adverse impact. The initial concern was that the interstitial water released during mining would contain nutrients or trace metals different than those found in bottom water. Laboratory analysis during DENGs showed that the interstitial water within the upper 20 cm of sediment differs little in chemical composition from bottom water and that there will be no significant trace metal increase (PEIS page 91).

3. Not adopted. Although mining systems other than hydraulic are under consideration by industry, the hydraulic system (either towed or self-propelled) is favored by the consortia as noted on page 223. All three demonstration scale tests monitored by NOAA used hydraulic systems, and the use of only this system is currently foreseeable.

4. Agreed. National Oceanographic Data Center (NOOC) formats as well as monitoring guidance are provided in Appendix 2 of the Technical Guidance Document.
Attachment

EDITORIAL COMMENTS

5. Page 30, paragraph 2, line 6 - "more shallow" is incorrect.
6. Page 30, paragraph 3, line 8 - should note citation for accumulation carrier.
7. Page 33, paragraph 2, line 19 - SPONGEST?
8. Page 40, paragraph 1, line 1 - high diversity of deep sea (fauna?)
9. Page 58, paragraph 1, line 1 - "mining" is misspelled.

5. Appropriate correction has been made on PEIS page 33.
6. Appropriate additions have been made on PEIS page 33.
7. Appropriate correction has been made on PEIS page 41.
8. Appropriate addition has been made on PEIS page 41.
9. Appropriate correction has been made on PEIS page 62.
Less pollution:
More happiness.

Kilby Park
NOAA/RD/MPS2
Rockville, MD 20852
(301) 493-8734

28 V 81

Bob Knute / ONE

Thank you very much for sending me to read your
Deep Sealed Mining Draft Programmatic EIS. I personally was
impressed by its clean and concise content. I especially admired
its OPFESS' open attitude towards unknowns that include
such discharges.

Minor comments I have are as follows:

1. Page 115, Table 13 — Add "weight percent" on the
   unit for the upper half of Table 13.

2. Page 19, line 16 — If my memory is correct the bottom
   salinity at the James Site has a very narrow range
   of less than 34.58 - 34.78%o, it would be around
   34.69%. The report here is Joe Reid of Scripps
   Institution of Oceanography.

3. Page 29, line 19 — I think separating oxygen (O2) from
   "mg/l" is poor. Oxygen in the ocean
does not become O2; it is always O2. Artificially
separating O2 to O2 and expressing it in mg/l is,
which is scientifically backward. I recommend O2 be
expressed as mL/l (mL/liter). The relationship

1. Adopted. Appropriate changes have been made in Table 13, PEIS page 118.

2. Not adopted. Salinity data came from Ozturgut et al., 1978. The
   appropriate reference is given on PEIS page 17.

3. Not adopted. Oxygen data came from Ozturgut et al., 1978, who expressed
   them in mg/l. Those wishing to convert to mL/l can do so by using your
   formula.
between µg/L and µM/L for O₂ is:

µM/L = µg/L / 23.1
(for O₂)

I also recommend nutrient concentration such as nitrate, phosphate and silicate, be expressed as µM/L. Their conversion is:

µM/L = µg/L / 25
(for nutrients)

---

Page 198, line 13, and the inner back cover, line 3 — May I suggest "ratio" instead of "rates"? I believe these two words are usable, but I think "rates" may be preferred. I offer no definition of these two words (from Webster's New Collegiate Dictionary, 1979):

ratio n 1 the quotient of two mathematical expressions; the relationship in quantity, amount, or size between two or more things: PROPORTION

I would like to commend you and your colleagues for producing very informative PERIS.

Sincerely,
Kibbe Park

P.S. — Yes, I would like to receive the final PERIS and regulation. Thank you.
Dear Mr. Knecht:

We have reviewed the proposed regulations and draft programmatic environmental impact statement for the exploration for and commercial recovery of manganese nodules from the ocean. The Department of Energy has no substantive comments to provide.

Thank you for the opportunity to review this matter.

Sincerely,

Robert J. Stern, Director
NEPA Affairs Division
June 2, 1981

Mr. Robert W. Knecht  
Director, Office of Ocean  
Minerals and Energy  
NOAA, 2001 Wisconsin Ave. N.W.  
Room 410  
Washington, D.C. 20235

Dear Mr. Knecht:

Thank you for the opportunity to review the programmatic environmental impact statement (PEIS) on deep seabed mining.

Washington, as a state which is being considered a possible site for receiving and processing of ocean minerals, has an interest in the development of a program which meets the nation’s demand for important metals in an environmentally sound manner.

Anticipated environmental impacts of the proposed mining activities are twofold: a) those resulting from the mining and transportation phase and b) those caused by onshore processing and waste disposal. Since Washington State is remote to the ocean mineral deposits of primary commercial interest, our comments will focus on onshore impacts associated with ocean mining.

Environmental impacts as a result of use of existing port facilities, will be relative to dredging and filling, construction of unloading and storage facilities. Sediments will be in the form of ore dust, liquids and exhaust fumes. Consumptive uses range from water and power requirements to land occupied by bargeing, storage and local transportation modes.

Port to plant transportation will likely be done via pipeline or truck and rail traffic if that alternative were selected. This will entail consumption of land, power and water.

1. Agreed. See discussion in PEIS Section III.A.1.

2. Agreed. See discussion in PEIS Section III.A.2.
Module processing is similar to conventional land based ore processing and resembles a small refinery operation. There would be onsite storage of ore concentrate and processing coal, slurry ponds, stacks, gaseous emissions, use and discharge of toxic and/or hazardous chemicals, high demand of electric energy, water, oil, coal and/or natural gas plus land for construction of the plant. Quantities, volumes and impacts will largely depend on choice of a three vs. four-folding recovery process.

Waste disposal presents the greatest environmental concern because of the unknown chemical and physical nature of the waste products and the high acid waste volumes generated which, depending on type of processing (three or four-metal), will range from 3 to 4.5 million tons a year. Lead consumption, contamination of surface and ground waters from runoff and seepage, and dust are the principal environmental concerns associated with onshore waste disposal. Tailings ponds would cover as many as 2500 acres of land for 20 years for a 3 million ton a year capacity plant.

As stated in the PEIS, the onshore impacts will vary depending upon the location of receiving and processing facilities. Obviously, a great deal of planning and coordination will be necessary in order to prevent environmental degradation and use conflicts as a result of the aforementioned activities. Washington's coastal management policy of locating marine terminals and mineral processing centers in appropriately designated coastal zones should facilitate the onshore planning process. However, the location of suitable waste disposal sites remains a serious environmental problem that needs to be resolved prior to the issuance of licenses for offshore mining operations. For example, it is doubtful Washington would have sufficient acreage available in its coastal zone to support a disposal site of the dimensions envisioned in the PEIS.

The alternative to onshore disposal, ocean dumping, may, on the other hand, cause considerable harm to the marine environment. This issue should be thoroughly discussed in all future EIS's and appropriate alternatives and mitigation strategies should be provided.

In summary, the PEIS appears to be well-written and comprehensive. When more information is available, our office would appreciate receiving copies.

Sincerely,

Brian Walsh
Environmental Planner
Shorelines Planning Section

3. Agreed. See discussion in PEIS Section III.A.3.


5. Agreed. These items will be discussed in detail in site-specific EISs that involve waste disposal. The process will be subject to state and local controls. Waste disposal is unlikely to be a serious environmental issue at the licensing stage but is covered in Section 3.5 of the Technical Guidance Document.

6. Agreed. Ocean dumping will be assessed, if proposed, in site-specific EISs.
May 27, 1981

Mr. Robert W. Knecht, Director
Office of Ocean Minerals on Energy
National Oceanic & Atmospheric Administration
U.S. Department of Commerce
2001 Wisconsin Avenue
Washington D.C. 20235

Dear Director Knecht:

Thank you for the opportunity to review your Draft Programmatic Environmental Impact Statement on Deep Seabed Mining.

It appears that Washington State will not be directly affected by the mining of deep seabed minerals. However, our state could be impacted if onshore processing facilities were located here (i.e., construction impacts, waste disposal, use of port facilities, etc.). Any specific proposals in our state would have to comply with the State Environmental Policy Act, Shorelines Management Act, and other appropriate laws and regulations.

If you have any questions, please contact me at (206) 753-6162.

Sincerely,

Greg Sargie
Environmental Review Section

1. Agreed. Coastal states will play an important role in evaluating onshore impacts, in site-specific EISs, and controlling them as provided by state law.
May 27, 1981

Mr. Robert W. Knecht, Director
Office of Ocean Minerals and Energy
NOAA, Room 410
2001 Wisconsin Avenue, N.W.
Washington, D.C. 20235

Dear Mr. Knecht:

This office reviewed and coordinated a review of the Draft Programmatic Environmental Impact Statement for Deep Seabed Mining. Basically, we have no specific comments on the DPEIS. In general, we cannot agree that anticipated impacts are not expected to be significant, due to the fact that studies have not yet been conducted to determine effects of disturbing the bottom at these depths. We strongly support proper environmental studies being conducted during the first phase of this program to determine impacts. Results of these studies would supply needed information for sound management decisions to be made later.

Due to the fact that onshore processing facilities may possibly require the consumption of much fresh water, we feel that it should be addressed in more detail in the DPEIS. Sites such as Tampa that are being proposed as possible onshore processing sites should be looked at very closely. Areas in south Florida often have intensive fresh water demands and may not be a feasible site for such industry. We also would like a clarification of Figure 23 on page 166. It appears that a site in northwest Florida (Pensacola) is shown as a potential onshore site. This was not addressed in the text and should be if there is a potential site there.

In addition, much more detail of wastes from processing should be given in order to make sound management decisions concerning onshore processing sites. Obviously, state and local governments will play a large role in determining onshore sites and should be brought into the decision-making process as early as possible.

In discussions of the permitting process on page 172, we feel strongly that NOAA should be the "lead agency" in coordinating permits and licenses, but should not be given expanded authority to approve all licenses and permits for offshore and onshore. The DPEIS should outline in more detail where "informal involvement" stops.

An Alternative Action/Equal Opportunity Employer

1. Not adopted. NOAA's conclusions as to anticipated impacts entail estimates of probability, based on the DOMES program, which included the monitoring of mining tests. To be safe, however, all potential impacts will be addressed during license phase mining systems tests as noted on PEIS page 80 and the Technical Guidance Document Section 1.


3. Agreed. Site-specific EISs will address water availability and consumption in detail.

4. The onshore site shown in PEIS Figure 23 is Mobile, Alabama, not Pensacola, Florida.

5. Agreed. Subsequent site-specific EISs will address these issues in detail. State and local governments will play an important role in this phase and will be brought into the decision-making process as early as possible.

6. NOAA believes that details of the "informal agreement" alternative will differ among states and site-specific situations, that the process will evolve over time, and that additional specificity at this time would be premature and might delay program implementation. See response to comment #5.
We appreciate the opportunity to review the DPEIS for Deep Seabed Mining and request that this office receive copies of the final PEIS and regulations.

Sincerely,

Walter O. Kolb
Sr. Governmental Analyst
May 29, 1981

Mr. Robert W. Knecht, Director
Office of Ocean Minerals & Energy
2001 Wisconsin Avenue
Washington, DC 20235

Re: Draft Programmatic Environmental Impact Statement on Deep Seabed Mining SAI No. 81-1208E

Dear Mr. Knecht:

The Department of Veteran and Community Affairs (OVCA) has reviewed the Draft Programmatic Environmental Impact Statement (PEIS) and has the following comments and questions:

1. Areas of Industry Interest - This PEIS covers only an area in the eastern central Pacific Ocean. Exploration is scheduled to begin in 1981 and commercial recovery in 1988. OVCA has learned that parts of the South Atlantic (including the area off the coast of Florida) may also have economically recoverable amounts of manganese nodules. We also have some indication that the Gulf of Mexico off Florida may have phosphate deposits. Has NOAA considered opening deeper areas outside the eastern central Pacific for mineral exploration and development?

2. Issues for Further Investigation - Although the PEIS is very extensive, the nature of the subject required that some significant issues be analyzed superficially. OVCA recommends that the following matters be investigated more thoroughly in coming years:

   a) Scheduling: Assuming that commercial recovery will begin in 1988, at what point will industry begin.

1. Although the act authorizes NOAA to issue licenses and permits for mining manganese nodules anywhere in the deep seabed, the presently foreseeable area of interest to the industry is limited to the DOMES area, and the PEIS thus addresses only that area. Phosphate deposits on the United States Outer Continental Shelf are under the jurisdiction of the Bureau of Land Management of the Department of the Interior.

2. The process has begun in that mining consortia have been investigating possible areas, if not specific sites, for several years.
3. The criteria of which we are aware are identified by Bragg (1979) and summarized on page 152 in the PEIS.

4. Agreed. These issues will be addressed in detail in site-specific EISs.

5. Agreed. Local costs and benefits are appropriately addressed by local units of government. NOAA in its facilitation role expects to work closely with affected state and local units of government to consider problems and opportunities.

