DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-2255

REPLY TO
ATTENTION OF

JUL 26 1991

Operations Division
Dredged Material Management Office

Dear Interested Party:

I would like to thank you for your interest and participation in the Puget Sound Dredged Disposal Analysis (PSDDA) Third Annual Review Meeting. The PSDDA agencies collectively feel that this has been a been a very successful year in implementing the program. As problems or issues have arisen, we have attempted to resolve them within the framework of the PSDDA Management Plan, and through the Annual Review Process with full public input and participation. The interaction with the public is vital to the success of the PSDDA program, enabling appropriate program changes to occur after undergoing a full public interest review process.

This letter transmits to you the memorandum summarizing the minutes of the annual review meeting and post ARM PSDDA Agency views and determinations on issues raised at the ARM. If you have any questions on the enclosed information, please contact Dr. David Kendall of my staff at (206) 764-3768.

Sincerely,

Brian R. Applebury, P.E.
Acting Chief, Operations Division

Enclosure

PSDDA THIRD ANNUAL REVIEW MEETING (ARM) MINUTES

(Attachments to these minutes include Post-ARM meeting issue resolution summary (Appendix A), comment letters received (Appendix B), data submittal requirements (Appendix C), revised modifications to holding times for PSDDA chemical analyses (Appendix D), and modified table for interstandard QA limit comparisons (Appendix E).

1. The third Puget Sound Dredged Disposal Analysis (PSDDA) annual review meeting (ARM) was held at the Tacoma Inn in Tacoma, Washington on Thursday, May 2, 1991. Ray Schmitz, Chief, Operations Division, Seattle District Corps of Engineers welcomed meeting attendees, which numbered about 70. A list of meeting attendees is provided as enclosure 1. Ray Schmitz then introduced Steve Hunter, Assistant Director for Central Programs and Enforcement with the Washington Department of Ecology, who provided opening remarks. Notes from his general remarks are included as enclosure 2.

2. Ray Schmitz then introduced the ARM panel of agency representatives, which included; Ann Essko, Asst. Division Manager for the Washington Department of Natural Resources, Greg Sorlie, Washington Department of Ecology, John Malek (for Ron Lee), EPA Region 10, and David Kendall, Seattle District Army Corps of Engineers, Dredged Material Management Office.

3. Ray Schmitz presented the meeting agenda (enclosure 3). At this point and throughout the day Ray Schmitz asked that additional issues from the attendees be submitted to the panel in writing for inclusion in the program.

4. Ray Schmitz then presented an overview of the annual review process, meeting objectives, and accomplishments in the PSDDA program since the last (Second) Annual Review Meeting held in 1990 (see enclosures 4 and 5).

5. Program Overview. Betsy Striplin (WDNR) presented a program overview including reports and major actions that occurred during the 1990 dredging year (June 16, 1989 - June 15, 1990). The program overview and DY 1990 data summaries included information from the two main PSDDA reports for DY 1990. These include the Dredged Material Evaluation Application Report (DMEAR) prepared for the PSDDA agencies by the Corps of Engineers Dredged Material Management Office (for reference see enclosure 6), and the Management Plan Assessment Report (MPAR) prepared for the PSDDA agencies by the Department of Ecology (for reference see enclosure 7).

encl. 8 Overview of Dredging Year 1990
encl. 9 Projects Undergoing Testing During DY90
encl. 10 Characterization Results
encl. 11 Disposal Site Usage in DY90
encl. 12 Compliance Monitoring
encl. 13 Environmental Monitoring Questions
encl. 14 PSDDA Monitoring Variables
encl. 15 Monitoring Stations
encl. 16 What is a Guideline Value?
encl. 17 Guideline Values
encl. 18 1990 PSDDA Monitoring Program

encl. 19 SVPS Stations in Elliott Bay
encl. 20 Elliott Bay Dredged Material Footprint
encl. 21 Sediment Stations in Elliott Bay
encl. 22 Elliott Bay: Perimeter Chemistry Results
encl. 23 Elliott Bay: Toxicity Results
encl. 24 Elliott Bay Summary
encl. 25 Elliott Bay Site Management Change
encl. 26 SVPS Stations in Port Gardner
encl. 27 Port Gardner Dredged Material Footprint
encl. 28 Sediment Stations in Port Gardner
encl. 29 Port Gardner: Perimeter Chemistry Results
encl. 30 Port Gardner: Toxicity Results
encl. 31 Port Gardner: Benthic Infauna Results
encl. 32 Port Gardner: Bioaccumulation Results
encl. 33 Graph of Relationship between Bioaccumulation and Body Weight
encl. 34 Port Gardner: Laboratory Bioaccumulation Results
encl. 35 Port Gardner Summary
encl. 36 Port Gardner Site Management Changes

As summarized in the enclosures, Betsy Striplin's overview covered projects that underwent testing, testing results, disposal site usage, compliance monitoring, environmental monitoring questions, monitoring variables for partial and full monitoring, and use and definition of guideline values.

Betsy Striplin summarized the 1990 monitoring efforts at the Elliott Bay and Port Gardner disposal sites. In Elliott Bay, dredged material remained onsite and no increases in sediment chemical concentrations were attributed to dredged material. Elliott Bay partial monitoring resulted in a site management change based on physical mapping (see clarification p. A-23, MPAR). Full monitoring at Port Gardner found some dredged material located off the site to the west, northwest, and southwest. Sediment chemical concentrations were not elevated due to dredged material, and biological effects of dredged material were not observed. Based on the monitoring, two site management changes are proposed for the Port Gardner disposal site (see clarification p. A-23, MPAR).

Following her presentation, Betsy was asked the following questions. Could dredged material found outside the Port Gardner site be due to short-dumping? Based on information from the site and monitoring, it is unlikely that the material observed offsite came from a short dump.

Does material released within the disposal site, but outside the target area really constitute a "violation"? Betsy replied that use of the term violation is in reference to the disposal site permits issued by DNR. Because disposal site users are required to dispose within a central disposal zone as a condition of their DNR permit, disposals outside of this zone are technically in violation of their permit.

Does increased benthic infaunal abundance have a trigger guideline value? There is no current guideline value for increased benthic infaunal abundance. If increases were observed during monitoring, we could check the results at each of the benchmark stations for comparable increases. PSDDA agencies are aware of the phenomenon of increased abundance in disturbed areas due to opportunistic species. PSDDA benthic

infaunal samples were analyzed to species level so that community level changes could be assessed.

Betsy was asked to elaborate on the new management change that calls for review of physical characteristics of dredged material bound for the Port Gardner disposal site. Predictive models were used to establish the PSDDA sites. Projects with large volumes of material with physical characteristics which result in greater spreading upon disposal relative to parameters used in the predictive dump models may have some permit restrictions. This would be a consensus PSDDA decision and would then be made a condition of the DNR permit, and potentially the Corps permit.

Are tissue chemistry levels found during monitoring compared to baseline or pre-disposal values? Trigger levels are based on baseline concentrations. The organics trigger is 5X the baseline values. The metals trigger is 2X the baseline values.

6. PSDDA Reporting and Program Review. Tom Mueller presented the first issue paper on PSDDA Reporting and Program Review. Reference issue paper MPAR p. B-1.

encl. 37 Title page
encl. 38 Documents Required by Management Plans
encl. 39 Problem Identification
encl. 40 Background
encl. 41 Modifications Proposed

Eric Johnson expressed the Washington Public Ports Association's concern that while report consolidation is fine, reducing the frequency of meetings to less than annually may be premature because policy or management issues may require annual meetings. There are many things happening in the sediment arena in the next few years due to complex projects, state management standards, etc. Eric also asked how it will be decided whether an issue should be considered in an annual review meeting forum. Tom responded that PSDDA agency discussion and consensus will determine whether an issue is "major" enough to warrant consideration at an annual review meeting. Public notices may also be used to solicit input on what issues warrant discussion at annual review meeting (reference WPPA letter Appendix B). PSDDA agencies will continue to have annual review meetings for the foreseeable future. The only question is the extent of report preparation prior to annual review meetings.

A question was asked as to whether the biomonitoring workgroup would still be continued and whether adequate peer review would still continue. No development type workgroups will be dropped. The main issue is to scale back or consolidate the extremely time consuming reporting requirements as they now stand. Peer review of PSDDA technical work would still occur.

7. Bioassay Performance Review. Justine Smith presented the Bioassay Performance Review Work Plan issue paper. Reference MPAR issue paper p. B-7. PSDDA agencies will continue their technical review of the bioassay testing requirement through the rest

of 1991. Justine presented the work plan which includes work on the amphipod, larval, and microtox bioassays. Much of the work will be completed using staff time and summarizing data already in existing databases. Additional laboratory work on the larval and microtox bioassays will be performed. Information will be used to produce three data reports specific to each bioassay. The data reports will be reviewed by a technical review team and will culminate in one issue paper which will be produced in November 1991 and submitted to a regulatory review team chaired by David Kendall.

encl. 42 Proposed Action
encl. 43 Amphipod Bioassay
encl. 44 Larval Bioassay
encl. 45 Microtox Bioassay
encl. 46 Products, Review, and Schedule

Most discussion about this issue paper concerned the microtox bioassay and the interpretation of the light enhancement response. Ed Casillas commented that initial light enhancement may in fact be a toxic response. These issues will be explored further during the implementation of the work plan.

8. *Neanthes* Biomass Test. Maria Peeler presented the issue paper on the *Neanthes* Biomass Test Work Plan. Reference MPAR p. B-13. Maria covered the history of PSDDA's attempts to develop a chronic/sublethal test and specifically past work on the *Neanthes* biomass bioassay. This year's workplan and key products include convening a *Neanthes* technical team which will develop and provide guidance for field studies, an interlab study, a workshop, and then will submit a data report with recommendations for review by the regulatory review team chaired by David Kendall. A final draft issue paper will be released January 1992 for presentation and consideration at the 1992 PSDDA Annual Review Meeting. Interested attendees were asked to sign up for the *Neanthes* work group.

encl. 47 Neanthes Workplan
encl. 48 Past Neanthes Studies
encl. 49 Results of Recent Neanthes Long-term Experiment
encl. 50 Neanthes Workplan Overview
encl. 51 Neanthes Workplan Activities and Key Products
encl. 52 Neanthes Workplan Activities and Key Products
encl. 53 Schedule

Eric Johnson of the Washington Public Ports Association questioned the assumption that broader experience (field tests) and interlab comparison work with the *Neanthes* test will validate previously observed ranges of response for this test. Eric feels the schedule is overly optimistic and does not provide time for resolution of problems that may arise. Maria agreed that the schedule is tight, but that some extra time was included. The PSDDA agencies' intention is to incorporate the *Neanthes* 20-day test into the PSDDA at the next ARM in the spring of 1992. However, if for some reason the test has not been substantiated or is not ready, a status report or available new information will be presented at the 1992 ARM. Evaluation of other chronic/sublethal tests and/or endpoints will be pursued as part of the Regulatory Work Group.

Morgan Bradley of the Muckelshoot Tribe asked whether copies of scopes of work for the proposed field tests are available. Maria replied that field tests have not been decided to date and that the *Neanthes* technical team will provide recommendations for tests. Morgan also asked why the biological endpoint for *Neanthes* was limited to the density of eggs. He is concerned whether the eggs are really viable and why the test is not carried out further. Is density of eggs a good indicator to use?

Danil Hancock remarked that there are many species of *Neanthes*, and asked how the PSDDA program will maintain fidelity of species. Mike Johns commented that the species being used is not really *Neanthes arenaceodentata*, but is whatever Dr. Reish's original culture is finally called. The species for the testing consistently has come from Dr. Reish's culture. In addressing Morgan's question, Mike explained that an experiment was conducted to look at egg fecundity/viability. There are two main reasons that egg viability is not used as the endpoint for this experiment. One is that it is difficult to track the egg masses in jars containing sediments. Another is that surviving male worms in test containers eat the egg masses.

Tom Wright commented that he feels it is a leap of faith to assume that growth is linked to reproduction and that the link between growth and reproduction has not been made to date. All technical issues relative to the *Neanthes* test will be peer reviewed as part of the *Neanthes* work plan.

9. Regulatory Interpretation of PSDDA Bioassays. David Kendall concluded the morning session with presentation of the work plan for Developing Regulatory Interpretations of PSDDA Bioassays. Reference MPAR p. B-19. The purpose of the regulatory review is to assess bioassay performance, revisit the suitability of each bioassay to evaluate dredged material effects, and determine the need for changes in program biological testing requirements. PSDDA agencies are always working to try to improve on and update biological testing. Regulatory issues for the amphipod test, sediment larval test, saline microtox test, and *Neanthes* test were discussed. The Regulatory Work Group will be formed to review the work of the technical groups. Technical groups include the *Neanthes* Biomass Test Work Group and the smaller bioassay-specific work groups discussed in Maria Peeler's and Justine Smith's presentations. Ultimately the Regulatory Work Group will produce an issue paper with recommendations for changes based on technical work group input (scheduled February 1992).

encl. 54 Title page
encl. 55 Problem Statement
encl. 56 Regulatory Definition
encl. 57 Site Condition II Definition
encl. 58 Purpose of Regulatory Review
encl. 59 Regulatory Issues
encl. 60 Graph, Amphipod Mort. v. Ref. Sediment-percent fines
encl. 61 Amphipod and Larval Test Performance by Year
encl. 62 Microtox and Juvenile Infaunal Test Performance by Year
encl. 63 Schedule

Diane Robbins asked whether sulfides in and of themselves are being considered as a pollutant in dredged material rather than as only a QA problem for bioassays. Dave responded that both ammonia and sulfides are not persistent and are dispersed quickly during disposal and that they are not a water quality problem. This conclusion was evaluated and documented during the Corp's Dredged Material Research Program. It was shown that generally within a small dilution zone on a site, especially with exposure to oxygen, the ammonia and sulfides disappear. No real field effects are expected for the conventionals and they are measured in the PSDDA program to document and explain their possible interference with bioassay interpretation in the small testing jars using to test organisms in the laboratory.

Carl Kassebaum asked what the implications of the sulfide and ammonia effects on bioassays were on AET development. Dave responded that he is unsure at this time. John Wakeman hypothesized that the AET's abnormality endpoint in the larval test might be as sensitive to these influences as the mortality endpoint. The issue of grain size may be an important one for amphipod testing as it relates to AET development. However, because the SL's and ML's are not specifically driven by individual AET's, it is unlikely that these factors would significantly affect the PSDDA program. The PSDDA agencies will continue evaluating the effects of ammonia, sulfides, and grain size especially as they relate to the PSDDA program.

Tom Wright asked whether there are problems with ammonia and sulfides in the larval elutriate test. Dave replied that PSDDA does not routinely use the elutriate test. Tom suggested that removal of the sediments from the test jars would solve the ammonia and sulfide problems. Tom also said that in a 404 evaluation, in the field mixing should be taken into account, which should cause any field effects from conventionals to vanish. The sediment larval work group will also be examining this issue.

10. LUNCH BREAK

11. Sediment Holding Times for Bioassays. David Fox presented the issue paper on Sediment Holding Times for Bioassays. This issue paper and discussion of this topic is found in the MPAR report p. B-5.

encl. 64 Title page
encl. 65 Holding Time Definition
encl. 66 Current Guidelines
encl. 67 Problem Definition
encl. 68 Bioassay Holding Time Studies
encl. 69 Holding Time Effects (Carr Inlet) -- Amphipod
encl. 70 Holding Time Effects (Elliott Bay) -- Amphipod
encl. 71 Holding Time Effects (Carr Inlet) -- Neanthes Biomass
encl. 72 Holding Time Effects (Elliott Bay) -- Neanthes Biomass
encl. 73 Holding Time Effects (Carr Inlet) -- Microtox
encl. 74 Holding Time Effects (Elliott Bay) -- Microtox
encl. 75 Holding Time Effects -- Mysidopsis
encl. 76 Holding Time Effects -- Nereis
encl. 77 Basic Conclusions
encl. 78 The Flip Side
encl. 79 Recommendation

Joe Cummins of the EPA Manchester Lab is concerned that the regulatory agencies are arriving at decisions on holding times for sediment based on program implementation considerations rather than scientific information. Joe feels that the papers presented do not justify the change in holding times, and recommended that the PSDDA agencies give the literature a more thorough review. He feels that even a 6 week holding time is not justified by adequate information. Dave Fox said that as a concept, tiered testing has been accepted as an integral part of the PSDDA program. On the issue of whether the papers are supportive, Dave stated that the preponderance of information seems to indicate that effects of an extension of the holding time at this point appear minor compared to the benefits from a more reasonable tiered testing schedule.

Carl Kassebaum commented that unless the dredger is willing to take a significant risk, virtually no tiered testing can occur. Remobilization can cost much more than concurrent chemistry and biological testing. Carl said that one negative point might be that increased toxicity may result from longer holding times. Carl also brought up the use and availability to the PSDDA agencies of bioassay data generated during concurrent testing that may not have been required under PSDDA tiered testing guidelines. Carl is concerned that this situation puts the dredger in the position of having information that might not have otherwise been available subsequently being used against them. Extending the holding time would help reduce future occurrences of this situation, although there may be the risk of increased toxicity.

John Wakeman responded to Joe Cummins that the data quality objectives of the PSDDA program and the former Puget Sound Estuary Program (PSEP) program are sometimes different. For PSDDA we are only trying to determine whether material is suitable for open-water disposal. In reviewing the holding time report prepared by PTI, except for one microtox case, no change in the PSDDA interpretations would have occurred based on holding time data presented. In the case where data objectives are different than the PSDDA program, perhaps one could not live with the uncertainties introduced by longer holding times. The PSDDA agencies will consider the objectives for use of the information and how it fits into the overall program.

Tim Thompson of Parametrix said that from a scientific standpoint he has a problem with the data due to the relatively small number of samples and sediments tested. He feels that there is not enough sound evidence to support the change. Dave Fox responded that both PTI's study, Tatem's article, and other referenced studies all show similar results.

Danil Hancock commented that there would be a high variability in the holding time influences among the chemicals of interest e.g. heavy metals v. volatile organics. Tatem's article did look at the effects of holding time on bioaccumulation and chemistry, and generally showed that there was little change over time, especially for metals. It typically showed no change to increased bioaccumulation with longer holding time. Any decreases exhibited in bioaccumulation at certain holding times were followed by an

increase in bioaccumulation potential for longer holding times.

Morgan Bradley asked why there was a change in sediment toxicity if the sediment is held in a nitrogen environment at 4 degrees C. Dave responded that no mechanism for the changes was offered in the papers. Another comment was made that in an anaerobic environment, sulfur producing bacteria may change the pH and thus change the availability of some chemicals such as heavy metals.

Joe Cummins commented that the PTI sediment used was highly contaminated but was not highly toxic. This was not very representative. Dave Fox said that the Elliott Bay sediment was toxic relative to biological effects considered important in the PSDDA program. Mortalities were found to be significantly different from control and reference. Joe Cummins stated that nothing specifically supports the two week holding time presently used (by PSEP), but that it was practical and he feels comfortable with the time.

Beth Power of EVS Consultants said that the important question to ask is where along the time continuum is the sediment most like that found in the natural bedded sediments we are characterizing. It is possible that sediments after holding time of eight weeks are more representative than sediments after two weeks or vice versa. Neither may be representative of the environmental condition in situ.

Morgan Bradley asked whether there is a steady state for sediment toxicity? He is concerned that we will have increasingly toxic sediment due to holding time as we go to longer chronic sublethal testing. Is this considered in the test interpretation for longer tests?

12. Disposal Site Monitoring. Betsy Striplin presented the issue paper on the Disposal Site Monitoring Review Work Plan. Reference MPAR p. B-23. Additional work on the site environmental monitoring program includes perimeter chemistry data interpretation, assessment of benthic communities, and bioaccumulation. Betsy presented proposed actions and a schedule for each issue, which will culminate in draft issue papers in January 1992.

encl. 80 Continued Devel. of the Disposal Site Environ. Monitoring Program
encl. 81 Perimeter Chemistry: Background and Status
encl. 82 Perimeter Chemistry: Proposed Action
encl. 83 Perimeter Chemistry: Schedule
encl. 84 Benthic Communities: Background and Status
encl. 85 Benthic Communities: Proposed Action
encl. 86 Benthic Communities: Schedule
encl. 87 Bioaccumulation: Background and Status
encl. 88 Bioaccumulation: Proposed Action
encl. 89 Bioaccumulation: Schedule

13. SL/ML Adjustments. Tom Gries presented the issue paper on SL/ML Adjustments.

encl. 90 Title page
encl. 91 Ecology Responsibilities

encl. 92 Problem Identification
encl. 93 Sources of New Sediment Quality Data for Puget Sound
encl. 94 Ecology Recommends no Changes to Existing AET's (1988 Update)
encl. 95 Recommended Changes to Selected PSDDA Screening Levels
encl. 96 Schedule for New AET's

Tom's analysis has included six chemicals which have had numerous detection limit exceedances of SL during PSDDA testing (enclosure 95). Checking the six chemicals revealed that raising the SL's for these chemicals to routinely achievable detection limits would have no effect on sensitivity, efficiency, or overall reliability compared to the old SL's. All the numbers recommended are below or equal to the lowest current apparent effects threshold and below the state's new sediment management standards. Considering this, Ecology recommends raising the six SL's.

Tom reminded attendees that at last year's ARM it was decided not to recalculate the AET's due to lack of new data and lack of changes to interpretive guidelines from the prior years. Since then however, new data have been received. Total number of new data points is almost identical to the number of data points used to calculate the original AET's. However, there are still some decisions to be made in terms of interpretation guidelines and their effects on recalculation of the AET database.

There are three main reasons why the AET database was not updated: 1) hit v. no-hit interpretive changes, 2) QA guidelines and lack of QA2 information on the data sets, and 3) important new data sets available only very recently. The new data is predominantly from cleaner areas of Puget Sound (e.g. ambient monitoring, reference area studies, etc). Thus, Ecology is not prepared to make recommendations on the AET database yet. Tom proposed a schedule and tasks, with the recalculation exercise occurring in the fall.

John Wakeman asked what kind of QA documentation is required now and how do we ask for it? Tom replied that while there are some specific quality assurance manuals available, all data necessary for QA2 was not being submitted for review. The PSDDA Quality Assurance guidance manual (QA1) Appendix A lists all data required for submittal including that required for QA2 (reference ARM Appendix C). The QA1 Manual is out of date and is in need of substantial rewriting. The two main types of data lacking in the submittals are data supporting calibration of instruments and verifying chromatograms and mass spectra.

John Wakeman commented that this level of QA submittal will raise costs. Tom said that the requirement for this data submittal is already in the PSDDA documents and this requirement has not been enforced. Better communication to the labs on specific submittal requirements will be implemented immediately by the DMMO.

Tim Thompson asked whether applicants should be submitting QA2 data to the PSDDA program now if in the past it has not been required. Tom said that there are two uses of the PSDDA data and thus there are two required QA levels. The first (QA1) use is for suitability decisions. The second (QA2) is for use recalculating PSDDA SL and

ML's annually. Tom is willing to go to labs for past projects to get missing QA data that he needs.

Chris Getchell asked whether there was any work done substantiating the correlation between individual chemistry quality and biological testing outcome (hits/non-hits)? Tom said this is reflected in the historical AET's in the sensitivity and efficiency analyses. More recent information is recorded in the Corps' DMEAR report in the pattern analysis section. The pattern analysis was a preliminary look at chemistry and biological testing outcomes and was of limited value using the smaller Corps data set. Future pattern analysis may be considered using the larger Ecology sediment quality database.

Gene Revelas of SAIC asked how often the QA2 review changes the findings of the QA1 review? Tom said that he has only looked at two projects in their entirety. With this limited experience Tom said that it appears that it won't be changing the QA1 review results much.

Tom Wakeman of San Francisco District Corps of Engineers asked why go to the effort of QA2 if it isn't going to make any difference in our interpretation? Tom replied that we don't have the experience to date to determine whether it will make a difference or not. Tom has only had the chance to look at 38 samples out of about 300. To date PSDDA agencies have agreed that QA2 level of review is needed before data is allowed into the database used to calculate AET's. This is not necessarily an unbendable rule, but is the process followed to date.

This concluded the issue paper reports.

14. New Issue, Applicant Data Submittal. Tim Thompson of Parametrix reintroduced the issue of applicant data submittal. When additional concurrently run biological testing data that would not be required by the PSDDA tiering process has been collected by an applicant, must this data be submitted? He asked for documentation and also asked whether PSDDA interpretive criteria would be applied to this data. An additional comment was that he feels the dredger should have the option of running only the biological tests with chemistry performed only for confirmation. John Malek replied that this will be discussed between the PSDDA agencies. From the EPA standpoint the chemistry is used for inventorying, while biology has the primacy for decision-making. The controversy for PSDDA was that PSDDA developed threshold levels (SL and ML) for when we expect those biological responses to occur. These correspond to chemical numbers. These are not cause and effect numbers but efficient and reliable predictors. Discussion of this topic was tabled until further discussion can occur among the PSDDA agencies. (For resolution of this issue reference Appendix A post-ARM meeting summary).

15. Dioxin: PSDDA Agency Findings and Process. Status reports began with a report on dioxin by John Malek of EPA. At last year's annual review meeting attendees wanted to

know when and how PSDDA would require testing for dioxin in dredged material. This discussion is covered in the MPAR on pp. 27-28. Dioxin is not a contaminant of concern routinely tested by PSDDA, however, it can be required on a best professional judgement basis when there is reason to believe dioxin may be present in the sediment. Generally this has been interpreted to mean in the near "vicinity" of kraft process mills. There are also other sources of dioxin, but data shows that the major source of dioxin is the kraft mills. The two kraft mills in Puget Sound are the Simpson mill in Tacoma and the Weyerhauser mill in Everett. The PSDDA agencies agreed to keep abreast of developments on dioxin, closely coordinate PSDDA activities with other groups in the northwest including the Columbia River and outer coast of Washington, agreed to seek staff training on ecological and human health risk assessments involving dioxin (a workshop was held in September 1990), and considered sponsoring a technical workshop on dioxin. This workshop was not held because studies are ongoing.

The definition of "in the near vicinity" has been followed up as follows: (1) the Simpson mill is within the Commencement Bay Superfund site. The outfall has been extended and the mill's process has been changed following review of their NPDES permit. EPA has been reviewing this area under the Superfund program and so it has not been targeted specifically by PSDDA. (2) For the Everett area near the Weyerhauser mill outfall, Ecology has agreed to run the WASP4 model and the CORMIX model to assist in defining "in the near vicinity". PSDDA agencies have been working to obtain a database of bathymetry and currents in the Everett area from the US Navy. This information has not yet been provided. Other work includes the EPA Office of Near Coastal Waters' study of dioxin levels in Dungeness crab and other crab species in Puget Sound at 12 sites. These results are due spring 1991, with a final report available in fall 1991.

For the upcoming year the PSDDA agencies will continue using best professional judgement to determine when testing should occur. The PSDDA agencies will continue to keep abreast of developing information on dioxin and will continue to coordinate with programs in the Pacific Northwest.

Eric Johnson asked what was wrong with the WASP4 and CORMIX models. John replied that we lacked the data necessary to run the models and are waiting to receive it from the Navy for the Everett area.

John Wakeman added that the Seattle District Corps, in conjunction with work being done for crab mitigation in Grays Harbor, has an annotative bibliography on the ecological consequences of dioxin in the aquatic environment.

16. Reference Area Study Preliminary Results. Brett Betts of Ecology then presented a status report on the Results of the Reference Area Study. Sampling for the survey was conducted in June 1990, and was primarily to characterize reference areas for biological performance standards and to fulfill recommendations of the EPA Science Advisory Board (SAB) from 1989.

encl. 97 Title page
encl. 98 Objectives
encl. 99 Study Design
encl. 100 Locations of Areas Sampled
encl. 101 Grain Distrib. at Samish Bay
encl. 102 PCB's at Reference Areas
encl. 103 Bioassays Exceeding PSEP Control Limits
encl. 104 Amphipod Mortality at Reference Areas
encl. 105 Bioassay-Conventionals Correlations
encl. 106 PSDDA SL Exceedances
encl. 107 Summary of Results
encl. 108 Conclusions

Regarding the Apparent Effects Threshold methodology, the SAB recommended to standardization performance standards for reference areas because they are intrinsic to the use of the AET methodology. Grain size, conventional, and chemistry information was obtained from stations within reference areas geographically scattered throughout Puget Sound. Reference areas included Carr Inlet, Holmes Harbor, and Samish Bay. Bioassays included amphipod mortality, larval bivalve and echinoderm, *Neanthes* biomass test, and microtox. Results are still preliminary. Brett showed examples of the range of grain sizes found in the three embayments. In the bioassay results many samples exceeded the QC standards for performance for a control sample, however, this is not a major issue as these are reference sediments and not control sediments. There was high larval bivalve mortality at all stations and embayments. According to the draft report "Reference Area Performance Standards for Puget Sound" (June 1991), "A plausible explanation for the results of the bivalve larvae mortality endpoint, which contradicts results of other bioassays based on comparison to QC limits for control, is that estimates of numbers of initial larvae is not representative of the initial number of larvae. Therefore exceedance of bivalve larvae QC limits for mortality in control is not considered indicative of significant toxicity in these samples." All bays were found to be acceptable reference areas under the PSDDA guidelines due to biological testing. The final report will provide rationale as well as maps and position information for the stations. A draft report will be released in June. A final report will be released in August for public distribution.

