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Project Number 1703

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Reference: CLEAN Contract No. N62472-90-D-1298
Contract Task Order No. 0173

Subject: Draft Responses to Comments to the Draft Final Work Plan and Addenda for Ecological Risk Assessment at Navy Sites, Naval Education & Training Center, Newport Rhode Island

Dear Ms. Carlson:

Enclosed are responses to the EPA comments which we received from your office on May 6 and May 9, 1995. As I mentioned last week, we were not able to deliver these responses earlier for your internal review. I apologize for the lateness of this deliverable, and I hope that it does not cause any regulatory repercussions.

If you have any questions or comments regarding this material, please do not hesitate to contact me.

Very truly yours,

Stephen S. Parker
Project Manager

SSP/gmd

Enclosure

c: B. Wheeler, NETC Newport (w/enc.)
J. Quinn, URI GSO (w/enc.)
J. Trepanowski/M. Turco, HNUS (w/enc.)
File 1703-3.2 (w/o enc.)

6/1/95 cc: PROJECT FILE
CODE 1822/TB
CODE 1831/SH

1622

RESPONSE TO COMMENTS
REVIEW OF THE NAVY'S DRAFT FINAL WORK/QUALITY ASSURANCE PLAN
FOR THE NARRAGANSETT BAY ECORISK AND MONITORING FOR NAVY SITES
DATED MARCH 24, 1995

Comment: No. 1

Generally, the work plan has shown improvement over previous versions. However, it is unclear to us why an approach to present uncertainties in the ecological risk assessment as recommended by EPA's revised Table of Contents (faxed on March 3, 1995) was not included. Uncertainty is an inherent aspect of risk assessment. This issue is discussed further in Attachment A.

Response:

EPA's desire for the work plan to include discussion of uncertainty was not overlooked. Specific discussion of the approach for assessing uncertainty was included in the Exposure, Effects and Risk Assessment Sections of the Master Work Plan, although not in separate subsections as indicated in EPA's outline. The Navy did however, include subsections for discussion of uncertainty in its site specific report format (see Table 6-2 of Master Work Plan), which re-affirms the Navy's concurrence that an evaluation of risk uncertainty is critical to the risk assessment. Thus, revision to the Master Work plan based on EPA's comment are not planned at this time.

Comment No. 2:

The work plan should include a preliminary list of contaminants of concern ("COCs") for each site. While EPA agrees that the final list of COCs should be jointly developed with all involved parties, a preliminary list of COCs will assist us in deciding whether the tests proposed are appropriate. Additionally, since the list of COCs will be different for each site, the work plan should adjust each COC list to site conditions.

Response:

The general work plan should not include a preliminary list of contaminants of concern (COCs), but a list should be included in each Addendum for a specific site. The Navy concurs that a preliminary site-specific COC list should be included in each site-specific work plan. A list was included in the plan for McAllister Point (Addendum A) as shown in Tables A2-1 to A2-4. Lists for Derecktor Shipyard (Addendum B) and Old Fire Fighting Training Area (Addendum C) will be included in the Draft Final Work Plans for these sites.

ATTACHMENT A

Comment No. 3:

p. 14, 2nd paragraph - Explain the rationale for conducting an analysis of "pathogens associated with sanitary services." Additionally, subsequent sections where pathogens are mentioned should cite studies that support their use in ecological risk assessment.

Response:

The pertinent paragraph in the Master Work Plan (Section 2.1.2.1., p. 14) reads as follows: "Other potential stressors pertinent to these assessments include nutrients and pathogens associated with sanitary services for the towns of Middletown, Portsmouth, and Newport, RI. Like classical chemical contaminants, nutrients undergo transport, transformation, and fate processes which affect their

ultimate availability to biological systems. Water column concentrations of nutrients are of primary concern in aquatic systems. A typical direct response to alterations in the availability of nutrients is a shift in plant species' abundances. Indirect effects may ramify throughout consumer trophic levels, resulting in changes to overall community structure and ecosystem function. Sources of these stressors are also expected to be sources for the more conventional chemical contaminants." The above text will be expanded to indicate that the rationale for conducting an analysis of pathogens is as an integrated indicator of nutrient-related stress as well as an indicator of the potential importance of those sanitary services as transporters of contaminants of concern to the area of study.

