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COMMENTS ON THE PROPOSED
NEW BEDFORD HARBOR PILOT
DREDGING PROGRAM

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EVALUATION OF NEW BEDFORD HARBOR PILOT DREDGING PROGRAM

SUMMARY

The United States Environmental Protection Agency and the United States Army Corps of Engineers are about to embark on a multi-million dollar pilot dredging project in New Bedford Harbor, ostensibly as part of the ongoing feasibility study process to screen and evaluate potential remedial alternatives. Many aspects of the study project differ from conditions which would be found if broad scale dredging of the upper estuary were selected as a remedy. For example, the dredging and containment in the pilot study will take place in an area where levels of PCBs and other contaminants are said to be much lower than contaminant levels reported in the alleged "hot spots" in the upper estuary.

For several reasons, a few of which we highlight here, this project is ill-conceived. A decision to proceed with this flawed pilot project suggests that the study is designed less as an objective effort to evaluate one of many remedial options than as a cosmetic exercise predetermined to lead to selection of dredging as a remedial alternative. First, in view of critical differences between the pilot study conditions and actual conditions were full-scale dredging undertaken, the study will produce little information useful in evaluating full-scale dredging as a remedial alternative. Second, EPA's present schedule provides that its investigation of harbor conditions and screening of remedial alternatives (the remedial investigation and feasibility study or RI/FS), will be completed by August 23, 1988. After

a public comment period, a final remedial decision will be made in the Record of Decision published on December 30, 1988. Timing alone would prevent the pilot project from providing information useful to the RI/FS process. Third, EPA has established that selection of clean-up remedies at a Superfund site must be guided by an overall assessment of the risks presented by various remedial alternatives, including the no action alternative. No risk assessment has been done for the pilot study itself. Moreover, as designed, the pilot study would not produce information useful to the mandated risk assessment process for consideration of remedial options. Thus, the pilot study seems to be just one more step down a road apparently destined to make dredging the inevitable choice among remedial alternatives, other alternatives not having been comparably studied. Dredging is not a permanent remedy and will only waste incalculable amounts of money (including expenditures on the pilot study) at a site where no significant or immediate health hazard has been demonstrated.

EPA's insistence on proceeding with the pilot study under these circumstances creates a grave concern that public funds are being wasted because in the end the pilot study will not legitimately aid EPA in determining whether any remediation is necessary in New Bedford Harbor, or what remedial measures might be most suitable under applicable standards. For these reasons, defendants strongly urge EPA to reconsider whether this costly pilot dredging study is necessary and useful. If EPA decides to proceed, it must redesign the pilot study to assure both useful and environmentally sound results.

1.0 GENERAL

In September 1987 the United States Army Corps of Engineers (USACE) published its "Pilot Study of Dredging and Dredged Material Disposal Alternatives" ("Study") for the New Bedford Harbor Superfund site.^{1/} The genesis of this Study lies in the public and interagency comments critiquing the United States Environmental Protection Agency's (EPA) August 1984 draft feasibility study of remedial action alternatives for the Upper Acushnet River Estuary above the Coggeshall Street Bridge in August 1984. Of five proposed remedial alternatives considered in that draft feasibility study, four involved dredging to remove bottom sediments. In light of critical comments, the EPA commissioned the USACE to conduct an Engineering Feasibility Study intended to develop technical information necessary to evaluate dredging as a remedial alternative. This pilot study is being conducted in support of the Engineering Feasibility Study. The pilot study purports to develop information that will answer two key questions, namely, what are the contaminant release

^{1/} Though dated September 1987, the undersigned did not receive the report until October and thereafter instituted a timely review of the study. EPA neither established a formal comment period nor invited comments from those companies which have been sued by EPA for response costs in connection with New Bedford Harbor. Ebasco's November 1987 Progress Report lists the "go-ahead" date for the pilot study as September 18, 1987, approximately one month before the undersigned even received a copy of the Study. Id., Exh. 1-1.

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rates from dredged material disposal alternatives, and what are the contaminant release rates for dredging alternatives.

The USACE maintains that the information obtained from their feasibility study, including the pilot dredging study, is critical to the Record of Decision (ROD) for selection of any remedial action alternative for New Bedford Harbor. The USACE further maintains that, while it has used laboratory studies, literature reviews and desktop analyses to assess engineering feasibility and to develop conceptual designs, pilot scale evaluation is needed. The USACE seeks to justify the pilot scale dredging program on the ground that "dredging and disposal of highly contaminated sediment must be considered innovative application of alternatives, where dredging equipment must be evaluated without benefit of field-verified laboratory testing protocols, and where the data base for the impact of site-specific factors on design is currently not available." Study at 2 (emphasis added).^{2/}

We have four major concerns with the Study as proposed. First, if EPA and the USACE genuinely seek information on "innovative application of alternatives" where "dredging and disposal of highly contaminated

^{2/} Although the study report mentions "site-specific factors" as an important element requiring a pilot study, this assertion is belied by the repeated emphasis on the innovative nature of the proposed dredging alternatives, a matter which relates to dredging generally rather than to "site-specific factors" relating to New Bedford Harbor. Without elaborating on the point further in this context, the undersigned question whether the costs of such a general experimental program are properly included as response costs with respect to New Bedford Harbor specifically.

sediment must be considered," id., then the design of the Study falls short of the mark. Of paramount importance, the pilot study focuses on a site with reported average PCB concentrations of approximately 33 parts per million (ppm), hardly "highly contaminated" by EPA's definition (see E.C. Jordan/Ebasco Services, Inc., Hot Spot Feasibility Study, March 1987). Selection of a pilot study area of reported low-level concentrations of PCBs poses significant problems in attempting to extrapolate the results of the pilot study to any large-scale dredging project in areas with significantly higher reported levels of PCBs than those involved in the Study. For example, failure to detect PCB contaminants at downstream monitoring stations in the pilot study may not mean that the pilot dredging and containment procedures would be safe for large-scale operations of like nature in more heavily contaminated areas; it would establish only that areas of low reported PCB concentrations do not produce downstream problems. Moreover, with no explanation, the Study would evaluate only a limited slate of dredge types, excluding others which can be considered more innovative or state-of-the-art.