Betsy Striplin cautioned that reference area grain size distribution can change due to events in the reference embayments, so the specific sediment grain sizes may not always occur at specific position coordinates. She recommended that a wet screening method be used during reference sediment collection.

John Wakeman asked whether the report would include information on the relationship between the wet screening method used in the field and actual grain size. Brett said that this information would be added to the report.

17. "Green Book" Status Report. John Malek provided a status report on the "Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual ("Green Book"). This is referenced in the MPAR p. 36. The manual is national guidance developed jointly by EPA and the Corps, and provides a framework for testing dredged

material proposed for ocean disposal. The notice of availability appeared in the Federal Notice on April 4, 1991. Distribution is being handled by the Waterways Experiment Station. To receive the final Green Book contact: Billie Skinner (601) 634-3701.

Full implementation is required to occur in 6 months, or when a regional implementation manual is developed prior to that. Within Region 10 it is undecided whether to have one regional manual or two separate manuals for Washington and Oregon. A brief letter of implementation between Region 10 and North Pacific Division is being prepared that will immediately implement the manual. In the letter, development of a manual will be agreed to. Regionally it appears that implementation is not a problem as our programs are currently consistent with the Green Book. There are no implications to PSDDA at this point because the Green Book is oriented toward ocean dumping and not 404 waters, which covers Puget Sound. In comparison, however, there are a number of similarities between PSDDA and the Green Book. There are some semantic differences in terms of tiering and there is more emphasis on consideration of bioaccumulation in all of the tiers. The Green Book recommends a different procedure for measuring PCB's.

Other manuals are also in preparation. A draft manual on ocean disposal site monitoring and management is being circulated within EPA and the Corps for comments. A public draft may be available spring of 1992.

A companion testing manual to the Green Book for Clean Water Act 404 waters is being worked on by the Corps and EPA. An effort is going on in the Great Lakes for testing in fresh water. John does not anticipate any major changes to PSDDA. A manual is also planned for disposal site monitoring and management in 404 waters at some point in the future.

Tom Wright mentioned a national guidance manual on alternatives evaluation of disposal options. This will cover both ocean and 404 waters. An internal draft will be out soon. Carl Kassebaum asked if the alternatives analysis manual is a continuation of the work done by Petticord. John confirmed that it is a continuation and simplification of that work.

18. Washington State Sediment Management Standards. Keith Phillips of Ecology presented a status paper on the Relationship of Sediment Management Standards (SMS) to the PSDDA Program. This issue is discussed on pp. 36-37 of the MPAR.

encl. 109 Title page
encl. 110 Adoption Schedule and Scope
encl. 111 Application Model
encl. 112 "Regulatory Beauty"
encl. 113 General Applicability of SMS to Dredging Programs
encl. 114 Application to Existing PSDDA Disposal Sites
encl. 115 Application to Other Dredging Activities
encl. 116 Flowchart
encl. 117 Rule Language Related to Dredging
encl. 118 SMS v. PSDDA Comparison of Biological Testing Requirements

In March, the State of Washington adopted a new chapter in its administrative code called the Sediment Management Standards. The rule establishes criteria for sediment quality throughout the state, and provides a framework for source control and identifying and cleaning up contaminated sites. The rule integrates a number of sediment quality programs. Application of the Sediment Management Standards would be applied to the dredging program as part of the section 401 water quality certification or through administrative orders issued pursuant to federal or state clean water laws. The rule defers requirements for dredging activities to established federal and state dredging programs. PSDDA is protected by the language of the rule. Appropriate parts of the PSDDA program documents are directly referenced in the rule as existing guidance. Also federal and state coordination is required in the rule for decisions regarding dredged material management. The rule requires that Ecology approve PSDDA existing open-water disposal sites by issuing administrative orders. The orders are to incorporate the requirements of PSDDA. Ecology will have the administrative orders out this year. For individual projects, the rule will be applied via the 401 water quality certification. There are some differences in the definition of "minor adverse effects" between the PSDDA Site Condition II definition for non-dispersive disposal and the Sediment Management Standards definition. Performance standards and interpretation is slightly different and will addressed by the Regulatory workgroup chaired by David Kendall. Keith believes that this is not a significant issue. Tom Wright suggested that this testing is sequential testing rather than tiered testing.

19. David Kendall asked for priority suggestions for action on issues and clarifications to be considered by the PSDDA agencies at a post-ARM meeting. Topics mentioned as important were the monitoring plan and issues, effects of grain size and ammonia and sulfides on the generation of AET's, updates of the AET database using new data, and an accelerated program to deal with material that does not pass guidelines for open-water disposal under PSDDA. A question was asked about remediation of sediments. This is being handled under the state of Washington sediment management standards. The above issues that are in the purview of the PSDDA program are also considered to be important by the PSDDA agencies and will be covered in currently existing work plans. In terms of confined disposal, the state of Washington has a program that is looking into confined disposal alternatives and feasibility of a multi-user confined disposal site.

20. Ray Schmitz reviewed the issues for consideration/clarification at a post-ARM meeting (reference also attached Appendix A):

a. Biennial Reviews. Clarification of what constitutes "major" versus "minor" issues as triggers for annual review meetings, request for a 1993 ARM.

b. Data Submission. Clarification of requirement for complete data submissions, especially when contractor opts to do concurrent chemical and biological testing, but all chemistry below screening levels. Requirement to submit bioassay data

needs clarification.

c. Holding Times. A change from 6 weeks to 8 weeks for bioassays. PSDDA should re-evaluate/review data pertinent to issue.

d. ML/SL Adjustments. Clarification of the hit/no hit for AET revisions.

e. *Neanthes*. PSDDA agencies have committed to improving assessment of chronic/sublethal effects by 1992. Need to clarify what we will do if *Neanthes* does not work as anticipated.

f. QA2 Requirements. PSDDA has always required submittal of all data needed for QA1 and QA2 review. Need to clarify this requirement and provide specifics needed for submittals (see Appendix A of QA1 Report for required submittals).

g. Effects of grain size, ammonia, sulfides on AET revisions need clarification.

Additional concern added during discussion:

h. Review rationale for a definition of significant community effects.

Ray Schmitz concluded the meeting, thanked attendees for their participation, and thanked the Department of Ecology for hosting this year's Annual Review Meeting.

APPENDIX A. POST-ARM ISSUE RESOLUTION SUMMARY

POST-ARM MEETING ISSUE RESOLUTION SUMMARY

On May 28, 1991, representatives from the PSDDA agencies met to discuss Annual Review Meeting (ARM) issues that required additional interagency discussion and clarification (reference PSDDA Third Annual Review Meeting minutes, paragraph 20). A summary of decisions/actions from this meeting are presented below.

■ BIENNIAL REVIEWS. (Reference ARM minutes, paragraph 6). Review meetings will be continued annually until further notice. Consolidated reports covering DY91 will be produced in fall 1991, with consolidated biennial reports produced every other year thereafter. (NOTE: Reporting of DY91 information will include consolidation of the physical and environmental monitoring reports.) Thus, the first biennial report covering DY92 and DY93 will be produced in fall 1993.

■ DATA SUBMISSION. (Reference ARM minutes, paragraph 14). All applicants considering concurrent chemistry and biological testing will be informed that *ALL chemistry and biological data must be submitted to PSDDA agencies. This data is to be submitted whether or not tiered testing procedures would have required biological testing.* The decision whether or not to pursue concurrent or tiered testing remains with the applicants. This programmatic clarification will be included in all Sampling and Analysis Plan response letters.

■ HOLDING TIMES FOR BIOASSAYS. (Reference ARM minutes, paragraph 11). PSDDA agencies discussed this issue and available data. It was decided that the uncertainty introduced by extending the biological holding time from six weeks to eight weeks is offset by the inherent viability and cost-savings of the tiered testing option. Agency consensus was to support the change. Maximum holding time will be increased from six weeks to eight weeks for biological testing.

■ ML/SL ADJUSTMENTS. (Reference ARM minutes, paragraph 13, and bullet on Effects of Grain Size, Ammonia, and Sulfides on AET Revisions).
It was suggested that the AET database be reinterpreted using current PSDDA guidelines for the microtox and larval tests, and then be discussed by the PSDDA agencies and the Regulatory Work Group. For the larval test, the original AET's were calculated using statistical difference in the abnormality endpoint only. This interpretive guideline was changed during the second ARM to a combined abnormality and mortality endpoint. For data received since that time, a combined abnormality and mortality endpoint has been utilized for regulatory interpretation; however, because of the amount of work involved, and because there has been difficulty with the mortality endpoint due to apparent ammonia and sulfide toxicity, it was suggested that the abnormality endpoint continue to be used for AET calculation for the near term. A variety of endpoints will be evaluated by the Regulatory Work Group as well as comparisons of the different larval tests (e.g. echinoderm to oyster, etc.), however, this will be a low priority item.

■ *NEANTHES*. (Reference ARM minutes, paragraph 8). The PSDDA agencies have agreed that the PSDDA evaluation procedures will be improved relative to the assessment of potential chronic/sublethal effects of dredged material disposal by no later

than the 1992 Annual Review Meeting. Pending the results of technical, regulatory and public review, these improvements may include use of the *Neanthes* biomass test or other appropriate tests. The PSDDA agencies' are committed to improving and incorporating the *Neanthes* chronic sublethal 20-day test into PSDDA at the spring 1992 ARM, provided that remaining issues/concerns have been adequately addressed by that time and the agencies are able to reach agreement on regulatory interpretation of results. The two areas receiving attention this year are interlaboratry variability and increased field experience. If the test has not been substantiated or is not ready, a status report, including available new information, will be presented at the 1992 ARM. Evaluation of other appropriate chronic/sublethal tests and/or interpretive endpoints will be pursued as part of the Regulatory Work Group and will also be presented at the 1992 ARM.

■ QA2 REQUIREMENTS. (Reference ARM minutes, paragraph 13 and Appendix B). As a clarification, QA1 and QA2 information should be included in the same data submission to PSDDA agencies. PSDDA has always required submission of both QA1 and QA2 data, although this has not been enforced. Costs will be tracked on the applicants' cost sheets for a year, and QA submission requirements will then be re-evaluated.

■ EFFECTS OF GRAIN SIZE, AMMONIA, AND SULFIDES ON AET REVISIONS. (Reference ARM minutes, paragraph 9, and bullet on ML\SL Adjustments). PSDDA consistently requires sediment conventionals be run and continues to use water quality information on a best professional judgement, case-by-case basis to evaluate PSDDA biological test results. It is possible that the bioassay data used to generate the original, revised (1988) and/or current AET's/ML's/SL's would be interpreted differently today. Interpretation of bioassay results would now include consideration of the possible effects of grain size, ammonia, and sulfides. It is unknown, however, whether ML's and SL's were affected by grain size, ammonia, and sulfides. There is a potential for ML's and SL's to be too low, based on false positives resulting from the effects of these parameters. PSDDA agencies will continue collecting water quality data, and will continue reviewing data on a case by case basis. In the context of AET revisions, the Regulatory Work Group may make recommendations to Ecology for qualifying bioassay data with apparent grain size, ammonia, and\or sulfides effects for future AET revisions.

■ DEFINITION OF SIGNIFICANT COMMUNITY EFFECTS. (Reference MPAR, p. B-25). Natural communities can have large species shifts due to larval recruitment and based on variation during baseline sampling. The main issue is to determine whether changes in the benthos are area-wide, or are from effects of dredged material. PSDDA agencies are committed to reviewing interpretation of benthos. Information obtained by EPA's Office of Near Coastal Waters (NCW) and Ecology will be reviewed. This work will include different ways to interpret benthic data. A national benthic experts workshop will be convened by Ecology. A regional experts workshop may be convened to discuss these issues regionally as they apply to Ecology's Sediment Management program and PSDDA. PSDDA agencies will be involved in each workshop and will submit questions specific to PSDDA's needs, e.g. how do we determine whether

changes in benthos are from dredged material disposal. Based on information gained from these sources, PSDDA will attempt to clarify the definition of "significant community effects".

APPENDIX B. COMMENT LETTERS

WASHINGTON
PUBLIC
PORTS
ASSOCIATION

Port of Allyn
Port of Anacortes
Port of Bellingham
Port of Benton
Port of Bremerton
Port of Brownsville
Port of Camas- Washougal
Port of Centralia
Port of Chehalis
Port of Chelan County
Port of Clarkston
Port of Columbia
Port of Coupeville
Port of Dewatto
Port of Douglas
Port of Edmonds
Port of Ephrata
Port of Everett
Port of Friday Harbor
Port of Garfield
Port of Grandview
Port of Grapeview
Port of Grays Harbor
Port of Hoodsport
Port of Illahee
Port of Ilwaco
Port of Kalama
Port of Kennewick
Port of Keyport
Port of Kingston
Port of Klickitat
Port Longview
Port of Lopez
Port of Manchester
Port of Mattawa
Port of Moses Lake
Port of Olympia
Port of Othello
Port of Pasco
Port of Pend Oreille
Port of Peninsula
Port of Port Angeles
Port of Port Townsend
Port of Poulsbo
Port of Quincy
Port of Ridgefield
Port of Royal Slope
Port of Seattle
Port of Shelton
Port of Silverdale
Port of Skagit County
Port of Skamania County
Port of South Whidbey Island
Port of Sunnyside
Port of Tacoma
Port of Tahuya
Port of Vancouver
Port of Wahkiakum Co. #1
Port of Wahkiakum Co. #2
Port of Walla Walla
Port of Warden
Port of Waterman
Port of Whitman County
Port of Willapa Harbor
Port of Woodland

Executive Committee
John McCarthy
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Vice President
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Secretary
Sue Watkins
Treasurer
Robert McCrorie
Past President

Donald R. White
Executive Director

RECEIVED
APR 29 1991

April 25, 1991

Mr. Raymond G. Schmitz
Chief, Operations Division
U.S. Army Corps of Engineers
Seattle District
P.O. Box C-3755
Seattle, WA 98124-2255

Dear Mr. Schmitz:

Thank you for the notification of the of the 1991 Annual Review Meeting for the Puget Sound Dredged Disposal Analysis (PSDDA) program. The Washington Public Ports Association has reviewed the proposed agenda, as well as the Management Plan Assessment Report for dredging year 1990.

Although we have no additional issues to submit for consideration at this meeting, we do have comments on the present agenda. Your letter does not request agenda comments to be submitted in advance, but we are submitting these comments to the agenda in order to give the PSDDA agencies additional time to consider them prior to the May 2 meeting.

Agenda comments

Our comments on the agenda relate to the issue of annual versus biennial public reviews of the PSDDA program. It appears from the discussion in the Issue Paper titled "PSDDA Requirements for Program Review Reports and Meetings", found at page B-1 of the Management Plan Assessment Report, that the primary reason for the biennial review proposal is the number of technical documents which must be prepared annually in order to meet the mandate of the PSDDA program.

We certainly concur with any proposed change which makes the PSDDA program more efficient, or reduces the amount of staff time spent preparing potentially duplicative reports, and we commend the agencies for proposing any consolidation of reports which might free staff time for other activities.

However, the original PSDDA documents do not require that the heart of the annual review process be a series of technical documents or clarifications. The Management Plans Technical Appendix - Phase I document states: "The purpose of the reviews will be to assess how effective and efficient the process is in meeting the PSDDA goals and objectives." This document continues by adding that issues to be covered may include: "Whether the PSDDA guidelines for sediment evaluation and site impacts continue to be adequate and necessary".[1]

P.O. Box 1518 • Olympia, Washington 98507 • (206) 943-0760 • Fax 753-6176 • 1501 Capitol Way • Suite 304

The pattern analysis work which we have been cooperating on so far tries to answer this very type of question, and we are concerned by the possibility that simple questions relating to the effectiveness and efficiency of the program might be asked only every other year.

We disagree with the assertion on page B-2 of the MPAR that PSDDA is an example of a program which has gained enough experience to require less oversight, having been "fine-tuned" appropriately. This assertion conflicts with the statements made repeatedly by the PSDDA agencies (and concurred with by WPPA) that the program has in fact not yet gathered enough data to make any management decisions regarding central policy questions such as the adequacy of chemical screening levels, or many other fundamental policy decisions.[2]

While there may be a number of technical issues which have been fine-tuned to the satisfaction of the agency staff, the annual reviews need to remain more than a forum for discussing narrow technical clarifications, and must remain dedicated to their original broader purpose. Policy discussions which relate to the general efficiency and effectiveness of the program need not take up an extraordinary or unreasonable amount of PSDDA agency staff time.

For these reasons, the Washington Public Ports Association would request that annual reviews remain in effect for discussing general policy issues which relate to the effectiveness and efficiency of the PSDDA program, and for comparing the program's goals to its performance. Several such issues are likely to face us all within the next year (as the state implements its sediment management standards, for example), and we should not imply that we are reluctant to use the established annual review process to address these issues.

Technical issues or clarifications can certainly be addressed on a biennial basis, as set forth in the above-referenced issue paper, in order to reduce the amount of staff time devoted to writing annual technical reports. But we must continue to have an annual forum for discussing the PSDDA program's adherence to its broad goal of providing environmentally safe, cost-effective sites for the unconfined, open-water disposal of dredged material.

Other comments

The ports would also like the annual review to clarify the statement on page 34 of the Dredged Material Evaluation Application Report for dredging year 1990 regarding how best to handle ongoing pattern analysis work.

The document indicates that the Washington Department of Ecology's sediment quality data base should be preferentially used to perform automated sensitivity tests for the pattern analysis. As long as solid analysis is performed on the data patterns, so that we can all assess the efficiency of the program, it does not matter which PSDDA agency performs the work. We request some more detail on this proposal, however, in order to better understand the program's position.

We understand and acknowledge the great deal of excellent work that has been put into the technical components of the PSDDA program. Whenever a new program such as PSDDA is developed using state-of-the-art science, a great deal of effort must be expended during its early stages in order to perfect it. This effort is beginning to pay off, as we now have a successful unconfined open-water disposal program -- but this added technical workload should not drive the program's central policy decisions.

We thank you for this opportunity to comment, and we look forward to a productive and responsive 1991 Annual Review Meeting.

Yours truly,

WASHINGTON PUBLIC PORTS ASSOCIATION

Eric D. Johnson

Eric D. Johnson
Environmental Specialist

c: Frank Urabeck, Seattle District COE
John Malek, Region X EPA
Greg Sorlie, Washington Department of Ecology
Ann Morgan, Washington Department of Natural Resources

1. PSSDA Management Plans Technical Appendix - Phase I, page II-56.

2. See: (1) PSDDA Management Plan Assessment Report for dredging year 1990, at page 11. (2) Dredged Material Evaluation Application Report for dredging year 1990, at page 29 and page 31. (3) WPPA letter of January 30, 1991 to Mr. Mueller of Seattle District COE, at page 2.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Post Office Box 488 • Manchester, Washington 98353-0488 • (206) 895-4649

April 23, 1991

TO: Tom Gries

THROUGH: Cliff Kirchmer

FROM: Stewart Lombard

SUBJECT: Comments on PSDDA Management Plan Assessment Report

I have reviewed the Puget Sound Dredged Disposal Analysis: Management Plan Assessment Report for Dredging Year 1990. I found some errors in the report which I felt I should call to your attention.

In Appendix A, starting on page A-9, is a Clarification entitled "Modifications to the Chemical Testing Quality Assurance Guidelines." There are three errors that should be corrected.

First, it states that the Puget Sound Estuary Program (PSEP) has established warning limits and action limits for some quality assurance (QA) parameters. The QA section of the Puget Sound Protocols and Guidelines has not been formally adopted and is, in fact, under consideration for major revision at this time.

Second, in the table of QC limits, the Relative Percent Difference (RPD) is equated to the Coefficient of Variation (COV). The RPD is equal to the square root of 2 times the COV. The limits should be applied to one statistic or the other.

Finally, Note 1 of the table states that the CLP control limit is based on matrix spike duplicates. The CLP metals procedure does not include matrix spike duplicates. The precision control limit of 20% is applied to the RPD for lab duplicates with results greater than 5 times the Contract Required Detection Limit. For PSDDA metals results, which are frequently near or below the detection limit, the use of matrix spike duplicate results (the analytical results, <u>not</u> the recoveries) would provide an estimate of analytical precision for each sample batch.

Would you please relay this information to David Fox or whoever could make the necessary corrections?

SML:sml

Laucks
Testing Laboratories, Inc.
940 South Harney St., Seattle, Washington 98108 (206)767-5060

Chemistry, Microbiology, and Technical Services

Date: May 10, 1991

To: Mr. David Fox
U.S. Army Corps of Engineers
P.O. Box 3755
Seattle, WA 98124-2255

From: Mike Nelson

Subject: **Comments on PSDDA recommended holding times**

Dear Mr. Fox:

After reviewing the PSDDA recommended holding times tabulated in Puget Sound Dredged Disposal Analysis: Management Plan Assessment Report I have the following comments.

I believe that the holding times selected should be scientifically determined. Unfortunately, many analytical holding times have not been evaluated. The EPA has established contractural holding times through its CLP program for soils and sediments. In addition, there are practical restraints from a laboratory standpoint. It is desirable to have holding times sufficiently long to allow an initial analysis and a reanalysis, if necessary. If there is no reason to believe that data quality would be adversely affected by longer holding times, the only effect of shortened holding times is to create a higher likelihood that data will be rejected or qualified due to holding time exceedences.

I believe the following holding times (all at 4°C) are inappropriate and consideration should be given to increasing them.

Analyte	PSEP hold time	PSDDA hold time	CLP hold time	Recommended
Mercury	None	7 days	26 days	26 days
Extractables	7 days	7 days	10 days*	14 days**
Solids, TOC	None	7 days	None	14 days

* From Validated Time of Sample Receipt
** From sample collection

The other holding times, in particular those for sulfides and ammonia, are appropriate, in my opinion. These analytes are fugitive and pH-sensitive and should be determined in as timely a manner as is reasonably practical.

Thank you for the opportunity to respond to these issues.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Post Office Box 307 • Manchester, Washington 98353-0346 • (206) 895-4740

May 15, 1991

Mr. David Fox
Department of Army
Army Corp of Engineers
Seattle District
4735 East Marginal Way South
Seattle, WA 98134-2385

Dear Mr. Fox:

I am the Laboratory Director for the Washington State Department of Ecology Manchester Laboratory. I have some comments on the proposed seven day holding time for mercury in sediments.

As you may know, the current USEPA holding time for mercury in water is 28 days, when the sample is appropriately preserved. I am interested in any data that you may be able to present in support of a shorter holding time for mercury in sediment. If there is no data to support this shorter holding time, I strongly urge that the PSDDA Agencies use the current EPA holding time of 28 days.

It is important that holding times are based on scientific data, not convenience or unproved assumptions.

Sincerely,

William R. Kammin
Environmental Lab DIrector

WRK:wrk

NORTH
CREEK
ANALYTICAL

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-2569
Phone (206) 481-9200 • FAX (206) 485-2992

May 14, 1991

Mr. David Fox
DMMO, Corps of Engineers
P.O Box C-3755
Seattle, WA 98124-2255

Dear Mr. Fox:

Pursuant to your conversation with Scot Cocanour regarding the issue of PSSDA's requirements for sediment samples holding times. We like to reference the enclosed EPA Recommended Sample Holding Times found in Section Four Pages 5 and 6 of the EPA SW 846/ Rev.1 (Dec. 1987).

For the sake of uniformity and regulatory compliance we encourage the use of the above referenced holding times for PSDDA sediment samples.

Should there be any additional information you may like, please do not hesitate to call us.

Yours very truly,

NORTH CREEK ANALYTICAL

Ricardo Marroquin
Marketing & Development

TABLE 4-1.
RECOMMENDED SAMPLE CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES

Parameter	Container	Preservative	Holding Time
Volatile Organics			
Concentrated Waste Samples	8-oz. widemouth glass with Teflon liner	None	14 days
Liquid Samples			
No Residual Chlorine Present	2 40-mL vials with Teflon lined septum caps	4 drops conc. HCl, Cool, 4°C	14 days
Residual Chlorine Present	2 40-mL vials with Teflon lined septum caps	Collect sample in a 4 oz. soil VOA container which has been pre-preserved with 4 drops of 10% sodium thiosulfate. Gently mix sample and transfer to a 40-mL VOA vial that has been pre-preserved with 4 drops conc. HCl, Cool to 4°C	14 days
Acrolein and Acrylonitrile	2 40-mL vials with Teflon lined septum caps	Adjust to pH 4-5, Cool, 4°C	14 days
Soil/Sediments and Sludges	4-oz (120-mL) widemouth glass with Teflon liner	Cool, 4°C	14 days

TABLE 4-1.
(Continued)

Parameter	Container	Preservative	Holding Time
Semivolatile Organics/Organochlorine Pesticides/PCBs			
Concentrated Waste Samples	8-oz. widemouth glass with Teflon liner	None	Samples must be extracted within 14 days and extract analyzed within 40 days following extraction.
Water Samples			
No Residual Chlorine Present	1-gal. or 2 1/2-gal. amber glass with Teflon liner	Cool, 4°C	Samples must be extracted within 7 days and extracts analyzed within 40 days following extraction.
Residual Chlorine Present	1-gal. or 2 1/2-gal. amber glass with Teflon liner	Add 3 mL 10% sodium thiosulfate per gallon, Cool, 4°C	Samples must be extracted within 7 days and extracts analyzed within 40 days following extraction.
Soil/Sediments and Sludges	8-oz. widemouth glass with Teflon liner	Cool, 4°C	Samples must be extracted within 14 days and extract analyzed within 40 days following extraction.

May 14, 1991

AMTEST

AmTest Inc.

Professional
Analytical
Services

14603 N.E. 87th St.
Redmond, WA
98052

Fax: 206 883 3495

Tel: 206 885 1664

U.S. Department of the Army
Seattle District Corps of Engineers
ATTENTION: David Fox
P.O. Box 3755
Seattle, WA 98124-2255

Dear David,

This letter is a formal response to a number of concerns that I expressed to you in a conversation following the PSDDA Annual Review Meeting (5/2/91).

Although it is encouraging to observe that changes can be made in the PSDDA program (Bioassay Holding Times, adjustments of SL's etc.), indiscriminate changes without just scientific cause could have disastrous and embarrassing impacts. In other words, it would appear that these recent adjustments are being made to rectify some poor initial decisions. Furthermore, it would appear that in many cases, these poor decisions, are the result of attempting to alter documented and tested scientific methods. My advise would be: "If it works, don't fix it!!"

The holding times listed on page A-7 will require further consideration on the part of the agency. After reviewing Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), PSEP protocols, and the appropriate ASTM Manuals, I fail to see where a seven day holding time is a requirement for the analyses of Total Solids, Total Volatile Solids, Total Organic Carbon and Mercury. If the integrity of the sample were compromised, I certainly think that the methods would make reference to this fact. I have enclosed a table from SW-846 that EPA would use as the fundamental guidelines for your review. I would keep in mind that both the EPA, and the participants in various ASTM committees for example, make decisions of this nature (i.e., holding times) on a scientific basis as opposed to a personal preference. Therefore, changes must be justified. I also have a difficult time understanding the need for PSDDA to either supercede or contradict the requirements of PSEP (the foundation for PSDDA).

For Ammonia, (Plumb 1981) the seven day holding time appears as a recommendation. I strongly doubt that subsurface sample alioquots stored at four degrees would result in the significant loss of Ammonia. As Ammonia is highly soluble, I would be more concerned about the amount of interstitial water associated with the sample as opposed to the degradation and/or the oxidation of organic nitrogen. If the sample is compromised, it is most likely the result of the field collection or a limitation in the analytical method (i.e., inability to fix the ammonia), not the holding time. As the goal of the laboratory is to perform the analyses in a timely fashion, the somewhat arbitrary designation of seven days is difficult to understand particularly when often times the samples are five to six days old at the time of laboratory receipt.

The comment "... it seems reasonable to adopt seven days for other analytes when no other guidance is available..." could only be made by someone who has not worked in the laboratory. From our perspective the laboratory has enough to do within the first days of sample receipt without adding an additional burden (not to mention cost) that has no scientific justification. Consider instead, if you will, that the lack of guidance is indicative of a low level of importance.

