



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

BY FACSIMILE AND MAIL

February 14, 1995

Deborah Carlson, RPM
U.S. Department of the Navy
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway
Code 1823, Mail Stop 82
Lester, PA 19113-2090

RE: Ecological Risk Assessments at the Naval Education and
Training Center (NETC), Newport, Rhode Island

Dear Ms. Carlson:

Attached you will find EPA's comprehensive evaluation of previous and future ecological risk assessment efforts at NETC-Newport. This evaluation is in a narrative format. The purpose of this evaluation is to facilitate a dialogue between EPA, RIDEM and the Navy in order to reach consensus on the goals and procedures for an acceptable, defensible ecological risk assessment.

The Navy, RIDEM and the EPA have previously agreed to postpone the submission of the draft final ecological risk assessment workplan for thirty (30) days from receipt of this letter. During this hiatus period, the Navy may wish to develop and submit a preliminary response/detailed outline for review. As you are aware, EPA, RIDEM, the Navy and supporting personnel are scheduled to meet on Friday, February 24, 1995 to discuss this attachment. If we receive your preliminary responses prior to this meeting, I believe we will all be better prepared to discuss the proposed responses and any associated issues.

As you will note in the attachment, we have already discussed many of the critical issues associated with a satisfactory ecological risk assessment; our goal at this time should be to ensure that these tasks, procedures and statements are actually included in the pending draft final workplan.

In order to simplify this evaluation, I will provide EPA's comments of the draft final ecological risk assessment reports as a separate document. These comments are referenced in this evaluation and will be forwarded to you later this week.



After completing your review of the attached document, please call me at 617/573-9614 to discuss any questions or your proposed approach for resolving these issues.

Sincerely,



Andrew F. Miniuks, Remedial Project Manager
Federal Facilities Superfund Section

Attachment

cc: Susan Svirsky, EPA
Ken Finkelstein, NOAA
Paul Kulpa, RI DEM/DSR
Brad Wheeler, NETC
Mary Pothier, CDM-FPC

COMPREHENSIVE ASSESSMENT OF A SATISFACTORY ECORISK ASSESSMENT
Naval Education and Training Center
Newport, Rhode Island

I. INTRODUCTION

The following information represents a satisfactory ecological risk (ecorisk) assessment for the Navy Sites at the Naval Education and Training Center (NETC), Newport, Rhode Island, using the Draft Work/Quality Assurance Plan of the Narragansett Bay Ecorisk and Monitoring for Navy Sites (the Workplan) and the Addendum to the Draft Work/Quality Assurance Plan (the Workplan Addendum) as a foundation for the description.

Many elements of this report have been previously conveyed to the Navy through various reviews and correspondence and through meetings between EPA and the Navy, and this report offers further assistance/clarification for conducting satisfactory ecorisk assessment at NETC by the comprehensiveness of its recommendations. None of the guidance in this assessment report differs from earlier instructions to the Navy from EPA comments or other correspondence. The information in this report should be used to complement and reinforce earlier statements. In no case, should it supersede specific instructions in these earlier documents.

The purpose of this assessment was to identify the general characteristics of a satisfactory ecorisk assessment necessary for NETC. Major modifications to the draft Workplan and Workplan Addendum documents will be necessary to ensure satisfactory results.

EPA national guidance identifies specific approaches for assessing ecorisk to biological/ecological systems exposed to chemical contamination in different media. This guidance is the basis for these technical comments. It is imperative that the Navy frequently communicate with EPA, the RIDEM and the NETC Ecorisk Advisory Board, recognize their comments, and modify the workplans and proposed field work to resolve the issues raised in the comments. EPA believes that past failure by the Navy to incorporate this input to the project has resulted in a decrease in the value of the study data and has added to the cost of the study. Much of the currently proposed work will require major revisions before resubmittal to EPA and RIDEM for approval. The Navy must follow EPA, RIDEM and NETC Advisory Board guidance during the revision process to focus the study on NETC and to answer questions developed in the problem formulation phase of the ecorisk assessments.

In addition, if the draft final Workplan and Workplan Addendum are to be used as the introduction and background to the NETC offshore ecorisk assessment, these documents must be revised to focus on specific concerns within the nearshore area of the NETC.