The use of pathogen data in ERA's is not wide spread. Pathogen data was used in the Phase I Risk Assessment Pilot Study (Munns et al., 1991). This reference will be included in the appropriate places.

Comment No. 4:

p.34, Section 3.6.5.1, 2nd paragraph - There should be a discussion of the potential limitations of the vacuum technique for extraction of pore water from whole sediment. (Please note that the correct citation is "Winger and Lasier, 1991.") Some pore water vacuum extraction techniques are limited. To relate pore water and sediment data, semivolatile organics and metals and their partitioning/volatility between solid and aqueous phases must be measured. Applying a vacuum to the sample could alter the thermodynamics of partitioning (or the volatility) of any polycyclic aromatic hydrocarbon ("PAH") during extraction. The vacuum technique could also alter the oxidation-reduction status of the sample should active aeration occur during application or release of the vacuum. The report should address how this affects the results.

Response:

The following discussion will be added to Section 3.6.5.1. of the Master Work Plan to address EPA's concerns:

> "A change in the redox state of sediment samples caused by exposure to oxygen is likely to free some sulfide bound divalent metals (Cd, Cu, Pb, Ni, Zn, and Fe) and increase the concentrations of these metal species in pore water samples. A study by Howard and Evans (1993) indicates that the acid volatile sulfide (AVS) concentrations of samples exposed to air upon collection is ~20% of the AVS concentrations of the same samples handled in a nitrogen atmosphere. This decrease is caused by both the loss of H_2S gas and dissolution of solid-phase sulfides upon exposure to oxygen. In this study, the samples will be composited and stirred vigorously in a bucket for one minute to homogenize them prior to subsampling for AVS and pore water toxicity. In the laboratory, the vacuum extraction method of Winger and Lasier, (1991) is used, wherein porewater is removed from sediments with minimal aerial exposure. This method has been found to produce samples of similar toxicity as that of other porewater extraction techniques (Carr and Chapman, 1995). Subsequently, samples are filtered through 0.45 um filtration apparatus for both porewater toxicity and metals chemistry analysis. Although filtration is not necessary for toxicity evaluation, it is performed to maintain comparability with the processing required for metals analysis (because of potential sediment interference in the dissolved phase measurement). Similarly, the loss of AVS during the press sieving of bulk sediments for toxicity testing is also likely. Hence, the laboratory sediment processing procedures cause aerial exposure and a loss of sulfides, although the magnitude of this effect has not been quantified."
>
> "Therefore, pore water metal concentrations in both bulk sediments and in extracted pore waters are likely to increase due to dissolution of solid-phase sulfides during sample handling in the field and in the laboratory. The results produced will be more conservative indicators of potential trace metal toxicity problems than results obtained from an alternate method whereby samples are not exposed to oxygen."

"Pore water toxicity and simultaneously extracted metal (SEM) and AVS measurements are assumed to be directly comparable given similar sample handling procedures. The comparability of bulk sediment chemistry and toxicity to amphipods is more uncertain, given that sediments for bulk analyses are not press-sieved prior to analysis. These uncertainties may lead to disparate results between toxicity test methods, and such findings will be addressed in the discussion of uncertainty in the Effects Assessment."

EPA has suggested that a quantitative assessment of comparability of exposure between the bulk sediment and porewater toxicity tests would require the elucidation of AVS partitioning/volatility between solid and aqueous phases. The Navy concurs, however, this is a research issue pertaining to the development of these test methods, and is beyond the scope of the present study.