6. Prior to preparation of the Draft PEIS, NOAA conducted a 5-year research program involving the DOMES area. The act required NOAA to develop a 5-year research program to address these issues. (See National Oceanic and Atmospheric Administration, 1981a).

State of Florida
NOAA has done an excellent job of discussing a new and complex issue in the PEIS. The Department of Veteran and Community Affairs appreciates this opportunity to review and comment on this document.

Sincerely,

John Burke
Assistant Secretary
Mr. Robert W. Knecht, Director
Office of Ocean Minerals and Energy
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

Dear Mr. Knecht:

The programmatic Environmental Impact Statement pertaining to Deep Seabed Mining prepared by the National Oceanic and Atmospheric Administration has been reviewed by the Budget and Planning Office and interested state agencies. The State Environmental Impact Statement Identifier Number assigned to the project is I-09-50-007.

While no substantial comments were received, the Budget and Planning Office appreciates the opportunity to review this project. If we can be of any further assistance during the environmental review process, please do not hesitate to call.

Sincerely,

[Signature]

Leon Willhite, Manager
Intergovernmental Section
Budget and Planning Office

jc
May 19, 1981

Mr. Robert W. Knecht, Director
Office of Minerals and Energy
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
Washington, D.C. 20230

Dear Mr. Knecht:

I wish to share with you a recent letter and comments from Puna Hui Ohana, a Hawaiian community organization, regarding deep seabed mining.

Unfortunately, this group was unable to attend your hearings in Honolulu. Within applicable rules and regulations, I would appreciate your including Puna Hui Ohana's written comments in the hearings record.

Puna Hui Ohana has been very vocal in the past regarding the development of geothermal energy resources in the Puna area and I hope that you will give this group's comments and concerns regarding deep seabed mining your close consideration.

I appreciate all you have done regarding OTEC and deep seabed mining and commend you on your superb job to date. I look forward to continuing to work together with you in the future.

Aloha,

Daniel K. Inouye
United States Senator

Enclosure

1. NOAA agrees with the central theme of the numerous recommendations, concern over the socio-cultural ramifications associated with locating a processing plant in a rural-agricultural area. These ramifications are of a site-specific nature and will need to be addressed in a site-specific EIS to be prepared when and if a processing plant is proposed for the Island of Hawaii.

NOAA's role in onshore processing is to act as the lead agency for compliance with NEPA and to prepare a site-specific EIS. NOAA would also secure the participation of Federal cooperating agencies, work closely with state and local governments, and provide for public involvement.

NOAA's Technical Guidance Document outlines the type of information needed to prepare a site-specific EIS on the onshore processing testing at a pilot plant or demonstration scale plant. This information includes the location and affected environment, the environmental consequences (including significant cultural effects), mitigation measures, and the status of compliance with any Federal, state, or local permits or licenses relating to the protection of the environment.
April 30, 1981

Hon. Daniel K. Inouye
Member, The Senate
Room 442, Russell Senate Office Bldg.,
Washington, D.C. 20510

Dear Senator Inouye,

Please find enclosed two copies of testimony, with regard to Deep Seabed Hard Mineral Act (P.L. 96-282), which I was unable to deliver at the April 24, 1981 hearing held in Honolulu. It was impossible to arrange round-trip transportation from Hawaii Island to Honolulu.

The Puna Hui sincerely hopes the recommendations that are being called to the attention of your office will be constructively received.

Mahalo a nui loa and,

Aloha,

Everett Kinney

U.S. Senator Daniel Inouye
U.S. Senator Spark Matsunaga
Hon. Daniel Akaka, Member of Congress
Hon. Cec Heftel, Member of Congress

EBK/ppk
ENTRY:

Aloha mai. I bring you greetings and aloha from the Puna Hui Ohana.

My name is Everett Kahillokalani Kinney. I have travelled here in representation of the Puna Hui Ohana, an active multi-issue aboriginal Hawaiian umbrella community organization from Pahoa, lower Puna Makai, on the Big Island of Hawaii. We are essentially a rural-agricultural economic area strategically located nearly half-way between the potentially productive geothermal fields nearby to our South and the possibility of a manganese processing and refining complex nearby to our North.

INTRODUCTION:

Implications, Growth Mechanisms: In brief, the implications connected with these particularly huge growth mechanisms are clear and immense. In association with current growth factors including fragmentive planning, increased in-migration and geothermal development, the certainty of urban manifestations disrupting and displacing the present cultural integrity of lower Puna appears imminent.

Social-Cultural Concerns: Massive industrialization in Puna's presently homogeneous socio-cultural setting, as may
be reflected in multi-billion dollar, capital-intensive manganese or alumina smelting factories utilizing sophisticated and potentially dangerous chemical technologies together with heavy electrical energy requirements, poses several fundamental questions as:

1. How and who will be participating in the decision-making apparatus?
2. To what extent will community representation participate in the planning process?
3. How and in what particular ways will the decision affect Puna residents as well as the Big Island lifestyle as we now know it.
4. What methods and processes will be determined to define the community's concerns?
5. Who will benefit and who will lose? What will be some of the trade-offs?

Manganese Industry, A Brief Overview: Of all the candidate industries a community may want to consider for economic purposes, "smelting" factories, where ores are fused or melted in order to obtain or refine a metal, have traditionally been the least desirable and will nearly always provoke vigorous argument and emotions. Depending on what basic refining process is used, manganese refining, in addition to an initial smelting process, also requires an
electroplating process to recover the cobalt, copper and nickel in a three-metal process. The addition of manganese to a four-metal process will be additionally complex but will reduce the percentage of waste materials. Whatever process is ultimately accepted, implications in design, capitalization, waste disposal and chemical hazards will seriously test a community's willingness to respond favorably to such an industry despite primary and secondary economic benefits.

Several leach method (five) in varying degrees of complexity and process requirements will use several potentially hazardous chemicals that must be transported or manufactured at the site. The public will need to be informed about the hazards involved in the use and storage of such dangerous chemical compounds as hydrogen sulfide, ammonia and chlorine, one or two of which could be fatal should storage or process facilities rupture human, accidental or natural hazards (as earthquakes). The Big Island ecological systems, its man-land relationships, may be too fragile to survive a "Three mile Harbor" or a "Love-Canal."

Module recovery and the disturbance of the benthic regime evokes heated arguments from academicians and lay people alike. Disposal of millions of tons of highly toxic process residues need to be discussed openly and honestly, seeking alternatives to dumping at sea and possibly endangering our
shoreline fishing and spawning grounds. Or, storing it on land where it might seep into the underground water systems.

The announcement that no consortia shall be allowed to begin nodule recovery before January 1, 1988 is the first definitive indication of an operation time framework. In addition, the possibility that one or two consortias will be filing permit applications by 1984 demonstrates a high level of intent and readiness within the industry.

COMMUNITY PARTICIPATION:

Broad and growing distrust of collateral interests involving concentrations of economic power in association with energy producers and mining interests tend to contribute to public antagonism and hostility. This is especially true when favorable governmental statements are seen as being somewhat collusive. As an example, for nearly two years the Puna Hui Ohana, using objective and constructive techniques, has been requesting a State and County Geothermal planning and policy mechanism to assure community input into up-front decision-making. As of this date we have been relatively unable to encourage either party to begin negotiations toward this goal. Can we be assured the planning activities with regard to Managanese nodule processing will be any better?

Funds for Community Research: A major obstacle facing the community when planning to investigate impacts likely to affect it, is the lack of appropriate funding and technical
resources with which to conduct an investigation in its interest. In comparison, government and corporate bodies have wide access to such resources, a percentage of those resources are extracted as taxes and as consumer profits from the very public seeking to defend its position. The Hui has in past and will continue to do so in the future, recommend two concepts that state:

1. To the extent that a corporate developer or corporation benefit directly or indirectly from research funded by government resources, than to that extent shall a percentage of such funds be also made available to the affected community so that it may conduct research investigating the long-term impacts of such corporate benefits.

2. To the extent a developmental unit, government or private, shall directly impact the environment of a community, then to that extent it shall contribute to the mitigation of such impacts. This concept is intended to include permitting or licensing agencies.

OTHER RECOMMENDATIONS:

Social-Cultural Impact Analysis: Both the State and the Federal's National Ocean and Atmospheric Administration's draft documents emphasize, mainly, physical and economic impacts. Very little attention was focused on the human-social environment and the extent to which they would be affected. They
also addressed greater concerns to socio-economic analysis than to social-cultural impact analysis.

**Measuring Perceptions:** We respectfully submit that the magnitude of the proposed manganese complex is so huge that both quantitative and qualitative research methods be developed to thoroughly measure impacts on the human environment. While we agree there are built-in difficulties in quantifying an individual's perceptions, attitudes and values, we contend that when such data collection is aggregated within surrogate value systems that they provide valuable associations between the independent and dependent variables.

**Social Planning:** Also recommended are social planning techniques that coordinate industrial, institutional and community interests within a consensus of ideological commitments. The three groups could constructively participate in (1) fact finding and problem definition, (2) the building of communication or operating structures, (3) the selection and determination of social goals and policies in the design of action strategies, (4) some aspects of plans implementation and (5) the monitoring of change and assessment of feedback information. These activities may be considered as stages in the planning process.

**An Agenda for Action:** As an example, the Foundation for Neighborhood Development's "discovery" methodology utilizes the following elements to arrive at natural and practical information which is the base of their research process and

Senator Inouye
includes the following steps:

A. Agenda for new action—"the problem"

B. Description—documenting the environment
   1. Physical—space in which person moves
   2. Social—person relating to environment
   3. Economic—physical signs of management

C. Theme development—from description system with focus for action

D. Issue Identification—action to be taken

E. Strategy Building—option for action

F. Implementation—decision for action

G. Monitoring—action evaluation

H. Redefinition—goals of action

I. Redescription—generalizing success for failure

J. Begin new action in process

According to FUND instead of imparting knowledge about a particular subject, attention is directed to a process of making visible and using the knowledge that people naturally possess: a process which helps humans to link together their experiences in their real life environments. The individual becomes a participatory agent within the environment and is able to become predictive in dealing with elements imposed into his environment. An individual has the power to discover and manage his environment to the extent that he can participate with and assert control over it. For planning purposes
it lessens the possibility of ambush with respect to social
resource management.

We are hopeful our recommendations regarding the development
of regulations pertaining to environmental concerns are
reasonable and helpful. They recognize all economic development induces changes in the existing social fabric and
allows an affected human population various choice options
and investigative processes.

Thank you for this opportunity to testify on behalf of
the Puna Hui Ohana.
29 May 1981

COMMENTS OF ENVIRONMENTAL DEFENSE FUND, FRIENDS OF THE EARTH, NATIONAL AUDUBON SOCIETY, NATIONAL WILDLIFE FEDERATION, NATURAL RESOURCES DEFENSE COUNCIL AND SIERRA CLUB REGARDING DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT AND REGULATIONS FOR DEEPSEA MINING

James N. Barnes
Sally Lentz*
Dean Tousley*

CENTER FOR LAW AND SOCIAL POLICY
1751 N Street, N.W.
Washington, D.C. 20036
(202) 872-0670

*law student interns
## INDEX

**Overview**

<table>
<thead>
<tr>
<th>I. Failure to Require Mitigation Measures for Commercial Operations</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Analysis of PEIS Results</td>
<td>4</td>
</tr>
<tr>
<td>1. Destruction of Benthos</td>
<td>5</td>
</tr>
<tr>
<td>2. Impact of Fines</td>
<td>6</td>
</tr>
<tr>
<td>3. Trace Metals</td>
<td>7</td>
</tr>
<tr>
<td>4. Surface Plume Effects</td>
<td>8</td>
</tr>
<tr>
<td>B. Best Available Technology as a Means for Mitigation</td>
<td>10</td>
</tr>
<tr>
<td>1. Requirements Under the Act</td>
<td>10</td>
</tr>
<tr>
<td>2. Determination of Best Available Technology</td>
<td>12</td>
</tr>
<tr>
<td>C. Over-the-Side Discharge</td>
<td>14</td>
</tr>
<tr>
<td>II. General Method for Addressing Environmental Requirements</td>
<td>16</td>
</tr>
<tr>
<td>III. Information Requirements</td>
<td>17</td>
</tr>
<tr>
<td>1. Definition of Environmental Information Required</td>
<td>17</td>
</tr>
<tr>
<td>2. Limitation on Scope of Information Required in Site Specific EISs</td>
<td>17</td>
</tr>
<tr>
<td>3. Delay in Submission of Information Regarding System Tests and Equipment</td>
<td>18</td>
</tr>
<tr>
<td>IV. Monitoring</td>
<td>19</td>
</tr>
<tr>
<td>A. General Provisions</td>
<td>19</td>
</tr>
<tr>
<td>B. Observers</td>
<td>20</td>
</tr>
<tr>
<td>C. Reporting Requirements</td>
<td>20</td>
</tr>
<tr>
<td>1. Advance Notice of Systems Tests</td>
<td>20</td>
</tr>
<tr>
<td>2. Adverse Effects on Environment</td>
<td>21</td>
</tr>
<tr>
<td>D. Endangered Species</td>
<td>22</td>
</tr>
</tbody>
</table>
OVERVIEW

This assessment of the Draft Programmatic Environmental Impact Statement (hereinafter PEIS) and proposed Deep Seabed Mining Regulations for Exploration Licenses is made in light of the following international and environmental concerns.