The Workplan Addendum was intended not merely to supplement the draft Workplan but to focus on site-specific concerns about the NETC nearshore area. For the draft final Workplan to be used as the introduction and background for ecorisk assessments at the NETC sites, new and formal site-specific addenda to the draft final Workplan must be provided. The formal addenda would be unlike the current draft Workplan or Workplan Addendum because they would contain detailed information regarding newly designed field studies related to the various NETC sites. In addition, the formal addenda would provide clear, concise, and succinct discussions of how the field studies would address the specific questions developed in the problem formulation phase of each of the ecorisk assessments.

During the development of these site-specific documents, the Navy should always remember that all documents generated for the NETC sites are public documents and should be organized and written with the general public as the intended reader.

II. ECORISK ASSESSMENT AND PROBLEM FORMULATION

The primary function of any risk assessment is to link science to decision-making. An underlying decision process must be incorporated into the NETC ecorisk assessment process during the problem formulation phase of the studies and is a crucial first-step hitherto not apparent at NETC. Problem formulation happens at the regional level and must be an interactive process between the risk manager (EPA, RIDEM and the Navy) and the regulators (EPA and RIDEM), with assistance from the NETC Advisory Board of interdisciplinary scientists and professionals.

It is the Navy's responsibility to seek EPA input and the assistance of the NETC Advisory Board, and to ensure communication among these groups and manage the design and execution of satisfactory ecorisk assessments.

Some potential study objectives include:

- To develop a comprehensive (baseline) risk assessment using new and existing data to evaluate the risk of leaving the site unremediated;

- To provide estimates of ecological risks and associated uncertainties in the absence of remediation; and
- To identify for each ecological assessment endpoint chosen, the current and future condition of the particular ecological resource related to the endpoint relative to conditions that would prevail in the absence of contamination.

The scope of the study may be defined by:

- Determine which media are contaminated such that they may be toxic;
- Identify what chemicals are involved;
- Determine the concentrations and the spatial and temporal distributions of these chemicals;
- Propose what route of transport might provide additional contamination in the future; and
- Identify which organisms are expected to be significantly exposed to the chemicals.

The purpose of the Ecological Risk Assessment should be to:

- Determine if significant ecological effects are occurring at the site;
- Determine the causes of these effects;
- Determine the source of the causal agents; and
- Determine the consequences of leaving the system unremediated.

The conceptual model for the ecorisk study is created by:

- Describing the abiotic and biotic segments of the contaminated environment;
- Defining the spatial extent of the problem;
- Identifying the chemicals responsible for the contamination;
- Selecting appropriate measurement and assessment endpoints for evaluating ecological effects of the contamination;

- Describing pathways by which the contaminants move through the abiotic and biotic environment potentially inducing biological effects among plants and animals; and
- Considering current and future potential risks.

The proposed draft final Workplan must be developed to address clearly the study objectives as part of the ecorisk assessment. The project tasks (Section 7.4 of the draft Workplan) must be developed so that, upon their completion, new information would be available to close current data gaps and provide for the completion of the ecorisk assessments.

It is possible that data gaps will remain following the analysis component of the ecorisk assessments. These remaining data gaps and their impact on the ecorisk assessments should be clearly stated in the section on uncertainties.

Although ecorisk assessments rely on data that are complex and sometimes limited or ambiguous, the process can succeed in being unbiased, technically defensible and useful to decision-making if the approach (established during the problem formulation phase) appropriately defines the objectives, scope, and purpose of the study according to the conceptual model for the site (see EPA comments on the draft Workplan dated September 8, 1994) and if clear documentation of the process is presented, including process design and interpretation of the results.

The draft final Workplan will play an important role in describing the problem and, in this study thus far, has not clearly defined lines of inference that would be used to draw conclusions using the project data in subsequent ecorisk assessments. For example, a major objective of the Lower East Passage study should have been to evaluate the benthic community in the nearshore area of McAllister Point. This evaluation would have compared the station's data relative to the reference station's data to support, or refute the eventual inference that the nearshore benthos is, or is not adversely affected by some stressor. The results of sediment laboratory toxicity tests could then further support, or question the initial inference designed as an objective of the study.