Second, the USACE justifies the Study on the grounds that, while the information resulting from the Engineering Feasibility Study "will be critical to the record of decision (ROD) for selection of the remedial action alternative," the pilot study "will reduce the uncertainty in the choice of alternatives for the ROD...." Study at 2. Under the current RI/FS schedule, it is difficult to see how such uncertainty of choice can be reduced if the overall site feasibility study were completed in August of 1988 and the ROD were issued on December 30, 1988, as is presently planned. Were the pilot dredging program conducted on schedule, its

results could not possibly be evaluated in time to provide a meaningful contribution to the ROD under the current timetable. Other aspects of the New Bedford Harbor RI/FS have involved significant critical peer review extending over many months, if not years. Realistically, one should expect the evaluation of a novel and extensive pilot dredging program to involve the same type of extensive review. Furthermore, certain data elements in the Study will not even be collected prior to finalization of the ROD scheduled in December of 1988.

Third, in designing the pilot project, EPA has failed to adhere to its own guidelines requiring careful evaluation of any potential risks to human health and the environment created by any remedial activity. Moreover, as presently designed, the results of the monitoring program and decision criteria proposed to evaluate the Study provide no appropriate basis to perform the meaningful risk-based assessment and evaluation mandated for screening remedial alternatives.

Two years ago the undersigned companies cautioned EPA not to embark on the multimillion dollar dredging project recommended by the "fast track" draft feasibility study for the upper estuary because of numerous technical uncertainties which needed to be explored first. Now, the Engineering Feasibility Study undertaken by the USACE beginning in 1985 is reported to have produced much information (most of which data has not yet been made available to us) regarding sediment characterization, contaminant migration, sediment migration, deposition/resuspension rates, leachate characteristics, and the like. The USACE also has available

extensive information concerning the use of confined disposal facilities (CDFs) in other locations.^{3/}

We must question, therefore, whether the pilot dredging study is a proper part of a feasibility study or whether it is in reality a design study. A feasibility study should fairly and thoroughly examine all potential remedial alternatives, including the no action alternative, whereas this Study prematurely focuses on a preferred solution at a level

^{3/} The USACE has been researching the environmental effect of dredging for several decades. In the last twenty years, the USACE has administered large research programs developed to provide information on the viability of dredging and disposal methodology, e.g., the Dredged Material Research Program (DMRP), which was initiated in 1973 through the USACE Waterways Experiment Station (WES). The DMRP under PL91-611 was accomplished in a five-year time frame at a cost of \$32.8 million. See Miller, Jan A., Confined Disposal Facilities on the Great Lakes, presented at the USACE Dredging and Disposal of Contaminated Sediments Meeting, August 12-14, 1986; Poindexter, Marian E., Optimization of Confined Dredged Material Disposal, Information Exchange Bulletin, Environmental Effects of Dredging, U.S. Army Corps of Engineers Waterways Experiment Station, Vol. D-87-6 (Oct. 1987).

In addition, the USACE has already collected some information on the performance of CDFs. Its "dike disposal program" was initiated in the 1970s to provide a disposal place for polluted sediments resulting from operations and maintenance dredging on the Great Lakes. Since that program was initiated, over thirty CDFs have been built in the Great Lakes Region, 22 in water and 8 in upland sites. Most of the CDFs are on the order of 20 to 100 acres in area. The largest at Point Moulillee, Michigan, is 685 acres. Monitoring of these CDFs has continued for several years to evaluate long-term leaching and dilution effects. In at least four of these sites around the Great Lakes there are navigational projects where bottom sediments have PCB levels of greater than 50 ppm (Miller, 1986). It would be far more cost-effective to develop specific monitoring at these sites where the CDFs already exist than to undertake the massive new demonstration program proposed by the USACE in New Bedford Harbor.

appropriate only for a design stage once all potential alternatives have first been fairly screened and evaluated.^{4/} Rather than spend \$4 million dollars on a pilot dredging study, the EPA should be undertaking a fresh, detailed, and unprejudiced evaluation of all remedial alternatives. The government's effort should be equally dedicated to examination of remedial alternatives such as in-situ biodegradation which are more consistent with the Congressional preference for innovative and permanent remedial approaches.^{5/}

The cleanup standards enacted in Section 121 of the Superfund Amendments and Reauthorization Act of 1986 direct EPA to pursue "permanent solutions and alternative treatment technologies." Disproportionate emphasis on dredging during the RI/FS not only violates the mandate for full consideration of all potential remedial technologies in the FS but violates the letter and spirit of the 1986 Superfund amendments as well. Dredging and long-term storage of contaminated

4/ Approximately \$6 million of the RI/FS has been budgeted for the USACE work alone, compared to \$500,000 for the evaluation of destruction and detoxification technologies, and \$34,000 for the evaluation of hydraulic control options. The pilot dredging study alone is budgeted at approximately \$4 million. The Study itself suggests that the proposed work is in fact an advanced design effort, rather than a screening tool. Cf. Study at 2 ("A pilot study will reduce the uncertainty ... in the final design and will allow smoother transition from alternative selection to final design and thence to construction").