The Deep Seabed Hard Mineral Resources Act, 30 U.S.C. §1401 et seq. (hereinafter the Act) states as its first purpose 
“(1) to encourage the successful conclusion of a comprehensive Law of the Sea Treaty” and recognizes that “it is in the national interest of the United States and other nations to encourage a widely acceptable Law of the Sea Treaty.” The Act itself reflects the desire to establish a scheme compatible with the provisions of the Law of the Sea Treaty. It is our continuing strong belief that the proposed regulatory scheme similarly must be compatible with the Treaty, so as to encourage its successful conclusion and to ensure a smooth transition of regulatory authority once the Treaty takes effect.

Without a Law of the Sea Convention, U.S. enterprises have no rightful access to minerals of the deep seabed, as most nations now interpret the status of such minerals under international law. Most nations believe that implementation of unilateral national legislation on deep seabed mining violates existing U.N. resolutions. Absent an international mining regime that was acceptable to the community of nations, activities
pursued unilaterally by U.S. enterprises would be open to sharp criticism by the international community and would lack the security necessary to justify the large investments that must be made to carry out those activities. Without the Treaty, access to the desired resources will not be assured. To the extent that the U.S. regulatory scheme supports the basic precepts of the Treaty, and encourages its successful conclusion, adverse international repercussions regarding what many nations believe to be illegal unilateral actions may be mitigated.

From the perspective of environmental concerns, the Treaty establishes the framework for a comprehensive system of protection. We have recognized publicly that the Treaty's general framework might well be furthered by development of a sound regulatory structure by the United States. In general, we support the thrust of the proposed regulations and the compilation of the PEIS as being steps in the right direction. But we note that national legislation cannot take the place of international safeguards for the protection of the marine environment. Moreover, the other emerging national laws evidence a lack of adequate environmental provisions, and inconsistencies among domestic laws being considered by various nations are likely to make harmonization difficult. We urge the U.S. to take steps to ensure that all regulatory regimes established by so-called reciprocating states contain the necessary environmental powers and standards, and...
that they collectively are consistent with the draft Law of the Sea Convention.

The potential environmental consequences of deep seabed mining are serious. The Marine Board of the National Academy of Sciences recommended in 1973 that large scale deepsea mining not be allowed until the environmental implications are "thoroughly understood, evaluated and documented." It is apparent that we are on the brink of full scale seabed mining without having satisfied the concern of the National Academy of Sciences. The environmental community has stated repeatedly over the last several years that mining does not have to wait until we know everything. Rather, it should be seen as an unfolding experiment, with a continuing utilization of new data and information to improve mining technology. The environmental implications of seabed mining have not been thoroughly evaluated, have not been thoroughly documented and certainly are far from being thoroughly understood. The draft PEIS has contributed very little to remedying the pervasive lack of knowledge about the real short or long term environmental consequences of mining. Adequate scientific information has not yet been developed to prepare sound regulations. The U.S. research program still has barely touched the tip of the proverbial iceberg. Even the baseline data about the ecosystems involved, particularly the benthic ecosystem, remains virtually unknown. At this time, no one really knows the ultimate environmental implications of deepsea mining.

1. In the early 1970's the Marine Board and others began to identify potential environmental impacts that might result from deep seabed mining (two draft PEIS preparers and two Domes advisors were among the authors of the 1975 Marine Board report, "Mining in the Outer Continental Shelf and in the Deep Ocean"). By 1975 the list of potential concerns appeared complete, having been the subject of a two-day public workshop (PEIS page 261, Item 1). That list of concerns was the basis for the five-year Domes research effort that followed, which evaluated the environmental implications of deep seabed mining. (PEIS Section II.C.1.2.2.5). As Domes progressed, the public was apprised of the status of new findings by means of about one dozen workshops and advisory panel meetings (PEIS pages 261-267) all of which included the Center for Law and Social Policy or one or more of the groups represented by the Center. The final results of Domes were generally agreed to by the scientific and environmental community, including this commentator. He was quoted in the April 1981 C.F. Letter, published by the widely respected Conservation Foundation, "NGA has been trying to be responsible. They've tried to balance environmental and development interests and they've done a relatively good job... it appears fairly likely that the total environmental harm is less from ocean mining than from getting minerals from the land."

The status of Domes findings was outlined at the public scoping meeting (PEIS page 266, item 24) and workshop on future research needs (PEIS page 266, item 25). This workshop was attended by representatives of the Center and the Sierra Club, and approach agreed to by the commentator and other participants. NGA agrees that our understanding of this area of the ocean will be enhanced, and sees deep seabed mining monitoring, pursuant to the regulations and the Technical Guidance Document, as such an opportunity. See also comment 16 of the State of Florida, Department of Veteran and Community Affairs.
If the marine environment is to be adequately protected, the regulatory scheme must reflect the recognition that we are dealing with a myriad of unknowns which could have serious adverse consequences for life in the ocean. The oceans and the organic life they support are an integral part of the system which sustains all of our planet's species. Therefore it is essential that mining proceed with great caution, for in mining the ocean floor, we are tinkering with a basic support system, the significance of which we do not fully comprehend. Rigorous research, assessment and monitoring programs must be expanded. Potential adverse effects must be mitigated and mitigation must proceed until the effects are thoroughly understood through thorough evaluation and documentation.

We submit that the draft PEIS fails to thoroughly evaluate or thoroughly document its conclusions with respect to even those impacts with the most potential for adverse harm. Yet on the basis of this less than thorough understanding it proposes little or no mitigation measures.

1. Failure to Require Mitigation Measures for Commercial Operations
   Nothing in either the PEIS or the Regulations indicates an intention on the part of the government to require mitigation of adverse effects during the exploration phase, and the general thrust of the two documents leaves us in doubt that mitigation


3. Not adopted. Because of the small number of mining tests to be conducted by all licensees during the exploration phase, as well as their brevity, NOAA views the tests as an opportunity to monitor, learn, and refine the estimate of effects discussed in the PEIS. It is impractical and premature to specify particular mitigation measures at this time, because no significant adverse impacts from exploration have been identified and because available information is insufficient to predict what mitigation measures are reasonable and effective in reducing possible environmental impacts. Each exploration license will require, as a license condition, the licensee to monitor the environmental effects of its activities. NOAA observers and government and industry research will provide more new environmental information. As environmental effects become better known, mitigation measures can be devised to address those effects. License terms, conditions, and restrictions may be amended under §105(c) of the Act "to protect the quality of the environment," a "significant adverse effect on the environment" would provide grounds for immediate suspension of the license, or immediate suspension or modification of particular activities, under §109(c) of the Act. Information acquired during the exploration stage (which may include testing of commercial recovery systems) also can be used to develop mitigation measures applicable to the commercial recovery stage, and to prescribe "the use of the best available technologies (BAT) during commercial recovery if the criteria for requiring BAT under §109(b) of the Act are satisfied. The BAT concept presumes knowledge of the differential environmental effects of different sets of equipment. Such knowledge is not currently available, but its acquisition is a major objective of the exploration stage monitoring requirements.

4. Agreed. The PEIS concludes that any adverse effects during exploration are insignificant. See response #3.

5. Mitigation during commercial mining is discussed in the PEIS on pages 102-103, 107-108, and 109. Any decision on mitigation during commercial mining is premature at this time (see comment 3).
will be required during exploitation. The PEIS states that mitigation will not be required at the outset, nor are mitigation requirements proposed by the Regulations.

The failure of the regulations to provide any measures for mitigation of the potentially adverse effects identified by NOAA is of particular concern given NOAA's extremely limited efforts to adequately measure those effects.

A. Analysis of PEIS Results

NOAA identifies only four at-sea effects which have some potential for significant environmental impacts. On the basis of their admittedly limited investigations, NOAA concludes that mitigation of these effects is unnecessary at this time. The validity of that conclusion can only be measured by the accuracy of the data upon which it is based. Our analysis indicates that the data used by NOAA was not adequate, if at all existent, and calls into question the validity of the conclusions.

1. Destruction of the Benthos

With respect to the destruction of benthos in or near the collector track in the mine site area, it was determined that all the organisms living in the track would be destroyed and that there will be substantial mortality of those organisms living between the tracks from smothering. NOAA states that "it is unable to conclude that this scale of impact is significant to benthic populations, although it is clearly adverse." (emphasis added).
Thus, because relatively small areas will be affected during the license phase, NOAA proposes to require no mitigation. The measurement of significance through the size of the area destroyed is not particularly logical. There is extensive movement of species within the ocean. The interrelationship between the affected area and adjacent areas as well as species moving through the area is totally ignored. We do not know how the diverse organisms of the deep seabed are linked to the overall oceanic food chain.

Another principal unknown is the recolonization rate for disturbed areas. Benthic community metabolism in the deep sea may be several orders of magnitude lower than in shallow water. Thus recovery time is likely to be measured in hundreds of years.

2. Impact of Fines

NOAA identifies as an effect of "possibly greater concern" the area affected by fine sedimentary particulates (fines). NOAA states that "field measurements suggest that fines in the benthic plume, with particulate concentrations about twice that of the ambient, may remain suspended for a week or longer after the cessation of mining operations and be carried tens of kilometers by bottom currents." NOAA goes on to admit that "the impact of sedimentation rates and particulate loads on benthic fauna is not known at this time," (emphasis added) yet concludes that the effect of the rain of fines appears to be insignificant.

7. The PEIS states that the natural horizontal water currents and the limited linkage between benthic and water column food webs (pages xviii and 47-52) means that seabed mining will have no adverse effect on the upper water food chain. Specifically, the interrelationship between the mine area and the movement of species within the ocean as well as the benthic linkage to the overall oceanic food chain were also addressed in the PEIS on the following pages:

a. The movement of bottom-dwelling animals in response to mining was described on pages 92-93. Scavengers, such as amphipods and rat-tail fish, may be attracted to the mine site by the temporary increase in food supply. Species capable of moving through the mine area should be mobile enough to avoid any adverse effects.

b. The vertical migration of bottom-dwelling animals (rat-tail fish and amphipods) to higher levels in the water column and their relation to the food chain was described on pages 47-52.

c. The linkage of the deep-sea organisms to the overall oceanic food chain was described on pages 41-52.

8. The PEIS, on pages 101-102, states that future research (NOAA's Five Year Research Plan) will be directed at the rate of recolonization, the types of species that recolonize, and the resulting linkage between benthic and water column food webs. Monitoring for recolonization will also take place during test mining as outlined in NOAA's Technical Guidance Document.
If the impact is not known, it would appear that any determination of its significance would be highly speculative. This conclusion is particularly disturbing when, by NOAA's own admission, "although the impact is currently unknown, damage could be irrevocable." (PEIS, p. 98).

When irrevocable damage is certain but effect is unknown, it is only reasonable to proceed with great caution, yet NOAA suggests no mitigation in the license phase and only the possibility of mitigation in the permit phase. Mitigation during both phases should be required.

3. Trace Metals

With respect to the potential entry of trace metals into the food web via surface discharge, technical difficulties apparently have prevented any investigation into possible effects. Ingestion of metal-containing particles by zooplankton could result in the accumulation of toxic metals in higher levels of the food chain. This could result in significant depletion of zooplankton stocks and impacts on the stocks of tuna and other economic species, which in turn could affect other marine mammals and sea birds that depend on these stocks for their food. NOAA admits that "no data exists" on this problem. Its stated intention is to examine the "likelihood of this occurrence through theoretical studies". NOAA concludes that "In the absence of suitable data, NOAA has determined that the potential for a significant effect during the license phase is remote." (PEIS, p. 100).
Under the circumstances, absent any evidence and given the potentially serious effects involved, we submit that it is irresponsible to conclude that the impact of trace metals will be insignificant. Until such time as adequate data is available proving that there is no threat from such effects, industry should take steps to mitigate them to the greatest extent possible. Also, it seems appropriate to require carrying out field studies in addition to theoretical research.

4. Surface Plume Effects

Nodules will be transported to the surface, accompanied by some quantity of sediment, living organisms and water. Whether the continuous line-bucket or the suction method is used, some water and sediments will be released along the upward path, into the water column. More sediments are likely to come to the surface with the suction method. Although it is probably possible technologically to pipe most sediments back down for discharge at intermediate depths, it is unknown whether that would be preferable environmentally.

Whatever percentage of these materials discharged at or near the surface, a plume will be formed from the particles. It remains unclear how long it will take these particles to settle, although they will be dispersed laterally quite quickly.