There continues to be no resolution as to whether or not the Navy will conduct a nearshore assessment of marine benthic infauna and epifauna in the proximity of McAllister Point to complement an earlier offshore study (see Assessment of Marine Benthic Infauna and Epifauna in Vicinity of Naval Education and Training Center [NETC] Sites, March 31, 1994).

As a result, the objective of the ecorisk assessment and current study of McAllister Point Landfill remains uncertain because of the unresolved status of this potentially pivotal component of the work at the site. The Navy is mistaken in its understanding of the status of this issue, as discussed in the response to EPA's General Comment #3 from the evaluation of the Draft Work/Quality Assurance Plan for Narragansett Bay Ecorisk and Monitoring for Navy Sites. While the issue has been discussed, it has not been resolved with EPA. Non-resolution of this critical issue at NETC, at this point in the project, further supports EPA's concern over the Navy's performance of this ecorisk assessment.

In contrast, EPA has recognized the Navy's acknowledgment that "actual modifications [will need to be] made to the Work Plan in response to" General Comment 1 of the same EPA comment letter regarding a (re)formulation of the conceptual model for the site. This is the only way to solidify the purpose, scope, and study objectives of the ecorisk assessment.

EPA urges the Navy to resolve any outstanding issues in a timely manner and the Navy should (re)approach the NETC studies with a plan that identifies problems and discusses means to solve them. Using all available data, this problem formulation exercise should (re)define the scope of the ecorisk assessments. For example, initial sediment screening level concentrations nearshore to the McAllister Point Landfill indicated a potential problem with contamination early in the process. The Navy however, approached the subsequent study without paying sufficient attention to those preliminary findings. Had a weight-of-evidence (e.g., triad) approach been pursued, along with the collection of shellfish for evidence of bioaccumulation, the Navy could have obtained most of the data necessary to complete a defensible ecorisk assessment. The Navy could then have focused on isolated "hot spot" areas of contamination with additional short-term studies. Instead, the Navy addressed the NETC sites one study at a time, and the result has been an incomplete ecorisk assessment, requiring more work with numerous delays and technical misunderstandings.

An offshore benthic community survey was conducted by the Navy for the NETC offshore area but the more contaminated nearshore area of McAllister Point was delayed for the later study. This approach interrupted the continuity and comparability among the offshore, nearshore, and reference areas data. The only data available for the nearshore area was composited sediment chemistry and mussel and clam tissue chemistry. This data did not provide any direct quantifiable measures of the potential for adverse effects among the benthos, however.

These basic characteristics of a satisfactory ecorisk assessment (i.e., clearly stated objectives, scope, purpose, and conceptual model) have not been included in the NETC ecorisk assessments submitted to EPA thus far, and were absent, or lacking in the draft Workplan, Workplan Addendum, and preliminary ecorisk assessment data for the Lower East Passage study area presented to the NETC Advisory Board on October 27, 1994. Recently, however, the Navy has provided more careful work in ecorisk assessment at the NETC. Continued effort by the Navy should result in a satisfactory outcome.

III. ANALYSIS COMPONENT AND FOLLOW-UP TO THE ECORISK PROCESS

The draft final Workplan should accurately represent the 1992 EPA national framework guidance document once Figure 3 and the corresponding text are edited according to EPA comments on the draft Workplan (dated September 8, 1994). The analysis component (i.e., exposure and ecological effects assessments) of ecorisk in the draft Workplan was not well defined (see EPA comments on the draft Workplan - 7.4 Technical Approach, 7.4.1 Overview), and the analysis within the draft final ecorisk assessments for McAllister Point Landfill and the Old Fire Fighting Training Area were not fully executed. More specifically, they lacked a full description of the nature and extent of contamination and lacked toxicity testing and benthic ecology in the nearshore areas for a weight-of-evidence approach to the analysis. These issues will be further explained in EPA's comment letters on the draft final ecorisk assessments.

