



U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF OCEANOGRAPHY AND MARINE ASSESSM
OCEAN ASSESSMENTS DIVISION
HAZARDOUS MATERIALS RESPONSE BRANCH
c/o U.S. Environmental Protection Agency
Waste Management Division - HSL-3
J.F. Kennedy Federal Building
Boston, MA 02203
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Ms. Carol Keating
U.S. EPA Waste Management Division
J.F. Kennedy Federal Office Building
Boston, MA 02203

Dear Carol:

Thank you for the Final Report; Risk Assessment Pilot Study, Phase I; Naval Construction Battalion Center; Davisville, Rhode Island. This study was performed by a group of highly experienced workers who undoubtedly devoted a good deal of effort. The report contains a great deal of information, but information that can be interpreted in a number of ways. As is generally the case, when much data is collected and specific information presented, the opportunity to criticize becomes greater. This site review will respond to the report in three areas: relationship of the study to NOAA resources, general and specific comments on the final report, and relationship of the study to the overall site program.

While the results of this study were mixed, they do support the overall conclusion that "no major environmental problems" exist in Allen Harbor. The report establishes that seeps from the landfill are contaminated and that the sediments, both subtidal and intertidal, are contaminated by a number of substances at levels that exceed the lower ranges of tests that have been associated with adverse effects in other studies. However, none of the tested substances greatly exceeded those levels. In addition, a number of the more subtle bioassay tests indicated toxic responses, but other, more powerful ones showed no toxic responses. Nevertheless, the pathway from the sites need to be characterized and sources to the harbor reduced or eliminated.

It also appeared that the authors of the report used the more contaminated embayments of the East Coast as a framework for comparison of the results from these studies. As a result, the contamination and impacts that were observed tended to be downplayed, perhaps inappropriately, as not being of "major" importance.

NOAA Resources

(1) The relationship of the study to NOAA resources is high; three species of NOAA resources were examined directly—quahog (*Mercenaria mercenaria*), soft-shell clam (*Mya arenaria*), and oyster (*Crassostrea virginica*). Also, the study encompassed a battery of bioassays and histopathological examinations which could be expected to give a direct and comprehensive picture of the physiology of the fauna in the Allen Harbor system. Tissue residues show mixed results; no readily discernible pattern of contamination among the

stations in Allen Harbor and Narragansett Bay was evident. The results of the other chemical and physiological measures are similarly mixed.

(2) The results of this study showed that, while the physical habitat, primarily the sediments, is marginally contaminated especially when compared to ER-L values (e.g., pesticides, PCBs), the biological tests did not show effects, or at least not obvious, profound effects, even when a wide range of sophisticated techniques were used.

General and Specific Comments

(3) The portion of the project covered by the final report was labeled a "pilot study" and as such it was an extensive effort. On the one hand, there is mention of shortcomings in the study design of the first phase (like the difference between toxicity and mere mortality in amphipod bioassays, and sample sizes too small to detect differences). On the other hand, the overall conclusion of the study downplays the importance of the contamination. A few topics (like further investigation of neoplastic (tumor) disease in Allen Harbor and the relative contributions of the landfill, of boating activities, and of the surrounding land mass) are identified for work in Phase II, but the overall question of approach was not described. Neither in the work plan nor in this final report does the project describe criteria about how the decision between Option I (verification of no effect) and Option II (determination of nature and extent of contamination) in the following phase of the project will be made. The results of this pilot study allow for a significant effort in the second phase.

(4) The formulation of the ecological risk analysis based almost entirely on the notion of risk quotient (expected environmental concentration divided by benchmark concentration), a recognized approach to the topic, but there is much more that could be discussed. First, the risk quotient analysis was not available for all substances (i.e., those substances for which values for water quality criteria, apparent effects thresholds (AETs), or effective range-low (ER-Ls) have not been developed). Second, while risk characterization beyond the risk quotient approach is likely to be a judgment based on weight of evidence, there are several other approaches that could be used to supplement the risk assessment (approaches for which data were gathered in the pilot study): contaminant concentrations in biota, toxicity test results, literature values of toxicity, field surveys of receptor populations, and measures of community structure and ecosystem function (U.S. EPA 1989. *Risk Assessment Guidance for Superfund; Volume II: Environmental Evaluation Manual; EPA/540/1-89/001*. p. 53). Third, while the exposure is assessed very well (but reported and discussed in the section on results and discussion, not in the section on ecological risk assessment), the organisms likely to be exposed to contamination and the endpoints of the exposure (i.e., specific effects on organism physiology and community structure) are discussed only generally. Though it was not in the objective of the study, it is important for NOAA—and it is also important for a thorough ecological risk assessment—to know what species are in Allen Harbor and how they use it. Most of the attention of the study was directed to physiology and chemistry; any information about the natural history of Allen Harbor was incidental. (Note: the study does provide information on the densities and conditions of shellfish, but there is no information on finfish.)