There could be substantial environmental impact from suspension and resedimentation of discharged sediment. Aesthetic considerations aside, the disposal of deep ocean sediment and

10. Not adopted. NOAA states on PEIS pages 87-88 that the potential for significant effect during the license phase is remote. Theoretical studies by NOAA show that manganese nodule chemistry is stable and not likely to be altered while passing through the zooplankton digestive system. Although one can imagine a long-term, cumulative, slow build up in zooplankton tissue; in fact, any given plankter will drift with the plume and thus be exposed to high concentrations of suspended particles in the surface plume for only 3 or 4 days (PEIS page 96).
bottom water in the surface areas could result in several types of environmental impacts. The upper layers of the ocean are where phytoplankton exist, where photosynthesis takes place, and where part of the earth's oxygen is produced. Depositing sediment on top of this zone could limit light penetration. Phytoplankton could be reduced and photosynthesis and early stages of the food chain impaired. If certain ocean layers are rendered less hospitable, the vertical distribution of phytoplankton could be changed. As sediment sinks, bacteria attached to it could use oxygen in oxygen-scarce zones, adversely affecting organisms. Some mining locations are also areas of intensive fishing for tuna and other species. Whether fishing and deepsea mining are compatible is unclear. The sediment discharged from the surface could be detrimental to commercial fish stocks either directly or indirectly through their effect on the food chain. We do not know.

Despite the fact that "this concern was not examined during DOMES I or II research NOAA concluded that the potential for a significant affect during demonstration-scale mining tests is judged to be remote." (PEIS, p. 102). We submit that it is irresponsible to reach such a conclusion after conducting only limited investigations.

The failure of NOAA to produce concrete evidence in support of its findings demonstrates the very limited knowledge under
which mining activities are to take place. The balance of the marine ecosystem is continually threatened by the tendency to underestimate or ignore possible impacts by those charged with protecting the public and natural resources and systems. Mitigation of these impacts, the effect of which is unknown, is the least that must be done to protect the marine environment on which all human existence depends. Implementation of the principle of Best Available Technology is one means for mitigating these effects, and its mandate in the Act requires a supporting regulatory scheme for its implementation.

B. Best Available Technology as a Means for Mitigation

NOAA concludes in the PEIS that it will not now require mitigation measures in commercial operations (the permit phase) even for those impacts which it suggests will be most significant: destruction of benthos in the collector track (95), the associated "rain of fines" from the benthic plume (98), potential entry of trace metals into the food web (100), and surface plume effect (102). In each instance, NOAA states that mitigation measures might be required if significant detrimental effects are discovered. But for now, the message to industry is that it needn't be concerned about minimising adverse impacts.

1. Requirements Under the Act

The Act requires the use of best available technologies to mitigate significant effects. Section 109(b) mandates the
The Administrator shall require in all activities under new permits, the use of the best available technologies for the protection of safety, health, and the environment, whenever such activities would have a significant effect on safety, health or the environment, except where the Administrator determines that the incremental benefits are clearly insufficient to justify the incremental costs of using such technologies." [emphasis added].

NOAA has decided not to require mitigation measures for the permit phase on the basis of conclusions that the impacts cited above will probably not be "significant". Yet NOAA admits those conclusions as to insignificance have virtually no basis in scientific fact. The PEIS repeatedly pleads ignorance as to the impacts, yet repeatedly concludes that they will not be significant. The logic is as follows: "We do not know what the effects of these activities will be or how to value these effects, therefore the effects will be insignificant and we will not require that they be mitigated." It seems obvious that a more rational response to such ignorance would be an extra measure of caution of the following sort: "We do not know what the adverse effects of these activities will be, so the real possibility that they will prove to be significant requires us to minimize them."

The best available technologies, as mandated by the Act, are to be used in all activities under new permits. This principle must be invoked to ensure full environmental protection
and should be explicitly stated in the regulations, along with a general formula for its application.

2. Determination of Best Available Technology

While the PEIS and proposed regulations are silent on this issue, NOAA's discussion paper on the proposed rulemaking suggested the application of a traditional economic model for optimal allocation of resources to determine the best available technologies. As we previously suggested in our comments on the discussion paper, NOAA's discussion of this requirement is incomplete and does not seem to be of real assistance to anyone.

In the traditional model, optimal efficiency is reached when marginal costs equal marginal revenue. Faced with a typical economic problem of allocation of resources (i.e., replacement of equipment in a factory), marginal cost and marginal revenue are quantifiable in dollar terms. The discussion paper notes that determinations on “best available technology” in the deepsea mining context will involve substituting “social benefits” for “marginal revenue” and “marginal costs” will be couched in terms of economic factors as well as social or environmental risks.

Both social benefits and social risks in the deepsea mining context are unquantifiable factors. In such a scheme these unquantifiable factors are highly susceptible to being undervalued when competing with concrete economic calculations. This problem is partly compensated for because of the presumption in favor of the use of best available technologies. However, the lack of any criteria for the determination of best available technology creates
problems for all the parties concerned. Without some general guidelines the Administrator has no identifiable basis upon which to make decisions, industry has no incentives to develop technologies which minimize adverse impacts, and other interested persons outside government have no standard by which to effectively contribute to the decision-making process concerning determination of available technologies.

In the absence of general requirements that adverse effects be minimized from the outset, industry will likely waste valuable time and resources investing in "least cost" technologies with the potential that they will be found "environmentally inadequate" once in operation. At that point, the sunk costs would weigh heavily against imposition of new mitigation requirements under the cost/benefit analysis required by the Act. Such an end-run around the best available technology provision would be a perversion of Congress' intent under the Act.

If NOAA's proposals are followed, all of the parties involved will be left without basic guidelines upon which to base their planning and development. Even the establishment of very basic guidelines, as demonstrated in the following hypothetical, would be helpful: If it were determined that the adverse effects on the environment of collector Y were significantly greater -- perhaps one order of magnitude or more greater -- than the adverse effects of collector X, then collector Y would be
deemed the best available technology. This at least would provide a basis for measuring a significant adverse effect on the environment, i.e., if the difference between the adverse effects of one technology is one order of magnitude or greater than another technology then the technology with the lesser impact must stand as the preferred technology. If a difference of one order of magnitude or more was found between two collector heads, the next step would be to determine the implications of that significant difference. Research by government and industry would be required in order to assess the implications of any significant difference between technologies. The burden should rest with the miner to show that the environmental implications of the difference are significantly outweighed by the economic costs of adopting different technologies. If there were no appreciable increased costs to using one collector versus another, and one had significantly less environmental impacts, then it definitely should be required.

C. Over-the-Side Discharge

The PEIS states that sediments will be discharged over the side of the mining ship (xvii). The fact that this procedure was used during the mining tests to date (58) does not necessarily justify its adoption as standard operating procedure, particularly given the limited knowledge concerning the effects of the surface plume which would result. The DOMES studies identified the

15. Assuming that NOAA has identified a significant impact on the environment, a technology proven to be less damaging than others must be considered for mandatory use for commercial recovery permits under the BAT provisions of §109(b) of the Act. Regarding exploration, NOAA currently has no finding of significant impact. NOAA also has no evidence of a technology with an order of magnitude difference in adverse impact, nor does the commenter identify such technologies. Accordingly, it is premature to specify BAT based on present findings and state of technology.

NOAA cannot presume that even an order of magnitude difference in adverse effects by itself is sufficient to constitute a significant impact on the environment, although such a difference must, of course, be considered in determining significance, as the commenter suggests and would be evidence for a requirement of BAT under §109(b) and, if appropriate, of research as well.
effect of discharged suspended matter on the oxygen minimum zone of the eastern tropical North Pacific Ocean as a potential problem. Large increases in particulate mining wastes in this zone could cause significant reductions in dissolved oxygen and nitrate concentrations, and might produce dissolved hydrogen sulfide.

Hydrogen sulfide is lethal to most species that would be forced to migrate through it. Subsurface currents could transport these particles and impacted waters toward the north and east, where they could further lower the low oxygen concentrations of this region. Because the eastern boundary of the tropical North Pacific Ocean is an upwelling region, there might eventually be harmful effects on the eastern Pacific tuna fishery.

NOAA had previously indicated the matter would be studied, yet no evidence of such study is apparent. This summary account in over-the-side discharge without adequate knowledge of the consequences or alternatives is not the kind of analysis which NEPA requires.

Since more sediments are likely to come to the surface with the suction method of collection, alternative methods of collection should be considered. There is also the possibility of piping sediments back down for discharge at greater depths. Research is necessary to determine the environmentally preferable method, but certainly without knowledge of the impact when it is potentially extremely adverse, mitigation and an exploration of feasible alternatives is necessary.

16. Adopted. Appropriate addition has been made on PEIS pages 83-84. However, DOKES did address the effect of the mining discharge on the oxygen minimum zone. The DOKES I Final Report (page 107) states that "If during mining operations the discharge of sediments and bottom water introduces additional organic matter into the mixed layer, the flux of organic matter through the thermocline would increase. An increase in oxygen demand from increased organic matter settling into the oxygen minimum zone would have important effects if the oxygen supply is depleted. This would be followed by denitrification, and, if nitrate and nitrite becomes exhausted, then sulfate reduction may begin with resultant production of hydrogen sulfide."

During the DOKES baseline studies, shipboard and laboratory experiments were conducted to determine whether the elevated particulate load expected from mining activity would increase the bacterial respiration in the water column and produce an increase in the biological oxygen demand. The experiments, conducted with water from the tropical North Pacific, indicate that with incubation periods up to one month, nitrate and nitrite are reduced to molecular nitrogen but hydrogen sulfide is never formed (Ozretich, R.J., and B.A. Ozretich (1978): Bacteria and sediment interaction. NOAA, Final Report to DOKES Project).

From theoretical computations that include consideration of the oxygen minimum zone, Anderson (Anderson, J.J. (1978), "Deep Ocean Mining and the Ecology of the Tropical North Pacific." University of Washington Dept-of Oceanography Special Report No. 83) concludes that "It is unlikely that hydrogen sulfide will ever be produced." Anderson (same reference) also states that "sulfate reduction has never been observed in the tropical North Pacific."

17. Agreed. Alternative methods of collecting nodules have been and will continue to be considered by industry. The hydraulic techniques discussed in this PEIS have been successfully tested and appear to be favored by the mining consortia at this time. See comment #3.

II. General Method for Addressing Environmental Requirements

In general, the proposed regulations appear to have adopted a "conditional issuance approach" as the method for addressing the environmental requirements of the Act. As stated in our previous comments on the proposed rulemaking, we support what NOAA has referred to as a "combination strategy", but what we refer to as an "evolving combination strategy." Recognizing that existing scientific understanding of deepsea systems and processes is rudimentary and that the present knowledge concerning the possible adverse environmental impacts of deepsea mining is limited, a viable prescriptive scheme would be impossible to develop at the present time. However there are some issues that could be addressed in prescriptive terms, as suggested in the revised version of the Deep Seabed Mining Environmental Assessment Report, November 1980. Every effort should be made to delineate reasonable performance standards when a sound basis

19 for such measure is apparently based on current scientific and technical knowledge. As to those issues for which no prescriptive measures can be currently determined, then we support a conditional issuance approach. As new information becomes available, however, prescriptive standards should be developed to replace conditional measures. We emphasize the evolving nature of the strategy as

20 crucial. In the initial stages of development conditional standards would be most prevalent. As time goes by and progress is made
in terms of available scientific knowledge on environmental impact, then conditional standards would be replaced increasingly by prescriptive standards, thus the evolving nature of the strategy.

III. Information Requirements

1. Definition of Environmental Information Required

The requirement for information pertaining to anticipated environmental effects in an application for pre-license exploration (§970.204(a)) is much too vague. What kind and specificity of "physical, chemical and biological information" should the application present? What does "best of applicant's ability" mean? Specific information on assessment of environmental impacts is needed.

2. Limitation on Scope of Information Required in Site-Specific EISs

The Executive Summary states: "This PEIS is comprehensive and is intended to limit the scope of information required in site-specific statements. . . . Should new technology be developed, operations outside the DONES area be undertaken, or at-sea processing of nodules be initiated, a supplement to this PEIS or a new PEIS may be prepared." (PEIS, at xvi). In view of the rapid increase in knowledge of environmental conditions and effects which can be expected to occur when serious exploration and development of commercial scale equipment gets underway, such a blanket limitation on the scope of site-specific EISs is warranted. By the time site-specific EISs are developed, the

scientific community hopefully will be more knowledgeable about potential adverse effects and the ocean ecosystem in general, as will NOAA and the mining industry.

As the gains in knowledge will be substantial, ongoing and cumulative for many years (reflecting our current state of ignorance) it would not be practical or productive to undertake continual revisions of the programmatic EIS. Rather, NOAA should address issues covered in the PEIS in site-specific EISs to the extent that new information renders that in the PEIS obsolete -- however recently the programmatic statement has been updated. In addition, given the aforementioned inadequacies of the PEIS, it is essential that the site-specific EISs address at least the four impacts identified as having the greatest potential for adverse impact.

3. Delay in Submission of Information Regarding System Tests and Equipment

The provision allowing for delay in the submission of detailed and specific information regarding system tests and equipment (§970.204(a)) is inappropriate unless the license or permit is also delayed pending satisfaction of these informational requirements and completion of the EIS. If a license can issue without detailed information or system tests and equipment, the environmental assessment required by NEPA will be incomplete, and the opportunity for public input under §970.213 is lost. Because the equipment tests have the greatest potential for adverse impacts in the exploration stage, it is precisely on that subject that the need for detailed information is greatest.