Holding times have other implications. I assume that the repercussion of not performing the Mercury analysis, for example, within seven days of sample collection, is that the applicant resample. This is a harsh requirement given the scientific nature of the compound. It seems ironic that the holding time for VOA's is 14 days, yet your proposal indicates that Mercury is of more concern and is less stable. Perhaps you could make reference to an existing study that demonstrates this issue. I have enclosed an article that clearly indicates that even VOA's do not degrade after 14 days. The study shows that samples are still viable, given the other variables, after 3-4 months.

The second, and perhaps more important issue, is relative to many of the PSDDA quality control criteria. From my perspective, I have long been waiting for the Quality Assurance section of the Department of Ecology to participate in the PSDDA program (laboratory certification). Perhaps when Cliff Kirchmer and his group become more actively involved in PSDDA, they will enlighten the program relative to:

1) The true meaning of control and action limits, and how they are statistically derived. Method control limits vs. ideal PSDDA control limits.

2) The problems of arbitrarily assigning QC limits of one analytical procedure (i.e. TAD) to another (i.e SAD)

3) The implications of modifying a particular method (i.e. 8270) and the expected results that these modifications will have on the documented control limits.

4) The limitations of Certified Reference Materials and the use of their "95% confidence intervals" to judge data quality. The manner in which these materials are "certified".

AMTEST

U.S. Army Corps of Engineers, Seattle District
Mr. David Fox

I appreciate the opportunity to respond to the proposed changes in the program and look forward to the continuing improvement. If you have any questions, or wish to discuss these issues further, please feel free to contact me.

Sincerely,

Mark A. Fugiel
Technical Director
AM TEST INC.

ENCLOSURES
MAF/pb

TABLE 2-20.
REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES

Name	Container[1]	Preservation	Maximum holding time
Bacterial Tests:			
Coliform, total	P, G	Cool, 4°C, 0.008% $Na_2S_2O_3$	6 hours
Inorganic Tests:			
Chloride	P, G	None required	28 days
Cyanide, total and amenable to chlorination	P, G	Cool, 4°C, NaOH to pH>12, 0.6g ascorbic acid	14 days
Hydrogen ion (pH)	P, G	None required	Analyze immediately
Nitrate	P, G	Cool, 4°C	48 hours
Sulfate	P, G	Cool, 4°C	28 days
Sulfide	P, G	Cool, 4°C, add zinc acetate	7 days
Metals:			
Chromium VI	P, G	Cool, 4°C	24 hours
Mercury	P, G	HNO_3 to pH<2	28 days
Metals, except chromium VI and mercury	P, G	HNO_3 to pH<2	6 months
Organic Tests:			
Oil and grease	G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Organic carbon, total (TOC)	P, G	Cool, 4°C, HCl or H_2SO_4 to pH<2	28 days
Purgeable Halocarbons	G, Teflon-lined septum	Cool, 4°C, 0.0008% $Na_2S_2O_3$	14 days
Purgeable aromatic hydrocarbons	G, Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$, HCl to pH2	14 days
Acrolein and acrylonitrile	G, Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$, Adjust pH to 4-5	14 days
Phenols	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$	7 days until extraction, 40 days after extraction
Benzidines	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$	7 days until extraction, 40 days after extraction
Phthalate esters	G, Teflon-lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
Nitrosamines	G, Teflon-lined cap	Cool, 4°C, store in dark, 0.008% $Na_2S_2O_3$	7 days until extraction, 40 days after extraction
PCBs, acrylonitrile	G, Teflon-lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
Nitroaromatics and cyclic ketones	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ store in dark	7 days until extraction, 40 days after extraction
Polynuclear aromatic hydrocarbons	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ store in dark	7 days until extraction, 40 days after extraction
Haloethers	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$	7 days until extraction, 40 days after extraction
Chlorinated hydrocarbons	G, Teflon-lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
TCDD	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$	7 days until extraction, 40 days after extraction
Total organic halides (TOX)	G, Teflon-lined cap	Cool, 4°C, H_2SO_4 to pH <2	28 days
Pesticides	G, Teflon-lined cap	Cool, 4°C, pH 5-9	7 days until extraction, 40 days after extraction
Radiological Tests:			
Alpha, beta and radium	P, G	HNO_3 to pH<2	6 months

[1]Polyethylene (P) or Glass (G)

Holding Times: VOAs in Water Samples

SPECIAL REPORT

An evaluation of holding times for the analysis of volatile organic target compounds in water samples

By David W. Bottrell, Joan F. Fisk and Michael Hiatt

"Holding time" for environmental samples is stipulated because the chemical and physical characteristics may change during all steps, from sampling through analysis. Sampling method, sample container, storage time and conditions prior to shipment, and shipping conditions each may affect rates of degradation; "holding time effects" only addresses the components of sample preservation and storage after arrival at the analytical laboratory.

For purposes of this evaluation, an appropriate working definition of holding time is the maximum period between sampling and analysis before significant deterioration occurs.[1] This definition is in agreement with American Society for Testing Materials (ASTM) references,[2] except for ASTM's restriction of the 99 percent confidence interval for organic analyte quantification to 85 percent of the mean initial concentration. Using this definition, interlaboratory studies show that variability in the concentration reported is greater than acceptable holding time effects for essentially all volatile organic analytes (Table 1). This indicates a significant gap between the perception of quality and the routinely achievable accuracy of environmental measurement.

Commonly observed holding times are the result of requirements specified in 40 CFR Part 136.[3,4] The necessity for acid preservation to assure the reliable extension of holding times to current limits for aromatic volatiles was demonstrated initially, and has been confirmed by additional studies at Environmental Protection Agency (EPA) laboratories.[5,6] Current requirements for acid preservation and 14-day holding times reflect these results. The need for standardization in procedures, as well as the significance of microbial activity in some samples, suggests that recommendations of preservation still are appropriate for some samples.

Related studies were completed at Oak Ridge National Laboratory (ORNL), and have been described in several presentations and reports.[7,8,9] These investigations attempted to meet several EPA, Department of Defense (DOD) and Department of Energy (DOE) program objectives, including the development of a procedure to generate homogeneous spiked volatile performance evaluation material; evaluate sodium bisulfate as a "solid acid" preservative; and provide a reference set of analyte-specific holding times (generic water matrix).

The ORNL studies indicated that acid preservation (approximate pH 2) was necessary to suppress the degradation of chlorinated solvents through various dehalogenation mechanisms, such as trichloroethene to dichloroethene, and of the volatile aromatics through microbial degradation. Based on the obvious regulatory significance of chlorinated solvents and aromatics, preservation at pH 2 was recommended for water samples.

The utilization of 500mg of sodium bisulfate was suggested by the ORNL investigation. This material, checked for potential interference/contamination before use, can be added to a 40mL volatile organics analysis (VOA) container prior to sample collection. To reduce systematic analytical error, standards and quality control (QC) materials should be made at the same concentration of sodium bisulfate to standardize purging efficiency. Preliminary results indicate that this procedure adds an additional benefit in the improved quantification of ketones[7] due to increases in consistency and efficiency of analyte transfer during the sample purge step of headspace analysis.

An alternative to program-mandated generic requirements is the determination of site-specific holding times (representative matrix) for restricted analytes of interest utilizing the actual laboratories providing analytical support for the project. This procedure has been utilized in specific studies, such as the Love Canal Habitability Study. However, for routine environmental investigations, holding time at the analytical laboratory is an undifferentiated step in the series of procedures from sampling to analysis

and is not amenable to independent evaluation. Holding times, as well as other contributions to total error, should be considered in the development of data quality objectives[10] and the implementation of the plan through sampling and analysis project documentation.

Overall quality objectives should be evaluated, and individual sources of measurement error considered. Analyte,[7,8,9] matrix,[11,12,13] sampling variables,[14,15,16,17] storage conditions,[18,19] preservation[20] and the individual analysis shown in Table 1 all provide specific sources of variability and error. Each of these can be significant. Attention should be focused on overall quality and the applicability of the information to support decisions.[21] Current requirements address isolated features that may result in costs that aren't consistent with their significance relative to overall quality.

The confidence in sample information is analyte- and matrix-dependent. Reported results cannot be accepted as absolute.[21] Unfortunately, environmental contamination at method detection limit levels may be unidentifiable, due to loss resulting from conditions of sampling (both the event and the transfer to the appropriate container), shipment, storage, sample preparation and other activities. Volatilization, microbial degradation, nutrient levels and chemical degradation affect the persistence of individual analytes in the sample matrix.[21,22,23]

Holding time is only one of the numerous variables on which method-specific qualification or confidence limits of analytes should be based. Current data review procedures qualify or limit confidence in a determination primarily based on the single factor of holding times and disregard other potential sources of error. ❑

Table 1

Results from CLP quarterly blind performance evaluation studies; summary from third and fourth quarters 1988. Aliquots of sample set sent twice at three-month interval (maintained at 4 degrees Celsius).

	OB 3 - FY88		OB 4 - FY88	
Compound	Mean Conc. (µg/L)	Acceptance Limit % Recovery	Mean Conc. (µg/L)	Acceptance Limit % Recovery
Methylene Chloride	NU*	—	NU	—
Acetone	131	41-130	NU	—
Carbon Disulfide	155	67-140	127	55-110
1,1-Dichloroethene	140	67-120	135	66-110
1,1-Dichloroethane	150	80-120	150	80-120
1,2-Dichloroethene	140	67-120	130	66-110
Chloroform	145	80-110	140	73-110
1,2-Dichloroethane	145	80-110	150	80-120
2-Butanone**	135	47-130	90	6.7-110
1,1,1-Trichloroethane	150	80-120	140	67-120
Carbon Tetrachloride**	139	65-120	95	33-93
Vinyl Acetate	NU	—	NU	—
Bromodichloromethane	150	80-120	150	80-120
1,2-Dichloropropane	160	93-120	160	87-130
CIS-1,3-Dichloropropene**	119	45-110	39	13-38
Trichloroethene	145	80-110	145	73-120
Dibromochloromethane	160	87-130	155	80-130
1,1,2-Trichloroethane	145	80-110	150	80-120
Benzene	140	80-110	140	73-110
Bromoform	160	80-130	150	73-130
4-Methyl-2-Pentanone**	126	55-110	104	32-110
2-Hexanone**	101	35-110	75	6.7-93
Tetrachloroethene	127	63-110	119	58-100
Toluene	140	80-110	135	73-110
1,1,2,2-Tetrachloroethane	140	73-110	135	67-110
Chlorobenzene	145	80-110	145	80-110
Ethyl Benzene	129	64-110	113	50-100
Styrene	114	51-100	115	46-110
Xylene (Total)	140	73-110	130	67-110

Note: The mean concentrations are calculated using the By-Weight procedure developed by the EPA Environmental Monitoring Systems Laboratory-Cincinnati; 150 µg/L initial concentration, 65 participating laboratories.

* Analyte not used in scoring, window < Contract Required Quantitation Limit (CCP)

** Significant loss—three-month period, stored at 4 degrees Celsius, no preservative added

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***Joan F. Fisk** is the chief of the Analytical Methods Implementation Section (AMIS) within Superfund's Analytical Operations Branch at the EPA. AMIS identifies Superfund's environmental sample analysis needs, develops analytical methods to support those needs, and contracts for analyses of samples, QC requirements and procedures for the review of resulting analytical data. It also maintains the Contract Laboratory Program, of which Fisk serves as the national program manager. With Superfund since 1983, Fisk also has worked in the EPA Office of Water's Office of Analytical Support as a chemist/project officer. Fisk graduated from the University of Bridgeport, Conn., with a bachelor's degree in chemistry.*

***Michael Hiatt** is the chief of the Quality Assurance Research Branch of the Quality Assurance and Methods Development Division at EMSL-LV. His research interests include the development of sample introduction systems for mass spectral characterization of environmental matrices and the application of automated data validation techniques. Hiatt also has been a chemist for EPA's Region 9, and a chemist and manager for several commercial laboratories in California. Hiatt received a bachelor's degree in chemistry from the University of Nevada at Las Vegas.*

APPENDIX C. DATA SUBMITTAL REQUIREMENTS

Table modified from Appendix A of PSDDA Guidance Manual: Data Quality Evaluation for Proposed Dredged Material Disposal Projects, June 1989.

QA2 DATA REQUIREMENTS

CHEMICAL VARIABLES

ORGANIC COMPOUNDS

The following documentation is needed for organic compounds:

- o A cover letter referencing or describing the procedure used and discussing any analytical problems
- o Reconstructed ion chromatograms for GC/MS analyses for each sample
- o Mass spectra of detected target compounds (GC/MS) for each sample and associated library spectra
- o GC/ECD and/or GC/flame ionization detection chromatograms for each sample
- o Raw data quantification reports for each sample
- o A calibration data summary reporting calibration range used [and decafluorotriphenylphosphine (DFTPP) and bromofluorobenzene (BFB) spectra and quantification report for GC/MS analyses]
- o Final dilution volumes, sample size, wet-to-dry ratios, and instrument detection limit
- o Analyte concentrations with reporting units identified (to two significant figures unless otherwise justified)
- o Quantification of all analytes in method blanks (ng/sample)
- o Method blanks associated with each sample
- o Recovery assessments and a replicate sample summary (laboratories should report all surrogate spike recovery data for each sample; a statement of the range of recoveries should be included in reports using these data)
- o Data qualification codes and their definitions.

METALS

For metals, the data report package for analyses of each sample should include the following:

- Tabulated results in units as specified for each matrix in the analytical protocols, validated and signed in original by the laboratory manager
- Any data qualifications and explanation for any variance from the analytical protocols
- Results for all of the QA/QC checks initiated by the laboratory
- Tabulation of instrument and method detection limits.

All contract laboratories are required to submit metals results that are supported by sufficient backup data and quality assurance results to enable independent QA reviewers to conclusively determine the quality of the data. The laboratories should be able to supply legible photocopies of original data sheets with sufficient information to unequivocally identify.

- Calibration results
- Calibration and preparation blanks
- Samples and dilutions
- Duplicates and spikes
- Any anomalies in instrument performance or unusual instrumental adjustments.

BIOASSAYS

Amphipod Mortality Test

The following data should be reported by all laboratories performing this bioassay:

- Daily water quality measurements during testing (e.g., dissolved oxygen, temperature, salinity, pH) (plus ammonia + sulfides at test initiation & termination)
- Daily emergence for each beaker and the 10-day mean and standard deviation for each treatment
- 10-day survival in each beaker and the mean and standard deviation for each treatment
- Interstitial salinity values of test sediments
- 96-hour LC_{50} values with reference toxicants
- Any problems that may have influenced data quality.

Juvenile infauna Mortality Test

The following data should be reported by all laboratories performing this bioassay:

- o Daily water quality measurements during testing (e.g., dissolved oxygen, temperature, salinity, pH) (plus ammonia + sulfides at test initiation & termination)
- o 10-day survival in each beaker and the mean and standard deviation for each treatment
- o 96-hour LC_{50} values with reference toxicants
- o Any problems that may have influenced data quality.

Echinoderm Larval Test (Solid Phase)

The following data should be reported by all laboratories performing this bioassay:

- o Daily water quality measurements (e.g., dissolved oxygen, temperature, salinity, pH) (plus ammonia + sulfides at test initiation & termination)
- o Individual replicate and mean and standard deviation data for larval survival at test termination.
- o Individual replicate and mean and standard deviation data for larval abnormalities at test termination
- o 48-hour LC_{50} and EC_{50} values with reference toxicants
- o Any problems that may have influenced data quality.

Echinoderm Larval Test (Suspended Phase) (if conducted)

The following data should be reported by all laboratories performing this bioassay:

- o Daily water quality measurements (e.g., dissolved oxygen, temperature, salinity, pH) (plus ammonia and sulfides at test initiation and termination)
- o Individual replicate and mean and standard deviation data for larval survival at test termination
- o Individual replicate and mean and standard deviation data for larval abnormalities at test termination
- o 48-hour LC_{50} and EC_{50} values with reference toxicants
- o Any problems that may have influenced data quality.

Microtox Test (Saline Extract)

The following data should be reported by all laboratories performing this bioassay:

- Percent decrease in luminescence for each concentration of supernatant (e.g., saline sediment extract) tested, including blanks
- Determination of a significant dose-response relationship by least-squares regression of percent decrease in luminescence on the logarithm of sample dilution
- Determination of EC_{50} values and 95-percent confidence limits for the reference toxicant
- Any problems that may have influenced data quality.

APPENDIX D. REVISED MODIFICATIONS TO HOLDING TIMES FOR PSDDA CHEMICAL ANALYSES

REVISED MODIFICATIONS TO HOLDING TIMES FOR PSDDA CHEMICAL ANALYSES.

The Management Plan Assessment Report for Dredged Material Management Year 1990 contained a clarification paper which recommended holding times for PSDDA chemical analyses for unfrozen (4°C) sediment (see page A-5). Several laboratories provided feedback relative to some of these holding times. Letters received from laboratories are included as enclosures to these minutes. Comments were directed at holding times for: 1) semivolatiles, pesticides and PCBs; 2) total solids, total volatile solids and total organic carbon; and 3) mercury. In addition, the holding time for ammonia was raised as an issue, although no modification to the current holding time was recommended. As a result of this feedback, additional protocol documentation review, and coordination with the Department of Ecology's Manchester Lab, National Marine Fisheries Service's (NMFS) Northwest Fisheries Science Center, Skidaway Institute of Oceanography (SIO-Savannah Georgia), and EPA's Region 10 QA Branch were undertaken.

As a result of the comments received, the guidance available in protocol documentation and the additional coordination, the following holding times are recommended (see Table 1 for multi-source documented and recommended holding times and Table 2 for recommended PSDDA holding times):

Semivolatiles, Pesticides and PCBs: PSEP contains one reference to "fresh" sediments on page 18 of the December 1989 revision of "Recommended Guidelines for Measuring Organic Compounds" and specifies that 7 days is the appropriate holding time. Revision 2 (November 1990) of Table 2-29 in EPA SW846, however, which is more recent guidance than that provided in PSEP, recommends a holding time of 14 days for sediments at 4°C. A 14 day holding time for semivolatiles, pesticides and PCBs would be consistent with the holding time currently used by PSDDA for volatile analytes. PSDDA will adopt this 14 day holding time.

Total Solids, Total Volatile Solids, Total Organic Carbon: The regulatory guidance cited for total solids (TS) and total volatile solids (TVS) is generally 7 days for both preserved aqueous and sediment samples. For total organic carbon (TOC), recommended holding times ranged from 1 to 28 days for aqueous samples. It was the general consensus among those experts contacted that, for these parameters, the holding time for aqueous samples is more critical than for sediments. The gravimetric fraction of these parameters is greater in sediment samples than in aqueous samples and this fraction in sediments is not as susceptible to change with holding time as it is in an aqueous sample. In this light, and to alleviate the burden the testing laboratories face with short holding times, it is recommended that the holding time for TS, TVS and TOC be set at 14 days for unfrozen samples.

Mercury: All of the regulatory guidelines for preserved aqueous samples list the holding time for mercury as 28 days. SW846 method 7470 (manual cold vapor-liquid wastes) states that non-aqueous samples should be analyzed as soon as possible. One protocol, Plumb 1981, recommends a 7-day holding time for mercury analysis on sediment samples held at 4°C.

Subsequent coordination with trace metals experts Drs. Robert Clark (NMFS) and Herb Windom (SIO), revealed enough uncertainty relative to the stability of mercury samples to warrant care in adopting any holding time for unfrozen sediment. Mercury methylation by microbes can dramatically alter the quantitation of this chemical, and the rate of methylation varies with sediment type, organic loading and microbial community. These biological effects take place even at 4°C. Freezing of sediments for mercury analysis was highly recommended as standard operating procedure.

Because of the uncertainty involved with mercury analysis, and until more definitive scientific evidence is gathered relative to holding times for unfrozen sediment, it is recommended that the current PSDDA guidelines be maintained: sediment samples for mercury analysis must be frozen and held for no more than 28 days.

Ammonia: It was suggested by AmTest that the holding time for ammonia was not as critical as the holding condition (ie. in a moist state). This may be true and special care should be taken to ensure that sediment samples for ammonia analysis are prevented from losing moisture. A 7 day holding time for ammonia for unfrozen sediments is clearly stated in PSEP, however, and is recommended by Plumb as well. The ammonia protocol of Plumb is the accepted protocol for PSDDA analyses. Additional coordination with the Department of Ecology's Manchester Laboratory indicated that 7 days should be considered a maximum. It is recommended, therefore, that the current PSDDA holding time of 7 days be retained.

NOTE: The PSDDA agencies have attempted to establish rational holding times for sediments at 4°C in response to the common laboratory practice of using unfrozen samples and the general unavailability of freezer capacity. It is still highly recommended that the PSEP protocols for sample storage be followed when possible, which means freezing of sediments at -18°C for those analytes for which freezing is indicated. As stated previously, mercury samples must always be frozen.

Table 1
DOCUMENTED AND RECOMMENDED
HOLDING TIMES FOR CHEMICAL ANALYSES
(at 4 degrees C unless otherwise stated)

REFERENCE	SEMIVOLATILES, PESTICIDES, PCBs	MERCURY	TOTAL SOLIDS	TOTAL VOLATILE SOLIDS	TOTAL ORGANIC CARBON	AMMONIA	TOTAL SULFIDES
DOCUMENTATION:							
Standard Methods (1) 17th Edition, Table 1060:I	A,7-28 days	A,28 days pH < 2	A,7d/2-7d	A,ASAP	A,7d/28d pH < 2	7d/28d pH < 2	A,28d/7d zinc acetate
EPA Regs 40 CFR Part 136 page 43260	A,7-14 days preserved	A,28 days pH < 2	A,7 days	A,7 days	none	28 days pH < 2	A,7 days zinc acetate
EPA 600/4-79-020 Water and Wastes, Table 1	A,7 days	A,28 days pH < 2	A,7 days	A,7 days	A,28 days pH < 2	28 days pH < 2	A,7 days zinc acetate pH>9
EPA SW 846 - Revision 1 Table 4-1	S,14 days	N/A	N/A	N/A	N/A	N/A	N/A
EPA SW 846 - Revision 2 Table 2-29	A,7-14 days preserved	A,28 days pH < 2	none	none	A,28 days	none	7 days zinc acetate
EPA CLP 1990 Statement of Work (from Laucks)	10 days from sample receipt	26 days	---	---	---	---	---
EPA Method 7470 Manual Cold Vapor-Liquid Wastes	N/A	non-A,ASAP A,28 days pH < 2	N/A	N/A	N/A	N/A	N/A
EPA Method 7471 Manual Cold Vapor-Solid Wastes	N/A	A,28 days pH < 2	N/A	N/A	N/A	N/A	N/A
Procedures For Handling and Chemical Analysis of Sediment and Water Samples (Plumb 1981)	S,ASAP	S,7 days	S,7 days	S,7 days	A,1-7 days	S,7 days	S,ASAP
PSEP (4 Degrees C)	7 days until extract. 40 days after extract.	none	none	none	none	7 days	7 days zinc acetate
PSEP (-18 Degrees C)	1 year until extract. 40 days after extract.	28 days	6 months	6 months	6 months	none	none
LABORATORY RECOMMENDATIONS:							
Laucks Testing Laboratories	14 days from collection	26 days	14 days	---	14 days	7 days	7 days
Department of Ecology Manchester	---	28 days	---	---	---	7 days maximum	---
North Creek Analytical	14 days from collection	---	---	---	---	---	---
AmTest	---	(2)	(3)	(3)	(3)	(4)	---
National Marine Fisheries Service	---	Freeze Samples ASAP (5)	---	---	---	---	---
Skidaway Institute Of Oceanography	---	28 days at -20 degrees C (5)	---	---	---	---	---

A = Aqueous sample
S = Sediment sample
ASAP = As soon as possible

(1) format for Standard Methods holding times: Maximum Storage Recommended/Regulatory (from EPA Regs, Fed. Reg 49, No. 209, Oct 26, 1984)
(2) Requested data to support 7 day holding time
(3) "Lack of guidance on holding time should be taken as indication of lack of importance"
(4) "If the sample is compromised, it is most likely the result of the field collection or a limitation in the analytical method (i.e., inability to fix the ammonia), not the holding time."
(5) Unfrozen samples not recommended

Table 2: PSEP and PSDDA Recommended Holding Times.

Variable	Container	Puget Sound Estuary Program		Recommended PSDDA Guidelines	
		Holding Time at 4 degrees C	Holding Time at -18 degrees C	Holding Time at 4 degrees C	Holding Time at -18 degrees C
Metals (except mercury)	P,G	no guidance	2 years	6 months	2 years
Mercury	G	no guidance	28 days	not recommended	28 days
Semivolatiles, Pesticides and PCBs	G	7 days (1)	1 year (1)	14 days	1 year (1)
Volatiles	G	14 days	not applicable (2)	14 days	not applicable (2)
Particle Size	P,G	6 months	not recommended (3)	6 months	not recommended (3)
Total Solids, Total Volatile Solids and Total Organic Carbon	P,G	no guidance	6 months	14 days	6 months
Total Sulfides	P,G	7 days	not applicable	7 days	not applicable
Ammonia	P,G	7 days	not applicable	7 days	not applicable

(1) until extraction; extracts must be processed within 40 days.

(2) freezing these samples will likely cause breakage of the sample container because no airspace for expansion is provided.

(3) samples must not be frozen or dried prior to analysis, as either process may change the particle size distribution.

APPENDIX E. MODIFIED TABLE FOR INTERSTANDARD QA LIMIT COMPARISONS

Attachment 1. Interstandard QA Limit Comparisons

QA Element	Current PSDDA QA1 "Control" Limits	Puget Sound Estuary Program		EPA CLP Control Limits	Recommended PSDDA Limits	
		Warning Limits	Action Limits		Warning Limits	Action Limits
Precision:						
Metals:	20% RPD or COV	none	20% RPD	20% RPD (1)	none	20% RPD (7)
Organics:	100% COV	35% COV	50% COV (or a factor of 2 for duplicates)	Chemical-specific recovery limits	35% RPD or COV	50% COV or a factor of 2 for duplicates (2)
Matrix Spikes:						
Metals:	75-125% recovery	none	75-125% recovery	75-125% recovery	none	75-125% recovery
Organics:	50% recovery	50-150% recovery	Project Manager decision (3)	Chemical-specific recovery limits		Best professional judgement (4)
Volatiles:				Range of minimum recoveries = 59-66%	70-150%	
Semivolatiles and Pesticides:				Range of minimum recoveries = 11-46%	50-150%	
Reference Materials:						
Metals:	80-120% recovery	none	80-120% recovery (5)	Not applicable	none	95% CI if specified for a particular CRM; 80-120% recovery if not.
Organics:	95% confidence interval for certified reference material	95% confidence interval if certified	Project Manager decision	Not applicable	none	95% CI for CRMs. No action limit for uncertified RMs.
Surrogate Spikes:						
Organics:	50% recovery	50% recovery (6)	Follow EPA CLP guidelines (6)			EPA CLP chemical-specific recovery limits
Volatiles:				Range of minimum recoveries = 59-84%	85% recovery	
Pesticides:				Minimum recovery = 60% (advisory only)	60% recovery	
Semi-volatiles:				Range of minimum recoveries = 18-30%	50% recovery	

(1) Based on lab duplicates with results greater than 5 times the CRDL
(2) Chemical-specific precision limits may be utilized for those chemicals used for matrix spike duplicates under CLP.
(3) Zero percent spike recovery requires rejection of data
(4) Based on comparison to EPA CLP control limits; less than 10% recovery may be cause for data rejection (PSDDA QA/QC workshop, January 24, 1991).
(5) Other recovery limits may be accepted if they are specified for a particular CRM
(6) Except when using the isotope dilution technique
(7) Matrix spike duplicates recommended to provide an estimate of analytical precision

NOTE: The QA section of the Puget Sound Protocols and Guidelines has not been formally adopted at this time

ENCLOSURES

1991 PSDDA ANNUAL REVIEW MEETING ATTENDEES

Name	Affiliation	Phone
Raymond Schmitz	Corps of Engineers, Seattle	764-3431
Greg Sorlie	Wash. Dept. of Ecology	
Ann Essko	Wash. Dept. of Nat. Resources	586-2796
David Kendall	Corps of Engineers, Seattle	764-3768
John Malek	EPA Region 10	553-1286
David Fox	Corps of Engineers, Seattle	764-3768
Justine Smith	EPA Region 10	553-4974
Maria Peeler	Wash. Dept. of Ecology	493-2932
Keith Phillips	Wash. Dept. of Ecology	459-6143
Betsy Striplin	Wash. Dept. Nat. Resources	753-0263
Tom Mueller	Corps of Engineers, Seattle	764-3495
Jeffree Stewart	Wash. Dept. of Ecology	438-7229
Sandra McCaslin	Wash. Dept. of Ecology	438-5197
Dave Smith	Wash. Dept. of Ecology	438-7078
Frank Urabeck	Corps of Engineers, Seattle	764-3708
Dale VanDonsel	Manchester Lab (Ecology)	895-4649
Mary Mahaffy	US Fish and Wildlife Service	753-9440
Scot Cocanour	North Creek Analytical	481-9200
Ricardo Marroquin	North Creek Analytical	481-9200
Phil Hertzog	Wash. Dept. Nat. Resources	586-2827
Al Colodey	Environment Canada	(604)987-7223
Mark Siipola	Corps of Engineers, Portland	(503)326-6463
Bill Lawton	Ocean Instruments	363-0500
Jay Spearman	Spearman Assoc.	820-1739
Michael Wheeler	PSWQA	493-9176
Randy Whitman	Dames and Moore	728-0744
Danil Hancock	Port of Portland	(503)731-7322
John Vlastelicia	Ogden Beeman & Assoc.	(503)223-8254
Joe Cummins	Manchester Lab (EPA)	871-0748
Thomas Cammarata		633-3783
Tony Petrillo	Tetra Tech	822-9596
Gary Braun	Tetra Tech	822-9596
Eric Johnson	Washington Public Ports Assn.	943-0760
Carl Kassebaum	Hartman Assoc.	382-0388
Tom Wang	Hartman Assoc.	382-0388
David Anderson	Envirotest Research	542-9222
J. Faigenblum	Wash. Dept. of Ecology	649-7275
John Wakeman	Corps of Engineers, Seattle	764-6744
Mark Herrenkohl	Landau Assoc.	778-0907
Bob Parker	Corps of Engineers, Seattle	764-3754
Amy Shields	Parametrix	455-2550
Rick Della	EHI	881-7700
Paul Fuglevand	Dalton, Olmsted, Fuglevand	486-7905
Diane Robbins	Invert Aid	846-2774
Mark Fugiel	Am Test Inc.	885-1664
Bob Matsuda	Metro	684-1218

Enclosure 1.