5/ To date, EPA technical consultants have failed to give any serious consideration to evidence gathered by the undersigned that suggest in-situ biodegradation may be a viable remedial alternative for New Bedford Harbor and EPA's bench test of biodegradation treatment technologies has been delayed indefinitely. Ebasco October 1987 Report at 2-8.

harbor sediments is a step away from, not towards, fulfillment of this statutory goal.^{6/}

All of these factors -- the USACE's failure to design a pilot study which would properly and fairly assess the appropriateness of a dredging option in a timely fashion, as well as the additional information now available -- lead inescapably to our fourth concern, namely, that EPA's decision to proceed with the pilot study evidences a deep-seated, and as yet unjustified, predisposition to dredge in New Bedford Harbor. This predisposition is even more inexplicable in view of the results of the Grater New Bedford PCB Health Effects Study released in July of 1988. The health study's conclusions -- that residents in New Bedford have no higher levels of PCBs than other Americans -- must be taken into account in evaluating whether any environmental risks exist in New Bedford Harbor

^{6/} The strong drive towards a dredging solution in this case is undercut by other government projects which are premised on the realization that knowledge of treatment of contaminated sediments is in its infancy. The National Oceanic and Atmospheric Administration (NOAA) is one of many federal agencies looking at the general problem of sediment contamination in coastal waters. NOAA's National Status and Trends Program's 1987 progress report chronicles levels of PCB, DDT, polycyclic aromatic hydrocarbons (PAHs), and various trace metals including arsenic, cadmium, chromium, copper, lead and mercury found in of many coastal sediments. NOAA reported that it would be five to ten years before enough was known about any possible health and environmental impacts to create environmental standards for contaminants in sediment. BNA Environment Reporter, May 22, 1987 at 440-441. EPA itself has commissioned a \$22 million study in Region V to answer some crucial questions on sediment pollution ("the primary goals of the Region V program are to develop tests to determine the environmental risk posed by a given sediment problem and to develop the capability to predict water quality impacts of various clean-up options"). Id.

and whether any remedial action is necessary. These several concerns are expanded upon in the comments below.

In light of the significant concerns expressed in these comments, the undersigned reserve their right to challenge the appropriateness of pilot dredging expenditures in a cost recovery action. This entire project is so flawed, both in design concept and application, that if EPA and the USACE were to proceed as planned, they would incur millions of dollars of unnecessary costs, inconsistent with the National Contingency Plan, which neither these companies nor any other company should have to pay.

Before proceeding to the substance of our comments, the undersigned reiterate that, as of the date of these comments, we have had virtually no access to the massive data base EPA has generated as a result of the multi-million dollar RI/FS now underway, particularly the USACE's engineering feasibility study data. Although the government announced last spring that it was embarking on a procedure of partial release of the purported administrative record,^{7/} our requests for clarification of that procedure and for a dialogue with EPA went unanswered for four months. See, letter of July 28, 1987 to William Brighton, Charles Bering, and Lee Breckenridge from counsel for the undersigned and the reply letter from Ellen Mahan dated December 4, 1987. Since June 1987,

^{7/} Although these comments are submitted for inclusion in the so-called "administrative record," nothing herein is a waiver of the undersigned's position that the administrative record review provision of § 113 of CERCLA (as amended by SARA) cannot constitutionally be applied against them.

the government has added a very limited number of RI/FS reports to its document repository, see, Ebasco Progress Report for November 1987, p. 2-13, 14. On only four occasions has the government proffered any additional data to counsel -- by letters dated June 11, June 29, August 28 and November 2, 1987. As noted below, the actual receipt of the proffered documents is taking much longer.^{8/} Even the information thus far made available represents only a small fraction of the data generated to date through the RI/FS process, including particularly the USACE data forming the basis of the pilot dredging report.

While access to this data would permit us to evaluate the results of the USACE Engineering Feasibility Study in detail, the obvious

^{8/} Even after EPA decided to release data, there has been unwarranted delay in some instances in the actual production of documents to the defendants:

- By letter dated July 28 we formally requested production of the documents described in EPA's June 29 letter. These documents were not made available for inspection until mid-September. We reviewed the documents during the week of September 28, and formally requested copies on October 16. None of those documents were received until November 25.

- In response to EPA's August 28 letter, our representatives inspected documents at Battelle and EPA Region I Headquarters the week of September 28. By letter of September 30 copies were requested; some of those copies were not received until the week of November 30, and others have not yet been received. See, letter of November 11, 1987 from Richard A. McGrath, Battelle Project Manager, to Attorney Cheryl A. Waterhouse (dated in advance of actual receipt of documents); see Ebasco November 1987 Report at 2-12.

- Despite a visit by counsel for the undersigned to E.C. Jordan's offices in Maine in June 1987, all the documents described in the June 11 letter were not available for inspection that day. As a result of this problem, we did not receive all of those documents until November 25.

shortcomings of the proposed study are apparent even without access to the underlying data. These deficiencies are discussed more fully below.^{9/}

^{9/} These comments are submitted to highlight problems in a program EPA seems determined to undertake. By filing these comments, we do not acquiesce in the wisdom of undertaking any such project as part of an RI/FS, nor do we necessarily concur in some of the premises underlying the study, i.e., the alleged health risks in New Bedford Harbor today or even the sampling results and reported concentrations of PCBs and other contaminants in the harbor.

2.0 DESIGN OF THE PILOT DREDGING STUDY

The dredging projects and containment facilities which would realistically be expected if remediation at New Bedford Harbor were to include dredging would be greater than the pilot dredging project by orders of magnitude. In trying to extrapolate results from the pilot dredging program, problems of scale and other differences between pilot project conditions and conditions of any remedial dredging scenario for a larger area are a serious concern. The Study's failure to explain the USACE's basis for selection of dredge types also raises unresolved questions.