22. Agreed. Language added on PEIS page xvi.

23. Agreed. Site-specific EISs will summarize current state of the art.

24. Agreed. In this case the environmental assessment and public input would be gained through the process of supplementing the original site-specific EIS. No system test would be authorized until this process is complete. A license issued without an environmental assessment on tests would be conditional so as to prevent systems tests until after a supplemental EIS is completed.
IV. Monitoring

A. General Provisions

We commend the requirements that environmental protection measures and monitoring be specified in exploration plans, §970.203(b) (7) and included in diligence requirements, §970.602(a), as well as the provision allowing for special terms, conditions and restrictions as circumstances require, §970.523.

We support NOAA's proposal to specify in some detail the nature, purpose and method of industry monitoring (PEIS xxi, 127).

However, the monitoring requirements should be better spelled out in the regulations, rather than leaving the monitoring plan to the complete discretion of the Administrator as §970.702 now provides. The development of a "technical guidance document" should be useful in this regard and it is assumed that such a document will be available for public comment upon its completion.

Prescriptive standards could be established immediately with respect to design requirements for monitoring. The necessary information to develop monitoring designs is presently available. These would be beneficial to the miner in establishing those areas of major environmental concern and by providing outright the basis for the monitoring activities. Second, it would provide a somewhat uniform means of collecting data which could be quite helpful in the general compilation of information. This would also assist in comparisons of various technologies.

The proposed regulations specifically require monitoring only of the effects of the benthic plume, §970.702(a), leaving...
other monitoring requirements to the discretion of the Administrator. The regulations should expressly require monitoring at least for the four potentially significant effects noted in §970.701(b)(2). In addition, NOAA should require tests on other poorly understood factors, such as chemical communication and sound interference among marine fauna.

We generally support the proposed areas of concern to be included in the terms, conditions and restrictions for licenses and permits as listed in §970.517 through §970.523. As enforcement is of utmost importance, however, we urge that provision be made in the regulations for regular submission of reports to information to NOAA by the miner.

B. Observers

We commend the provisions of the regulations allowing for placement of federal officers on vessels as observers. §970.522, §970.1105. Advance notice of system tests should be required during the license phase to facilitate the most effective monitoring by designated observers.

C. Reporting Requirements

(1) Advance Notice of System Tests

In connection with the development of an observer scheme, as stated in our previous comments on the proposed rulemaking, we suggest that the regulations specifically require advance notice of all system tests so that NOAA-designated observers be most effective in monitoring operations and environmental fact.
(2) Adverse Effects on Environment

A review of earlier drafts of the proposed rulemaking reveals that a provision which read approximately as follows was deleted in the final version:

If during an exploration voyage the explorer learns of any circumstances that create a significant adverse effect on the environment, or could reasonably be anticipated to create a significant adverse effect on the environment, the explorer shall immediately notify the Director of the significant adverse effect or the threat of significant adverse effect and the circumstances pertaining thereto.

It is unclear why this provision ultimately was deleted from the final draft of the proposed rulemaking. The requirement should be included in the regulations pursuant to Sec. 113(b), which requires each licensee and permittee to submit such information as the Administrator "may reasonably need for . . . evaluation of the exploration or commercial recovery activities." This would properly place an obligation on the explorer to report on possible adverse environmental effects in the first instance. As observers may not be present to monitor every phase of activity in which the explorer engages, it is quite reasonable to require the explorer to report any adverse or potentially adverse effects. The explorer is in the best position to discover and assess adverse effects and as such the burden is properly placed on the explorer to perform such functions.
D. Endangered Species

The regulations fail to require adequate monitoring and research on endangered species in proposed sites. Endangered species are mentioned in the regulations themselves only in the context of water and biotic sampling, suggesting that if such activity would adversely affect an endangered species it may be determined to have significant adverse environmental effects.

The PEIS characterizes the DOMES area as “typical of the tropical high seas.” (p. xvii). No evidence is offered in support of this conclusion. The “landscape” of the ocean in terms of terrain and extent and diversity of plant and animal life may be greater than that observed on land. Our information in this regard is highly limited. To attribute the characteristics of the DOMES area to other tropical areas, and by implication, to other potential sites, is a mistake.

Only one endangered species was identified in the DOMES area. “Sixteen species are thought to migrate through the DOMES area or reside, breed or feed in transportation corridors.” PEIS, p. xvii. The existence of at least sixteen species in the area warrants some explicit regulatory protection from mining activities.

The conclusion that “marine mammals and sea turtle occurrences are infrequent and unlikely to be affected by mining” PEIS, p. 90, was based upon a literature survey by Documentation Associates. However, NOAA admits that

29. License applications are subject to §7 of the Endangered Species Act (ESA). If any endangered species would be taken or their critical habitat destroyed or adversely modified, NOAA will take appropriate action under the ESA and implementing regulations. In connection with the regulations, NOAA obtained ESA §7 consultations with the Fish and Wildlife Service and the National Marine Fisheries Service. See also the Technical Guidance Document, Sections 2.3.1.2 and 3.4.1.2.

30. Adopted. The PEIS has been changed accordingly, by deleting the erroneous text.
The potential impact that mining may have on endangered marine mammals and sea turtles was not addressed as a separate investigative category during DOMES. PEIS, p. 89.

NOAA's failure to study the impact of mining on endangered species requires that research and monitoring programs on such effects be established under the regulations, along with provisions for protection of endangered species.

V. Logical Mining Unit
A. Size of Unit in General

The regulations state at §906.601(b) that it will be presumed that an exploration area will not be larger than 80,000 square kilometers. There is no indication how NOAA derived that figure, and at this point we know of no facts that would support it. While we certainly disagree with the contention of at least part of the industry that the Act forbids any limits on the size of exploration sites, we feel that further research is needed before limits can be established. In the meantime, flexibility should be maintained.

The size of the mining unit is significant from the environmental perspective to the extent that it is adversely affected. In this connection we question the validity of the estimates of the extent of benthic destruction in the PEIS.

The PEIS states: "If it is assumed that five (three 3-metal and two 4-metal) first generation miners will operate for 20 years in the mining area, the total area of benthic destruction would be:
20 years (1800 km²/yr x 3 mines + 1800 / 3 km² x 2 mines)
= 130,000 km² or 37,900 nmi² — (p. 93).

This projection underestimates to a great extent the potential production capabilities of the industry. The preferred size of a mining site for a 20-year period ranges from 50,000 km² to 400,000 km², depending on which mining company is making the proposal. Taking the smallest preferred site size and assuming that the miner considers it feasible to mine the entire site, then destruction of benthos based on NOAA's estimates of the number of operations will cover an area of about 250,000 km² — and this does not include the effect of the accompanying rain of fines, which will affect a much larger area.

B. Reserved Sites

It should not be optional with the applicant to delineate a second site for possible future conveyance to the Enterprise under a Law of the Sea Convention. §70.601(d). Rather, delineation of such a second site should be required with specificity in each application. If the assurances of Congress in this Act that it was intended to facilitate completion of a Law of the Sea Convention (Sec. 2(b)(1)) are to be taken seriously by the rest of the world, the Act must not be seen as an attempt to subvert the intent of the parallel mining regime established in the draft text of the LOS Convention.

32. Disagree. Regardless of the size of the mine site, one year of mining with one vessel is likely to involve a sub-area of about 900 km², as explained in PEIS Appendix 3. Low-grade deposits would require the mining of larger areas each year to maintain production; they would not be competitive with the higher grade deposits assumed to be mined first. See response #13 to EPA letter.
Accordingly, it follows that second sites for eventual transfer to the Enterprise should be established from the very beginning of operation of the Act. Then, when a LOS Convention enters into force for the United States and other so-called reciprocating states, we will stand prepared to fulfill our obligations to share the "common heritage of mankind" as required under the Convention.

VI. Stable Reference Areas

The concept of protected areas in which the marine environment would not be interfered with by mining or other commercial activities is absolutely crucial to environmentally responsible development of deep seabed resources.

A. Function and Scope

The function of such areas, while including the need for "reference zones for purposes of resource evaluation and environmental assessment of deep seabed mining" (as defined in the Act), should be broader, covering the need to allow, encourage and facilitate scientific investigation over a prolonged period in undisturbed zones, and to obtain information pertinent to alternative uses and values of the deep sea, and possible conflict of such uses and values with mining or other commercial activities.
These other uses and values, which may not now be even imaginable, can include recognition and use of both other economic resources of materials and energy and non-quantifiable scientific or cultural uses and values. For example, it is only three years since a project was put together by physical scientists for creating in the sea, at a depth of 5,000 meters or more, a "telescope" for the detection of neutrinos and muons which could contribute uniquely to understanding of the fundamental subatomic structure of matter. Such an instrument, as presently envisioned, would physically occupy an area less than 1 km² (compared with the range of 50 to 400 thousand km² being discussed as the size of a unit license for mining), but it might need to be located in a very much larger undisturbed zone.

In the coming decades it is highly likely that other, totally unforeseen "uses" of the deep sea will be conceived, and this appears increasingly to be the case as technology progresses and more knowledge is obtained.

Recent discoveries about the deep ocean environment reveal some of the many topics about which we have so much to learn. The following are some of the discoveries made since the Law of the Sea Conference began:

--- the presence of hot metalliferous brines in the Red Sea and elsewhere;

--- the existence of entire communities of animal forms new to science whose primary source of nourishment is derived not from photosynthesis but from sulphur metabolising bacteria;
— venting of gases and suspended materials from the sea floor, with compositions extraordinarily high in a variety of chemical elements, including metals such as manganese, copper and silver;

— that forms of life in the deep oceans, many similar to some of those in shallow water and others apparently quite different, have extremely long life spans; and

— that diversity of life in the deep sea, previously thought to be low, may in many instances be comparable to the high diversity and abundance characteristic of tropical shallow water communities.

These and other considerations are all relevant to human evaluation of the resources of the deep sea. Other properties, such as thermal layering in the open sea and volcanism of the seabed, are being considered as sources of recoverable energy and materials. This is largely because the development of underwater technology, which makes new resource use feasible, has been as rapid as has been scientific discovery.

These natural deepsea systems, which nodule recovery could change in ways we cannot now imagine, have existed for millions of years before the appearance of humans on the land. Our intervention by exploitation and even by vigorous exploration is likely to disrupt these systems, destroying some of their potential value to us and impeding further discovery and understanding. Some of these interventions are subtle yet global in scale, taking place almost before we notice what is happening.
For example, noise generated by human activities in the sea impedes our ability to develop a clear understanding of communication between whales, dolphins and other sea creatures, and may significantly interfere with other important communication mechanisms in the sea. Similarly, recent alterations in the chemistry of the sea through human activity may already be influencing important chemical communication systems among marine invertebrates. Deepsea mining could further interfere with such chemical communication. In this sense, these must be considered as examples of pollution.

The establishment of protected areas by prospective reciprocating states will prove to be inadequate ultimately as the "protected" status will only bind those states that are parties to the agreements. A truly international process, such as would prevail in the context of a Law of the Sea Convention, is needed to assure the protection of these areas. Nonetheless, those nations now attempting to implement their unilateral laws can play an important role in leading the world to responsible development of this concept.

B. Selection of Suitable Areas

As NOAA correctly concludes, criteria for selection of stable reference areas must be determined. PEIS, p. 130. In addition, it must be determined what research should be conducted in them, and provisions must be made for facilities, funds and

33. Adopted in part. Chemical communication and sound interference are two other possible impacts from deep seabed mining that have not yet been investigated by NOAA.

The noise associated with the operation of the collector on the seafloor was mentioned in the PEIS (page 93). Additional information on noise in the water column has been added on pages 97-98. The effects of water column noise will be addressed in site-specific EIS's. See Technical Guidance Document, Section 3.4.1.10.

Interference with chemical communication between invertebrates could be one repercussion of mining. The PEIS (page 104) mentions the possible interference of the plume with the chemosensory capabilities which the benthos may have developed to aid in locating the meager food resource on the seafloor. Additional mention has been added to PEIS page 104 as to the possible effect on the chemical communication systems of invertebrates. These concerns were not addressed during Domes, and although NOAA research will investigate benthic and surface plume effects, it may not be able to discern chemical from physical impacts.
scientific and technical personnel for such investigations.

With respect to the selection of suitable areas, a good deal of preparatory work is necessary to answer such questions as:

- how many such areas are needed, how big and what shapes they should be;
- whether they should be contiguous or scattered;
- how important is the need for some protected areas to be adjacent to mined areas (for example, for recolonization by organisms);
- how different special features should be treated, insofar as they are already known, e.g., deep trenches, areas of high volcanism, locations of discontinuities of temperatures and chemical composition, and of concentrations of deep sea organisms; and
- how it can be assured, as far as possible on the basis of existing knowledge, that some of the protected areas are comparable to those for which licenses are issued with respect to nodule distribution and composition, and to ecological, topological and oceanographic features.