Jim Thornton	ENSR	881-7708
Vicki Fagerness	Ecochem	233-9332
Patrick Cagney	Corps of Engineers, Seattle	764-3624
Bert Brun	Corps of Engineers, Seattle	764-6578
Linda Cox	Corps of Engineers, Seattle	764-3654
Tom Wakeman	Corps of Engineers, San Fran.	(415)744-3263
Kim Jones	Hart Crowser, Inc.	324-9530
Nancy Musgrove	EVS Consultants	328-4188
Bonnie Orme		285-6521
Roger Kadeg	Ebasco Environmental	451-4606
David Browning	SAIC	485-5800
P. Hoechel		381-7700
Bill Kammin	Manchester Lab	
Dave Nazy	Wash. Dept. of Ecology	649-7258
Ed Casillas	NMFS/NOAA	553-7740
Cathy McPherson	EVS Consultants	(604)986-4331
Beth Power	EVS Consultants	(604)986-4331
Chinfeng Chang	UW School of Fisheries	
Chris Mebane	NOAA -- Coastal Resources	553-2101
Lynda Karas	Parametrix	455-2550
Gene Revelas	SAIC	485-5800
Richard Phipps	Wash. Dept. of Nat. Res.	753-4288
Tom Sibley	UW School of Fisheries	543-4257
Tom Wright	Corps of Engineers, WES	(601)634-3708
Sandy Browning	SAIC	485-5800
Tim Thompson	Parametrix	455-2550
Jack Cox	CH2M Hill	453-5000

PUGET SOUND DREDGED DISPOSAL ANALYSIS
ANNUAL REVIEW MEETING

THURSDAY, MAY 2, 1991 -- 9:00 - 9:15 A.M.

TACOMA INN
8726 SOUTH HOSMER AVENUE

COMMENTS FOR CHRIS GREGOIRE

I. GOOD MORNING AND WELCOME TO THE THIRD ANNUAL REVIEW MEETING OF THE PUGET SOUND DREDGED DISPOSAL ANALYSIS, OR PSDDA, PROGRAM.

II. MANY HAVE REFERRED TO THE 1990'S AS THE "DECADE OF THE ENVIRONMENT"

A. WHILE ECOLOGY'S RECENT 2010 PROCESS IDENTIFIED IMPROVED AIR QUALITY AS ONE OF ITS TOP ENVIRONMENTAL PRIORITIES, IN MANY WAYS THIS WILL ALSO BE THE "DECADE OF DREDGED MATERIAL MANAGEMENT" IN PUGET SOUND AND AROUND THE COUNTRY.

1. BOTH ROUTINE NAVIGATION DREDGING PROJECTS AND SEDIMENT CLEANUP PROJECTS WILL INCREASE PRESSURE ON THE ENVIRONMENTAL HEALTH OF OUR STATE AND THE NATION.

Encl. 2

2. ALMOST 2 MILLION CUBIC YARDS OF DREDGED MATERIAL WERE DETERMINED SUITABLE BY THE PSDDA PROCESS FOR DISPOSAL AT UNCONFINED OPEN WATER SITE IN DREDGING YEAR 1990 (JULY 1989 - JUNE 1990). THE SHEER VOLUME OF EVEN SUCH CLEAN DREDGED MATERIAL MAKES IT DIFFICULT TO IGNORE.

3. SIMILAR VOLUMES OF DREDGED MATERIAL WHICH ARE NOT SO CLEAN MUST ALSO BE MANAGED, AVOIDING DAMAGE TO THE ENVIRONMENT. A MULTI-USER CONFINED DISPOSAL SITE, OR AN ALTERNATIVE OPTION MUST BE ESTABLISHED SOON.

4. DREDGING PROJECTS MUST CONTINUE, TO ALLOW SAFE NAVIGATION AND IMPROVEMENT OF LIFE IN PUGET SOUND.

III. WASHINGTON STATE IS A NATIONAL LEADER IN THE FIELD OF SEDIMENT MANAGEMENT

Encl. 2 (con't)

A. WASHINGTON STATE IS NOW WIDELY ACCEPTED AS A NATIONAL LEADER IN ITS EFFORTS TO CONTROL POLLUTION AND ADEQUATELY ADDRESS AREAS OF CONTAMINATED SEDIMENTS IN PUGET SOUND, ONE OF 17 NATIONAL ESTUARY PROGRAMS.

B. IN FEBRUARY, WASHINGTON STATE REPRESENTATIVES PRESENTED TO U.S. EPA DIRECTOR WILLIAM RILEY THE 1991 PUGET SOUND WATER QUALITY MANAGEMENT PLAN, THE FIRST COMPREHENSIVE CONSERVATION AND MANAGEMENT PLAN IN THE NATION.

C. ELEMENT S-1 OF THE 1991 PSWQMP (SEDIMENT PROGRAM POLICIES) SPECIFIES THAT "PROGRAMS FOR MANAGEMENT OF DREDGING AND DISPOSAL OF SEDIMENTS SHOULD RESULT IN A NET REDUCTION IN THE EXPOSURE OF ORGANISMS TO ADVERSE EFFECTS."

1. THE INTENT OF THIS POLICY IS THAT DREDGING AND DISPOSAL CONTRIBUTE TO THE CLEANUP OF THE SOUND BY SEPARATING SEDIMENTS WHICH HAVE LOW LEVELS OF CONTAMINATION FROM

Encl. 2 (con't)

MORE CONTAMINATED SEDIMENTS, PREVENTING CONTINUED EXPOSURE OF ORGANISMS TO ADVERSE EFFECTS.

D. WHEN AND HOW TO MANAGE THE DREDGED MATERIAL FROM THESE PROJECTS IN PUGET SOUND IS THE JOB OF THE PSDDA AGENCIES. FOR FIVE YEARS, THE COORDINATION AND COOPERATION BY THE U.S. ARMY CORPS OF ENGINEERS, THE STATE DEPARTMENT OF NATURAL RESOURCES, EPA AND ECOLOGY HAVE PROVIDED THE CORNERSTONE TO ASSESS THE SUITABILITY OF DREDGED MATERIAL FOR UNCONFINED OPEN WATER DISPOSAL. THUS, THE PSDDA PROGRAM HELPS CLEAN UP THE SOUND.

E. WASHINGTON STATE BECAME THE FIRST STATE IN THE NATION, INDEED THE FIRST GOVERNMENT ANYWHERE, TO ESTABLISH SEDIMENT QUALITY STANDARDS, RULES DEFINING AREAS OF SEDIMENTS IMPACTED BY DISCHARGES WHICH ARE TO BE MONITORED, AND RULES FOR CLEANING UP CONTAMINATED SEDIMENTS. MANY OF THOSE CONCEPTS ORIGINATED IN THE PSDDA PROGRAM.

Encl. 2 (con't)

F. WE ARE NOW IN THE PROCESS OF DEVELOPING DREDGED MATERIAL MANAGEMENT STANDARDS. MUCH IN THOSE RULES WILL CODIFY THE PSDDA PROCESS, AND EXPAND ON ITS KNOWLEDGE.

IV. THE PSDDA PROGRAM IS UNIQUE IN ITS DEGREE OF AGENCY COOPERATION AND ITS EMPHASIS ON PUBLIC INVOLVEMENT

A. THE DEGREE TO WHICH PSDDA AGENCIES HAVE DEMONSTRATED THEY COULD EFFECTIVELY COMMUNICATE AND COOPERATE (SHARED FUNDING, RESPONSIBILITIES, DECISIONS), AND THE PARTNERSHIP THEY HAVE FORMED, IS UNIQUE IN THE COUNTRY.

B. THE WHOLE PROCESS NOT ONLY ALLOWS, BUT REQUIRES OPEN REVIEW AND REVISION OF ITS PROCEDURES, BASED ON DETAILED AND OPEN PUBLIC AND SCIENTIFIC REVIEW. RECOMMENDATIONS FOR PROGRAM REASSESSMENT OF SUCH ASPECTS SUCH AS SAMPLING STRATEGIES AND APPROACH TO REGULATORY DECISION-MAKING ARE SOUGHT FOR REVIEW, ASSESSMENT AND POTENTIAL IMPLEMENTATION.

Encl. 2 (con't)

C. PSDDA STARTED OUT AS A FOUR AGENCY COOPERATIVE PROCESS TO IDENTIFY PROBLEMS AND NEEDS, TO ADDRESS THESE IN A COOPERATIVE PROGRAM MODE BY ESTABLISHING CLEAR, UNIFORM GUIDELINES. I HOPE IT CONTINUES IN THAT PATH AND MAINTAINS YOUR SUPPORT FOR MANY YEARS TO COME.

D. THIS MEETING IS PART OF YOUR OPPORTUNITY TO HELP THE PSDDA PROGRAM STAY ON TARGET, AND IMPROVE THROUGH A CAREFUL REVIEW OF OUR COLLECTIVE RECENT EXPERIENCE. I STRONGLY ENCOURAGE YOU TO TAKE AN ACTIVE ROLE IN THIS REVIEW PROCESS.

E. ANY GROUP OF AGENCIES THAT SPEND A WHOLE YEAR ASSESSING THE BEST WAY TO KEEP A WORM ALIVE OUGHT TO BE CONSIDERED EITHER CRAZY OR ENLIGHTENED.

Encl. 2 (con't)

Puget Sound Dredged Disposal Analysis (PSDDA)
Agenda for Annual Review Meeting -- May 2, 1991
Dredged Material Management Year 1990
(June 16, 1989 - June 15, 1990)

May 2, 1991
Final Agenda

Introduction and Overview

Greeting (900-915am): Christine Gregoire, Director Washington State Department of Ecology;

Statement of Meeting Objectives (915-930am): Ray Schmitz, Corps (Meeting Moderator).
Annual Review Process, Meeting Objectives.
Conclusions of Previous Annual Review Meeting, Actions Taken.

Program Overview (930-1015am):
Overview of PSDDA Reports and Monitoring Reports including major actions accomplished during the 1990 dredging year: Betsy Striplin, Washington Department of Natural Resources

Presentation of Issue Papers and Status Reports Identified by PSDDA Agencies

Issue Papers (1015-1130am)

PSDDA Reporting and Program Review Meetings (Corps)

PSDDA Bioassay Performance Review Work Plan (EPA)

Neanthes Biomass Test Work Plan (Ecology)

Work Plan for Developing Regulatory Interpretation of PSDDA Bioassays (Corps)

Discussion of above topics (1130-1145am).

Lunch (1145-1245)

Continuation of Issue Papers (1245-145pm):

PSDDA Bioassay Holding Times (Corps)

Disposal Site Monitoring Review Work Plan (DNR)

SL/ML Adjustments (Issue Paper to be distributed at ARM)(Ecology)

Discussion of above topics (145-200pm).

Encl. 3

Public Comments/Issue Papers (200-400pm)

Washington Public Ports Association

Status Reports (400-500pm):

Dioxin: PSDDA Agency Findings and Process (EPA)

Results of Reference Area Study (Ecology)

Status of the Ocean Disposal Guidance Manual (EPA)

Relationship of Sediment Management Standards to the PSDDA Program (Ecology)

Discussion of above topics (500-515pm).

PSDDA Agencies seek public input on priorities to be assigned relative to Issue Paper and Status Report Action Items (515-530pm)

Summary and Closing (530-545pm)(Ray Schmitz, Corps)

a) Issues to which PSDDA Agencies will Respond Before the Next Annual Review Meeting.

b) Written comments/issues may be submitted following the ARM, but must be submitted to the PSDDA agencies by May 16, 1991.

Encl. 3 (con't)

THIRD ANNUAL PSDDA REVIEW MEETING
MEETING OBJECTIVES

- THE MEETING ADDRESSES DREDGED MATERIAL MANAGEMENT YEAR (DREDGING YEAR) 1990 (JUNE 16 1989 - JUNE 15 1990).
- THE PURPOSE OF THE MEETING IS TO DISCUSS (1) DISPOSAL SITE MANAGEMENT STUDIES, (2) ADJUSTMENTS UNDER CONSIDERATION TO THE PSDDA PROGRAM ON SPECIFIC ISSUES, (3) STATUS REPORTS ON IMPORTANT ONGOING ACTIONS OF INTEREST TO THE PSDDA AGENCIES AND PUBLIC, AND (4) CLARIFICATIONS TO PROTOCOLS/ MANAGEMENT PLAN WHICH WERE DISTRIBUTED IN ECOLOGY'S MANAGEMENT PLAN ASSESSMENT REPORT.
- ADDITIONAL WRITTEN COMMENTS ON ISSUES MAY BE SUBMITTED UNTIL MAY 16, 1991.
- SUMMARY MINUTES OF THE ANNUAL REVIEW MEETING WILL BE AVAILABLE WITHIN 30-45 DAYS FOLLOWING THE MEETING.
- THE FOURTH ARM WILL BE HELD DURING APRIL 1992, HOSTED BY DNR.

Encl. 4

SUMMARY OF SECOND ANNUAL REVIEW MEETING AND COMMITMENTS MADE/ACCOMPLISHED

- GENERAL CONCLUSION THAT THE 2ND ARM WAS HIGHLY SUCCESSFUL, AND ALLOWED A GOOD EXCHANGE BETWEEN THE PSDDA AGENCIES AND THE PUBLIC ON PROPOSED MANAGEMENT PLAN CHANGES REGARDING CLARIFICATIONS, ISSUES, AND STATUS REPORTS.
- WRITTEN COMMENTS SUBMITTED WERE CONSIDERED.
- PSDDA HAVE REVISITED SL AND ML VALUES (HANDOUT IN BACK, ISSUE PAPER TO BE PRESENTED BY ECOLOGY).
- PSDDA AGENCIES HAVE PERFORMED A TREND/PATTERN ANALYSIS IN RELATION TO SL VALUES (ACCOMPLISHED IN CORP'S DMEAR REPORT).
- COORDINATION BETWEEN PUGET SOUND ESTUARY PROGRAM (PSEP) AND PSDDA ON PROTOCOLS, HOLDING TIMES, ETC (ONGOING ACTION).

Encl. 5

SUMMARY OF SECOND ANNUAL REVIEW MEETING AND COMMITMENTS MADE/ACCOMPLISHED (Continued)

- PSDDA AGENCIES CONDUCTED WORKSHOPS ON THE FOLLOWING TOPICS:
- (A) DATA SUBMISSION WORKSHOP (6 JUNE 1990) DEVELOPMENT ONGOING ON DATA INPUT SCREENS, PROTOTYPE FEEDBACK REQUESTED FROM PRACTITIONERS (HANDOUTS AVAILABLE FOR REVIEW IN BACK)
- (B) BIOASSAY WORKSHOP (10 JULY 1990)
- (C) RISK ASSESSMENT WORKSHOP (18-19 SEPTEMBER 1990)
- (D) CHEMISTRY QA/QC AND PSDDA STREAMLINING WORKSHOP (24 JANUARY 1991)
- PSDDA AGENCIES CONDUCTED ADDITIONAL STUDIES ON A POTENTIAL CHRONIC/SUBLETHAL BIOASSAY FOR SEDIMENTS.

Encl. 5 (con't)

SUMMARY OF SECOND ANNUAL REVIEW MEETING AND COMMITMENTS MADE/ACCOMPLISHED (Continued)

- TULALIP AND LUMMI TRIBAL CONCERNS; PSDDA AGENCIES ESTABLISHED COORDINATION PROCEDURES FOR SAMPLING AND ANALYSIS PLAN AND DATA REVIEW (THIS WAS ACCOMPLISHED THROUGH CORRESPONDENCE, AND A NUMBER OF MEETINGS WITH TRIBAL MEMBERS, ADDITIONAL MONITORING CONDUCTED AT PORT GARDNER AND BELLINGHAM BAY, COORDINATION STILL ONGOING TO RESOLVE CONCERNS).

Encl. 5 (con't)

DREDGED MATERIAL EVALUATION APPLICATION REPORT

(Dredging Year 1990)

Prepared
by
David R. Kendall
David F. Fox
John S. Wakeman

FINAL REPORT
January 1991

Dredged Material Management Office
Seattle District
U.S. Army Corps of Engineers

Encl. 6

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Puget Sound Dredged Disposal Analysis: Management Plan Assessment Report

Dredged Material Management Year 1990

March, 1991
91-13

Encl. 7

OVERVIEW OF DREDGING YEAR 1990

CHARACTERIZATION OF DREDGE SITES

USE OF DISPOSAL SITES

COMPLIANCE MONITORING OF DISPOSAL ACTIVITIES

ENVIRONMENTAL MONITORING OF DISPOSAL SITES

Encl. 8

PROJECTS UNDERGOING TESTING DURING DY90

DISPOSAL SITE	PROJECT NAME	VOLUME TESTED (CY)
ELLIOTT BAY	LONE STAR NORTHWEST	1,600
	MORTON MARINE	4,000
	US COAST GUARD, PIER 35	5,100
	METRO BY PASS OUTFALL	48,775
	DUWAMISH O&M	126,332
	US NAVY MANCHESTER FUEL PIER	181,830
	POPE AND TALBOT	11,100
PORT GARDNER	US NAVY HOMEPORT, ELEMENT I	975,000
ROSARIO STRAITS	PORT OF SKAGIT COUNTY	6,600
	BLAINE MARINA	358,000
TOTAL		1,718,337 CY

Encl. 9

CHARACTERIZATION RESULTS

DISPOSAL SITE	VOLUME TESTED (CY)	VOLUME FAILING (CY)	PERCENT FAILING
ELLIOTT BAY	378,737	23,100	6.1
PORT GARDNER	975,000	0	0
ROSARIO STRAITS	364,600	0	0
TOTAL	1,718,337	23,100	1.3

Encl. 10

DISPOSAL SITE USAGE IN DY90

DISPOSAL SITE	PROJECT NAME	VOLUME DISPOSED (CY)	NUMBER OF BARGELOADS
ELLIOTT BAY	DUWAMISH YACHT CLUB	22,275	81
	DUWAMISH RIVER O&M	107,267	69
PORT GARDNER	US NAVY HOMEPORT ELEMENT I	950,725	581
	PORT OF EVERETT MARINA O&M	41,349	80

Encl. 11

COMPLIANCE MONITORING

DISPOSAL SITE	METHOD	RESULTS
ELLIOTT BAY	US COAST GUARD VESSEL TRAFFIC SERVICE; DISPOSAL SITE USE REPORTS	NO VIOLATIONS
PORT GARDNER	OBSERVERS; DISPOSAL SITE USE REPORTS	2 VIOLATIONS

Encl. 12

ENVIRONMENTAL MONITORING QUESTIONS

1. DOES DEPOSITED DREDGED MATERIAL STAY ONSITE?

2. IS THE BIOLOGICAL EFFECTS CONDITION FOR NON-DISPERSIVE SITE MANAGEMENT EXCEEDED AT THE SITE DUE TO DREDGED MATERIAL DISPOSAL?

3. ARE UNACCEPTABLE ADVERSE EFFECTS OCCURRING TO BIOLOGICAL RESOURCES IMMEDIATELY OFFSITE DUE TO DREDGED MATERIAL DISPOSAL?

Encl. 13

PSDDA MONITORING VARIABLES

	PARTIAL MONITORING	FULL MONITORING
PHYSICAL MAPPING	**	**
SEDIMENT CHEMISTRY	**	**
SEDIMENT TOXICITY BIOASSAYS	**	**
BENTHIC ABUNDANCE		**
BIOACCUMULATION		**

Encl. 14

MONITORING STATIONS

STATION TYPE	VARIABLES MEASURED	MONITORING QUESTIONS ANSWERED
ONSITE	SVPS, CHEMISTRY, TOXICITY	2
PERIMETER	SVPS, CHEMISTRY	1
GRADIENT	SVPS, BENTHIC INFAUNA, BIOACCUMULATION	3
BENCHMARK	ALL, MOST ARCHIVED	1, 2, AND 3

Encl. 15

WHAT IS A GUIDELINE VALUE?

THE VALUE OF A MONITORING VARIABLE THAT, IF EXCEEDED, RESULTS IN A MORE DETAILED EVALUATION OF THE MONITORING DATA THAT MAY INCLUDE:

1) REVIEW OF ADDITIONAL DATA
2) ANALYSIS OF ARCHIVED SAMPLES
3) COLLECTION AND ANALYSIS OF ADDITIONAL SAMPLES

Encl. 16

GUIDELINE VALUES

VARIABLE	STEP 1	STEP 2
MAPPING	OVER 3cm DREDGED MATERIAL AT PERIMETER LINE	FURTHER ASSESSMENT TO DETERMINE FULL EXTENT
ONSITE CHEMISTRY	EXCEED ML VALUE	COMPARE BASELINE AND MONITORING BENCHMARK DATA
PERIMETER CHEMISTRY	ORGANICS EXCEED 1.47 TIMES BASELINE; METALS EXCEED 1.25 TIMES BASELINE	COMPARE BASELINE AND MONITORING BENCHMARK DATA
BIOASSAY	EXCEED TOXICITY GUIDELINE VALUE	COMPARE BASELINE AND MONITORING BENCHMARK DATA
BENTHIC INFAUNA	ABUNDANCE LESS THAN 1/2 BASELINE	COMPARE BASELINE AND MONITORING BENCHMARK DATA
BIOACCUMULATION	ORGANICS EXCEED 5 TIMES BASELINE; METALS EXCEED 2 TIMES BASELINE	COMPARE BASELINE AND MONITORING BENCHMARK DATA