Comment No. 5:

p.35, 2nd paragraph, Section 3.6.5.3 - Explain how the community data will be used to identify potential cause and effect relationships among chemistry, toxicological measures, and benthic ecology data. Species occurrence data can provide a critical link between exposure and the observed ecology. Statistical investigations of a potential cause and effect relationship between the chemical, biological, and ecological data can also add to the weight-of-evidence in the ecological risk assessment. For example, multivariate statistics could be used to probablistically identify factors that significantly contribute to an observed effect, assuming that other possible causes such as physicochemical parameters (e.g., grain size) are included in the data set with appropriate replication to satisfy statistical test assumptions (e.g., degrees-of-freedom).

Response:

The following discussion will be added to Section 3.6.5.3. of the Master Work Plan to address EPA's concerns:

The goal of the benthic community analyses will be to assess differences in major community parameters between the landfill and reference sites. The parameters examined will include species richness and evenness, the proportion of deposit feeders, density and diversity of amphipods, density of *Oligochaetes*, and density of *Capitella capitata*. Benthic invertebrates will be sampled at locations previously chosen to describe the concentration of contaminants within sediments and organisms as well as the toxicological properties of sediments adjacent to the landfill. These locations will be used for benthic community sampling because of the availability of data on chemistry and toxicology, and to provide information on food chains and rates of sedimentation and bioturbation at the sites. In the intertidal area, samples will be taken both within and outside of patches of *Mytilus* since they modify the habitat by the structure of their shells and by their biodeposition. Analysis of subtidal organisms planned for May 1995 will be supplemented by data collected at three sites by Menzie-Cura in August 1993.

The sampling plan does not, however, lend itself to sophisticated statistical analysis. The number of stations is small (12 landfill, 3 reference). There is much variability within the landfill area; site reconnaissance indicates that intertidal sites (7 total) are sand and pebble pavements with embedded *Mytilus* and with fresh water seeps at some locations, whereas subtidal sites (5 total) have various amounts of pebble and shells overlying sand and silt sediments. Because of the small sample size and large number of potentially significant natural and landfill associated variables, it is doubtful that cause and effect relationships can be shown statistically. However, the patterns observed will be compared with other exposure and effects measures to provide further weight-of-evidence of linkage (or lack thereof) between exposure and observed effects.

Comment No. 6:

p. 36, 2nd paragraph, Section 4.1 - Why was pore water excluded as a sample matrix? Such data could help explain results of the Arabacia bioassays and identify potential risk to infaunal organisms exposed to PAH in the pore water.

Response:

As discussed at the meeting at NETC on 3/3/95, pore water samples will not be analyzed for semivolatile organics (including PCBs, OCPs, PAHs and butyltins) because of the limited sample size available (~100ml) relative to the amount required (~1 to 2 liters) to achieve acceptable MDLs.

Comment No. 7:

pp.46 & 47, Section 6.3 - There is no reference to an uncertainty analysis as a stand-alone section or as subsections following exposure, effects, or risk characterization sections. Uncertainty is an inherent property of risk assessment and must be included.

Response:

Specific discussion of the approach for assessing uncertainty was included in the Exposure, Effects and Risk Assessment Sections of the Master Work Plan, although not in separate subsections as indicated in EPA's outline. The Navy included subsections for discussion of uncertainty in its site specific report format (Table 6-2 of the Master Work Plan). See also Comment Response No. 1.

Comment No. 8:

p.ii, Table of Contents - Based on EPA's revised Table of Contents provided to the Navy on March 3, 1995, Sections 2.2, 2.3, and 2.4 should each include an uncertainty analysis. Alternatively, the ecological risk assessments could be covered in a separate section of the document (e.g., Section 2.5 Uncertainties).

Response:

Specific discussion of the approach for uncertainty was included in the Exposure, Effects and Risk Assessment Sections of the Master Work Plan, although not in separate subsections as indicated in EPA's outline. The Navy has also included subsections for discussion of uncertainty in its site specific report format (see Table 6-2 of the Master Work Plan).

Comment No. 9:

Table 2-4 - Osprey is incorrectly identified as a terrestrial receptor species. This receptor consumes only fish and its major exposure pathway is aquatic. In addition, red-breasted merganser and great blue heron should be listed under both aquatic and wetland headings. This table, the text, methods used in the assessments, exposure models and assumptions, risk characterizations and any other appropriate sections of the report should be revised.