Location. The location selected for the pilot dredging program raises significant questions. Despite the USACE's views that "[t]he sound engineering approach for evaluation of alternatives and verification of design parameters is to perform pilot scale evaluations....particularly true for the New Bedford Project where dredging and disposal of highly contaminated sediment must be considered innovative..." (Study at 2), the USACE has selected a site totally unrepresentative of reported contamination in the "hot spot" areas where any remediation would presumably occur.

Appendix V of the Pilot Dredging Study reports concentrations of PCBs in samples taken from the proposed pilot study area ranging from non-detectable to 220 ppm. If (a) these samples are representative of the vertical and horizontal distribution of PCB in the pilot study area, (b) any of the contemplated dredging techniques will dredge to not less

than 24 inches in depth, and (c) dredging itself will tend to homogenize distribution of PCBs in the disposal areas (whether in a CDF or in a confined aquatic disposal facility (CAD)), then simple mathematical calculation yields an average likely PCB concentration in stored materials of approximately 33 ppm.

A project designed to store PCBs with concentrations reportedly on the order of 33 ppm cannot be characterized as "representative" of hot-spot dredging where concentrations are allegedly as high as 10,000 ppm or more. One of the basic principles of the behavior of PCBs in the environment, and how they partition between environmental media, is that PCB behavior, to a greater or lesser extent, relates directly to PCB concentration. PCB partitioning, for instance, can be heavily dependent upon concentration gradients for virtually all potential chemical and physical transformations of PCBs in the environment -- e.g., volatilization, solubilization, adsorption and diffusion. Thibodeaux, L., Chemodynamics, John Wiley and Sons, NY (1979).

In addition, while PCBs at the average level of 33 ppm will in all probability be adsorbed onto fine (i.e., clay and silt) particles, PCBs at higher concentrations (as are reported to exist in the "hot spot") have a higher probability of being in an oily or a non-aqueous phase

liquid (NAPL).^{10/} The NAPL phase is neither dissolved nor associated with suspended sediments so that PCB behavior can substantially differ from what is found in an adsorbed or dissolved stage.

PCBs in sediments containing low levels of oils (including the PCBs themselves) therefore may behave differently from PCBs in an adsorbed or dissolved stage. An associated release of NAPL from oily sediments upon dredging might not be modeled or represented adequately by consideration of suspended sediment alone. However, the USACE has indicated that it has assumed that in sediments with 100 ppm PCBs, the PCBs will be transported primarily with suspended sediments. This may not be the case if sediments contain higher PCB concentrations or high levels of petroleum hydrocarbons.

The potential presence of NAPL in more highly contaminated sediments means that the results of the pilot study performed in lightly contaminated sediments is not likely to be representative of conditions that may be encountered when dredging more contaminated areas. Nor would planned sampling be adequate for assessing NAPL release and transport under non-pilot conditions. It is a fundamental deficiency in design to conduct a study in an area where PCB concentrations are not

^{10/} As noted in comments submitted to EPA on previous occasions, PCBs may potentially be released from sediments containing an oily phase (either petroleum hydrocarbons or the PCBs themselves). More recently, in connection with the USACE study of PCB transport on April 24, 1986, it was noted that "PCB Aroclor could have been transported as small oil-like droplets released from sediments" Study, Appendix 2 at 3.

representative of the "hot spot" to which EPA has heretofore concentrated so much attention.

A separate and distinct question raised by the choice of location is whether dredging in the cove, with its low currents, would be representative of more dynamic conditions in other portions of the upper estuary. In fact, consideration of the hydrodynamics of the upper estuary seem to be singularly lacking in the Study, either as they exist now or as they might be changed by dredging itself. The pilot study does not take into account changes in tidal hydraulics which would be caused as dredging -- pilot or remedial -- would itself alter the bottom contours, since both the pilot and any large-scale dredging would change the harbor topography as sediments were removed. Results from the pilot study would have to be evaluated conservatively and would have to include estimates on variability in tidal hydraulics due to dredging and its effects on chemodynamics and release of PCB.

Timing and Duration. In addition to the chosen location not representing the "hot spot" area, the timing and duration of the pilot dredging study would likewise be unrepresentative of conditions which would occur during dredging associated with, for example, any of the four remedial alternatives earlier defined by EPA.

Pilot dredging is planned for the spring of 1988, a time when substantially increased runoff and flooding is likely. The behavior of PCBs under the conditions of a fresh water input potentially 10 to 20 times greater than the average fresh water input could be markedly

different from the behavior of PCBs during the longer period over which remedial dredging would take place. Not only would PCBs probably behave differently, but the increase of other contaminants released from non-point sources would confound the results of any of the monitoring studies (particularly the "toxicity tests") and, hence, any decisions based on those studies.

In addition, because the pilot study would be so short in duration, it would be possible (and probable) to suspend operations on the occurrence of any significant meteorological or oceanographic event, or, of course, such an event might well not happen during the brief study period. The logistics of suspending large-scale dredging operations would be much more complex, thereby creating a stronger disincentive to suspend such operations even for a significant meteorological or oceanographic event. Continuing a dredging project under adverse weather conditions could have a significant effect on the release rates of the contaminants in the sediment which could not be anticipated if the pilot study included no dredging during such weather conditions.

Operations. There also would be operator variation in a large-scale dredging program which would not be possible to model accurately through short-term pilot dredging. This operator variation can result from working over larger areas or during varying weather conditions or from operator fatigue. This variation would have to be taken into consideration when interpreting results of the pilot program and attempting to relate it to any full-scale remedial dredging.