Encl. 17

1990 PSDDA MONITORING PROGRAM

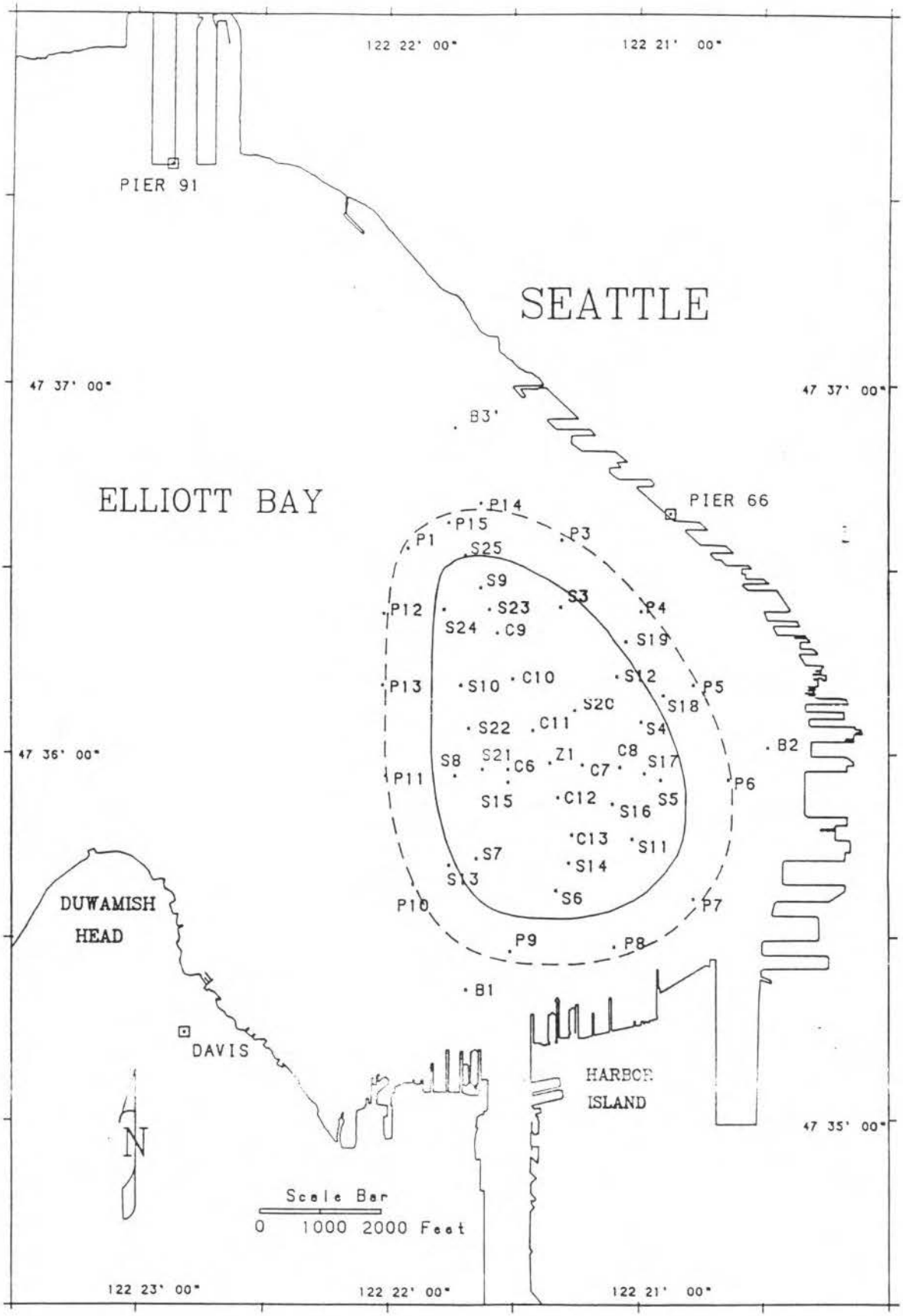
ELLIOTT BAY - PARTIAL MONITORING

130,000 CY

PORT GARDNER - FULL MONITORING

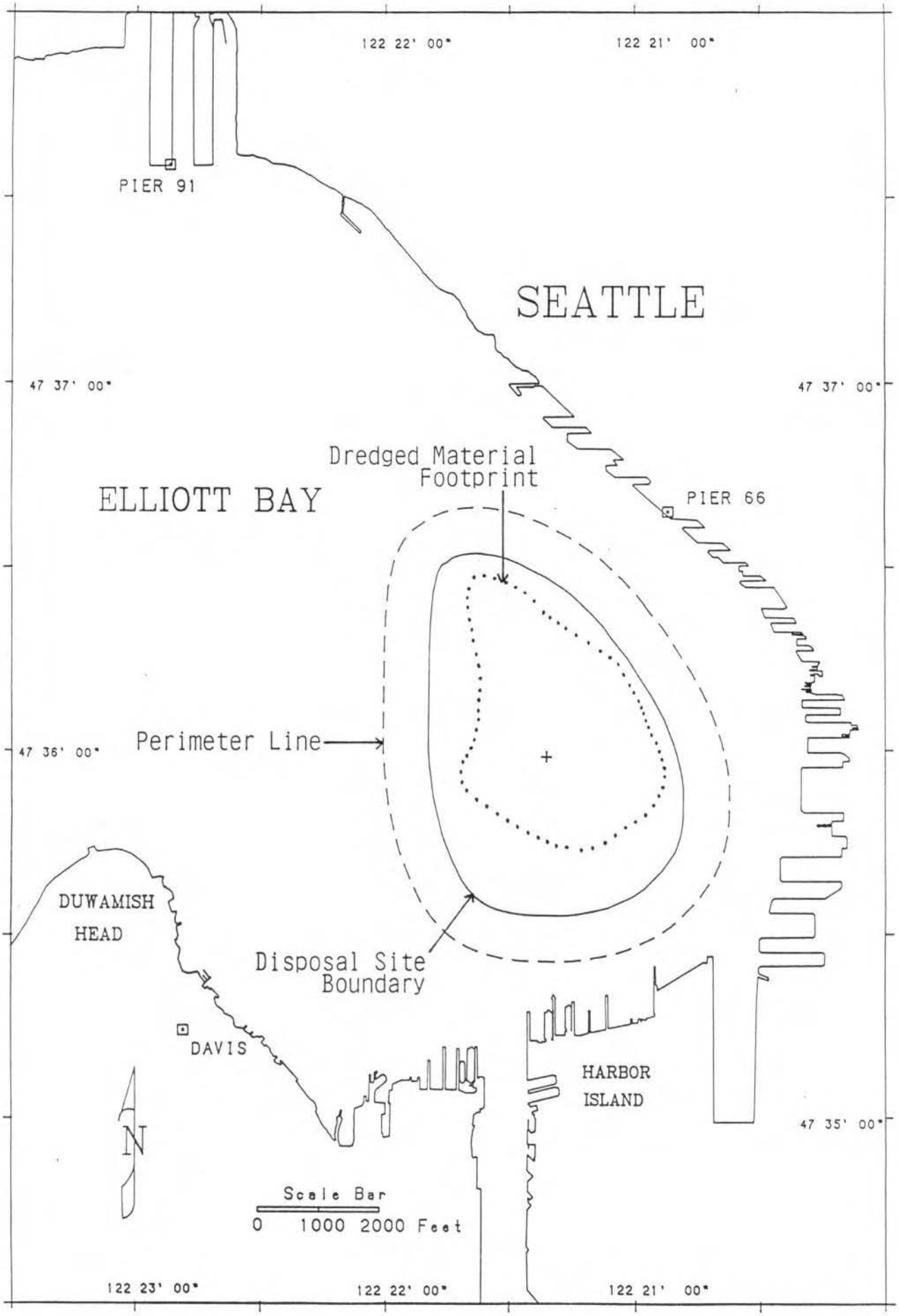
990,000 CY

Encl. 18

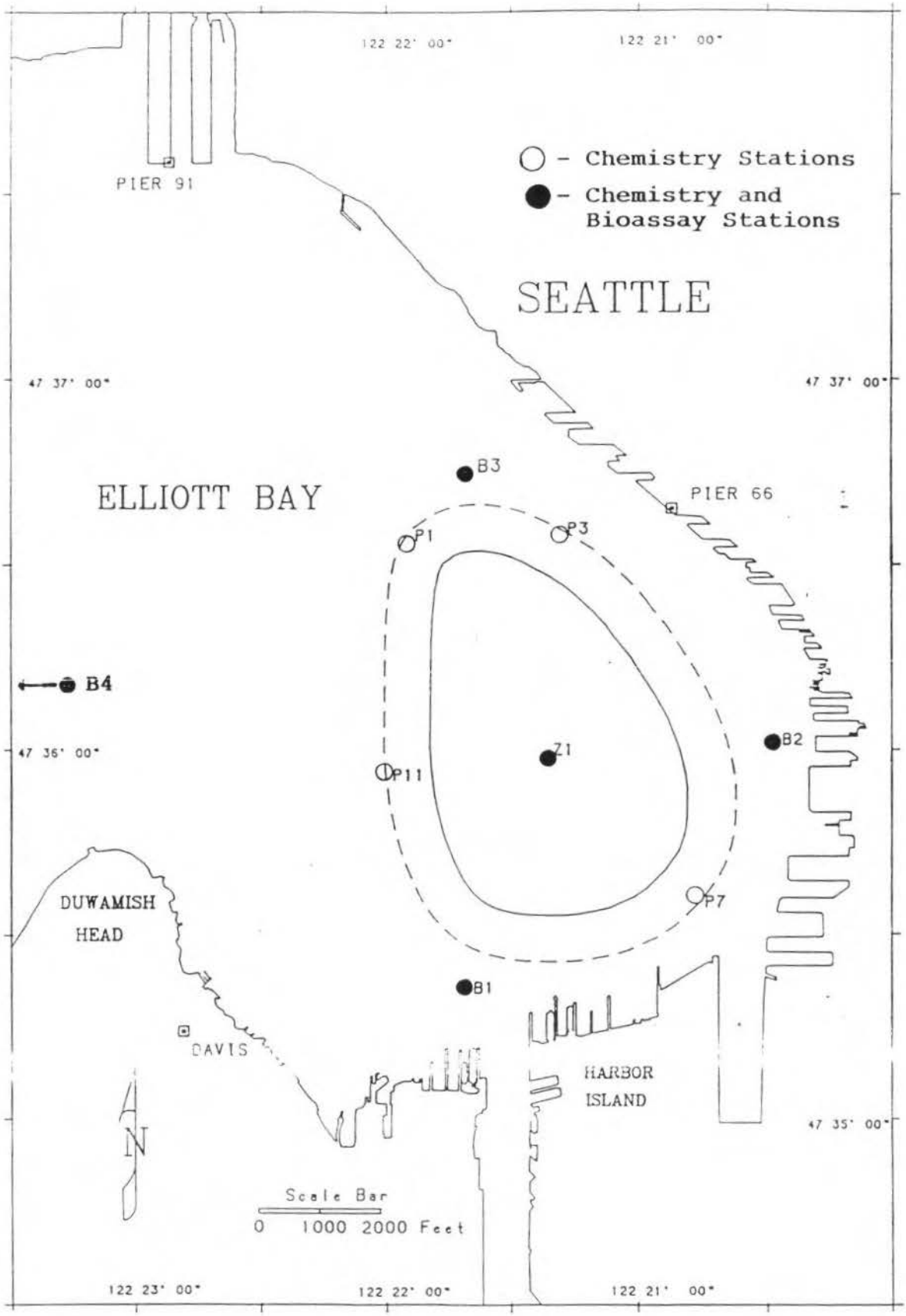


SVPS STATIONS IN ELLIOTT BAY

Encl. 19


122 22' 00"
122 21' 00"
PIER 91
SEATTLE
47 37' 00"
47 37' 00"
Dredged Material
Footprint
ELLIOTT BAY
PIER 66
Perimeter Line
47 36' 00"
DUWAMISH
HEAD
Disposal Site
Boundary
DAVIS
HARBOR
ISLAND
47 35' 00"
N
Scale Bar
0 1000 2000 Feet
122 23' 00"
122 22' 00"
122 21' 00"

Encl. 20



SEDIMENT STATIONS IN ELLIOTT BAY

Encl. 21

ELLIOTT BAY: PERIMETER CHEMISTRY RESULTS

STEP 1. GUIDELINE VALUES EXCEEDED AT ALL 4 STATIONS.

STEP 2. ADDITIONAL DATA REVIEW REVEALED:

A) DREDGED MATERIAL NOT PRESENT AT ANY OF THE 4 STATIONS

B) MASS LOADING SIMILAR TO BASELINE CONCENTRATIONS

C) SPATIAL VARIABILITY WAS 2-4x AT INDIVIDUAL STATIONS

D) MANY OTHER CONTAMINANT SOURCES PRESENT

E) QUALIFIED DATA

CONCLUSION: PERIMETER CHEMISTRY EXCEEDANCES ARE NOT DUE TO DREDGED MATERIAL.

Encl. 22

ELLIOTT BAY: TOXICITY RESULTS

STEP 1. NO GUIDELINE VALUES WERE EXCEEDED.

CONCLUSION: NO TOXICITY OBSERVED ON THE DISPOSAL SITE.

Encl. 23

ELLIOTT BAY SUMMARY

1. DOES DEPOSITED DREDGED MATERIAL STAY ONSITE?

   YES.

2. IS THE BIOLOGICAL EFFECTS CONDITION FOR NON-DISPERSIVE SITE MANAGEMENT EXCEEDED AT THE SITE DUE TO DREDGED MATERIAL DISPOSAL?

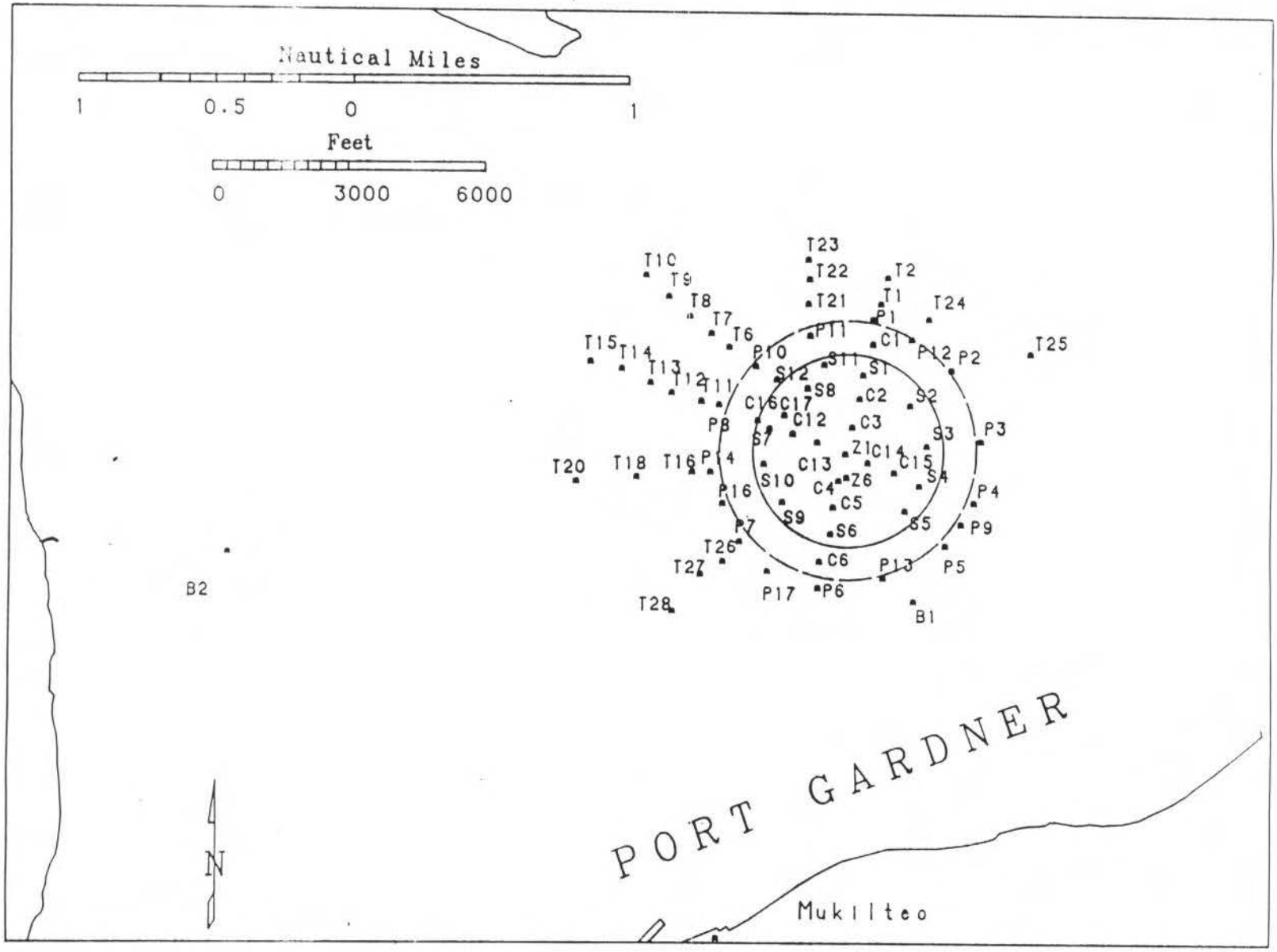
   NO.

Encl. 24

ELLIOTT BAY SITE MANAGEMENT CHANGE

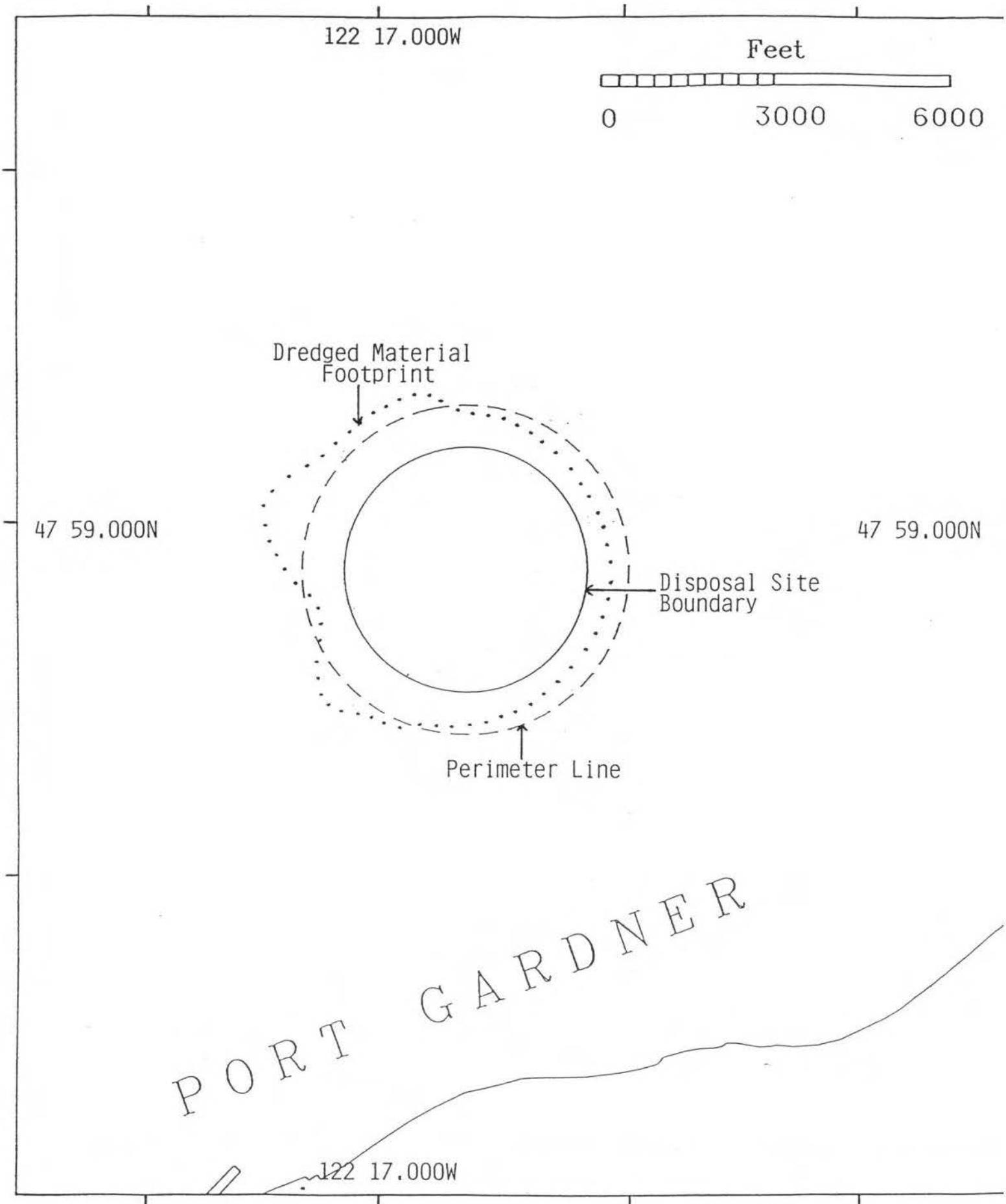
RELEASE DREDGED MATERIAL IN SOUTHERN QUARTER OF DISPOSAL SITE TARGET AREA.

Encl. 25

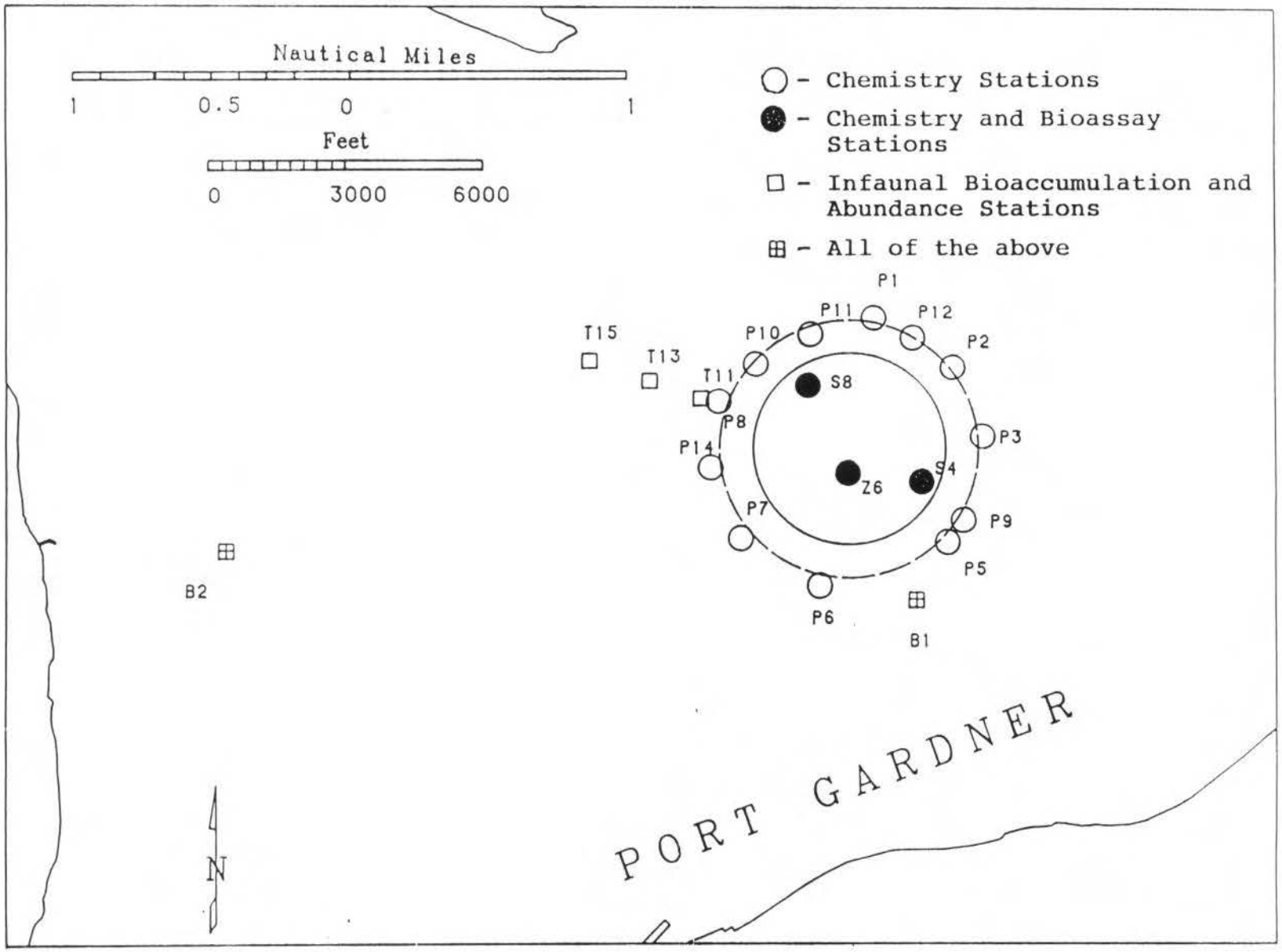


Encl. 26

SVPS STATIONS IN PORT GARDNER


122 17.000W
Feet
0
3000
6000
Dredged Material
Footprint
47 59.000N
47 59.000N
Disposal Site
Boundary
Perimeter Line
PORT GARDNER
122 17.000W

Encl. 27



Encl. 28

SEDIMENT STATIONS IN PORT GARDNER

PORT GARDNER: PERIMETER CHEMISTRY RESULTS

STEP 1. GUIDELINE VALUES EXCEEDED AT 5 OF 12 STATIONS.

STEP 2. ADDITIONAL DATA REVIEW FOUND:

A) DREDGED MATERIAL PRESENT AT 2 OF THE 5 STATIONS

B) MASS LOADING SIMILAR TO BASELINE CONDITIONS

C) UP TO 3x SPATIAL VARIABILITY AT INDIVIDUAL STATIONS

D) QUALIFIED DATA

CONCLUSION: IT IS UNLIKELY THAT PERIMETER CHEMISTRY EXCEEDANCES ARE DUE TO DREDGED MATERIAL.

Encl. 29

PORT GARDNER: TOXICITY RESULTS

STEP 1. NO GUIDELINE VALUES WERE EXCEEDED.

CONCLUSION: NO TOXICITY OBSERVED ON THE DISPOSAL SITE.

Encl. 30

PORT GARDNER: BENTHIC INFAUNA RESULTS

STEP 1. GUIDELINE VALUE OF 50 PERCENT REDUCTION IN MAJOR TAXA EXCEEDED AT EACH GRADIENT STATION.

STEP 2. COMPARABLE REDUCTIONS IN MAJOR TAXA ABUNDANCE OBSERVED AT BENCHMARK STATION.

CONCLUSION: DECREASED ABUNDANCES RESULTED FROM REGIONAL EFFECTS, NOT DREDGED MATERIAL.

Encl. 31

PORT GARDNER: BIOACCUMULATION RESULTS

STEP 1. GUIDELINE VALUES FOR METALS EXCEEDED AT EACH GRADIENT STATION.

STEP 2. ADDITIONAL ANALYSIS REVEALED:

A) NO INFORMATION ON BODY SIZE.

B) CONCENTRATIONS OF SOME METALS INCREASED WITH INCREASING DISTANCE FROM THE DISPOSAL SITE.

CONCLUSION: DATA NOT SUITABLE FOR INTERPRETATION.

Encl. 32

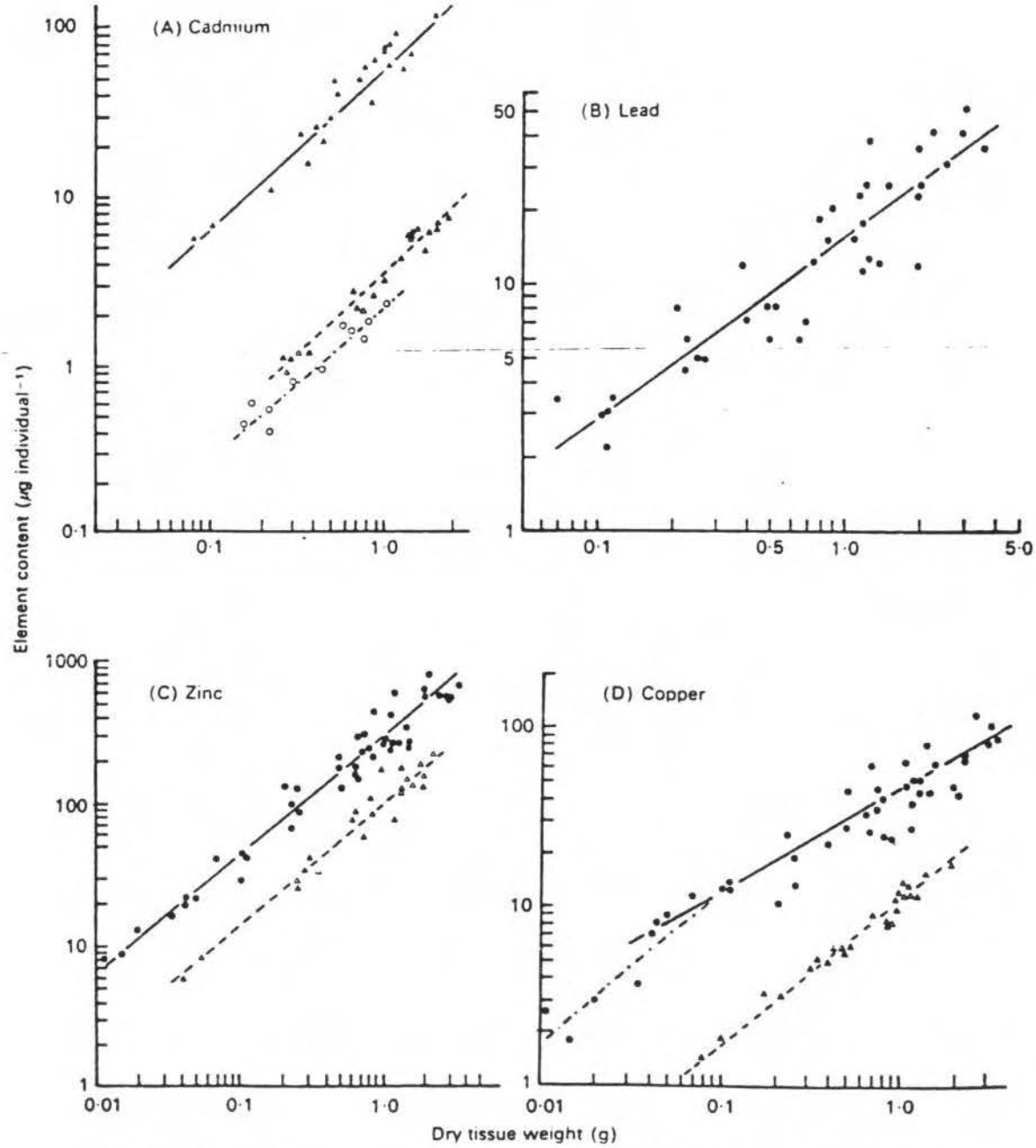


Fig. 7. Relationships between element content and body weight in the mussel *Mytilus edulis*. (A) Cadmium: ○-·-·-○, Menai Strait (August 1973); △- - -△, Outer Harbour, Poole, Dorset (raft population); ▲—▲, Inner Harbour, Poole, Dorset (lift bridge population). (B) Lead content (μg individual⁻¹) ●—●, from Restronguet Creek, Cornwall. (C) Zinc: in a 'clean' environment (△- - -△), Outer Harbour, Poole and a 'contaminated' environment (●—●), Restronguet Creek. (D) Copper: a 'clean' environment (△- - -△), Outer Harbour, Poole and a 'contaminated' environment (●—●), Restronguet Creek.

Encl. 33

PORT GARDNER: LABORATORY BIOACCUMULATION RESULTS

EXPERIMENT: 30-DAY BIOACCUMULATION TEST USING ONSITE SEDIMENTS AND THE DEPOSIT-FEEDING BIVALVE MACOMA NASUTA.

RESULTS: FIVE PSDDA CHEMICALS OF CONCERN TO HUMAN HEALTH DETECTED IN ANIMALS EXPOSED TO PORT GARDNER ONSITE SEDIMENTS.

TISSUE CONCENTRATIONS WERE SUBSTANTIALLY BELOW HUMAN HEALTH GUIDELINE VALUES.

MOST MAXIMUM CONCENTRATIONS SIMILAR TO OR LESS THAN BACKGROUND AND CONTROL SAMPLES.

PHTHALATES WERE DETECTED IN MACOMA BUT WERE GENERALLY ABSENT FROM THE ONSITE SEDIMENTS.

CONCLUSION: PSDDA CHEMICALS OF CONCERN TO HUMAN HEALTH DID NOT BIOACCUMULATE WHEN ONSITE SEDIMENTS (I.E., DREDGED MATERIAL) WERE EXPOSED TO DEPOSIT-FEEDING BIVALVE.

Encl. 34

PORT GARDNER SUMMARY

1. DOES DEPOSITED DREDGED MATERIAL STAY ONSITE?

NO.

2. IS THE BIOLOGICAL EFFECTS CONDITION FOR SITE MANAGEMENT EXCEEDED AT THE SITE DUE TO DREDGED MATERIAL DISPOSAL?

NO.

3. ARE UNACCEPTABLE ADVERSE EFFECTS OCCURRING TO BIOLOGICAL RESOURCES IMMEDIATELY OFFSITE DUE TO DREDGED MATERIAL DISPOSAL?

NO.

Encl. 35

PORT GARDNER SITE MANAGEMENT CHANGES

POSITION BARGES AT THE CENTER OF THE DISPOSAL SITE INSTEAD OF SPREADING DREDGED MATERIAL EQUALLY AMONG THE 4 QUARTERS OF THE SITE.