(5) The second paragraph on page 58 describes the groundwater system under the landfill as being susceptible to tidal fluxes. While study of the groundwater at the site was not in the direct course of this study, this situation is a potentially important link in the pathway of contamination to NOAA resources and should be investigated.

(6) The second complete paragraph on page 60 states that "contaminants within the landfill and at Calf Pasture Point are, as of this writing, insufficient to fully characterize

these waste sites." Further investigation is proposed. Results of this additional investigation should be reviewed.

(7) The second complete paragraph on page 67 states that there was no difference in butyltin concentrations between Allen Harbor and Mount View sites. According to the graph in Figure 11, the concentration of tributyltin Allen Harbor subtidal sediments was 0.07 (± 0.01) mg/kg; the concentration at the Mount View station was 0.02 (± 0.01) mg/kg. Given the relatively large difference in the means and the relatively small contributions of the variances, there should be a statistically significant difference between the means obtained in Allen Harbor and Mount View. Presumably the discrepancy is explained by the concentrations of di- and monobutyltin, which are not presented in the main report (they are cited in an appendix which was not available for review). This specific situation should be cleared up, but it is symptomatic of a larger problem. Not enough information is available to understand the statistical analyses without wading through the data summary. More data need to be included.

(8) Tables 20 and 21 (on dry weight concentrations of contaminants in deployed blue mussels from a variety of studies) have row headings and references for stations from Long Island Sound, but no values are listed. As the work for Long Island Sound is cited as the senior author of the final report, it must have been an oversight. This information would be valuable to have included, however.

(9) The third complete paragraph on page 85 states: "A plausible explanation for the elevated tissue residues in the current study may be one involving seasonality. The oysters analyzed during Phase I were collected in December, whereas the Quincy Bay study occurred in July. Munns *et al.* (1988) found tissue residues in mussels to vary several fold, with highest levels observed in winter. These changes may be related to reproductive and spawning activity, metabolic activity, or differences in bioavailability of contaminants. Seasonal sampling of oysters in Allen Harbor might lead to a more clear understanding of tissue residue variation." If the senior author had information available to indicate that there would be seasonal variation in tissue residues, why did the study not sample at different times of the year? If the results had indicated no difference between the stations (while there was still a difference in sampling time), would the study conclude that the lack of difference was the true condition or could seasonal variation mask a true difference? This circumstance, too, is symptomatic of a larger problem. The study wants to conclude that there is no difference between Allen Harbor and Narragansett Bay, so there is a role for "plausible explanations."

(10) As described on pages 91 and 92, the results of the *Ampelisca* bioassay on landfill materials observed mortality, but not necessarily toxicity in the test. The substrate from the landfill on which the bioassay was performed was described as coarse grained and containing bits of metal and broken glass. The study states that *Ampelisca* requires fine-grained sediment for normal survival and that the "implication, therefore, is that these toxicological analyses were confounded by a grain size effect." Either the bioassay needs to be run under conditions that allow toxic effects to manifest (since that is the purpose of the bioassay and that is the way the results will be compared station to station), or the *Ampelisca* bioassay cannot be used to evaluate landfill samples.

(11) The section on deployed mussel immunological response beginning on page 98 states that no differences were observed between test organisms deployed in Allen Harbor and at a reference station. The text further states that variability in response between animals was fairly high and that increased sample sizes would be necessary to detect differences. This sort of adjustment to the study design should be undertaken during Phase II.

Relationship to Overall Program

(12) The other portions of the remedial investigation/feasibility study (RI/FS) presented in the work plan (site review of 22 December 1989) included soil and groundwater sampling. Results of these other programs have not been made available for review, even though two field seasons have passed since the work plan was developed.

(13) The information about the groundwater system contained in comment (6) above indicates that increased attention will need to be devoted to a potential groundwater pathway of contamination.

Please contact me if you have any questions. I look forward to tomorrow's meeting. You may pass this letter on, intact, to Dr. Munns or reproduce portions at your discretion.

Sincerely,

Kenneth Finkelstein