C. Size of Areas

Although the details of preferred locations and the choice of the protected areas are primarily scientific questions, the decision regarding the scale of protected areas as a whole is in part a political question. In terms of the prime need to provide a hedge against the unknown, these areas should be as large as possible. We strongly disagree with the suggestion that one well-chosen site might suffice.

34. NOAA appreciates the commentors' views on possible criteria for stable reference areas. The agency recognizes the need to protect the ocean ecology, and particularly any special features, from significant adverse environmental impacts. NOAA's worst case scenario has less than 1.5% of the DOME area affected by deep seabed mining, so that at least 98.5% will be unaffected.
The language of the Act itself supports the notion that more than one stable reference area is to be established. Section 109(f) of the Act states in part:

(f) STABLE REFERENCE AREAS

(1) Within one year after enactment of this Act the Secretary of State shall . . . negotiate with all nations that are identified in such subsection for the purpose of establishing international stable reference areas in which no mining shall take place (emphasis added).

Recognizing the diversity of biological and oceanographic environments existing within different areas of the ocean and the subsequent variations in impact of mining activity, it is reasonable to select areas representative of the diversity of those potential mining sites. If the intent is in fact to use these areas "as a reference zone or zones for purposes of resource evaluation and environmental assessment," the reference should be made to a relatively similar site, if the investigations are to be at all accurate. Therefore the diversity of the actual mining sites must be represented to as great an extent as possible in the reference zone areas. It is on this basis that we believe that a reasonable policy would be that for every area for which a permit or license is issued, an area of equal size be designated for protection. The ultimate result would be that when the international regime is eventually in operation, the amount of area designated for exploration and exploitation, by both the Authority and private industry, would be equal in size to the areas designated for protection.
VII. Reciprocating States Criteria

The regulations continue to be silent on specific criteria for designation of reciprocating state status. The preface to the regulations indicates that NOAA, in conjunction with the State Department, will shortly publish "a set of broad criteria which will guide decisions relating to designations of reciprocating states." Section 119(a)(1) of the Act provides that the Secretary of State may designate a foreign nation as a reciprocating state only if that nation

regulates the conduct of its citizens and other persons subject to its jurisdiction engaged in exploration for, and commercial recovery of, hard mineral resources of the deep seabed in a manner compatible with that provided in this Act and the regulations issued under this Act, which includes adequate measures for the protection of the environment, the conservation of natural resources, and the safety of life and property at sea, and includes effective enforcement provisions.... (emphasis added)

As we have mentioned in our earlier comments on the Advance Notice of Rulemaking, the Administrator of NOAA should look both to the broad purposes in the Act and the general framework already agreed to in the LOS Convention text in developing firm criteria for designation of reciprocating states.
The PEIS does propose a list of criteria (p. 134-135) for RSR status, which, if required, would result in adequate measures for the protection of the environment. If these are suggestive of the sort of "broad" criteria to be issued, then we are supportive of this effort. However, less specific criteria would not be adequate. In our view, standards and criteria must be developed as a high priority and issued in the form of regulations at the earliest possible date, before further negotiations for a reciprocal regime are engaged in. It is not clear whether in "supplementing" these exploration regulations the criteria would actually be promulgated as regulations in and of themselves, as they should be.

We continue to believe that no-state can be designated as "reciprocal" unless it commits itself to the creation of a regulatory program that includes the equivalent of the major features of the U.S. legal regime, which itself has been designed to complement the Convention.

VIII. Manner of Mining - Conservation

We support NOAA's decision to allow selective mining of richer areas only in conjunction with a long-term plan for mining other areas. PEIS, xxii, 132.

We agree that the feasibility of saving manganese nodules of 3-metal operations for future recovery should be studied. PEIS, xxii, 132. We trust the study will be serious. It would

35. Two specific and opposing points of view concerning reciprocating states are expressed in comments on the draft EIS. The American Mining Congress objects that the draft criteria are excessive and suggests that the criteria should be limited to a restatement of Section 118 of the Act. The Center for Law and Social Policy, on the other hand, urges that the criteria include specific regulatory standards mirroring both the U.S. legal regime and the Draft Law of the Sea Convention.

Neither approach is consistent with the Act nor appropriate to reciprocal arrangements. Section 118 permits designation of a reciprocating state if that nation's regulatory program for ocean mining is compatible with the Act and its regulations. In particular, a reciprocating state must have adequate measures to protect the environment, conserve natural resources, ensure safety and provide for effective enforcement. In order to judge compatibility and to guide potential reciprocating states, the Department of State, in consultation with NOAA, must elaborate on the general standards set forth in Section 118.

The factors listed on PEIS page 140 identify those elements of the Act and its regulations which will be taken into account in developing criteria for designating reciprocating states.

Consideration of the draft Law of the Sea Convention as an element of reciprocity reaches beyond the scope of the U.S. legislation. Reciprocity relates to the compatibility of individual domestic seabed mining regulatory programs. Conformity in advance with an unfinished draft international treaty is impossible. If a Law of the Sea Treaty is concluded and the United States signs it, a decision could be made whether and how to conform reciprocal arrangements.

36. Agreed.

37. Agreed.
indeed be foolish to waste that resource now, only to have to increase deepsea or land mining for manganese in ten years.

We also submit, as we have in prior comments, that the government should embark immediately on a national conservation and recycling program for all critical minerals, including cobalt and manganese.

**Conclusion**

These six national environmental organizations have been actively involved in the creation of a sound international legal regime for the oceans since the UNCLOS III negotiations began in 1973. They also have followed closely the course of the U.S. deepsea mining law commenting at every stage of its development and implementation. They view the U.S. law as being one of several **interim** arrangements that must be consistent with the international regime. That view is reflected in the language of the statute, which reflects a carefully crafted compromise.

Given the diversity of interests and complexity of the issues involved in mining of the deep seabed, the development of viable interim arrangements which will result in a workable LOS treaty is a difficult task. It will take a considerable amount of knowledge and skill to devise interim arrangements which will fairly serve all interest groups and, at the same time, provide a system which will realistically promote mining. The task is challenging and, but the success of interim arrangements leading to a viable LOS treaty is important for the preservation of world
peace and security. Thus, we must not find the challenge to be insurmountable. What is required at this time is the application of common sense and good will to achieving the goals that are in all parties' long-term self interest.

We commend NOAA for its work thus far, although as noted above we have a number of specific concerns about the agency's proposals. We look forward to hearing NOAA's response to those concerns, and to working with the agency in the future.
April 3, 1981

Robert W. Knecht
Director
Office of Ocean Minerals and Energy
NOAA
2001 Wisconsin Avenue NW
Room 110
Washington, DC 20235

Dear Mr. Knecht:

Thank you for sending a copy of the Programmatic Environmental Impact Statement (PEIS) for the Deep Seabed Hard Minerals Resources Act. We will work to submit any comments to your office by the May 29, 1981 deadline.

We would like to receive a copy of the final PEIS and regulations later this year.

Sincerely yours,

[Signature]

Thomas J. Jackson
Vice President

1. The Oceanic Society will receive a copy of the final PEIS and regulations.
April 1, 1981

Robert W. Knobloch
Director, Office of Ocean Minerals and Energy, BOMA
2001 Wisconsin Avenue, NW
Room 110
Washington, D.C. 20036

Dear Friend:

Thank you for sending the proposed regulations and draft PEIS required by the Deep Seabed Hard Mineral Resources Act. I have not yet had an opportunity to look over them, but I will keep your deadline of May 29 for comments in mind.

I look forward to the Washington hearing scheduled for May 8. And I would like to be put on the list to receive copies of the final PEIS and regulations. Thank you very much.

Sincerely,

Carl Semler

The Friends Committee on National Legislation will receive a copy of the final PEIS and regulations.
April 30, 1981

Mr. Robert W. Knecht, Director
Office of Ocean Minerals and Energy
National Oceanic and Atmospheric Administration
2001 Wisconsin Ave., N.W.
Washington, D.C. 20235

Dear Bob:

I have reviewed the draft PEIS and ocean mining regulation procedure. It is an excellent job and reflects favorably on you and your team. Please send me copies of the final PEIS and regulations when completed.

Sincerely,

[Signature]

John E. Flipse, P.E.
Professor
Ocean & Civil Engineering

Texas A&M University

1. Texas A&M will receive a copy of the final PEIS and regulations.
Mr. Robert W. Knecht  
Director  
Office of Ocean Minerals and Energy  
2001 Wisconsin Avenue, N.W.  
Room 410  
Washington, D.C. 20235

Dear Mr. Knecht:

I do not remotely have either the time or the financial resources to carefully and constructively critique the draft Programmatic Environmental Impact Statement for the Deep Seabed Hard Mineral Resources Act.

Sincerely,

Howard Sanders  
Senior Scientist

1. Agreed.
University of Hawaii at Manoa

Environmental Center
Crawford 317 - 2530 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 944-7661

Office of the Director

Mr. Robert W. Knecht
Office of Ocean Minerals and Energy
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
Washington, D.C. 20230

Dear Mr. Knecht:

Draft Environmental Impact Statement
Deep Seabed Mining

The Environmental Center of the University of Hawaii has solicited comments on the Draft Programmatic Environmental Impact Statement for the Proposed Deep Seabed Mining Program from the following members of the University community: Keith Kave, Oceanography Department; Jacqueline Miller, Alexis Cheong Linder, and Garrett Kawamura, Environmental Center. In general our reviewers have found that the EIS adequately recognizes the potential impacts, the lack of available information, and the needs and requirements for future study and monitoring.

The following questions and comments have been brought to our attention and are hereby submitted for your consideration in the final EIS:

1. Adopted. The estimate of the economic value of the commercial fisheries given in the PEIS is for the DOMES area. Appropriate wording has been added on PEIS page 52 to clarify this.

2. Agreed. Research conducted in association with future exploration will be designed to provide this information. Model development should yield predictions on sedimentation rates; test monitoring will lead to an understanding of the effect of the sedimentation. See Technical Guidance Document, Sections 2.3.2.3, 2.3.2.4, 2.3.2.5, and 3.4.2.4.

3. Not adopted. The PEIS (page 228) predicts that about 250 MT (dry wt.) of abraded nodule fines may be lost overboard daily by a 5000 MT (dry wt.) hydraulic production unit. It would be unreasonable to require the retention of all of this material on the ship; rather to the extent "practicable and necessary" (PEIS page 88). The material has commercial value, hence industry may want to separate it from the bottom sediment, within reason, prior to discharge. The ratio of fines lost to nodules mined, as indicated on page 228, is about one to 30.

4. See response to CLASP comment #3. NOAA’s recent literature review indicates that the likelihood of zooplankton accumulating trace metals substantially above natural concentrations is low (see PEIS pages 87-88). NOAA plans research (National Oceanic and Atmospheric Administration, 1981a) on the subject; if it is inconclusive, a combination of monitoring and shipboard and laboratory experimentation during mining system tests may be necessary to assess fully this potential concern. See also Technical Guidance Document, Sections 2.3.1.4, 3.4.1.4, 3.4.1.6, 3.4.1.7, and 3.4.1.8.

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of suitable data." We concur with the statement by Hirota (1981) that the most reasonable approach to the present status of the problem is to conduct extensive monitoring. Theoretical studies on the incorporation of trace metals into benthic tissue of zooplankton and their predators will generate an educated guess as to impacts on organisms utilized for human consumption.

(Please 155) Because the constituents in the waste stream will differ between three and four metal plants for each of the processing techniques and for significant variation within a given technique, it is difficult to assess the impacts of waste stream disposal. Attention should be given to estimating the quality and quantity of generated wastes for each type of processing method. Recommendations for the most appropriate disposal method should also be included. Specific anticipated effects due to waste stream generation and disposal will (hopefully) be incorporated into site specific EIS.

We appreciate the opportunity to have reviewed this document and look forward to your response.

Sincerely,

Diane C. Drigot, Ph.D.
Acting Director

Office of Environmental Quality Control
Keith Chave
Jacquelin Miller
Alexis Cheong Linder
Garret Kawamura

University of Hawaii at Manoa

5. Agreed. Site-specific EISs will address these issues in detail.
May 28, 1981

Comments of American Mining Congress (AMC) on the Draft Programmatic Environmental Impact Statement for Deep Seabed Mining

The American Mining Congress ("AMC") respectfully submits these comments in response to your letter providing us the opportunity to review and comment on the Draft Programmatic Environmental Impact Statement ("D/PEIS").

At the outset, we would like to compliment you and your staff for the extremely professional job you have done in shaping a useful and concise document which covers such a large and relatively undefined new undertaking and new industry.

Our comments are divided into two sections. The first deals with the D/PEIS as it serves to support the proposed rules for Deep Seabed Mining Regulations for Exploration Licenses, published in the Federal Register on March 24, 1981 (46 Fed. Reg. 18448). The second section focuses on the D/PEIS as it functions to set forth and analyze the impacts and parameters of the National Oceanic and Atmospheric Administration's ("NOAA") responsibilities under the Deep Seabed Hard Mineral Resources Act ("the Act") in accordance with the requirements of the Council on Environmental Quality's ("CEQ") regulations on preparation and processing of environmental impact statements.
A. D/PEIS AS A FOUNDATION FOR REGULATIONS


   The stated purposes and needs for the PEIS include number (3), "to operate in concert with the regulations as a legal regime to guide the industry."