Encl. 36

ISSUE PAPER

PSDDA REQUIREMENTS FOR PROGRAM REVIEW: REPORTS AND MEETINGS

Encl. 37

PSDDA REPORTS & MEETINGS

DOCUMENTS REQUIRED BY MANAGEMENT PLANS:

- DNR ANNUAL SITE USE REPORT
- CORPS DMEAR REPORT
- CORPS PHYSICAL MONITORING REPORT
- DNR CHEMICAL AND BIOLOGICAL MONITORING REPORT
- ECOLOGY ENVIRONMENTAL MONITORING REPORT
- ECOLOGY MPAR REPORT
- CORPS ANNUAL REVIEW MEETING NOTICE

Encl. 38

PROBLEM IDENTIFICATION

- PUBLIC INVOLVEMENT REQUIRES ACTIVE PARTICIPATION TO TRACK & INTEGRATE NUMEROUS REPORTS
- PUBLIC PRESENTATION OF NUMEROUS REPORTS HAS BEEN FRACTURED & NEEDS IMPROVEMENT TO ENHANCE PUBLIC PARTICIPATION
- PSDDA AGENCIES' STAFF OVERWORKED & NEED TO SPEND MORE EFFORT IN REVIEWING APPLICATIONS, EVALUATING TESTING REQUIREMENTS & RESULTS, DATA MANAGEMENT AND INSPECTIONS TO ENSURE PERMIT COMPLIANCE

PROBLEM IDENTIFICATION (CONT.)

- NUMBER & COMPLEXITY OF PROJECTS HAS INCREASED FROM INITIAL YEARS
- NEED GREATER EFFORT TO DEVELOP & REVIEW SAMPLING & ANALYSIS PLANS, CONDUCT QA/QC REVIEW, AND TO ANALYZE DATA FOR SUITABILITY DECISIONS

Encl. 39 (con't)

PSDDA REPORTS & MEETINGS

BACKGROUND

- NEW PROGRAMS - MORE OVERSIGHT REQUIRED
  - ALLOW PUBLIC SCRUTINY
  - FINE-TUNE PROTOCALS
  - MAKE NECESSARY PROGRAM ADJUSTMENTS
- LESS OVERSIGHT AFTER PROGRAM GAINS EXPERIENCE
- PSDDA AGENCIES BELIEVE WE WILL BE IN LESS OVERSIGHT PHASE BY ARM 1992

Encl. 40

PSDDA REPORTS & MEETINGS

MODIFICATIONS PROPOSED

- NONE IN DY 1992, EXCEPT FOR REPORT CONSOLIDATION
- COMBINE DNR SITE USE REPORT WITH CORPS' DMEAR REPORT (STARTING IN SPRING 1992)
  - CORPS LEAD TO PREPARE REPORT
  - ECOLOGY PROVIDES SUMMARY OF DREDGING PROJECTS NOT USING PSDDA SITES FOR INCLUSION IN REPORT INSTEAD OF IN ECOLOGY'S MPAR REPORT
- BEGINNING IN DY 1990, THE MPAR IS CONSOLIDATED WITH:
  - CLARIFICATIONS
  - ISSUE PAPERS
  - 30-DAY ARM NOTICE

Encl. 41

MODIFICATIONS PROPOSED (CONT.)

- AFTER DY 1991 REPORTS HAVE BEEN PREPARED (SPRING 1992), THE CORPS' COMBINED DMEAR AND ECOLOGY'S MPAR TO BE PREPARED ON BIENNIAL BASIS THEREAFTER
  - REPORTS WILL COVER A TWO YEAR PERIOD
  - FIRST BIENNIAL REPORT COVERING DY'S 1992-1993 TO BE PUBLISHED IN SPRING 1994

Encl. 41 (con't)

MODIFICATIONS PROPOSED (CONT.)

- ALL 3 MONITORING REPORTS TO BE CONSOLIDATED INTO ONE
  - DNR LEAD FOR REPORT PREPARATION
    - CORPS AND ECOLOGY TO PROVIDE INPUT
  - TIED TO ACTUAL SITE MONITORING EVENTS RATHER THAN TO OTHER PSDDA REPORTS

Encl. 41 (con't)

MODIFICATIONS PROPOSED (CONT.)

- ANNUAL REVIEW MEETING
  - ROUNTINELY HELD FOLLOWING PREPARATION OF VARIOUS CONSOLIDATED REPORTS (1992, 1994, 1996)
  - DURING ODD NUMBERED YEARS, PUBLIC COORDINATION APPROPRIATE TO THE NATURE & NUMBER OF CLARIFICATIONS/ ISSUE PAPERS PROPOSED
    - IF FEW CLARIFICATIONS/ISSUES PROPOSED & NO PROPOSALS FOR MANAGEMENT PLAN CHANGES, THEN COORDINATE BY PUBLIC NOTICE WITH A 30-DAY COMMENT PERIOD.
      - PSDDA AGENCIES WOULD CONSIDER ALL COMMENTS PRIOR TO DECIDING ON IMPLEMENTATION OF CHANGE
    - IF MAJOR PLAN CHANGES ARE PROPOSED, AN ARM WOULD BE HELD

Encl. 41 (con't)

WORK PLAN FOR TECHNICAL REVIEW OF DREDGED MATERIAL BIOASSAYS REQUIRED BY PSDDA

(MPAR DY 1990, P. B-7)

PROPOSED ACTION:

THE PSDDA AGENCIES WILL CONTINUE THEIR TECHNICAL REVIEW OF THE BIOASSAY TESTING REQUIREMENTS THROUGH THE REST OF 1991. THE REVIEW WILL INCLUDE SUMMARY OF ADDITIONAL DATA, TECHNICAL STUDIES, AND REVIEW BY OTHER SCIENTISTS AND THE PUBLIC.

Encl. 42

AMPHIPOD BIOASSAY

TOPIC	HOW	WHO
FINE-GRAINED SEDIMENT	DATA	CORPS
AMMONIA/SULFIDES	DATA/LITERATURE	" "
DEFAULT REFERENCE VALUE	DATA	" "
REBURIAL DATA	LITERATURE	" "

Encl. 43

LARVAL BIOASSAY

TOPIC	HOW	WHO
WATER QUALITY EFFECTS	DATA	EPA
AERATION	STUDY (?)	" "
AMMONIA/SULFIDES	STUDY (?)	" "
ELUTRIATE V. SEDIMENTS	STUDY	" "
ABNORMALITY V. COMBINED ENDPOINT	DATA	" "

Encl. 44

MICROTOX BIOASSAY

TOPIC	HOW	WHO
HOLDING TIME	STUDY	EPA
LIGHT ENHANCEMENT	STUDY/DATA/LITERATURE	EPA
SALINE V. ORGANIC EXTRACT	STUDY/DATA/LITERATURE	EPA

Encl. 45

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AMPHIPOD DATA REPORT >>>>>>
                                TECHNICAL        ISSUE
LARVAL DATA REPORT   >>>>>>      REVIEW     >>>> PAPER
                                 TEAM
MICROTOX DATA REPORT >>>>>>
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ISSUE
PAPER    >>>>  REGULATORY REVIEW TEAM  >>>>  ARM'92
(NOV '91)
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Encl. 46

Neanthes Workplan

- ☞ History of PSDDA attempts to develop chronic/ sublethal test -- why is Neanthes being considered?
  - List of previous efforts
  - Results of recent long-term exposure study
  - Regulatory interpretations to be part of a separate comprehensive bioassay workplan
- ☞ Need for a workplan and schedule (why needed/ PSDDA agencies commitment)
- ☞ Workplan and Schedule

Encl. 47

Neanthes Studies

- PSDDA Sublethal Test Demonstration. 1988.
- Comparison of Bioassays for Assessing Toxicity in Puget Sound. 1989.
- Interim Protocol for Juvenile *Neanthes* Bioassay, Draft Report. 1989.
- Evaluation of Growth as an Indicator of Toxicity in Marine Organisms. 1989.
- Development of a *Neanthes* Sediment Bioassay for Use in Puget Sound, Draft Report. 1990.
- Protocol for Juvenile *Neanthes* Bioassay, Draft Report. 1990.
- *Neanthes* Long-Term Exposure Experiment: Relationship Between Juvenile Growth and Reproductive Success. 1990.
- *Neanthes* Long-Term Exposure Experiment: Further Evaluation of the Relationship Between Juvenile Growth and Reproductive Success. 1991.

Encl. 48

Results of Recent *Neanthes* Long-Term Experiment

- Completes the development requirements recommended by the expert workshop
- 108-day exposure (vs. 63-day during previous experiment) to ensure reproduction was observed
- Treatments: control (West Beach), reference (R) (Carr Inlet), Elliott Bay (EB), 50r/50EB, 25R/75EB
- Endpoints:
  - Test considered both total and individual significant difference over reference for biomass endpoint
  - Test considered both proportion of body with eggs and the relative density of eggs in the coelonic cavity for the reproduction endpoint
  - Test considered death at anytime during the experiment for chronic mortality endpoint

Encl. 49

Neanthes Workplan Overview

- ☞ Scoping
- ☞ Technical Team
- ☞ Data Summary
- ☞ Field Application of Tests
- ☞ Interlaboratory Studies
- ☞ Public Review

Encl. 50

Neanthes Workplan Activities and Key Products

<u>May 1991</u>

☞ Identify Technical Team Members

- PSDDA agencies (ex-officio team members)
- Other Federal agencies
- Other State agencies
- Bioassay experts
- Others??

☞ Preparation of Study Scope

- Existing data sources
- Field studies
- Interlab studies

Encl. 51

Neanthes Workplan Activities and Key Products

June 1991

- ☞ Convene Technical Team
- ☞ Review Proposed Studies

July - September 1991

- ☞ Obtain funds for studies
- ☞ Field study (applied/real field information on the 20-day test)
- ☞ Implement interlab study (concurrent)
- ☞ Conduct any other data analysis
- ☞ Publish data report
- ☞ Technical Review members send recommendation for issue paper to Agency team

Encl. 51 (cont)

Neanthes Workplan Activities and Key Products

October 1991

- ☞ Agency team drafts technical issue paper

November 1991

- ☞ Public Technical Review Workshop

January 1992

- ☞ Publish Final Draft Issue Paper

April 1992

- ☞ Present at PSDDA Annual Review Meeting

Encl. 52

Neanthes Workplan

1991								1992			
May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr

→ Identify Technical Team members
→ Prepare Study Scope

→ Convene Technical Team
→ Review Proposed Studies

→ Field Application of Tests
→ Interlab Studies

→ Draft Technical Issue Paper

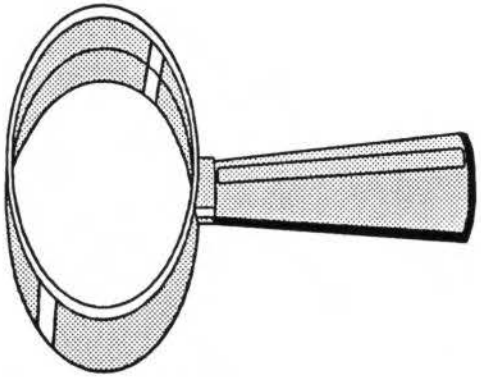
→ Public Technical Review Workshop

→ Final Draft Issue Paper

→ Present at PSDDA Annual Meeting

Encl. 53

WORKPLAN FOR



REGULATORY REVIEW

OF BIOASSAYS

Encl. 54

PROBLEM STATEMENT

- PROGRAMATIC REVIEW OF ALL BIOASSAY TESTS AND BIOLOGICAL DISPOSAL GUIDELINES USED IN PSDDA PROGRAM.

- THE MAIN PURPOSE OF REVIEW IS TO UPDATE EXISTING REGULATORY FRAMEWORK BY INTEGRATING RECENT TECHNICAL FINDINGS IN BIOASSAY TESTING METHODS, AND INCORPORATING IMPROVEMENTS IN PSDDA EVALUATION PROCEDURES TO BETTER ASSESS POTENTIAL CHRONIC/SUBLETHAL EFFECTS OF DREDGED MATERIAL DISPOSAL.

Encl. 55

REGULATORY DEFINITION

THE CLEAN WATER ACT SECTION 404(b)(1) GUIDELINES SPECIFY THE TYPES OF POTENTIAL ADVERSE EFFECTS TO THE AQUATIC ENVIRONMENT THAT MUST BE CONSIDERED WHEN MAKING REGULATORY DECISIONS ON DREDGED MATERIAL DISPOSAL.

* PERSISTENCE AND PERMANENCE OF EFFECTS, INCLUDING SHORT- AND LONG-TERM EFFECTS ON AQUATIC COMMUNITIES

* POTENTIAL FOR SUBLETHAL EFFECTS SUCH AS IMPAIRMENT TO ANIMAL GROWTH AND REPRODUCTION

Encl. 56

SITE CONDITION II DEFINITION

"MINOR ADVERSE EFFECTS, DUE TO CHEMICALS OF CONCERN IN DREDGED MATERIAL, ON BIOLOGICAL RESOURCES" AT THE DISPOSAL SITE (EPTA, 1988).

MINOR EFFECTS ARE DEFINED AS POTENTIAL CHRONIC SUBLETHAL EFFECTS, BUT NO SIGNIFICANT ACUTE TOXICITY WITHIN THE SITE, OR ITS DILUTION ZONE.

Encl. 57

PURPOSE OF REGULATORY REVIEW

- ASSESS BIOASSAY PERFORMANCE
- REVISIT THE SUITABILITY OF EACH BIOASSAY TO EVALUATE DREDGED MATERIAL EFFECTS
- DETERMINE NEED FOR CHANGES IN PROGRAM BIOLOGICAL TESTING REQUIREMENTS

Encl. 58

REGULATORY ISSUES

1. AMPHIPOD TEST

   (a) ESTABLISH ADMINISTRATIVE DEFAULT VALUE FOR USE WHEN REFERENCE SEDIMENTS EXCEED PERFOMANCE STANDARDS.

   (b) SIGNIFICANCE AND INTERPRETATION OF AMPHIPOD REBURIAL ENDPOINT.

2. SEDIMENT LARVAL TEST

   (a) ESTABLISH ADMINISTRATIVE DEFAULT VALUE FOR USE WHEN REFERENCE SEDIMENTS EXCEED PERFORMANCE STANDARDS.

   (b) ANALYSIS OF VARIOUS ENDPOINT ALTERNATIVES:
   (1) COMBINED MORTALITY AND ABNORMALITY (CURRENT)
   (2) MORTALITY ALONE
   (3) ABNORMALITY ALONE

   (c) ECOLOGICAL RELEVANCE OF "WATER COLUMN" TEST ANIMAL (e.g., bivalve/echinoderm larvae) AS INDICATOR OF SEDIMENT TOXICITY.

Encl. 59

REGULATORY ISSUES (continued)

3. SALINE MICROTOX TEST

   (a) HOW TO INTERPRETE "LIGHT ENHANCEMENT" (GLOW) RESPONSE RELATIVE TO CURRENT "LIGHT REDUCTION" ENDPOINT.

   (b) ECOLOGICAL RELEVANCE OF THE EXTRACT TEST AS SEDIMENT TOXICITY INDICATOR.

   (c) SENSITIVITY/INSENSITIVITY OF TEST TO CERTAIN TYPES OF SEDIMENT CONTAMINATION.

   (d) POTENTIAL MODIFICATION OF TEST (ORGANIC EXTRACT VERSUS SALINE EXTRACT)

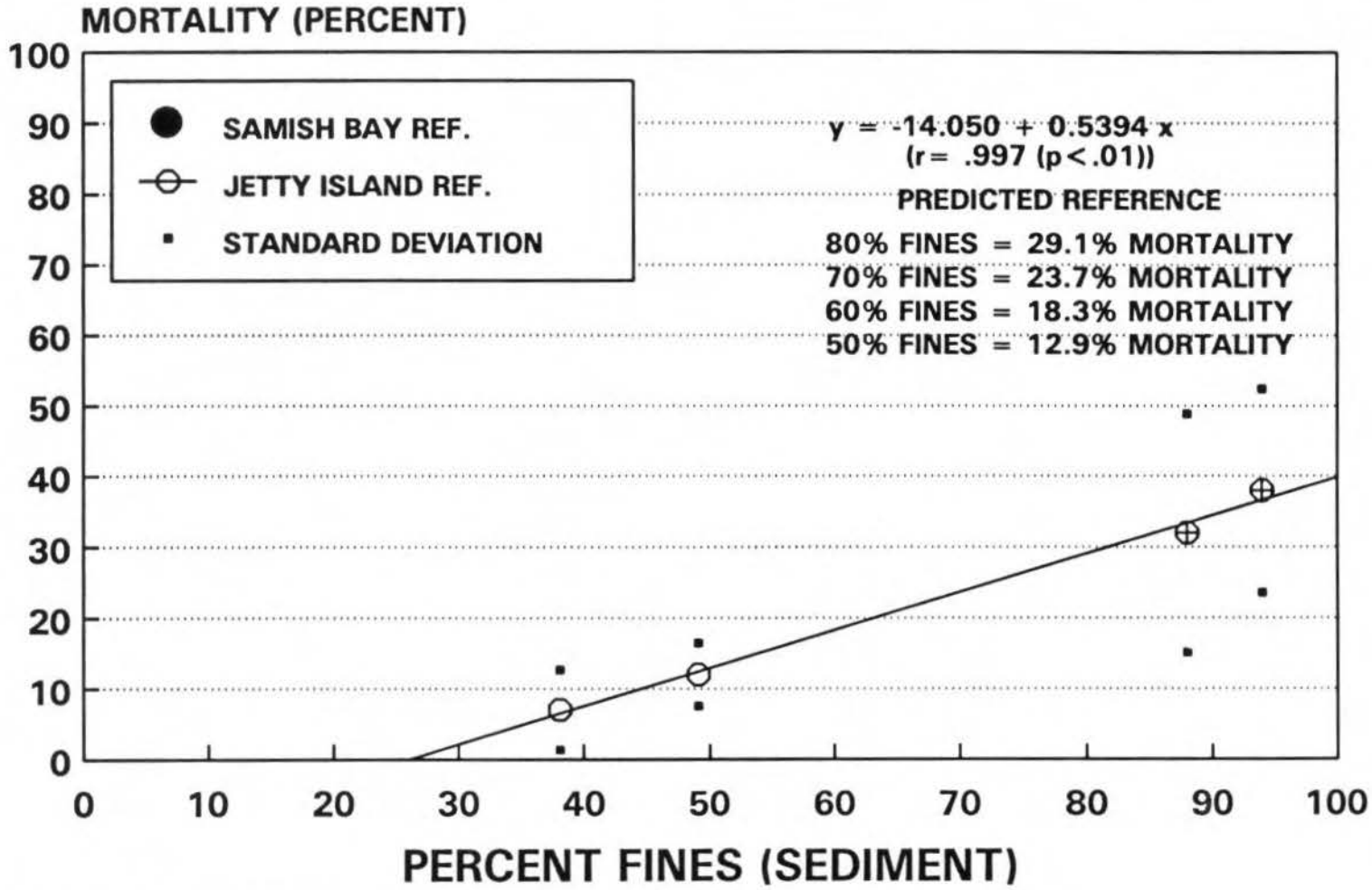
4. NEANTHES TEST (ACUTE-10 DAY AND 20 DAY BIOMASS)

   (a) ECOLOGICAL RELEVANCE/INTERPRETATION OF SUBLETHAL (BIOMASS) AND MORTALITY ENDPOINTS.

5. REGULATORY INTEGRATION OF BIOLOGICAL TESTING REQUIREMENTS (SUITE OF BIOLOGICAL TESTS PROPOSED FOR IMPLEMENTATION AT THE SPRING 1992 ARM).

Encl. 59 (cont)

AMPHIPOD MORTALITY VERSUS REFERENCE SEDIMENT-PERCENT FINES



MEAN + STANDARD DEVIATION

Encl. 60

Dewits = 10% = 22% mortality (maximum) 0
50% = 33% ——— 12.9
90% = 46% ——— 38.8

AMPHIPOD BIOASSAY TEST PERFORMANCE (Rhepoxynius abronius)

DREDGING YEAR	TOTAL NUMBER DMMU TESTED	NUMBER OF TIMES BIOASSAY UTILIZED IN SUITABILITY DECISION (SD)	NUMBER OF TIMES BIOASSAY NOT UTILIZED IN SD DUE TO QA/QC OR AMMONIA/SULFIDE PROBLEM
1989	23	23 (7 DOUBLE HITS)	0
1990	70	70 (6 DOUBLE HITS) (3 SINGLE HITS)	0 (11 RETESTS)
1991 (PARTIAL)	40	40 (2 DOUBLE HITS) (2 SINGLE HITS)	0 (10 RETESTS)
TOTALS:	133	133	0

SEDIMENT LARVAL TEST PERFORMANCE (bivalve: Crassostrea sp.; echinoderm: Dendraster sp., Strongylocentrotus sp.

DREDGING YEAR	TOTAL NUMBER DMMU TESTED	NUMBER OF TIMES BIOASSAY UTILIZED IN SUITABILITY DECISION (SD)	NUMBER OF TIMES BIOASSAY NOT UTILIZED IN SD DUE TO QA/QC OR AMMONIA/SULFIDE PROBLEM
1989	23	5 (1 SINGLE HIT)	18 (5 RETESTS)
1990	70	56 (3 DOUBLE HITS)	14 (11 RETESTS)
1991 (PARTIAL)	40	39 (5 DOUBLE HITS) (7 SINGLE HITS)	1 (10 RETESTS)
TOTALS:	133	100	33

Encl. 61

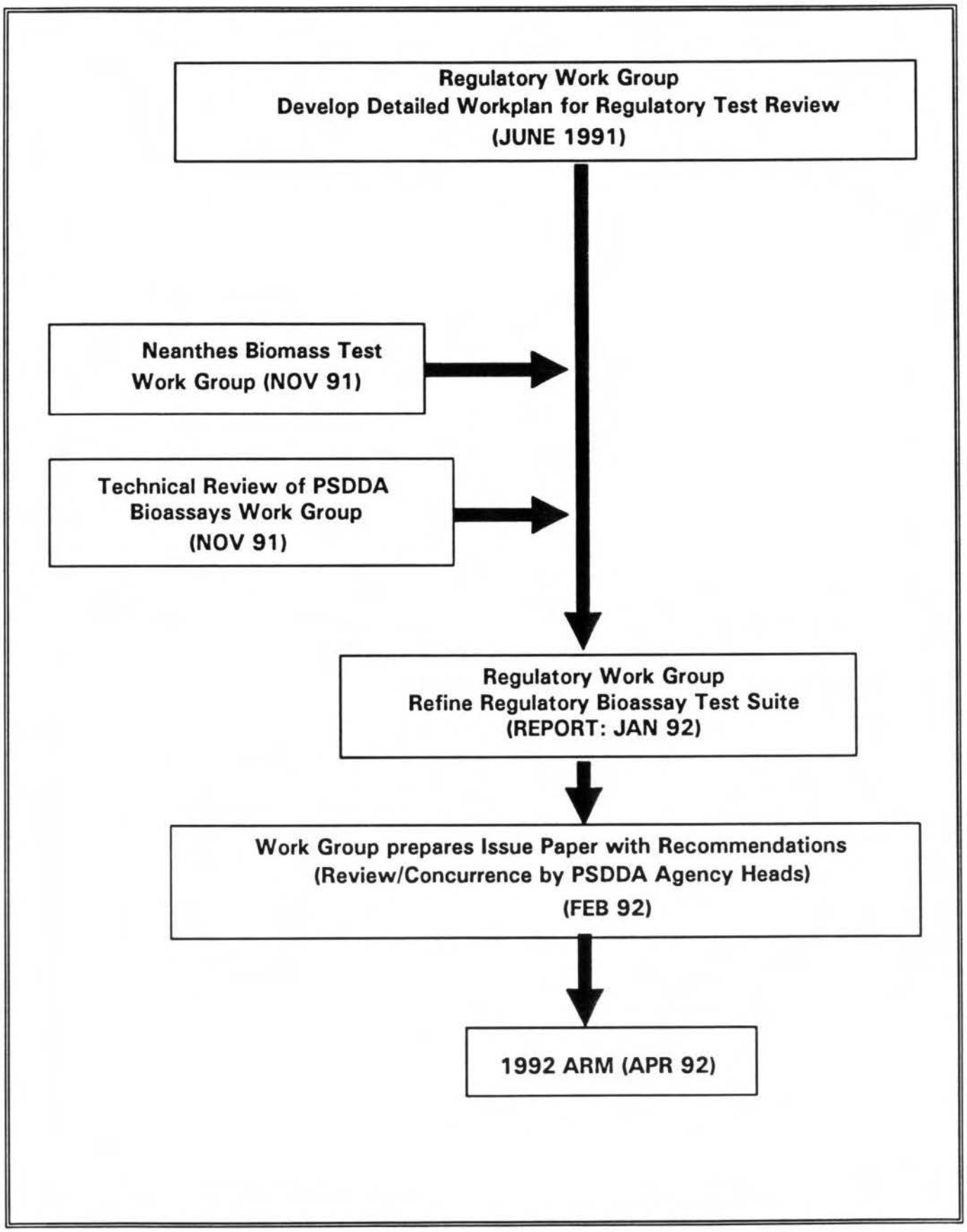
SALINE MICROTOX BIOASSAY TEST PERFORMANCE (Photobacterum phosphoreum)

DREDGING YEAR	TOTAL NUMBER DMMU TESTED	NUMBER OF TIMES BIOASSAY UTILIZED IN SUITABILITY DECISION (SD)	NUMBER OF TIMES BIOASSAY NOT UTILIZED IN SD DUE TO QA/QC OR AMMONIA/SULFIDE PROBLEM
1989	23	23 (6 DOUBLE HITS)	0
1990	70	70 (5 DOUBLE HITS)	0 (11 RETESTS)
1991 (PARTIAL)	40	40 (0 DOUBLE HITS ?)	0
TOTALS:	133	133	0

JUVENILE INFAUNAL BIOASSAY TEST PERFORMANCE (Neanthes arenaceodentata)

DREDGING YEAR	TOTAL NUMBER DMMU TESTED	NUMBER OF TIMES BIOASSAY UTILIZED IN SUITABILITY DECISION (SD)	NUMBER OF TIMES BIOASSAY NOT UTILIZED IN SD DUE TO QA/QC OR AMMONIA/SULFIDE PROBLEM
1989	23	NOT IMPLEMENTED	
1990	70	1	0
1991 (PARTIAL)	40	40 (1 DOUBLE HIT) (2 SINGLE HITS)	0
TOTALS:	133	41	0

Encl. 62


Regulatory Work Group
Develop Detailed Workplan for Regulatory Test Review
(JUNE 1991)
Neanthes Biomass Test
Work Group (NOV 91)
Technical Review of PSDDA
Bioassays Work Group
(NOV 91)
Regulatory Work Group
Refine Regulatory Bioassay Test Suite
(REPORT: JAN 92)
Work Group prepares Issue Paper with Recommendations
(Review/Concurrence by PSDDA Agency Heads)
(FEB 92)
1992 ARM (APR 92)

Encl. 63

ISSUE PAPER

SEDIMENT HOLDING TIMES FOR BIOASSAYS

Encl. 64

Holding Time Definition

The sediment holding time for bioassays is the time elapsing between collection of sediment samples in the field and initiation of bioassays in the laboratory.