Dredge Types. Selection of dredges to be used in the project is another area of concern. The Study is designed to evaluate only a very limited number of dredge types, to the exclusion of others which can be considered "innovative." Unfortunately, the Study does not disclose why state-of-the-art, innovative methods and equipment are not being evaluated, or why the three types of dredges which will be used were selected. Without information on the basis for selection of the three types of dredges, we must question whether the dredge equipment selection is another design flaw.

3.0 PROJECT SCHEDULE

Under the current schedule, EPA seems determined to spend millions of dollars on a pilot project even though the study results could not possibly be meaningfully incorporated into the remedial selection process now scheduled to conclude within the agency in the next eight months. This criticism can be best understood by viewing the proposed program in the context of the overall New Bedford Harbor RI/FS process. The New Bedford Harbor RI/FS process has been described by EPA as a mechanism to evaluate all potential remedial approaches for New Bedford Harbor, resulting in the selection of an optimal remedial approach. Based upon reports prepared by EPA to date, numerous remedial technologies other than dredging should be included in the RI/FS evaluation process. In order for this dredging study to be properly integrated into the overall project RI/FS, all data collection and field work associated with the pilot must be completed, checked and evaluated, one significant part of this process being senior technical peer review. Following completion of each of these tasks, the pilot dredging study report should then be integrated into the overall feasibility study and used as one means of evaluating the effectiveness and viability of dredging for New Bedford Harbor remediation.

Some examples of the difficulty of completing and integrating the results of pilot dredging by November 1988 are:

- o Dredging is to be conducted during the spring and summer of 1988. Dredge spoil handling and dewatering is to be evaluated

following completion of the dredging process. It is unlikely that sufficient data will be generated during the fall of 1988 which can be adequately reviewed and integrated into the overall feasibility study.

- o As part of evaluating the pilot CDF, EPA will be conducting a contaminant migration monitoring program. The monitoring program is to be so short (less than four months) that it is not likely to provide meaningful data for evaluating migration of contaminants from the pilot study CDF. This distortion alone could result in the design of a full-scale CDF which, over time, might release far greater amounts of contaminants to ground water, surface water, and ambient air than EPA contends is presently occurring.

- o Subsidence and settlement processes occur over an extended period, yet little time has been afforded to evaluate these processes (or other potentially significant long-term geotechnical processes) because the time is so short between the scheduled completion of the pilot dredging study and the selection of a remedy in the ROD.

In summary, it is unclear how most of the information developed from the pilot study could be adequately interpreted and subjected to peer review in time for inclusion in the overall New Bedford Harbor feasibility study scheduled to be issued on August 23, 1988. Furthermore, certain monitoring data, such as that describing potential

migration of contaminants from the CDF to the environment, would not be available in a form to provide meaningful input to the remedial evaluation and selection process.

4.0 ENGINEERING AND CONSTRUCTION OF THE CDF AND CAD

Much information is needed to design a CDF and CAD that could not be obtained in this pilot study. In addition, it is not clear that the proposed design of the pilot CDF and CAD structures is adequate to prevent a sudden release of contaminants or disruption of the study. A summary of certain engineering and construction concerns relating to the proposed CDF and CAD follows.

Hydrogeology. The hydrogeologic regime underlying a disposal facility is closely related to the elevation of the facility and the nature of the underlying soils. Broad variability of geologic strata observed in borings conducted in the vicinity of New Bedford Harbor (Woodward-Clyde Consultants, Field Investigation and Analytical Testing, New Bedford Superfund Site, January 1987) confirms that data developed from monitoring the pilot study disposal facility would not be representative of the range of conditions expected for the final project.

Dewatering. An issue apparently given little attention so far in planning for the pilot CDF is subsurface dewatering of the area designated for CDF use, which would probably be required if subgrade improvements were necessary for dike construction, or if an underlying liner were installed. If a liner were required, the dewatering effort would be substantial. However, due to the small size of the pilot study CDF, little useful information would be obtained regarding dewatering aspects of a full-scale CDF. Dewatering would entail a significant expense and could impact on areas outside of the project through subsidence, settlement or similar effects.

Dike Construction. Proposed dikes for the pilot study CDF are small in scale. By contrast, the large volume of material potentially to be confined in a full scale CDF, and the desire to minimize loss of shoreline, would necessitate a much more massive containment system than the pilot CDF, which would probably extend further into the harbor where low strength sediments would be more prevalent. The pilot dike design would thus not be representative of key features and unknowns of a full-scale dike. Little of what is critical to know about designing a full-scale CDF dike would be learned from the pilot dredging study.

Dredge Spoil Placement. While some consideration has been given to dewatering dredge spoil in the pilot program, the relatively thinness of pilot dredge spoils compared to much thicker layers of dredge spoils anticipated in a large-scale dredging project make it questionable whether the dewatering process and subsidence of spoils during dewatering can be realistically evaluated through this pilot study.

Geologic Variability. The pilot CDF would be built in a 250,000 square foot area. However, a large-scale CDF would occupy a substantially greater area, and in view of information indicating widely varying subsurface soil conditions (Woodward-Clyde, January 1987), geologic conditions encountered in building a large-scale CDF are likely to be much different. Variable geologic strata would probably result in non-uniform soil response, including potential differential settlement, differential subsidence, and possible shear failure. Such factors, important to determining the feasibility of large scale dredging, particularly if a liner is required, are ignored in the pilot study.