   We believe that this statement as to the purpose or function of the PEIS is incorrect; the PEIS does not and should not operate as a "legal regime." The PEIS includes an assessment of the environmental impacts, if any, of the regulations, but it does not have the force and effect of law. It is intended only as an analytical document to assure that certain factors required by law be considered; in essence it serves as a decision-making tool.


   Despite the statement in the Introduction that "[t]his PEIS covers the adoption of the Regulations called for by the Act," there is very little in the D/PEIS that either provides a basis for, or is focused upon, the regulations. We do not think this is an error or an omission. Rather, we believe that this is because the draft Regulations are focused primarily on the exploration license phase and thus are, properly, primarily procedural in nature and will not result in environmental impacts. Therefore, there are few, if any, environmental impacts from the proposed Regulations to be assessed in the PEIS.

1. Adopted. See revised language on PEIS page 3 concerning the scope and purpose of the PEIS with regard to the regulations.

2. Adopted in part. A reference to the adopted regulations is included on PEIS page 10. See also response #1.
We suggest that a statement to this effect be inserted in the text so as to clarify the reason for the minimal analysis of the Regulations found in the D/PEIS. Language such as the following might be inserted at I.O.I. 1st paragraph, 2nd sentence:

"... A notice of proposed rulemaking dealing with the requirements and procedures pertaining to exploration licenses accompanies this programmatic environmental statement. Since the proposed regulations cover only the exploratory, or first phase, of deep seabed mining and since the Regulations are procedural in nature, little environmental impact is anticipated to result from their adoption or requirements. This PEIS does assess the environmental impact of the exploratory phase of deep seabed mining as it is expected to be conducted in accordance with the proposed Regulations within the Domes area."

B. D/PEIS AS A DOCUMENT SATISFYING THE ACT AND NEPA REQUIREMENTS

Comments Relating to Policy and Law

1. Executive Summary, Table 1, p. xix.

Two of the mitigation strategies listed here are not feasible using any projected technology. It will not be possible to retain all the fine particles aboard the mining vessel or to restrict the distribution of benthic fines to the mine site, especially when mining near mine-site boundaries. These examples should be eliminated.


NOAA should insert a statement that resource conservation considerations must be balanced with environmental considerations before any restrictions on mining patterns are considered.

3. Adopted in part. These examples of possible mitigation measures are retained to show that even in the event of a finding of significant adverse impact, that mitigation measures are available so that mining may proceed nevertheless.

Restricting the benthic fines to the mine site was an example of an extreme case. It has been deleted, and replaced by control of dispersion of fines (PEIS page 107) which can involve either concentration or dispersion of fines over a large area. Research will examine significance of blanketing of benthic fauna and dilution of food supply away from mine site subareas, and which approach is less damaging to the environment. See response #9 to CLASP. As to retention of nodule fines, see response #3, University of Hawaii.

4. Adopted. The language has been added to PEIS page 136.

The PEIS should specifically reference the DOMES studies and other studies utilized in preparation of the PEIS, state that copies of these studies are available, and provide information regarding where copies of such studies may be obtained.

4. II.C.2, "Effects With Potential for Significant or Adverse Impacts," p. 91 et seq.

NOAA should clearly distinguish between major equipment testing activities and other activities carried out during the license phase throughout the D/PEIS as it has done in Appendix 3.4.1. This distinction is essential. It is not adhered to throughout the D/PEIS, with resulting vagueness and confusion.

Activities, other than major equipment testing activities, associated with exploration have been determined by NOAA to have no potential for significant environmental impact (III.C.3). Discussion in section II.C.2 is concerned with the four adverse effects of deep seabed mixing that may occur during major equipment testing and permit phase operations. The fact that the four concerns are not applicable to other exploration activities is not clearly stated. This causes confusion. To alleviate the confusion, the following should be inserted at p. 92, paragraph 1, 2nd sentence:

"These effects were determined to have no potential for significant environmental impact during exploration activities of the license phase. Thus, each subsection discusses a concern in terms of major equipment testing activities in the license phase and the permit phase."

5. Agreed - Specific references to the DOMES and other studies utilized in the preparation of the PEIS are found in the text of the PEIS and in Appendix I, pages 201-206. Most references are available from the National Technical Information Service (NTIS), Springfield, Virginia. The NTIS number, when known, is listed with the reference.

6. Adopted. The comment on license phase pre-testing activities has been added to the beginning of PEIS Section II.C.2. The Technical Guidance Document also clarifies this in Section 1.
At II.C.2.1, p. 93, last paragraph, line 1, the terminology is not consistent with that defined in Appendix 3.4.1, and exacerbates the confusion between major equipment testing and other exploration activities. "Exploration phase" should be changed to "major equipment testing phase."

At II.C.2.2, p. 98, paragraph 3, line 1, the distinction between major equipment testing and other exploration activities is again missing. We suggest that "of major equipment testing activities" be inserted after "Monitoring" to clarify this.

At II.C.2.4, p. 102, paragraph 1, line 1, "exploration phase tests" should be revised to read "license phase major equipment tests."

At II.C.2.4.1, p. 105, the list of "characteristics of relevance" is an encyclopedic shopping list. It simply reiterates the major areas of the Domes project, without any attempt to determine which are relevant to monitoring environmental impacts of ocean mining. The information requirements discussed in this section should focus upon those natural processes which may be impacted by regulated activities. Measurement of any particular quantity should be limited and defined by the specific anticipated impact.

5. II.C.2.4., "Surface Plume Effect on Fish Larvae--Mitigation--Permit Phase," p. 102.

The discussion of possible mitigation measures during the permit phase focuses on only one potential effect. All potential
impacts of proposed mitigation measures must be considered in the PEIS. The specifically recommended mitigation measure contra­dicts results described on p. 117 of the D/PEIS. We suggest that the last paragraph be revised as follows:

"However, deep discharge introduces effluent directly into a poorly understood portion of the water column. Any mitigation measures must be determined after consideration of all potential impacts of the proposed measures. In this case, it is imperative to consider that flocculation may increase sedimentation rates, decreasing residence time in the water column. Physical conditions which enhance flocculation are of greater significance in the mixed layer than in deep water. Thus, some impact of the surface plume on larval forms may be acceptable and more than offset by the more rapid removal of particulate material from the water column associated with a surface discharge."

6 II.D.1. "Environmental Monitoring." paragraph 1, p. 128.

Most of the monitoring techniques used during the DOMES project were conventional sampling schemes. Some of the DOMES techniques have been acknowledged to be less reliable than other methods not used, e.g., infauna sampling, water column trace metal analysis, ichthyoplankton sampling. The lack of understanding about deep-sea ecosystems is largely the result of the difficulty in sampling the regime. Just in the past two years, major advances have been made in sampling techniques. It would be incompatible with the basic concept of environmental protection not to take advantage of future developments which will permit greater understanding of the environment to be obtained more efficiently. Specific recommendations of methodology are appropriate for the technical guidance package. We suggest that the following be inserted after the second sentence:

9. Adopted in part. The language on PEIS page 109 has been revised to clarify that prior to any possible requirement for sub-surface discharge, the impacts of such a measure must be examined. We acknowledge that if flocculation is found to be enhanced in the mixed layer, compared to the level at which sub-surface discharge might occur, the resultant decreased residence time in the water column could offset some impact on larvae in the mixed layer. The tradeoffs must be assessed.

10. Agreed. The Technical Guidance Document identifies the parameters suggested to be monitored and their relevance to environmental concerns. It welcomes state of the art measures to monitor most reliably the effects of deep seabed mining. These are to be suggested by industry and reviewed by NOAA to assure their completeness, accuracy, and statistical reliability.
"The intent of the monitoring program is to maintain reliable knowledge concerning functioning of the ecosystem. Techniques used for monitoring should only be employed to directly assess the identified environmental concerns and should never be encyclopedic data collection efforts."


AMC disagrees with the characterization of the alternatives contained in the draft PEIS regarding reciprocal states criteria. Alternative 1 specifies no criteria and Alternative 2 specifies excessive criteria. Neither is consistent with the intent of the legislation.

Many of the 14 criteria (a-n) contained in the draft PEIS include criteria not specifically included in section 118 of the Act. The effect of including all 14 criteria in a reciprocal states regime would violate statutory intent by requiring that, to be recognized as a reciprocal state, a foreign nation would not only be required to comply with section 118 of the Act, but with many of the Act's other provisions which were intended only for implementation by the United States of its legislation.

Furthermore, should the United States insist upon the inclusion of such criteria in a reciprocal states regime, the effect would undoubtedly be either (1) to prevent the successful conclusion of ongoing negotiations directed towards formulating a reciprocal states regime, or (2) to delay the conclusion of those negotiations for as much as four years.

11. See response to Center for Law and Social Policy comment #11.
The Act specifically contemplates that NOAA will be ready to receive and process applications by U.S. citizens for exploration licenses by no later than January of 1982. The attainment of this statutory mandate would be frustrated by the attempted negotiation of such an elaborate reciprocating states regime.

Accordingly, it is recommended that the final PEIS be revised to include a middle-ground alternative which tracks the limited criteria specified as necessary for a reciprocating states regime contained in section 118(a) of the Act. Such an alternative would not only be preferable to the two alternatives contained in the present draft PEIS (neither of which is consistent with the statutory intent), but would, in fact, exemplify the precise intent of the Congress regarding the establishment of a reciprocating states regime.


In discussing the three alternative roles which the Agency might undertake in permitting onshore activities, NOAA eliminates Alternative 1, no involvement, rejects Alternative 3, one-stop permitting, and chooses Alternative 2, informal involvement. We agree that the Agency is not authorized to pursue Alternative 3, nor would it be particularly useful to do so, but think that another alternative exists which falls between Alternatives 2 and 3, which the Agency could implement and which would promote the success of the program. This alternative is for NOAA to act as

12. Adopted in part. In considering NOAA's role in permitting onshore activities, NOAA considered three alternatives - essentially no involvement, consolidated authority, and a "middle ground" approach with NOAA as lead agency. Intermediates among the alternatives could have been developed, but would have contributed little. The large and variable number of permits, numerous federal agencies, and complex and sensitive federal-state-local relations involved (Tables 19 and 20) require a flexible and somewhat informal arrangement (as NOAA has recommended) or an intricate and detailed matrix of quasi-legal relationships (which NOAA feels is premature and could needlessly delay program implementation).

Therefore, NOAA continues to feel that the informal "lead agency" concept is preferable, and that precise agency roles and degree of "facilitation" or "expedition" will evolve as the program develops and more detailed and site-specific information becomes available. NOAA's role to date can be characterized as "active facilitation," and it is our current intent to continue to play this role within the context of NOAA and other agency and governments' authority. Active expedition is quite feasible in the context of lead agency and informal facilitation. In fact, some observers would be hard pressed to tell the difference.
an active expediter in the permitting process. In this capacity, the Agency can give more emphasis to coordinating, to the maximum extent possible, permits issued by other agencies, and can endeavor to ensure that these permits are issued within the time frames established by the Act.


Tables 19 and 20 contain lists of agencies and statutes which NOAA foresees will be affected by activities associated with at-sea and on-land aspects of deep seabed mining.

We hope, if there are other agencies or statutes which would be involved, that the implementing agencies will add their names to these lists so that, when the PEIS is final, the list will be comprehensive.

Factual and Technical Comments

1. Executive Summary, p. xiii, paragraph 3, 2nd sentence.

The date for the first issuance of exploration licenses should be corrected to read "July 1, 1981."

2. Executive Summary, p. xvii, paragraph 9, 2nd sentence.

In view of the many uncertainties documented in this D/PEIS, we recommend that "Collector action will result in adverse environmental impacts . . . " be changed to "Collector action may result . . . ."
3. Executive Summary, p. xviii, cont. paragraph, 5th sentence.

The sentence which begins "Most animals are minute detritus feeders..." is true only if micro-fauna are excepted and if the meaning of "most" is determined by the counts of individual organisms. The sentence is almost certainly false if biomass is used as the quantifier. This distinction should be made clear or the sentence should be deleted.

16. Adopted. Appropriate change has been made on PEIS page xviii.

17. Not adopted. PEIS Figure 12 is not an example of a generalized marine detrital food chain. It is representative of the detrital food chain principle and applies to all the detrital systems mentioned on PEIS pages 47-51.

18. Agreed. Performance standards are preferable, wherever possible, as discussed in PEIS Section II.C.4.

19. Adopted. This notion has been added to PEIS page 107.


As discussed above, retention of module fines aboard the mining ship will not be "practicable" and should not be considered.


The example given of rapid build-up of copper in tissues of zooplankton in the surface plume is such a remote possibility as to be misleading. It should be deleted. We also suggest that the paragraph be revised to state that research efforts will be focused on determining appropriate mitigation measures to alleviate any unexpected significant adverse effects and that monitoring plans also will be adjusted as appropriate.

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The AMC appreciates this opportunity to comment on the D/PEIS. If there are any questions about our comments, or if we can be of further assistance, please do not hesitate to contact us.