Encl. 65

Current Guidelines

PSEP = 2 Weeks

PSDDA = 6 Weeks

Encl. 66

PROBLEM DEFINITION

- Chemical testing turnaround
- Preliminary data used to make bioassay decisions - errors
- No time for bioassay retests
- Increased cost
- Tiered testing avoided even for relatively clean sediments

Encl. 67

BIOASSAY HOLDING TIME STUDIES

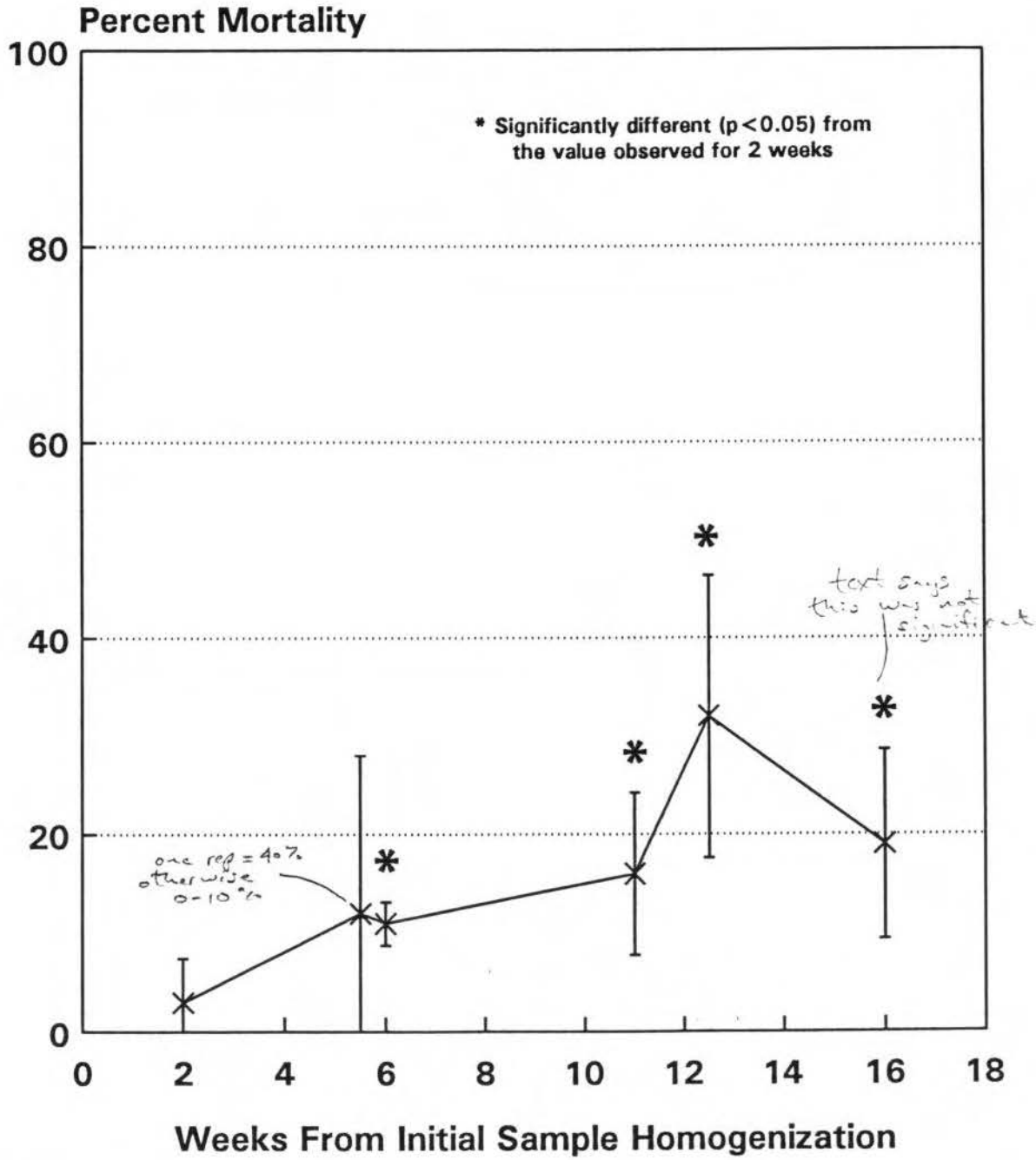
- ***Effects of Sediment Holding Time on Sediment Toxicity;***
  D. Scott Becker and Thomas C. Ginn, PTI, 1990

- ***Effects of Storage on Sediment Toxicity, Bioaccumulation Potential, and Chemistry;***
  Henry E. Tatem, et al, WES, 1991

Encl. 68

HOLDING TIME EFFECTS-AMPHIPOD

Carr Inlet Reference

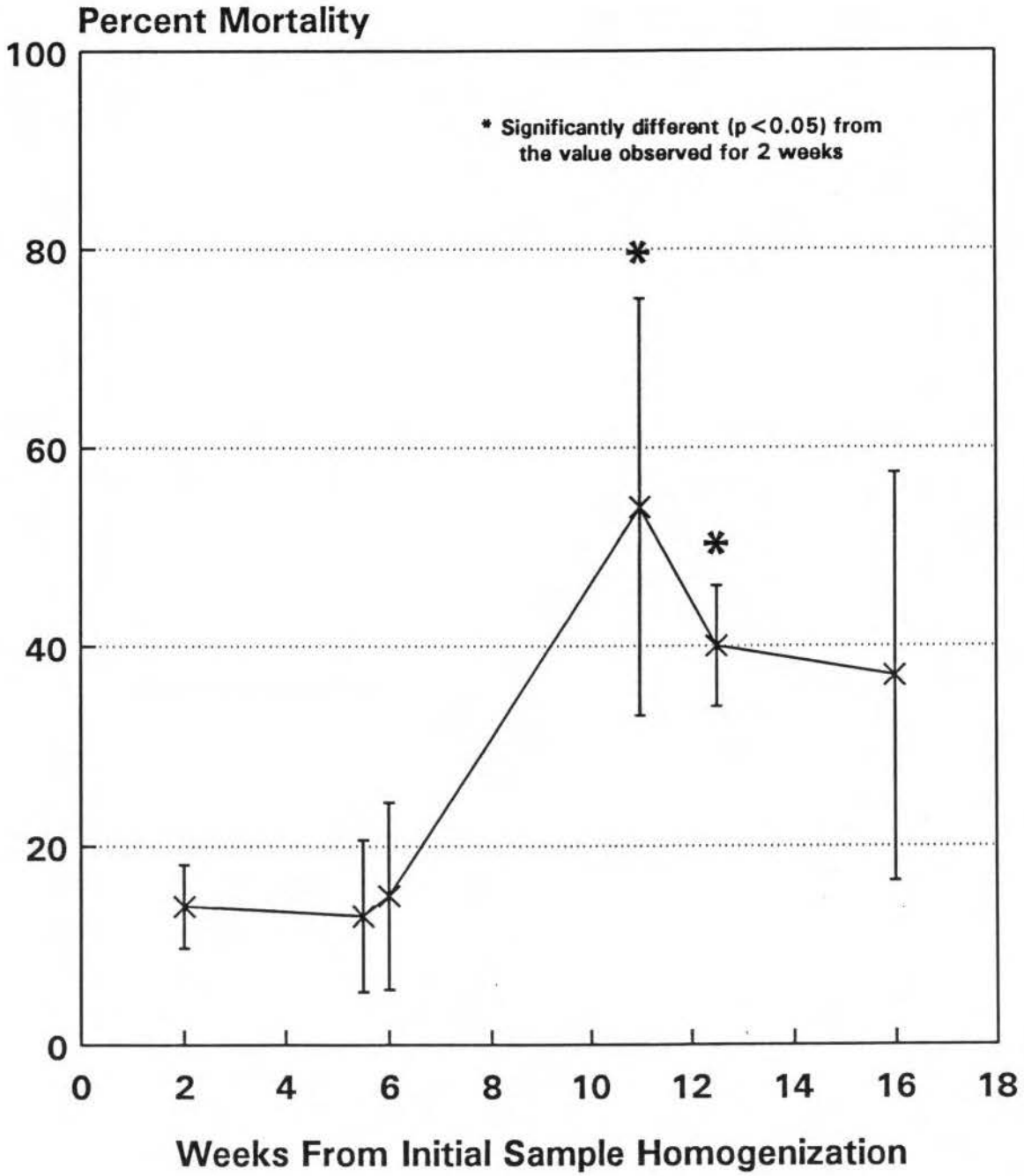


D. Scott Becker and Thomas C. Ginn, 1990

Encl. 69

HOLDING TIME EFFECTS-AMPHIPOD

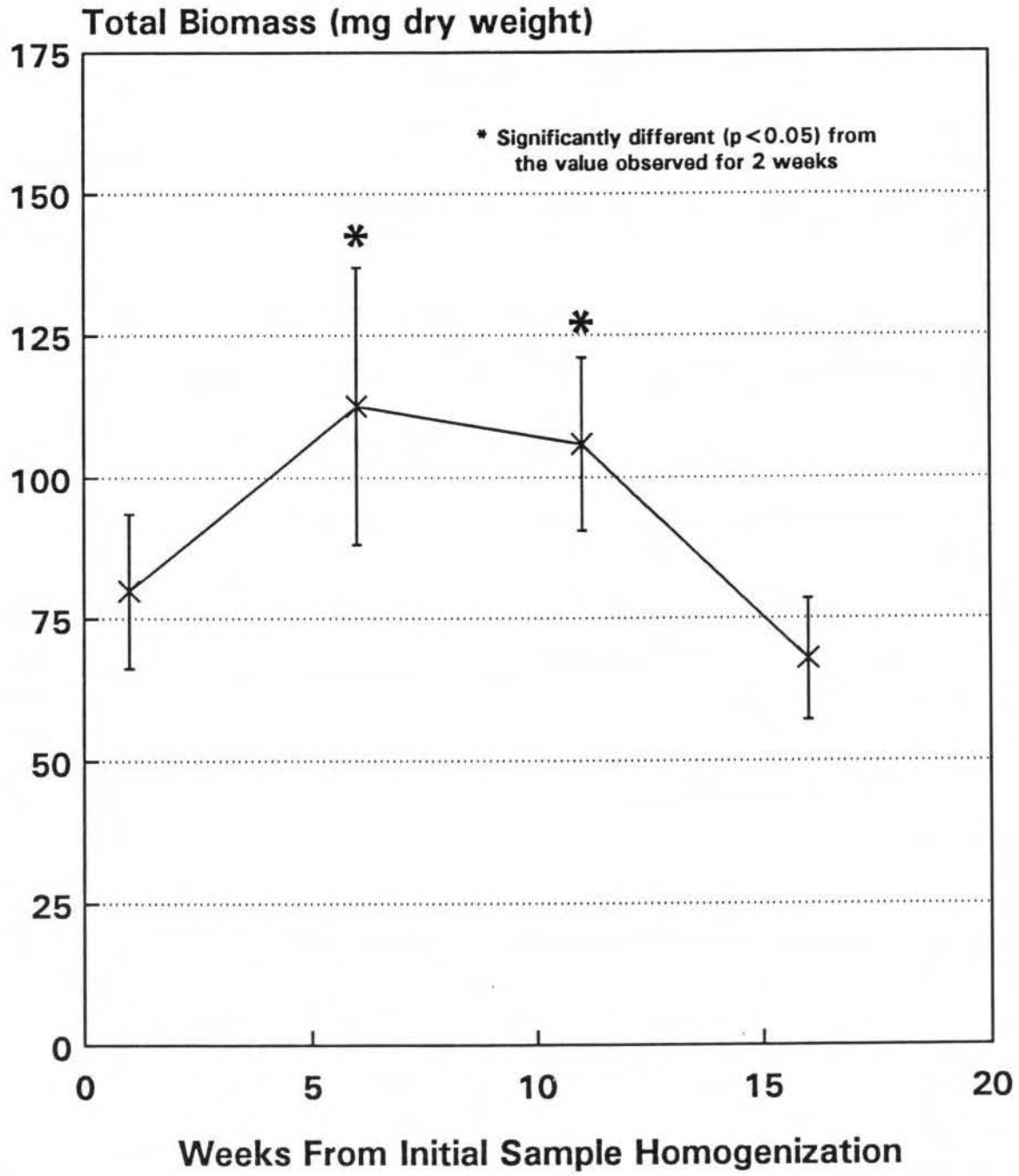
Elliott Bay - Harbor Island



D. Scott Becker and Thomas C. Ginn, 1990

Encl. 70

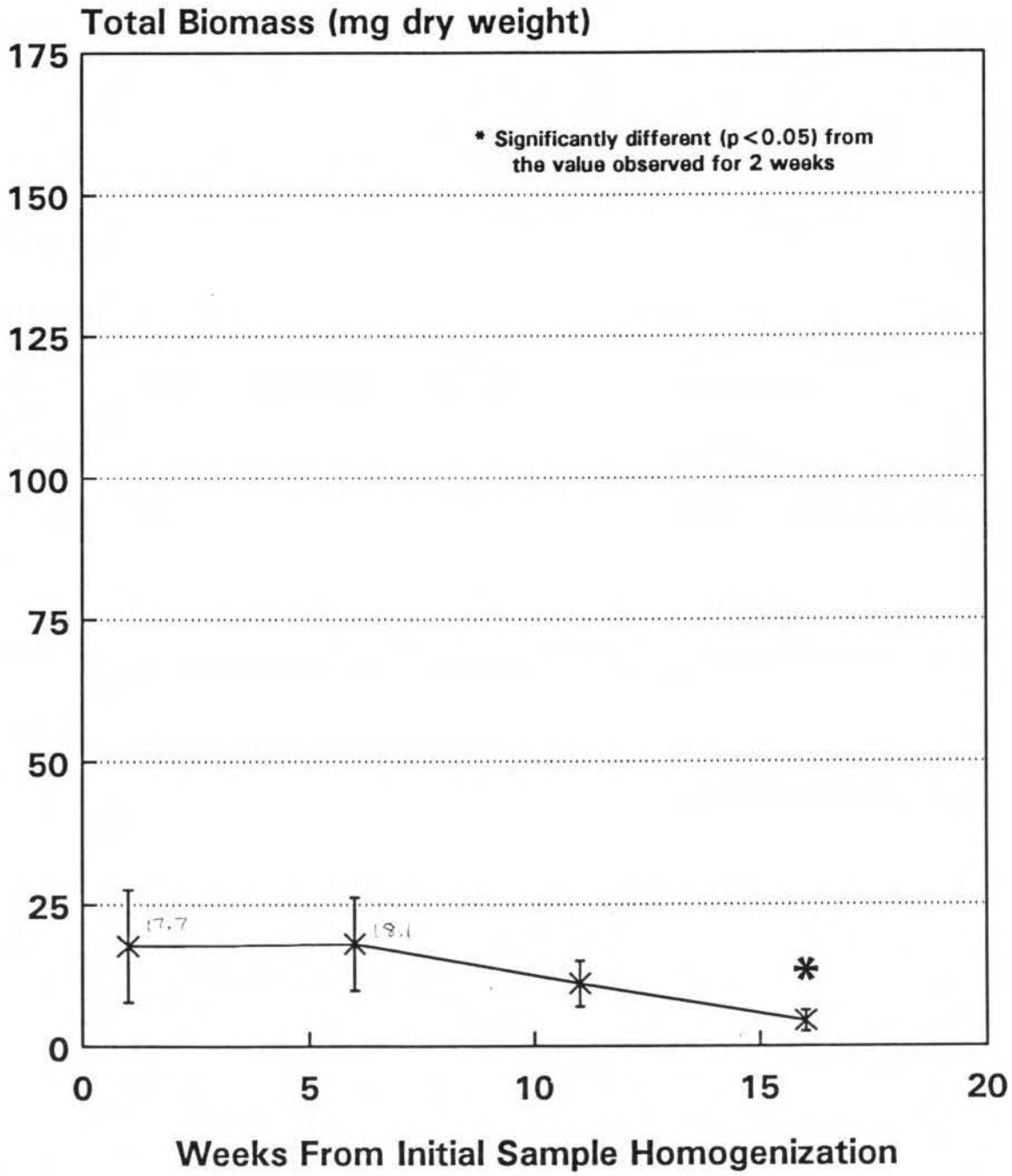
HOLDING TIME EFFECTS-NEANTHES BIOMASS
Carr Inlet Reference



D. Scott Becker and Thomas C. Ginn, 1990

Encl. 71

HOLDING TIME EFFECTS-NEANTHES BIOMASS
Elliott Bay - Harbor Island

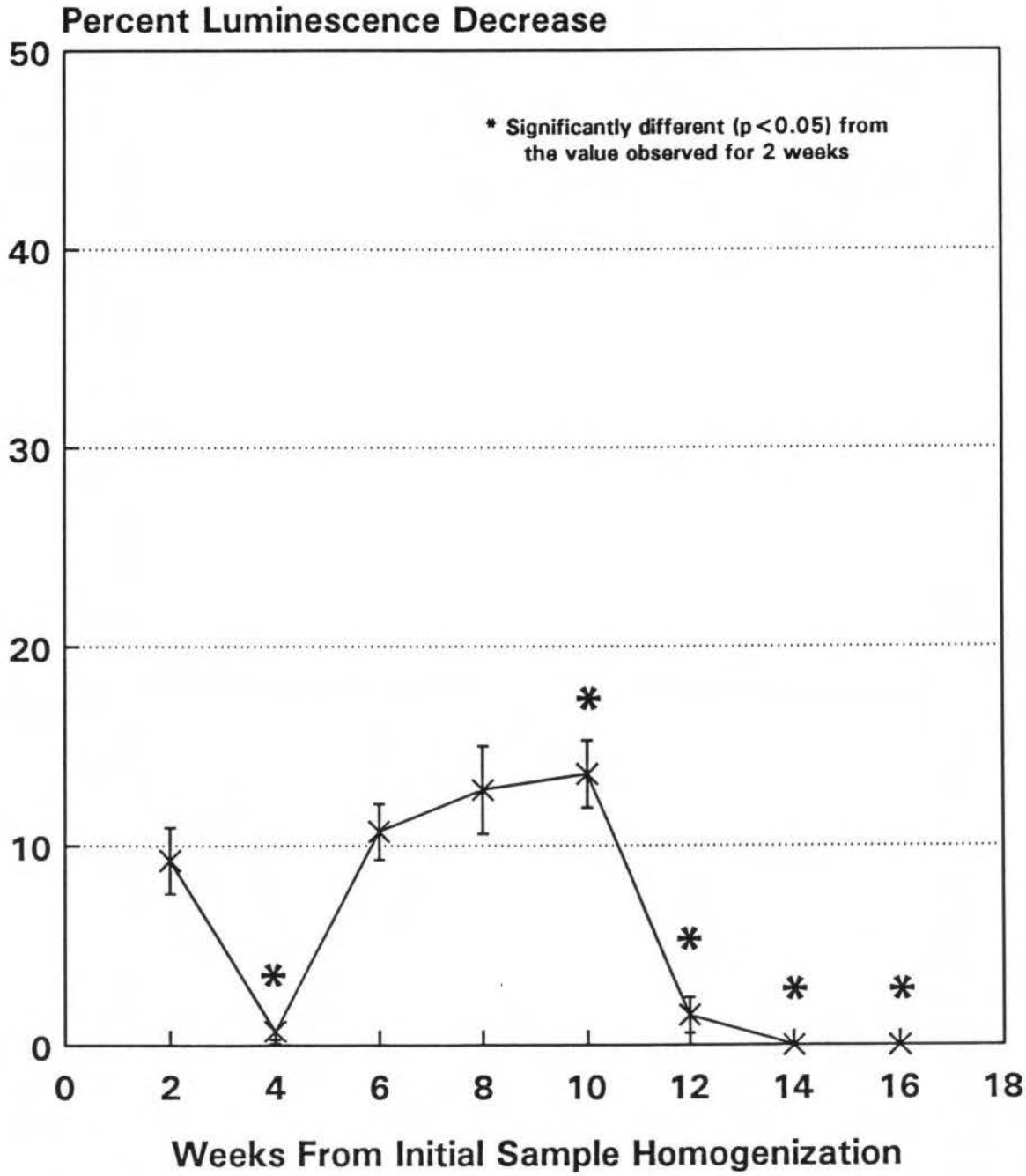


D. Scott Becker and Thomas C. Ginn, 1990

Encl. 72

HOLDING TIME EFFECTS-MICROTOX

Carr Inlet Reference

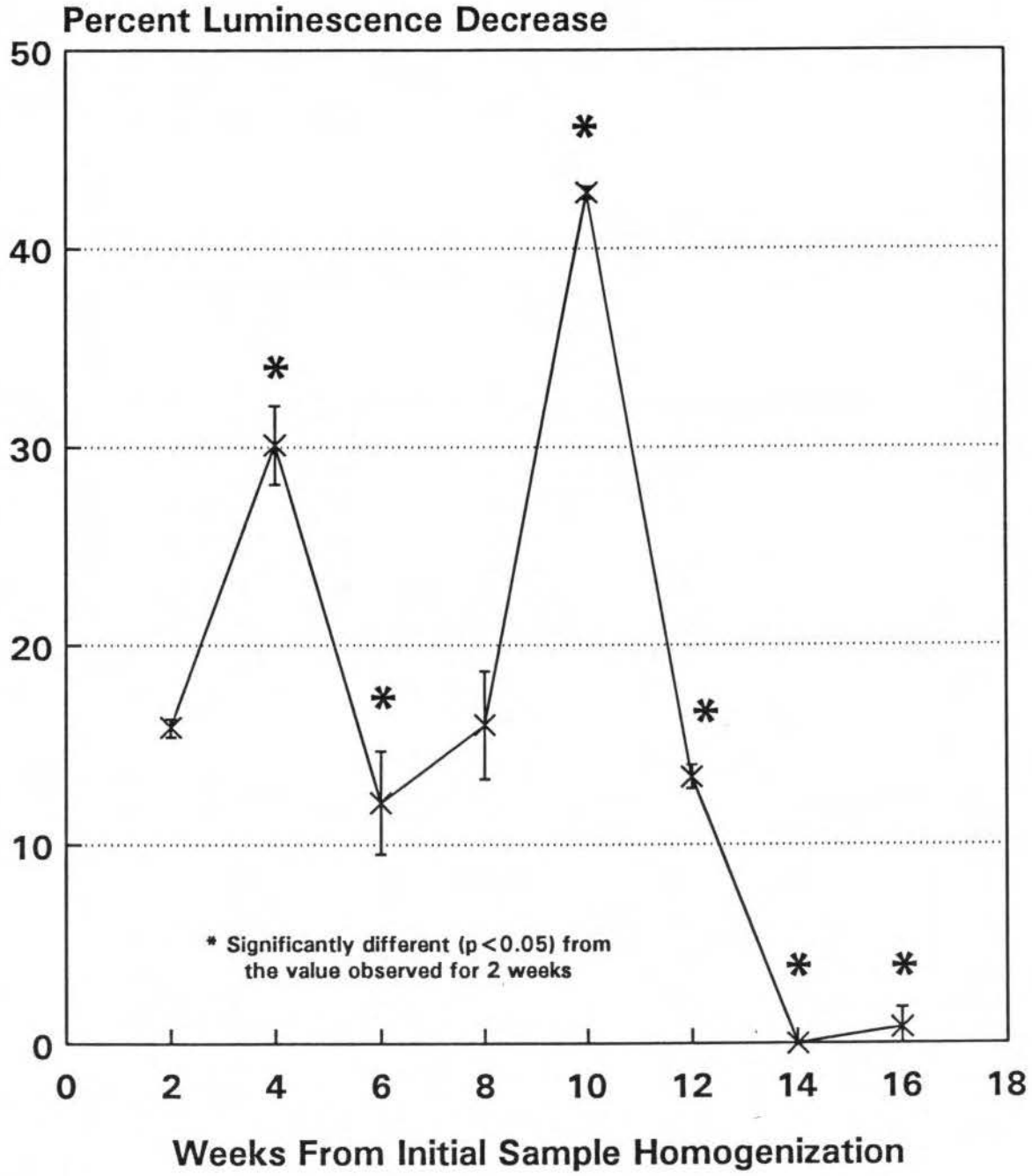


D. Scott Becker and Thomas C. Ginn, 1990

Encl. 73

HOLDING TIME EFFECTS-MICROTOX

Elliott Bay - Harbor Island

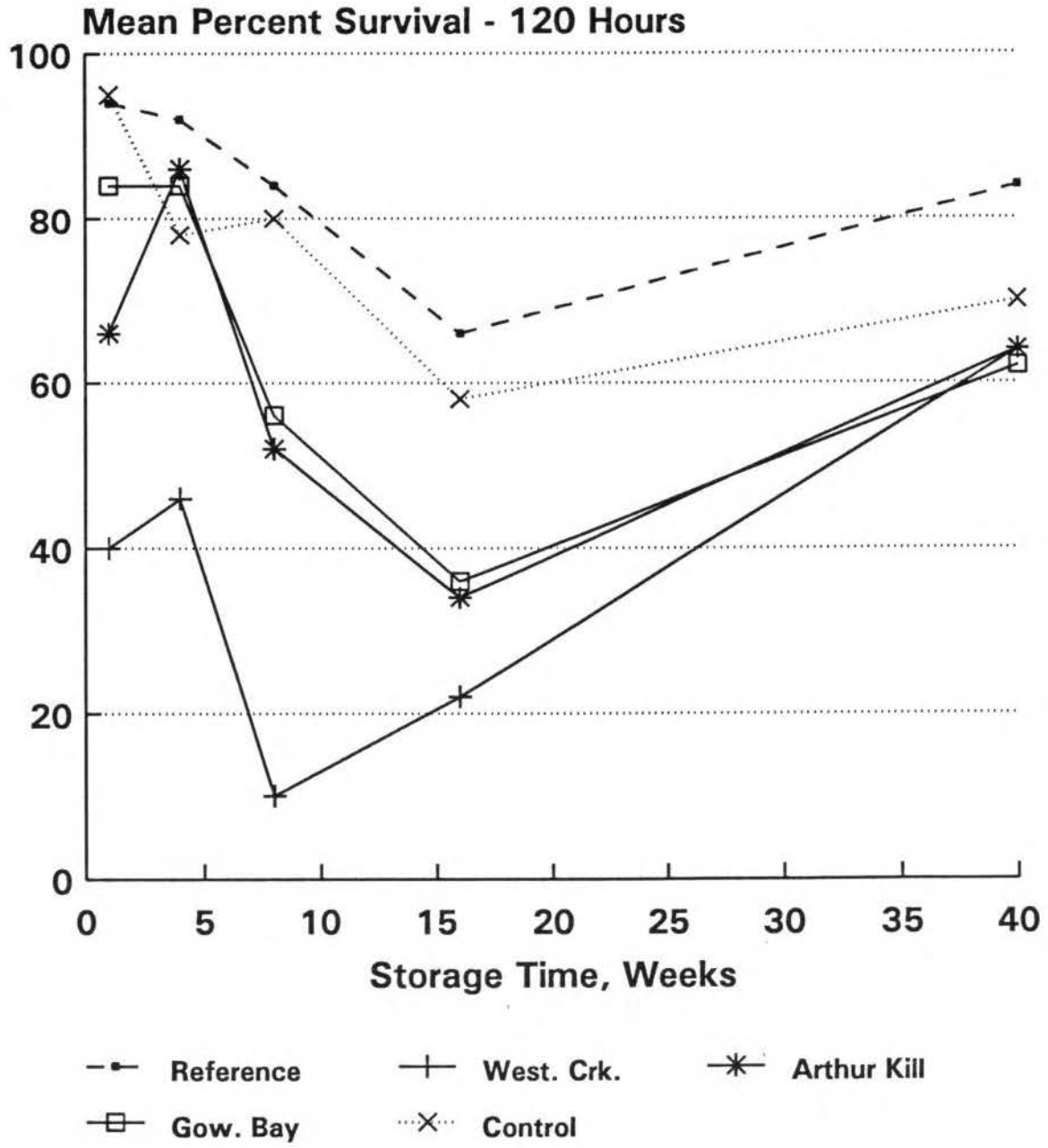


D. Scott Becker and Thomas C. Ginn, 1990

Encl. 74

HOLDING TIME EFFECTS

Mysidopsis bahia Mortality

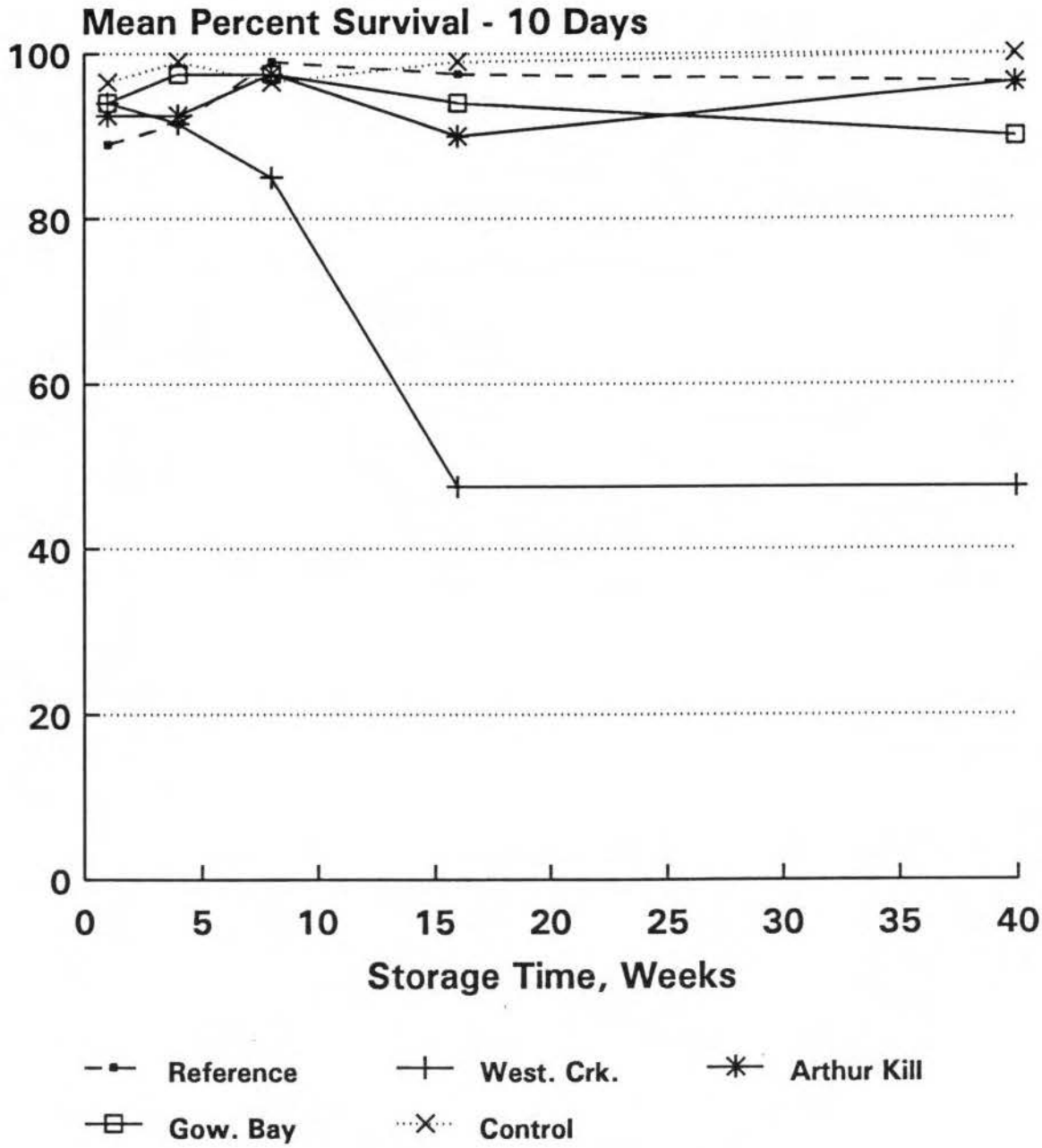


Henry E. Tatem, et al (WES), 1991

Encl. 75

HOLDING TIME EFFECTS

Nereis virens Bioaccumulation



Henry E. Tatem, et al (WES), 1991

Encl. 76

BASIC CONCLUSIONS

- Holding times *can* influence sediment toxicity
- In general sediments seem to show *no change* in toxicity over eight weeks or become *more toxic*
- Adopting an eight week holding time is environmentally protective and makes tiered testing a more viable option for some projects

Encl. 77

THE FLIP SIDE

Dredging proponents must weigh the potential cost savings resulting from tiered testing against the potentially greater chance of failure involved with holding sediments longer than two weeks

Encl. 78

RECOMMENDATION

PSDDA should adopt an eight week bioassay holding time guideline for sediments stored at 4°C under a nitrogen atmosphere

Encl. 79

CONTINUED DEVELOPMENT OF THE DISPOSAL SITE ENVIRONMENTAL MONITORING PROGRAM

INTREPRETATION OF PERIMETER CHEMISTRY DATA

ASSESSMENT OF BENTHIC COMMUNITIES

BIOACCUMULATION

Encl. 80

PERIMETER CHEMISTRY: BACKGROUND AND STATUS

ORIGINAL GUIDELINE VALUES: 1.25 TIMES BASELINE (METALS AND ORGANICS)

PROBLEMS:

1) LABORATORY VARIABILITY MAY ACCOUNT FOR EXCEEDING A GUIDELINE VALUE

2) BASELINE DATA ARE AVAILABLE FOR SOME, NOT ALL, PERIMETER STATIONS

Encl. 81

PERIMETER CHEMISTRY: PROPOSED ACTION

CONVENE WORK GROUP TO REVIEW PAST APPROACHES TO ESTABLISHING GUIDELINE VALUES, INVESTIGATE NEW APPROACHES, AND RECOMMEND A PREFERRED APPROACH.