General Construction. Overall, little information helpful to the construction of a full-scale CDF would be obtained from construction of the pilot CDF. Construction of the relatively small pilot CDF would take little time and would not likely be subject to the full range of weather conditions, river flow, and general variations associated with seasonal changes, as would occur during construction of a larger CDF. Large-scale logistical issues related to New Bedford Harbor environs would also not be evaluated. For example, routing large amounts of truck traffic necessary to bring in construction and fill materials through a densely populated and congested area is not a logistical concern for the pilot study but might well be in a remedial phase of dredging.

Adequacy of the Pilot CDF and CAD Design. Aside from whether the engineering and construction of the pilot CDF/CAD would generate useful information with respect to construction of a full-scale CDF/CAD, the Study provides little detailed information concerning the proposed engineering and construction associated with the pilot project itself. Unanswered questions include whether a thorough geotechnical investigation and design has been performed on proposed embankments with regard to slope stability, settlements, foundation conditions, and the like. More specifically, have any geotechnical design borings have been performed at the site? Have appropriate geotechnical soil tests for strength and compressibility been performed? What factors of safety were used in the design of the dike?

In addition, the design of the CAD calls for the CAD to be covered with a 2 foot thick cap of dredged material. Contaminated dredged

sediments will exit from the dredge in a liquid slurry, initially having little shear strength. How long will the USACE wait for the contaminated materials to consolidate and gain strength before capping? Is it expected that up to 91% silt and clay sediments will quickly consolidate into even a soft soil? If the underlying contaminated sediments are not given sufficient time to consolidate, there may be unacceptable mixing during the placement of capping material, with potential to leave contaminated soils at the surface.

5.0 MONITORING PROGRAM

The monitoring program for the pilot dredging study was designed by the USACE and EPA's laboratory in Narragansett, Rhode Island. Study at 20. The stated objective of this monitoring program is to provide information that can be used to:

- A. Evaluate the effectiveness of the dredging and disposal techniques employed,
- B. Predict the magnitude and areal extent of the water quality impacts during a full-scale operation,
- C. Select optimum monitoring protocols, and
- D. Regulate pilot study operations.

As described above, the EPA and USACE have not made available data from earlier phases of the Engineering Feasibility Study, information which the undersigned normally would review in evaluating the appropriateness and design of the pilot dredging study monitoring program. Based upon the design presented, however, it appears that the monitoring program as proposed appears inadequate to meet its stated objectives, fails to control for the range of variables which would undoubtedly occur during the pilot dredging study, and fails to set explicit and replicable criteria for decision-making.

Air Monitoring. Although the Executive Summary mentions an air monitoring program, there is no description of such a program in the report. Since EPA contends that volatilization of PCBs is one of the

primary pathways of PCB release into the environment that might directly affect the public, the pilot study should include a rigorous air quality monitoring program. Since no such program has been described, it is not possible to comment on its applicability or appropriateness at this time.

Monitoring Stations. Monitoring stations and wells to determine surface and ground water quality should be distributed with more intensity to detect potential migration effects as to which EPA has expressed concern. It is obvious from harbor sampling done to date that sediments exhibit a high degree of variability in reported concentrations of constituents. See, e.g., the USACE upper estuary sampling program in 1985-1986 and the variation in reported concentration levels in adjacent grids. The proposed number of wells and sampling points is woefully inadequate to measure potential avenues of PCB and heavy metal release in light of such naturally high environmental variability. Furthermore, since one of the objectives of the monitoring program is to evaluate potential contaminant plumes associated with different dredging techniques, there must be simultaneous measurements of currents (or water movement) at the time of sampling.

Other Contaminants. Virtually no attention has been given to the release of compounds other than PCB and heavy metals. Little is known, and little discussion was developed, regarding the concentrations of other contaminants which might be present in harbor sediments. For example, given the time period for the pilot dredging study, it is possible that significant quantities of volatile and semi-volatile organic compounds may be released during both the CAD and CDF dredging.

A monitoring program to provide rapid and comprehensive evaluation of this potential threat to human health should have been included.

NAPL Sampling. Because PCB and other organics may also be transported as a non-aqueous phase liquid (NAPL), the monitoring program should also include appropriate methods for sampling this phase. The surface water samples, as described, may not adequately detect PCB transported as a NAPL..

Length of Monitoring Program. The time scale for monitoring should be expanded. Under the proposed program only acute, relatively high-level releases are likely to be detected, while possibly chronic lower-level releases could have as much or greater environmental effect. Monitoring of these low-level release pathways should be done over a year or more if adequate data is to be generated.

Biological Monitoring Program. A substantial portion of the Study is devoted to describing proposed biological monitoring, although it seems clear that that these studies would be duplicative of work by the Narragansett Laboratory and at Woods Hole. The value of these bioassay studies (termed "toxicity tests" in the Study) relative to the observation of transport dynamics and engineering feasibility is unclear. Results from bioassays are, first of all, often uncertain and subjective. It also is unlikely that the bioassay results can, and probably improper that they should, be used to make "real time" critical decisions regarding the performance of the pilot dredging. Bioassays are best used to determine long-term effects, and not as field instruments.

As routinely used by permitting agencies (including the USACE itself), a bioassay would normally be done in advance of a dredging project to determine the effect, if any, of certain levels of PCBs (or other contaminants of interest) on selected species; such levels are then measured in the field. Moreover, in this instance, the time frame over which these bioassay studies would be conducted would not allow evaluation of any long-term biological effects on endemic species, nor would it measure potential effects on functions such as growth, reproduction, molting, mutations, or the like.