Marne A. Dubs
Co-Chairman
Undersea Mineral Resources Committee


22. Adopted. See new example of a remote possibility that could lead to a suspension of operations (PEIS, page 115).

23. Agreed. PEIS Figure 22 and the final two sentences of the last paragraph on PEIS page 115 already say this.
29 May 1981

Mr. Robert W. Knecht
Director
Office of Ocean Minerals and Energy
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
2001 Wisconsin Avenue, N.W., Room 410
Washington, D.C. 20235

Re: Comments on Draft Programmatic Environmental Impact Statement and Preliminary Regulatory Impact Analysis

Dear Mr. Knecht:

Ocean Mining Associates endorses the American Mining Congress (AMC) comments on the above-referenced documents, which comments have been submitted to NOAA simultaneously with the AMC comments on the Proposed Deep Seabed Mining Regulations.

Respectfully,

[Signature]

Richard J. Greenwald
General Counsel and Secretary

RJG:dsf
Dear Mr. Knecht,

I would appreciate receiving a copy of the final PEIS and regulation. Also, your placing my name on your mailing list will be appreciated in view of my active role in ocean mining technology developments and my teaching of a graduate course on ocean mining technology at Colorado School of Mines.

Regarding the Draft Report of March 1981, I read that this Report restricts itself to "exploration" only. If so, I would not have further comments, and your Report is rather comprehensive.

However, if this Report cover ocean mining systems and operations, I would like to provide comments to you on Chapter III. Some technical statements and system descriptions in Chapter III may not be agreeable for the commercial systems. But my detailed technical comments for the commercial systems may not be needed at this time, since this Report would apply to "exploration" only.

My general impression is that "Deep Seabed Mining" means manganese-nodule mining from the ocean and that borehole mining underwater is not implied. Currently, a few countries have been conducting underwater borehole mining nearshore. For the future planning purpose, however, it may be worth looking at such mining when completing this Report.

Thank you.

Sincerely yours,

Jin S. Chung, Professor
Technical Editor

The American Society of Mechanical Engineers
May 27, 1981

Mr. Robert W. Knecht, Director
Office of Ocean Minerals and Energy
National Oceanic and Atmospheric Administration
2001 Wisconsin Avenue, N.W., Room 410
Washington, D.C. 20235

Dear Mr. Knecht:

I am pleased to provide the following comments on NOAA's Draft Programmatic Environmental Impact Statement (PEIS) on Deep Seabed Mining. These comments are offered from the perspective of a long-time interest in seeing an American nodule mining industry developed. I think this industry can contribute significantly to the future economy and security of our country.

I served as a member of the American Mining Congress Undersea Ocean Resources Committee and its Ad Hoc Working Group on Environmental Matters from 1974 to retirement in 1980. Since retirement, I have been acting as a part-time consultant to the Department of Planning and Economic Development (DPED), primarily concerned with identifying the infrastructure requirements of potential processing operations in Hawaii. The comments below are offered from the standpoint of a concerned individual, rather than as a representative of the DPED.

My comments are directed toward that part of the PEIS having to do with the onshore processing of manganese nodules. In my opinion, this portion of the PEIS is deficient in several areas that may create future problems for the establishment of an American-based processing facility. Based on private communications with industry during my Hawaiian Infrastructure study, I believe that the scenario presented as most likely in the PEIS would not be adopted by industry. It is unlikely that industry will choose slurry unloading, pipeline transport to a distant plant site, stockpiling of nodules in ponds, rail delivery of coal and other process materials with separate unloading and stockpiling facilities, and the ponding of tailings. These concepts are basically inefficient from an energy and capital utilization standpoint. They also do not recognize the state of the art in several areas of material handling and tailing disposal.

My comments are addressed specifically to Part III, beginning on page 145.

III.A.1. Port Terminal Facilities. A marine terminal required for nodule receiving would give the operator an opportunity to gain the economy of barge or ship delivery of coal, coke, limestone and other bulk materials. The nodules would be largely freed of surface moisture during transport to port. They would thus be amenable to dry-bulk unloading by clamshell or bucket unloaders and conveying to the plant site. All other bulk materials would be handled by the same system. If surge storage were necessary, it could be used for any of the bulk materials. Stockpiling at
the plant would follow the conventional practice of using rail-mounted stacker reclaimers to deliver the materials to the plant. The nodules would gain the advantage of maximum drainage of surface water, probably reaching the 4% level indicated in the EIC studies.

Clamshell handling of nodules is proposed by EIC in their "Material Handling" drawing for each process published in the Dames and Moore report. These drawings show recovery of nodules from a pond to a conveyor bin and on to the cage mill crusher holding bin. By doing this at the port, one can eliminate ponds, pipelines, and conveyors, and use one system for all materials.

The shipment of products by ocean freight, especially to overseas destinations, is a desirable complement or alternative to rail freight.

The slurry transport study in Dames and Moore, Vol. II, 4.6.1.2, Design Assumptions includes grinding at the port area to minus 200 mesh. None of the FES slurry port diagrams indicate a grinding section. Nowhere in the FES study is the inconsistency between delivery of a minus 200 mesh to the plant and the proposed ore preparation for each process in Vol. III rationalized. A minus 200 mesh slurry would require extensive thickening and filtration steps to reach proper pulp density for processing.

III.A.3. Port to Plant Transport. It is difficult to visualize a major operator investing hundreds of millions of dollars in a plant located 10 or more miles from a port. Based on transportation studies for Fuel Gas Desulfurization sludges by the U.S. Department of Energy (DOE), a plant located 10 miles from the port would have internal transport costs on the order of $100 per ton of product for a three-metal plant. This would be far too expensive an intolerable erosion of the operating margin.

There appear to be several plant sites available in each general area where the port and plant can be adjacent or not more than two miles apart.

III.A.3. Nodule Processing Plant. The concept of clamshelling nodules from storage pockets into hoppers over a conveyor belt to a cage mill feed bin, is practical for coarse nodules "as received" on the transport ship. Even these nodules would have a substantial slime buildup that would require special handling or have to be discarded to tails. It would be impossible to recover minus 200 mesh material by clamshell.

If slurry delivery of "as received" nodules were mandatory, it would be more practical to dewater by screens as received, and stockpile in a conventional manner to achieve maximum drainage before processing.

The proposed one-third throughput level of a four-metal pyrometallurgical plant is uneconomical and does not reflect the intent of those potential operators interested in the pyrometallurgical approach. The operator has the obvious option of making high manganese from all or a part of the slag to meet his perceived share of the market level. He would not reduce his capability to produce the more valuable non-ferrous metals—nickel, copper, and cobalt.


4. Agreed. In a site-specific situation ocean freight could be important for transporting products.

5. Not adopted. The Dames and Moore reference assumes grinding at port if a slurry system is to be used to transport the nodules to a processing plant. PEIS Table 28 indicates that grinding (wherever it is done) is likely to be the first step in processing.

6. Not adopted. Coastal Zone regulatory and attitudinal concerns are the driving forces for considering inland plant locations. The public workshops noted in response 1 endorsed the concept of plants being located anywhere from shoreside to 50 miles inland. Site-specific conditions will dictate the practicability of this range.

7. Adopted. This has been added to PEIS page 159.

8. Adopted. This has been added to PEIS page 159.

9. Agreed. Whereas PEIS Table 16 attempts to present the entire range of possibilities on a single page, your specific point is addressed on page 244.
It is likely that by 1988, U.S. imports of ferromanganese will continue to increase to a level sufficient to absorb the total production of one or more pyrometallurgical plants. (See GAO Report H12597) It was not noted in the EIC studies, but the nickel-copper-cobalt matte produced by a pyrometallurgical plant is a transportable, salable product in world markets. It is interesting to note that a recent DOE study indicates pyrometallurgy has distinct energy advantages over hydrometallurgy in copper production.

Power requirements for the processes are greater than the power that can be generated internally from process steam and waste heat. The assumption that this can or would be purchased from a local utility assumes that the cost of purchased power will be less than adding internal generating capacity. Under present circumstances it appears that economies would favor internal generation. Alternatively, a cooperative effort outside of regulated utility energy production might be arranged.

HIA.3.1 Construction. The cost projection of $500 million for a three-metal processing plant appears to be a more realistic figure than in the previous MIT estimate. It would be interesting to cite the make-up of this figure.

HIA.4 Disposal of Nodule Processing Wastes. This section is the most potentially harmful in the PEIS. The facts are that NOAA has no in-house knowledge of the physical or chemical characteristics of either nodules or tailings. The interagency study referred to, using the only competent agency, the U.S. Bureau of Mines, should have been instituted several years ago. Last year, industry had it clear that NOAA's lack of capability to even analyze tailings was a major impediment to industry supplying NOAA with tailings research materials.

It is generally known that as each private consortium carries out process research studies, their work includes a careful review of the potential emissions and effluents, including liquid and solid phase tailings. One purpose of such reviews is to determine if wastes can be disposed of in a manner consistent with the legal and social requirements, including reuse. Thus, it can be said that much is known about tailings as is known about processes. While NOAA admits to a lack of knowledge about tailings, its contractor, EIC Corporation, has published pages of tables and narrative covering physical, chemical, and qualitative information concerning tailings from each process investigated. EIC could probably have done better if it had the interagency findings to work with.

The studies which have been underway at the University of Hawaii for potential agricultural uses of OMCO tailings should have indicated to NOAA that pyrometallurgical tailings are not likely to be totally refractory to normal handling.

Based on process descriptions and industry experience, it appears reasonable to believe that nodule tailings will resemble tailings from similar pyrometallurgical processes. They will be similar in slurry and have comparable amounts ofcolloidal material and similar trace element consist. They will have been washed and in most cases steam stripped before being released. They will be buffered to reduce excess acidity.

10. Agreed. NOAA's long term interest in manganese is reflected in the discussion on PEIS pages 137-139.

11. Not adopted. Studies of traditional copper ores are not relevant to manganese nodules. NOAA's energy study (PEIS page 285) revealed the pyrometallurgical approach to nodule processing to be more energy intensive than the other approaches examined.

12. Not adopted. This is probably true with respect to operating costs, but not from the standpoint of return on invested capital.

13. Adopted. When complete and published, the MIT study will offer additional details on this cost estimate, but it consists basically of plant equipment ($300 million), utilities ($90 million), and buildings, site preparation, and land ($50 million).

14. Agreed. Therefore NOAA has relied heavily, for this capability, on the U.S. Bureau of Mines and Geological Survey for advice on statement of work for requests for proposals, source evaluation boards for selection of contracts, and contract progress reviews.

15. Agreed. The contractor study was conducted in the mid 1970's whereas the interagency group was not created until 1980.

16. Agreed. This is stated on PEIS page 248. Nevertheless, when dealing at the generic level, it seems prudent to introduce the possibility of producing hydrolic slimes.
Millions of tons of tailings are handled daily in the U.S. By use of the thickened discharge method, hydro cycloning or impounding in levees in flat country using the DREW technique (decanalation, drainage and evaporation of water), the tailings are stabilized internally and the surface is stabilized by vegetation. It should be noted that the laterite tailings at Greenvale, Queensland are being successfully handled in this manner. Tailings deposited under water also stabilize and become very dense, as do tailings deposits in tropical areas of high rainfall. The unfortunate fact is that neither NOAA nor its contractors have made a serious effort to study the procedures used by the mineral industry in tailings disposal.

I would also like to comment on the failure to correct tables, particularly in Appendix 3, to include Hawaii. Hawaii has had an active program for node development for many years. Since 1975, the state has been particularly active in the study of potential processing sites. It has been inspected by various consortia and two have identified Hawaii as a prime contender for a plant. Hawaii has obtained the active interest of its political leaders in this program. Its congressional delegation was active in promotion of ocean mining. Your PEIS is being drafted pursuant to national deepsea mining legislation introduced and led to passage by Hawaii Senator Matsunaga. Your calculations are for processing sites in Southern California, the Pacific Northwest, and Central Texas. omission of Hawaii seems extraordinarily insensitive to this state.

Conclusion

If NOAA is to function effectively as a lead agency in offshore matters, it is essential that it acquire in-house competence in the mineral industry. Of the 29 preparers of the draft PEIS, only one, Mr. Packer, is a member of the Society of Mining Engineers. It seems that many of the deficiencies in this PEIS are due to the method of selecting contractors and preparing the scope of work. The lack of even minimal industry background in the agency denies the contractor the knowledgeable client he needs to do good work.

Very truly yours,
Raymond W. Jenkins

17. Incorrect. As discussed on PEIS page xxv, NOAA, EPA, the Fish and Wildlife Service, and the Bureau of Mines have initiated research aimed at characterizing wastes likely to result from the processing techniques now under development and assessing onshore and ocean disposal of the wastes.

18. Omission corrected. Funds were limited for this mid-1970's study. NOAA commends the state of Hawaii for a forward looking program concerning deep seabed mining for manganese nodules. Hawaii has been added on PEIS page xxv.

19. Two mining engineers were among the preparers of the PEIS: Dr. Cruickshank and Mr. Padan (who managed the effort).