Response:

The classification for osprey, red-breasted merganser and great blue heron as indicated in Table 2-4 will be changed to "avian predator" to be consistent with the exposure pathway models as presented in the site-specific work plans (e.g. Figure A2-8). Accordingly, the classification heading will be changed from habitat to niche to better describe the differences between target species with respect to potential exposure pathways. In addition the identification of receptor as "osprey" will be changed

to "avian predator". The exposure pathway model assumes multiple prey species as is appropriate for red-breasted merganser and great blue heron. The extent to which the exclusively piscivorous habit of osprey reduces or enhances risk to this target species will be addressed in the risk characterization for each site-specific study.

Comment No. 10:

Table 2-6 - The purpose of this table should be clearer. Define pathogens, pathogen abundance, and their bearing on the ecological risk assessment (see related comments 20 and 21 in EPA's review of the draft work plan by cover letter dated September 8, 1994). Also, it is unclear what is meant by "markers," in the discussion about chemical and microbial markers. (See also comments below regarding Tables A2-7, B2-4, and C2-4.)

Response:

The purpose of Table 2-6 is to list the exposure indicators which may be measured as part of the exposure assessment component of the ERA. Text will be added to the Master Work Plan in the discussion of Table 2-6 to clarify this intent.

In addition, text will be added to the Master Work Plan to clarify that pathogens are microbial organisms, and that pathogen abundance is the concentration of pathogen per unit of matrix; e.g. no./ml, no./g wet tissue. The bearing of pathogen abundance on the ERA is discussed in response to comment No. 3.

In the Master Work Plan, markers are defined as source-specific indicators of stressor exposure, i.e., compounds that provide information on the relative importance of various pollutant sources to the environment. For example, coprostanol, a fecal sterol chemical marker, has been used as a indicator for the relative contribution for sewage inputs into various waters of Narragansett Bay, assuming the concentration of other unmeasured compounds would be available in proportional amounts to the measured indicator. Similarly, selected benzotriazoles have been employed as markers for chemical inputs by specific industries into sediments of this estuary. Similarly, the presence of selected "pathogen" indicators, are actually surrogates for the true pathogens (e.g. enteric viruses), as it is assumed that the presence of the indicator implies the likely presence of the pathogen (Cabelli, 1978). Text of the Master Work Plan will be modified to clarify this point.

Comment No. 11:

Table 2-6 - The parameter, "Species occurrence" should be added to the Exposure Medium/Receptor headings: Sediment and Water. Assuming that the list of data parameters under each heading includes data that can be statistically correlated and compared, possible cause and effect relationships may be identified. (See also comment regarding page 35.)

Response:

The Navy feels that "Species occurrence" should not be added to Table 2-6, because this measurement endpoint is an Effects indicator, not an Exposure indicator. In addition, the occurrence of species is a component of the benthic community measurement endpoint listed in Table 2-4. The utility of "species occurrence" data to statistically examine cause and effect relationships is discussed in response to comment No. 5.

Comment No. 12:

Table 3-2 - Why are pore water and its respective target method detection limits for PAHs, organochlorine pesticides ("OCP"), and polychlorinated benzene congeners not included as sample matrices? Evaluation of risks to ecological receptors exposed to these constituents in the aqueous phase of the bulk sediment, or results in the Arabacia pore water bioassays will be improved with such information. (See also comment regarding page 36.)

Response:

Pore water and its respective target method detection limits for semivolatile organics were not included as sample matrices because of the large volume required for analyses as indicated in the response to the question on Section 3.6.5.1.

Comment No. 13:

Table 6-1 - Uncertainties or an uncertainty analysis must be added to the appropriate section(s) of this outline.

Response:

Specific discussion of the approach for assessing uncertainty was included in the Exposure, Effects and Risk Assessment Sections of the Master Work Plan, although not in separate subsections as indicated in EPA's outline. The Navy included subsections for discussion of uncertainty in its site specific report format (Table 6-2 of the Master Work Plan). See also Comment Response No. 1.