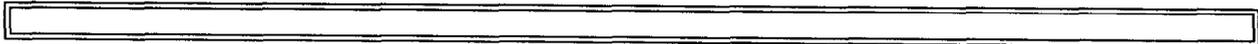
At present, the conceptual model in the draft Workplan incorrectly implies that the impact of the naval installation will be evaluated within the context of Narragansett Bay as a whole. Under the Superfund Program and consistent with EPA-New England guidance, the impact of the naval installation must be evaluated on its own merit, not as a percentage of the total impact from all sources to the bay.

In other words, the ecorisk assessment must characterize the full nature and extent of site-related contamination and toxic effects relative to the reference conditions and must include an evaluation of whether in exceedance of the reference condition based on chemistry and toxicity corresponding alterations in the marine ecology were observed in the field. By providing such weight-of-evidence and including results from previous studies concerning the chemistry, toxicity, or ecology of the Lower East Passage of the bay, potential adverse impacts on the current and future ecology of the site could be defined in the ecorisk assessment.

In addition, using only data from current studies is also inadequate. Current and later data should be used to close data gaps and clarify and reduce the uncertainties and assumptions in previous ecorisk assessments.

The Navy must exercise improved scientific judgment in the analysis phase of the studies. The following two examples show what needs to be improved. First, as part of the need to fill data gaps, the Navy (with support from the NETC Advisory Board) decided to conduct a shellfish study of the offshore area to determine site-specific bioaccumulation factors. The Navy wrote in the draft Workplan that the shellfish would be frozen. The Navy's error was to freeze the live mussels in their shells; preservation of body index data (i.e., morphometric measurements of body to shell distance, or body cavity size) was therefore not possible. As a result, the tissue residue data many have been compromised and the morphometric data on fresh tissue apparently not recorded. Second, evaluating the potential for trophic transfer of contaminants is a necessary aspect of ecorisk (and human health risk) assessments.

However, worst-case exposure scenarios are not considered if all the shellfish undergo depuration. EPA and National Oceanic and Atmospheric Administration (NOAA) do not object to the depuration of shellfish for 24 to 48 hours before analysis if the objective of the data is to normalize tissue contaminant concentrations. But the Navy did not discuss in full the rationale for their data objectives for this measurement endpoint. Non-depurated shellfish data must be included in the analysis separate from the subset of depurated shellfish data.



IV. INTEGRITY OF THE STUDY DATA

During the NETC Advisory Board meeting on October 27, 1994, EPA stated that it is of critical importance that complete and accurate records of sample collection dates, sample storage methods, steps towards completion of the analysis of samples, and documented completion of the analyses be maintained to ensure (and legally document) the integrity of the project data used to conduct the ecorisk assessment and to make risk management decisions concerning the site. In response to EPA requests in this meeting, followed up by a Request for Quality Assurance/Quality Control Documentation dated November 3, 1994, the Navy did the following:

- improve security of sample storage (see the Navy's Attachment B formal response dated January 6, 1995);
- acknowledge exceedances on sample holding times for mercury analysis of pore water (as noted in the Preliminary Report dated December 20, 1994);
- provide chain-of-custody records, propose sample holding times for chemical and biological testing, and propose Tier II data validation for organic and inorganic chemistry data.

A satisfactory ecorisk assessment must therefore possess documented (i.e., traceable), legally defensible, methods of sample collection, secure storage, and analysis, which include complete and accurate chain-of-custody records and data validation that together provide the best possible use of the data for the ecorisk assessment as defined by the conceptual model of the site developed in the problem formulation phase of the study. These are minimum requirements of quality assurance/quality control (QA/QC) in NETC ecorisk assessments.

In February 1994, EPA received the Draft Technical Report for the McAllister Point Landfill Remedial Investigation which described in Appendix O, the focus and intent of collected data for the ecological risk assessment. Comments and recommendations concerning this document (dated April 6, 1994, but originally reviewed July 26, 1993) were supplied to the Navy by NOAA and EPA. Suggestions by these regulators were subsequently not adhered to by the Navy.

If the Navy had followed most of the recommendations, the integrity of the data could have been preserved and delays in the completion of the ecorisk assessment might have been avoided.