The bioassay "experiments" also fail to control for several variables, such as the presence of polynuclear aromatic hydrocarbons (PAHs), metals or other contaminants such as hydrogen sulfide or methane, or the synergistic effects of these contaminants to account for the toxicity of these materials on organisms. Both PAHs and metals may be toxic to aquatic organisms at relatively low concentrations. Since the site for the pilot dredging study was selected based upon reported PCB concentrations alone, without information on concentrations of other potentially toxic materials, it would be confusing, at the very least, to isolate the effects related only to PCBs which may occur in the organisms being subjected to bioassays. For example, will a significant effect from the pilot dredging be attributed to the release of PCBs from sediment reportedly averaging 33 ppm? Could like effects have resulted from toxic levels of PAHs released from the same sediment?

The protocols for the mussel deployments also fail to provide for a means for establishing and quantifying exposure of these bivalves to

materials other than those released from the dredging or disposal activities. For instance, tests being conducted at far field Stations 4 and 5 may not adequately provide spatial controls for Stations 1, 2 and 3, if that is in fact their intention.

Spatial controls outside of New Bedford Harbor should also be provided. No one can adequately predict environmental factors whose effects may be related to regional phenomena; hence, conclusions may be drawn or decisions made as a result of the bioassays that have little bearing on near-field events.

Sampling Design and Decision Criteria. The discussion on sampling design and decision criteria presents insufficient information to ascertain whether any objective criteria would be used to evaluate the results of the pilot dredging study or make decisions regarding dredging operations. There is no discussion of background variability as it relates to the power or reliability of the statistical evaluations being used to draw conclusions. If this section of the study report embodies operating procedures for the pilot dredging program, it is questionable whether useful information will result.

In general, the decision criteria discussed in the pilot dredging program should be more explicit. The monitoring decision matrix uses highly subjective concepts to determine whether and how to proceed with the project: "[i]f no statistically significant increase is detected in data," "[i]f a statistically significant impact is detected that is greater than a factor of 2 above pre-operational phase" and "[i]f

conditions fail to rapidly return to those during the pre-operational phase," etc. Study at 36, 37. These "criteria" are unscientifically vague, and there is no evidence presented that sufficient information would be developed to draw rational conclusions or to permit rigorous and consistent evaluation of information or statistically and scientifically valid decisions. As presented, the monitoring program and decision criteria are conceptual only, lacking the precise detail necessary to serve as operational guidelines.

The Study also discusses "pre-operational monitoring data sets that will provide baseline levels of the variability of contaminant concentrations, toxicity, and bio-accumulation." Study at 35. However, unless there is information available on these factors, of which we are unaware, the evaluation of an "environmental baseline" for purposes of making decisions of the type described would be a herculean undertaking, if indeed possible at all. Because of high environmental variability, to define background and to develop a sampling design that controls other environmental variables would take substantial time and appears to be outside of the scope of the Study. For example, one of the conditions under which the dredging operation might be altered is described on page 35 as a "magnitude of the increase . . . greater than a factor of 2 above pre-operational phases." Although this sounds like a relatively simple criterion, in reality, in order to detect a 100 percent increase with reasonable confidence, a substantial replication of samples would be needed. This replication would determine the power of the sampling design and may differ either with the type or the location of what is being measured. There is no evidence that the design of the monitoring

study provides for, or will even consider, substantial replication of samples, a limitation which would impose a significant logistical penalty on the monitoring program. After four years of collecting environmental data and, specifically, after over a year of conducting studies and developing the design of the pilot dredging program, it is surprising and disappointing that this aspect of sampling design is dealt with so cursorily.

It also is apparent in reading Sections 4.3 and 4.4 of the Study that subjective interpretation of the results of the monitoring tests will occur. What is required, instead, is discussion of the sampling design, the specific statistical test to be used, the background variability and its effect on the power of the tests, and similar specific criteria.

6.0 RISK ASSESSMENT

Although EPA and the USACE have acknowledged that one of the primary remedial measures being considered for the upper estuary is dredging, alone or in combination with other measures, it appears that the determination of appropriate remedial measures is being made in advance of, perhaps in the absence of, a quantitative risk assessment for the New Bedford Harbor Site.^{11/} The pilot dredging program may serve to address specific areas of uncertainty associated with proceeding with dredging as a remedial action. However, important areas of uncertainty -- associated with estimating potential risks -- will not be addressed by the program as designed.

It also appears that no assessment has been made of the potential risks associated with the Pilot Dredging Program itself. The EPA and the USACE contend dredging in a less contaminated area will provide protection from unpredictable events or consequences of the project --

^{11/} Once again, these comments reflect the extent to which the undersigned are stranded outside the ongoing RI/FS process. Virtually all that we know regarding EPA's plans for a risk assessment is that there is a line item for a Task 08-Risk Assessment in the monthly progress reports by the project manager which does not yet appear to be complete. Considerations of public health and environmental risks are especially important for the New Bedford Harbor Site inasmuch as these should provide the basis for: 1) evaluating the overall effectiveness of various alternatives in reducing any long-term risks which may be posed by the current situation, as well as assessing any public health and environmental risks of the alternatives themselves, and 2) selecting appropriate target levels (e.g., concentrations of PCBs, metals, or other contaminants of concern), if any, in sediments, the water column, or air associated with specific remedial measures.

"this approach accepts the risk of a short term moderate increase in the release of contaminants...." Study at 35. This ad hoc rationalization is no substitute for risk assessment.

Finally, the monitoring program proposed for the pilot dredging program incorporates a decision framework that appears to be based on somewhat arbitrary "triggers" rather than on an identified unacceptable risk which might occur.