Comment No. 14:

Appendix A - SAIC Standard Operating Procedure - Techniques for Extracting Pore-Water: There should be a discussion about the use of the vacuum technique (Winger and Lasier, 1991) for extraction of pore water from bulk sediment. The report should also discuss whether contaminants in the pore water are the likely cause of any toxicity exhibited (see also previous comment concerning page 34).

Response:

The SOP states as its objective that the method is used to extract pore water from sediment. A general discussion about the applicability of the method is not appropriate for the SOP; however, the site-specific reports will discuss where measurements of metals in pore water are related to observed toxicity as described in section 3.6.5.1 of the Master Work Plan. Issues regarding procedural modification of metals bioavailablility have been presented in response to comments No. 4.

Comment No. 15:

Appendix B, Table 2 - See also comment above and the one for page 34.

Response:

Pore water and its respective target method detection limits for semivolatile organics were not included as sample matrices because of the large volume required for analyses.

Comment No. 16:

Appendix C, Section 2.1 - Halliburton NUS Project Manager's phone number appears to have been inadvertently omitted.

Response:

The phone number for HNUS Project Manager, Mr. Stephen Parker, is (508) 658-7899. The number will be added to the final work plan.

Comment No. 17:

Addendum A - Again, a discussion of uncertainties should be added to the table of contents.

Response:

Specific discussion of the approach for assessing uncertainty was included in the Exposure, Effects and Risk Assessment Sections of the Master Work Plan, although not in separate subsections as indicated in EPA's outline. The Navy included subsections for discussion of uncertainty in its site specific report format (Table 6-2 of the Master Work Plan). See also Comment Response No. 1.

Comment No. 18:

Addendum A - Dr. Ken Finkelstein of the National Oceanic and Atmospheric Administration has recommended that you qualitatively analyze the effect of landfill debris altering the nearshore habitat. Such observations should be incorporated into the weight-of-evidence decision tree.

Response:

Benthic community analyses were identified as a data need in Section 3.0 of the Master Work Plan and addressed in the 3/3/95 Ecorisk Advisory Board meeting as an approach to analyzing the effect of physical disturbance on the nearshore habitat. Section 3.0 will be modified to incorporate physical disturbance as a type of stressor effect to be examined. Results of benthic community analyses will be used as an additional weight-of-evidence in the effects assessment component of the risk characterization summary.

Comment No. 19:

Addendum A, - Footnotes that identify statistical significance should be corrected from "P=05" to "P<0.05" if $\alpha = 0.05$.

Response:

Footnotes will be corrected accordingly.

Comment No. 20:

Addendum A, Table A2-5 - The habitat of osprey should be changed to "aquatic" (see earlier comment for Table 2-4).

Response:

The classification for osprey, as indicated in Table A2-5, will be changed to "avian predator", with the classification parameter changed from "habitat" to "niche". See also Comment Response No. 9.

Comment No. 21:

Addendum A, Table A2-7 - The purpose of this table is unclear. Define pathogens, pathogen abundance, and their bearing on the ecological risk assessment. Explain what is meant by "markers" in the discussion on chemical and microbial markers (see also comment concerning Table 2-6 and use of species occurrence data).

Response:

The purpose of Table A2-7 is to list the exposure indicators which will be measured as part of the exposure assessment component of the ERA. Pathogens are microbial organisms including total and fecal coliforms (including *Escherichia coli*), fecal streptococci and enterococci and *Clostridium perfringens* spores. Pathogen abundance is the concentration of pathogen per unit of matrix; e.g. no./ml, no./g wet tissue. The bearing of pathogens as an exposure indicator for the ERA is as an integrated indicator of nutrient-related stress, as well as an indicator of the potential importance of sanitary services as transporters of contaminants of concern to the area of study. The text of the Master Work Plan will be modified to clarify this intent. Markers are defined in the Master Work Plan as source-specific indicators of stressor exposure. See also Comment Responses No. 3 and No. 10. The Navy feels that species occurrence should not be added to Table A2-7 because this measurement endpoint is an effects indicator, not an exposure indicator. Se also response to comment No. 11.