In several instances, the integrity of the project data was evidently compromised by the Navy's failure to take into account the recommendations by regulatory scientists. For example, during the October 27, 1994, NETC Advisory Board meeting, it was recommended that at least one additional nearshore station should be included either adjacent to Battelle Station 10/11/12 or Battelle Station 16/17/18. It was communicated to the Navy and its contractors that, both locations should be supported by additional sampling near each location because the highest organic and inorganic contamination in the Battelle study was detected in sediments at Stations 10/11/12, 13/14/15, 16/17/18, and 19/20/21. However, the Navy added only one station between the three most contaminated locations (Battelle Stations 10/11/12, 13/14/15, and 16/17/18), despite agreement at the meeting by a Navy contractor that adding two stations was reasonable. Only recently has the Navy added to/adjusted the proposed nearshore sampling locations to meet EPA requests.

These examples underscore the critical importance that sampling be executed according to the approved draft final Workplan and guidance provided by the NETC Advisory Board during meetings. Only then can the results of the subsequent analyses fully support the data quality objectives of the study, given the required level of significance and likely variability of the measured natural system. Using the resulting evidence of risk or no risk, with added support from a weight-of-evidence approach using some predetermined and approved level of significance, study inferences can be drawn from the data concerning the probability of ecological impact or non-impact as defined in the conceptual model for the site.

V. PRESENTATION OF THE STUDY DATA AND RISK COMMUNICATION

The presentation of results within the text, tables, and figures of the ecorisk assessment must be clear, concise, succinct, consistent, and objective. In this way, the ecorisk assessment permits readers to confirm and summarize their understanding of potential risks.

The draft Workplan, the Workplan Addendum, and the Draft Final Ecorisk Assessment reports to date have all lacked precise, succinct, and clear statements in their texts. For example, the draft Workplan was unfocused and unnecessarily long, yet it omitted critical information, such as a definition of the objectives, scope, and purpose of the study; it was therefore unclear what problems were being addressed by the proposed work in the Lower East Passage study area.

In addition, ecorisk assessment reports for the McAllister Point Landfill and Old Fire Fighting Training Area had numerous problems; for example, their risk tables were inconsistent in their presentation of the data. In fact, due to the large number of problems associated with these documents EPA's comments focused on the more major problems. These issues will be further explained in EPA's comment letters on the draft final ecorisk assessments.

The communication of risk depends on clear, concise, and consistent presentations that appeal to the reader's logic as s/he is led through the assessment process. For example, the reader would benefit greatly from the presentation of results as an evaluation of "comparative risk" (i.e., distinguishing between large risks and smaller risks that may be qualitatively different) by a discussion of the "major contributors to risk" (e.g., those chemicals with hazard quotients above some defined level of risk).

A discussion such as this would highlight significant contaminants and helps the reader compare and contrast contributors to risk among receptors, sample locations, or exposure pathways.

To ensure scientific objectivity, the ecorisk assessment process at NETC must be kept separate from the risk management process. Separation is necessary to ensure that risk managers do not attempt, however inadvertently, to bend the scientific results to conform with preferred management decisions and to ensure that scientists refrain from embedding their own risk management preferences in the technical risk analyses.

The risk assessor is responsible for the technical evaluation of ecological risk and may interact with the risk manager. For example, after the risk assessment is complete, the risk manager may need additional assistance in interpreting the implications of the ecorisk assessment to develop remedial options. The risk manager is directly responsible for the problem formulation and for developing recommendations based on both the technical risk analysis and risk value considerations.

It is recommended that the Navy evaluate the various roles of its' personnel in the satisfactory completion of NETC ecorisk assessments. Key personnel within the Navy (i.e., Navy scientists with ecorisk assessment expertise) may need to be (re)identified and tasked with direct management of the Navy's contractors and be given the authority to oversee the execution of the NETC ecological studies.

Scientists and professionals (i.e., NETC Advisory Board) must work together to ensure that the technical scope of the analysis is relevant to the important management questions as defined in the conceptual model and that results are communicated to the regulators and stakeholders (i.e., Navy, EPA, RIDEM and the public) in the form of well-written risk assessments that are logical and readily understood as public documents.