A. An Assessment Has Not Been Made Of The Potential Risks Associated With The Pilot Dredging Program.

The Superfund Amendments and Reauthorization Act of 1986 (SARA) and the original Superfund law (CERCLA) identify the role of risk assessment in Superfund-related actions taken by EPA. SARA provides that site remedies must attain a degree of cleanup that "assures protection of human health and the environment."^{12/} The proposed study does not include an assessment of the possible risks of pilot dredging. Although EPA and the USACE apparently assume intuitively that such risks have been

^{12/} EPA has prepared two technical support documents specifically designed to assist site investigators in performing risk assessments at Superfund Sites. These include:

Superfund Public Health Evaluation Manual. Office of Emergency and Remedial Response, Office of Solid Waste and Emergency Response. U.S. Environmental Protection Agency, Washington, D.C. OSWER Directive 9285.4-1. October 1986.

Superfund Exposure Assessment Manual. Office of Emergency and Remedial Response, Toxics Integration Branch. U.S. Environmental Protection Agency, Washington, D.C. OSWER Directive 9285.5-1. December 1986.

minimized by selecting an area for dredging that has comparatively low levels of PCBs (but unreported levels of PAHs or other substances), there should still be a formal assessment of the risks associated with the proposed action.

We note that the National Environmental Policy Act (NEPA) requirements are not applicable to CERCLA actions because they are said to be satisfied by an RI/FS report in lieu of an Environmental Impact Statement or EIS. With regard to the pilot dredging program, however, the failure to address the existing conditions in the Harbor and the environmental impacts of the pilot project itself in the context of risk assessment means that the study report would likely be considered deficient as an EIS. As to MEPA, no ENF has even been filed.^{13/}

B. The Decision Criteria Proposed For The Pilot Program Are Not Based On Considerations Of Potential Risk

As discussed above, several criteria have been developed to evaluate results of monitoring to decide if the pilot program should be terminated during any stage. The criteria appear to have been arbitrarily

^{13/} SARA also provides that remedial actions should comply with applicable or relevant and appropriate requirements (ARARs) of federal laws or -- if appropriate -- more stringent state laws. EPA's recent guidance on compliance with ARARs (July 1987) requires that the different ARARs, if any, that may apply to a site should be identified and considered at multiple points in the remedial planning process. We note that there is no discussion in the Study on whether any ARARs were considered in connection with this pilot project, so we do not comment on whether or which ARARs might apply to the pilot itself. We have only recently received EPA's draft ARARs assessment for New Bedford Harbor (October 1986), so we reserve our right to comment on EPA's ARARs assessment at a later date.

established without reference to any particular health or environmental basis. For example, the first two criteria state that:

- A. If no statistically significant increase is detected in data from any monitoring activities, the project will continue...; and
- B. If a statistically significant impact is detected that is greater than a factor of two above the pre-operational phase for any operational phase in monitoring data from the Coggeshall Street Bridge, that phase will be stopped and the rate of return to pre-operational conditions will be monitored.

The monitoring program chose an apparently arbitrary "factor of two" above pre-operational levels as a statistically based criterion for decisions. The "factor of two" was selected probably because it represents the smallest difference that could be measured against a background of temporal and spatial variability. What does this mean in terms of potential risks? Because there is no risk framework, the monitoring program is reduced to selecting an artificial number, when the real risk of the project measured against defined baseline conditions may be higher (or lower).

Indeed it is not at all clear that the monitoring program could even detect statistically significant differences on the order of a "factor of two." If so, then without some information on the potential risks associated with the occurrence of particular levels of chemicals in the water column, sediments or other environmental media, the inability to detect differences leaves open questions of what is the risk. Conversely, the ability to detect such a difference does not mean that there exists a significant risk.

C. The Pilot Dredging Program May Not Address Important Areas of Uncertainty Associated with Estimating Potential Release of PCBs and Other Chemical During Dredging

An important objective of the pilot dredging program is to reduce uncertainty associated with full-scale conditions. A critical uncertainty is the possible release of PCBs, metals and other chemicals from sediments upon dredging. This is central to the conduct of an exposure assessment, itself an integral component of a quantitative risk assessment. As discussed above with respect to design and monitoring, the USACE fails to address numerous areas of contaminant release, e.g., PCBs in an NAPL phase. These omissions impact not only the ability to assess the engineering feasibility of large-scale dredging, but significantly diminish the ability to gather appropriate information for risk assessment.

7.0 CONCLUSION

In summary, it appears that this planned pilot dredging and monitoring program is seriously flawed in that it would generate incomplete and inadequate data. The proposed project minimizes the likelihood of detecting any significant releases of contaminants that might occur. Accordingly, the Study's results would suggest false implications of the effects of full-scale dredging. Factors which will lead to that result include:

1. Choice of a pilot dredging study area which has very low concentrations of PCBs in the sediments compared to the levels reported in the so-called "hot spot" areas that EPA has indicated are sources of concern;
2. Conducting the pilot dredging study during a period when the potential for dilution through high rainfall conditions is high;
3. Design of a monitoring program which fails to control for a variety of environmental variables, including plume dynamics and the presence and effect of other contaminants;
4. Failing to develop a rigorous sampling design for the monitoring program and decision criteria for detecting any potentially important release of PCB; and

5. Proceeding with the pilot dredging study without regard to assessment of the risks created by the Study itself or to the need to develop information and decision criteria for overall risk assessment.

For these reasons, the EPA and the USACE must consider whether to proceed with a pilot dredging program at all, or if a decision is made to go forward, whether to proceed with the particular pilot program outlined by the USACE in the Study. We request a meeting to discuss these issues further and will contact you and the government's counsel regarding the details of such a meeting.

Please include these comments, and all correspondence related thereto, in the administrative record being compiled in this matter.

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