Comment No. 22:

Addendum B - See earlier comment concerning addition of uncertainties sections in the table of contents.

Response:

Specific discussion of the approach for assessing uncertainty was included in the Exposure, Effects and Risk Assessment Sections of the Master Work Plan, although not in separate subsections as indicated in EPA's outline. The Navy included subsections for discussion of uncertainty in its site specific report format (Table 6-2 of the Master Work Plan). See also Comment Response No. 1.

Comment No. 23:

Addendum B - Section 2.1.2.1 lists tributyltin ("TBT") as "...the most abundant OCP in the samples....." However, its presence is not discussed either in Section 1.2.2 or on Table B-1. Moreover, the report should clarify how TBT data will be used in the ecological risk assessment.

Response:

The comment has misquoted the text from Section 2.1.2.1. of Addendum B, which reads "Tributyltin (TBT) is the major butyltin species found in the sediments and..". Therefore, TBT is not the most abundant OCP in the samples; in fact, it is not considered to be an organochlorine pesticide. TBT will be included in Section 1.2.2 and Table 2-1 (copy of revised Table 2-1 is enclosed). TBT data will be utilized in the risk assessment in a manner similar to other contaminants of concern, i.e., investigation of exposure concentration through measurement in sediments and tissues relative to benchmark concentrations, and consideration of potential dose-response relationships.

Comment No. 24:

Addendum B, Section 1.0 - This section of the document must discuss both the off-shore study and the on-shore evaluation work at Derecktor Shipyard, as contamination present in these two areas could be related. It is likely that any contamination in the off-shore area is the result of on-shore activities and shipyard operations.

Response:

The Navy concurs that contamination in the off-shore area near Derecktor Shipyard may be a result of the on-shore activities and shipyard operations. Addendum B of the final Master Work Plan will include a summary of the Site Assessment Screening Evaluation effort and other studies previously performed and currently under way in the on shore portions of the shipyard. However, the information related to the on-shore studies will be limited to that published in documents which are available to the authors at the time of preparation of the summary to be included in Addendum B.

Comment No. 25:

Addendum B, Section 1.3 - The off-shore and on-shore studies at Derecktor should be integrated. Further, explain how such studies will answer questions about the site as a whole.

Response:

One of the objectives of the Site Assessment Screening Evaluation (SASE) at Derecktor Shipyard is to identify contaminants at the site and transport mechanisms which are available to them. This information will support the offshore study by identifying contaminant sources, thus supporting the third and fourth tiers of the conceptual model.

Currently, the on-shore and off-shore study document submittals are scheduled concurrently as the Navy originally intended for this site. In addition, one controlling Navy project manager and contractor are overseeing the preparation of both. This arrangement will allow the sharing of information between the authors of each document, and subsequently appropriate conclusions can be drawn. These conclusions will be integrated in both on-shore and off-shore study reports, as is appropriate to the subject matter presented in each. However, no independent report is currently scoped which would summarize the on-shore and off-shore conclusions.

Therefore, the Navy prefers not to delay one study for the sake of unforeseen delays on the other. This is a continuing concern of the Navy, and we welcome additional discussion regarding this point.

Comment No. 26:

Addendum B, Table B-2 - The habitat of osprey should be changed to "aquatic" (see earlier comments for Tables 2-4 and A2-5).

Response:

The classification for osprey, as indicated in Table B-2 will be changed to "avian predator". In addition, red-breasted merganser and great blue heron will be added to the list to be consistent with the exposure pathway models as presented in Figure B-7. Accordingly, the classification heading will be changed from habitat to niche to better describe the differences between target species with respect to potential exposure pathways. See also Response to Comment No. 9.

Comment No. 27:

Addendum B, Table B-4 - The purpose of this table is unclear. Define pathogens, pathogen abundance, and their bearing on the ecological risk assessment. It is not clear what is meant by "markers" in the discussions about chemical microbial markers (see also comments concerning Tables 2-6 and A2-7 and use of species occurrence data).

Response:

The purpose of Table B-4 is to list the exposure indicators which will be measured as part of the exposure assessment component of the ERA. Pathogens are microbial organisms including total and fecal coliforms (including *Escherichia coli*), fecal streptococci and enterococci and *Clostridium perfringens* spores. Pathogen abundance is the concentration of pathogen per unit of matrix; e.g. no./ml, no./g wet tissue. The bearing of pathogens as an exposure indicator for the ERA is as an integrated indicator of nutrient-related stress, as well as an indicator of the potential importance of those sanitary services as transporters of contaminants of concern to the area of study. Markers are defined in the Master Work Plan as source-specific indicators of stressor exposure. See also Comment No. 10. The Navy feels that "Species occurrence" should not be added to Table B-4, because this measurement endpoint is an Effects indicator, not an Exposure indicator. See also Response to Comment No. 11.

Comment No. 28:

Addendum C - See earlier comments concerning addition of uncertainties sections to table of contents.

Response:

Specific discussion of the approach for assessing uncertainty was included in the Exposure, Effects and Risk Assessment Sections of the Master Work Plan, although not in separate subsections as indicated in EPA's outline. The Navy included subsections for discussion of uncertainty in its site specific report format (Table 6-2 of the Master Work Plan). See also Comment Response No. 1.

Comment No. 29:

Addendum C, Table C2-2 - The habitat of osprey should be changed to "aquatic" (see earlier comments for Tables 2-4, A2-5, and B-2).

Response:

The classification for osprey, as indicated in Table C2-2 will be changed to "avian predator". In addition, red-breasted merganser and great blue heron will be added to the list to be consistent with the exposure pathway models as presented in Figure C2-7. Accordingly, the classification heading will be changed from habitat to niche to better describe the differences between target species with respect to potential exposure pathways. See also Response to Comment No. 9.

Comment No. 30:

Addendum C, Table C2-4 - The purpose of this table is unclear. Define pathogens, pathogen abundance, and their bearing on the ecological risk assessment. Explain what is meant by "markers" in the discussion about chemical and microbial markers (see also continents concerning Tables 2-6, A2-7, B-4, and use of species occurrence data).

Response:

The purpose of Table C2-4 is to list the exposure indicators which will be measured as part of the exposure assessment component of the ERA. Pathogens are microbial organisms including total and fecal coliforms (including *Escherichia coli*), fecal streptococci and enterococci and *Clostridium perfringens* spores. Pathogen abundance is the concentration of pathogen per unit of matrix; e.g. no./ml, no./g wet tissue. The bearing of pathogens as an exposure indicator for the ERA is as an integrated indicator of nutrient-related stress, as well as an indicator of the potential importance of sanitary services as transporters of contaminants of concern to the area of study. Markers are defined in the Master Work Plan as source-specific indicators of stressor exposure. See also Response to Comment No. 3 and No. 10.

The Navy feels that "Species occurrence" should not be added to Table C2-4, because this measurement endpoint is an Effects indicator, not an Exposure indicator. In addition, the occurrence of species is a component of the benthic community measurement endpoint listed in Table C2-2. See also Response to Comment No. 11.

NEW REFERENCES TO BE INCLUDED IN SECTION 8.0 OF THE MASTER WORK PLAN:

Cabelli, V., 1978. New Standards for Enteric Bacteria. *In*: R. Mitchell (ed.) Water Pollution Microbiology. Chapter 9. J. Wiley & Sons, New York, NY. 442 pp.

Carr, R.S. and D.C. Chapman, 1995. Comparison of Methods for Conducting Marine and Estuarine Sediment Porewater Toxicity Tests - Extraction, Storage, and Handling Techniques. Arch. Environ. Contam. Toxicol. 28:69-77.

Howard, D.E. and R.D. Evans, 1993. Acid-Volatile Sulfide (AVS) in a Seasonally Anoxic Mesotrophic Lake: Seasonal and Spatial Changes in Sediment AVS, *Environmental Toxicology and Chemistry*, 12: 1051-1057.