CONSIDERATIONS WILL INCLUDE:

- FIELD VARIABILITY
- INTEGRATION OF GUIDELINE VALUES, LOADING CALCULATIONS AND SL VALUES
- USE OF WEIGHT-OF-EVIDENCE VS. STATISTICAL APPROACHES
- USE OF QUALIFIED DATA
- COST

Encl. 82

PERIMETER CHEMISTRY: SCHEDULE

PSDDA AGENCY SCOPING	MAY 1991
WORKGROUP MEETINGS	JUNE-OCTOBER 1991
DRAFT ISSUE PAPER	JANUARY 1992

Encl. 83

BENTHIC COMMUNITIES: BACKGROUND AND STATUS

PRESENT STATUS: COLLECT 5 REPLICATE SAMPLES PER STATION

SORT AND COUNT INDIVIDUALS IN EACH MAJOR TAXON

GUIDELINE VALUE: 50 PERCENT DECREASE IN MAJOR TAXA ABUNDANCE RELATIVE TO BASELINE

PROBLEMS:

1) SURVEY DESIGN QUESTIONS HAVE BEEN RAISED CONCERNING NUMBER OF REPLICATES AND SCREEN SIZE

2) DATA INTERPRETATION INVOLVES CHANGES IN MAJOR TAXA WHEREAS CHANGES IN COMMUNITY COMPOSITION MAY BE MORE ECOLOGICALLY MEANINGFUL

Encl. 84

BENTHIC COMMUNITIES: PROPOSED ACTION

PARTICIPATE IN BENTHIC EXPERTS WORKSHOP TO BE SPONSORED BY THE PUGET SOUND ESTUARY PROGRAM THIS SUMMER OR EARLY FALL.

EVALUATE WORKSHOP RESULTS AS THEY RELATE TO PSDDA.

IF NECESSARY, CONVENE WORKGROUP OF REGIONAL EXPERTS TO ADDRESS PSDDA CONCERNS.

RECOMMEND PREFERRED APPROACH FOR ASSESSING BENTHIC COMMUNITIES.

Encl. 85

BENTHIC COMMUNITIES: SCHEDULE

PSEP BENTHIC EXPERTS WORKSHOP	AUGUST 1991
EVALUATION OF WORKSHOP RESULTS	SEPTEMBER 1991
CONVENE PSDDA WORKGROUP IF NECESSARY	NOVEMBER 1991
DRAFT ISSUE PAPER	JANUARY 1992

Encl. 86

BIOACCUMULATION: BACKGROUND AND STATUS

PROBLEM: BASELINE BIOACCUMULATION DATA DO NOT INCLUDE MEASURES OF ORGANISM SIZE.

GUIDELINE VALUES DO NOT ACCOUNT FOR POTENTIAL VARIABILITY IN CHEMICAL CONCENTRATIONS ASSOCIATED WITH ANIMAL SIZE.

Encl. 87

BIOACCUMULATION: PROPOSED ACTION

CONDUCT FIELD STUDY TO GENERATE ESTIMATES OF VARIABILITY IN CHEMICAL CONCENTRATIONS DUE TO ANIMAL SIZE.

DETERMINE WHETHER SIZE INFLUENCES CHEMICAL CONCENTRATIONS IN THE SEA CUCUMBER MOLPADIA INTERMEDIA AND THE BIVALVE COMPSOMYAX SUBDIAPHANA.

CONDUCT POWER ANALYSIS TO EVALUATE WHETHER GUIDELINE VALUES SHOULD BE CHANGED.

Encl. 88

BIOACCUMULATION: SCHEDULE

FIELDWORK	MAY 1991
DRAFT REPORT	AUGUST 1991
FINAL REPORT	OCTOBER 1991
DRAFT ISSUE PAPER	JANUARY 1992

Encl. 89

Changes to PSDDA Screening and Maximum Levels

Encl. 90

Ecology Responsibilities

❶ Obtain and Assure Quality (QA2) of New Sediment Chemistry and Bioassay Data

❷ Recalculate PSDDA Screening and Maximum Levels (SLs/MLs)

❸ Present Results and Recommendations at PSDDA Annual Review Meeting

Encl. 91

Problem Identification

- Some PSDDA Screening Levels are lower than routine sample limits of detection

- Significant new sources of sediment data since DY 1989 Annual Review Meeting:

  - Dredging projects
  - Monitoring studies
  - Other investigations

Encl. 92

Sources of New Sediment Quality Data for Puget Sound.

DATA SOURCE	SYNOPTIC SAMPLES	"Hit"/"No Hit" Interpretation?
PSDDA Phase I & II Baseline Studies	23	Yes
NPDES Inspections	@ 10	No
METRO Studies	@ 24	No
1989/1990 PSAMP Monitoring	100	Part
DY 1989/1990 Dredging Projects (11)	100	Part
South Sound Reconnaissance Study	24	Part
Puget Sound Reference Area Study	22	No
1990 PSDDA Disposal Site Monitoring	26	Yes
Total "New" Synoptic Samples	329	Incomplete

Encl. 93

Ecology recommends no changes to existing AETs (1988 Update)

* Some important sources of sediment data only recently available for review

* Lack significant QA2 data needed for unqualified changes

* Need consensus on "Hit"/"No Hit" interpretations

Encl. 94

Recommended Changes to Selected PSDDA Screening Levels.

PSDDA Chemical of Concern	Current Screening Level	Proposed Screening Level	Current Low AET (LAET)	Predictive Sensitivity/ Efficiency
1,2,4-trichlorobenzene	6.4	13	31	No change
2-methylphenol	10	20	63	No change
2,4-dimethylphenol	10	29	29	No change
Benzoic acid	216	400	650	No change
Benzyl alcohol	10	25	57	No change
Nitrosodiphenylamine	22	28	28	No change

Encl. 95

Schedule for New AETs

	By:
❖ Obtain all new data	July 1, 1991
❖ Obtain all missing QA2 data	August 1, 1991
❖ Resolve bioassay interpretation questions	August 15
❖ Complete QA2 review	October 1
❖ Complete all data entry	November 1
❖ Recalulate AETs and reliability	December 1
❖ Draft issue paper: Recommended Changes to PSDDA SLs/MLs	January 1, 1992

Encl. 96

PSDDA Status Report

PSEP Puget Sound Reference Areas Survey

Third Annual Review Meeting
May 2, 1991

Encl. 97

OBJECTIVES

- Characterize chemical and biological conditions at possible reference areas
- Evaluate effect of grain size and other conventional variables on bioassay response
- Identify suitable locations (stations) for reference area sampling
- Refine performance standards for reference areas

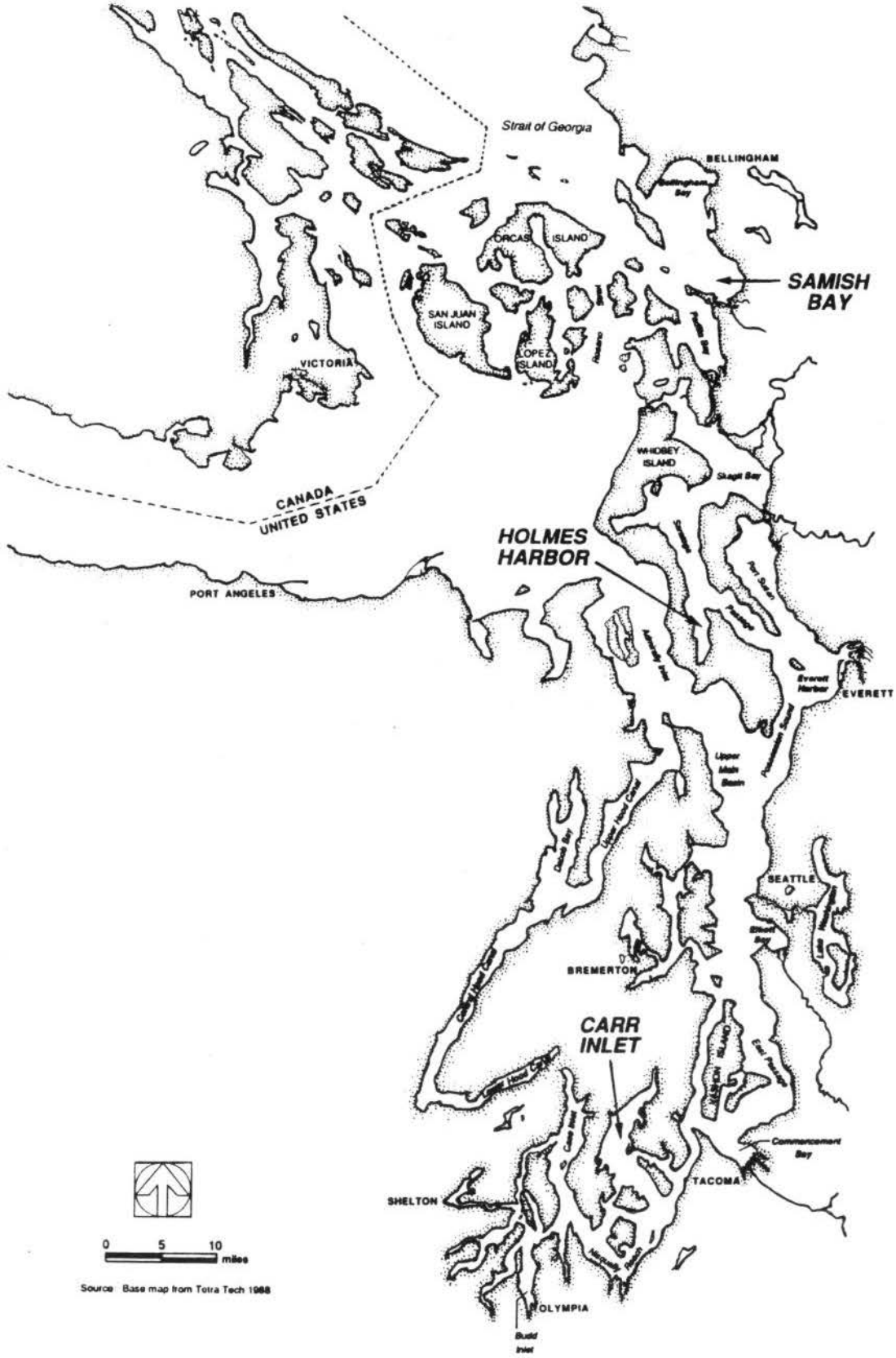
Encl. 98

STUDY DESIGN

- Three reference areas
  - Carr Inlet
  - Samish Bay
  - Holmes Harbor
- Range of grain sizes in each reference area (seven stations each)
- Chemical analyses: pesticides, PCBs, semivolatiles, metals, and conventionals
- Bioassay analyses: amphipod, bivalve larva, juvenile polychaete, echinoderm embryo, and Microtox
- PSEP protocols for all sampling and analyses

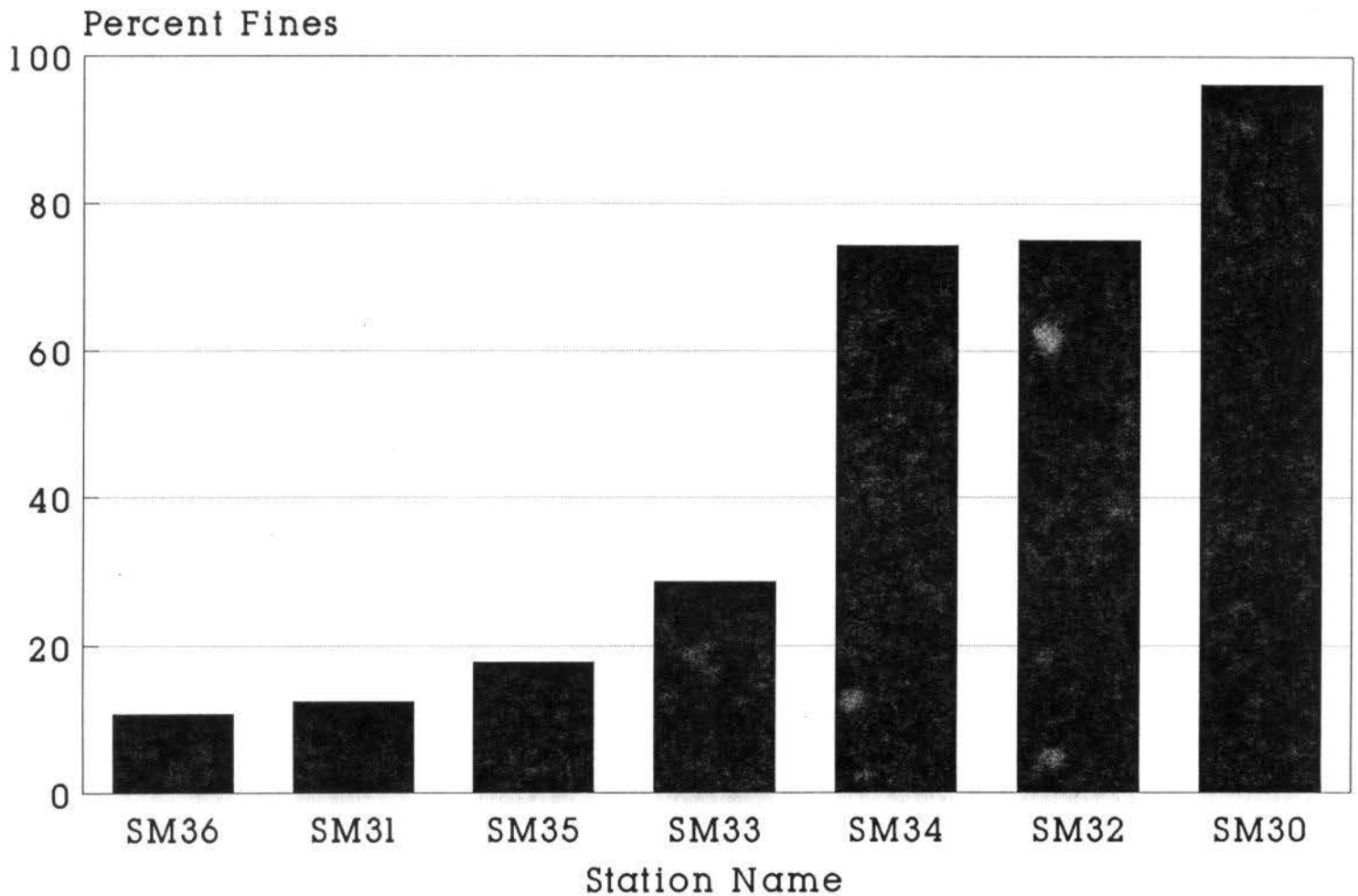
Encl. 99

LOCATIONS OF THE THREE REFERENCE AREAS SAMPLED IN PUGET SOUND



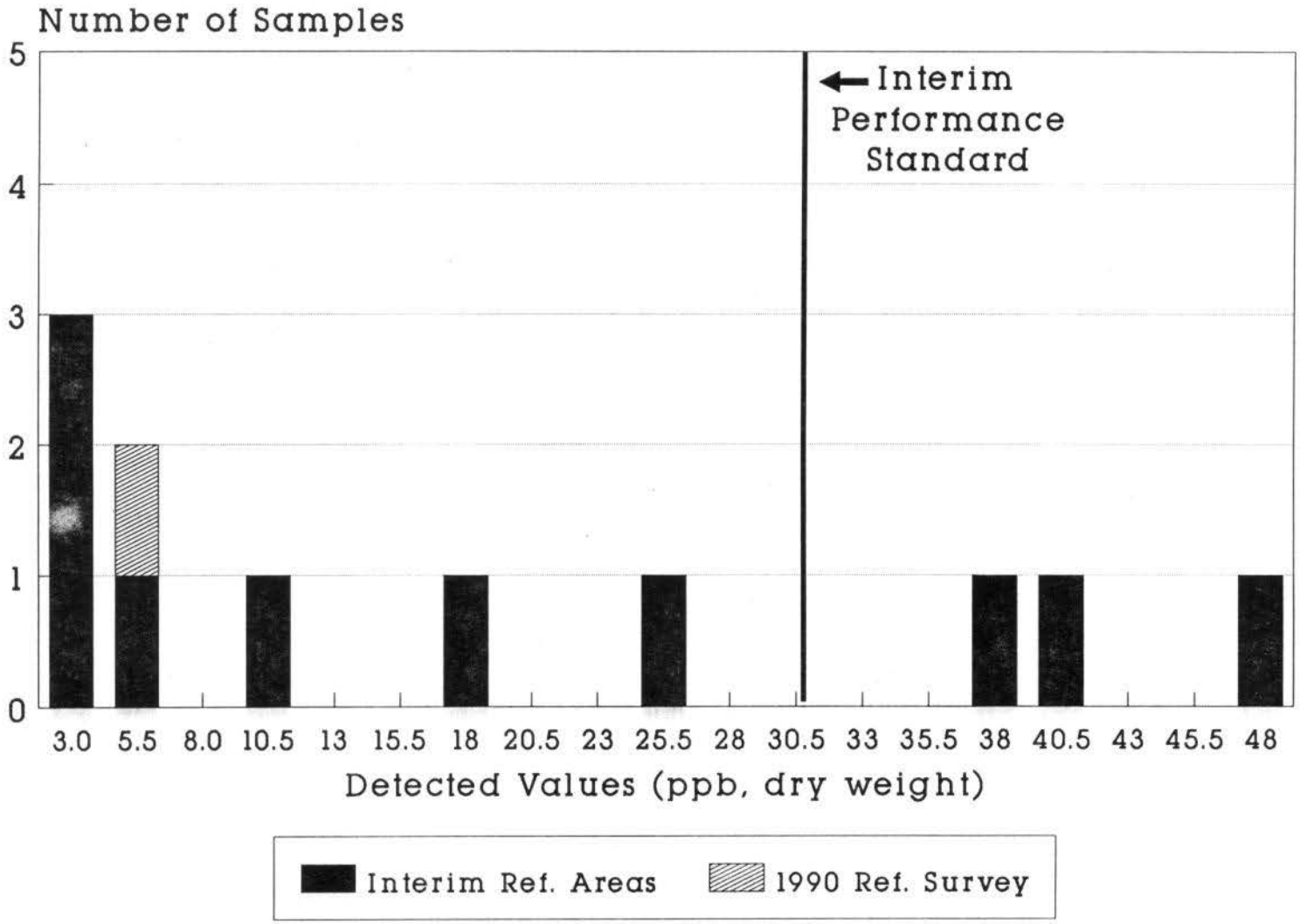
Encl. 100

Grain Size Distribution at Samish Bay Stations



Encl. 101

PCBs at Reference Areas



Encl. 102

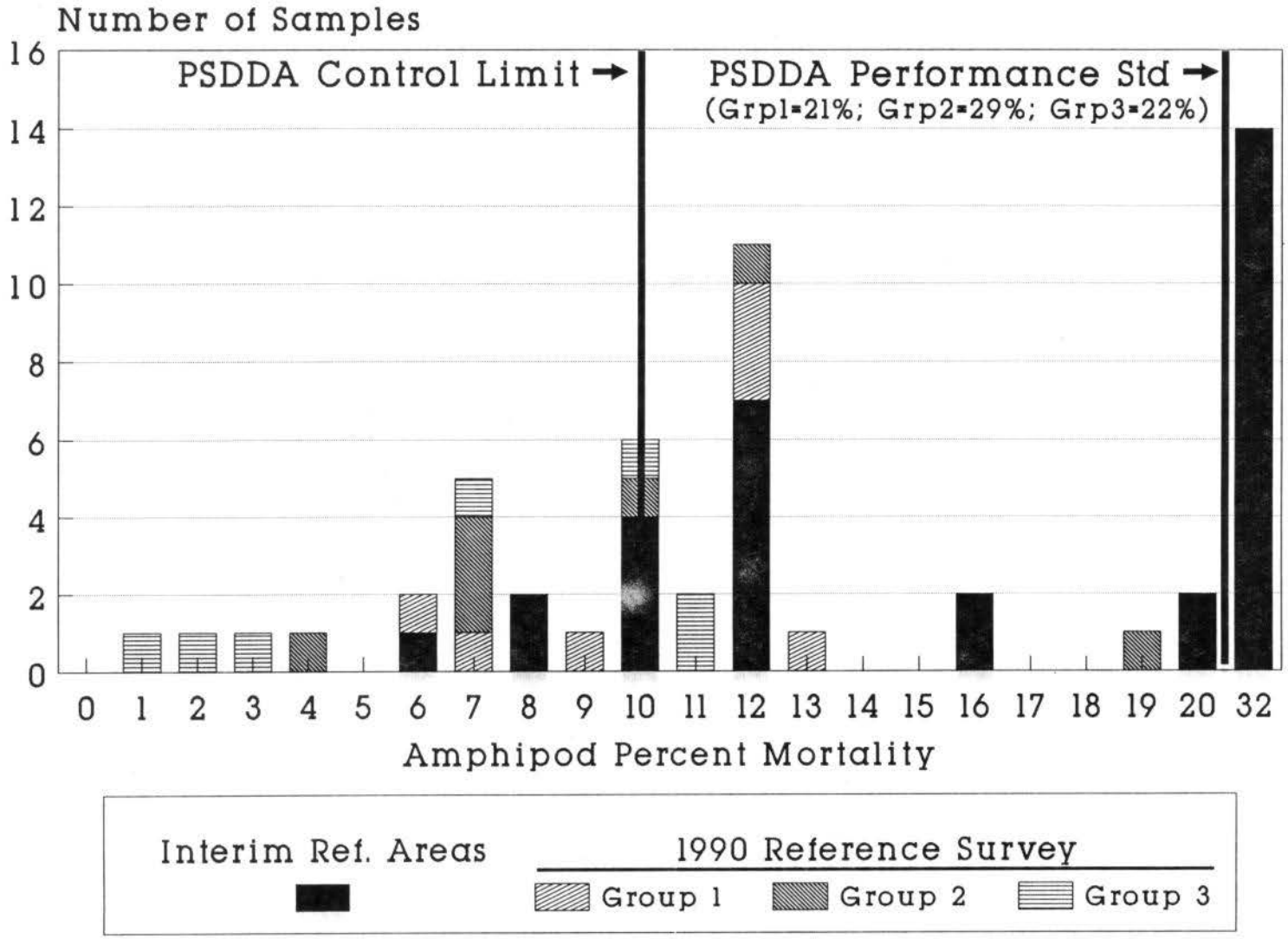
BIOASSAYS EXCEEDING PSEP CONTROL LIMITS

- Amphipod Mortality $\geq$ 10%
  - CR02, CR20, CR23, CR24, SM30, SM32, HH01, HH02
  - No stations exceeded the interim criteria
- Bivalve Abnormality $\geq$ 10%
  - HH01
- Bivalve Mortality $\geq$ 30%
  - All samples (also over 50%)
- No samples exceeded Echinoderm Abnormality and Mortality Limits.
- Neanthes Mortality $\geq$ 10%
  - HH01, HH02
- No samples showed decreases in luminescence for the Microtox bioassay

PTI

Encl. 103

Amphipod Mortality at Reference Areas



Encl. 104

BIOASSAY-CONVENTIONALS CORRELATIONS

- Bivalve bioassay responses showed significant correlations with TOC and grain size.
- Echinoderm combined endpoint showed a significant correlation with TOC and grain size.
- A significant relationship between grain size and amphipod mortality was observed only in Carr Inlet.
- Neanthes and Microtox showed no significant correlation with any conventional variables.

PTI

Encl. 105

PSDDA SL Exceedances

- 4-Methyl Phenol
  - CR02, CR20, SM30, SM34, HM05, HM07
- Benzoic Acid
  - CR02, SM30
- Benzyl Alcohol
  - CR25, SM30, SM36, HH02
- Cadmium
  - HM05
- Indeno(1,2,3-c,d)pyrene
  - HM07
- Detection limits for:
  - 1,2 Dichlorobenzene
  - 1,2,4 Trichlorobenzene
  - 2 - Methylphenol
  - 2,4 Dimethylphenol
  - Benzyl Alcohol

Encl. 106

SUMMARY OF RESULTS
—Bioassay Analyses—

- The bivalve larva combined endpoint greatly exceeded the PSEP QA criteria for seawater controls in all cases
- The bivalve larva combined endpoint showed statistically significant differences from the West Beach control in all cases
- Amphipod mortality exceeded the PSEP QA criterion for bioassay controls in 8 samples (4 in Carr Inlet, 2 in Samish Inlet, 2 in Holmes Harbor)
- Other analyses generally met the PSEP QA criteria for bioassay controls

PTI

Encl. 107

Conclusions

- Stations exceeding PSDDA SL guidelines showed no significant biological problems.
- The stations in these bays are suitable reference stations for Spring sampling based on overall chemistry and biology results.
- Reference stations represent a wide range of grain sizes.
- Chemical and biological data will assist in characterizing reference area conditions.
- Use of bivalve larvae combined endpoint should be re-examined.

Encl. 108

APPLICATION OF THE

SEDIMENT MANAGEMENT STANDARDS

TO THE PSDDA PROGRAM

Encl. 109

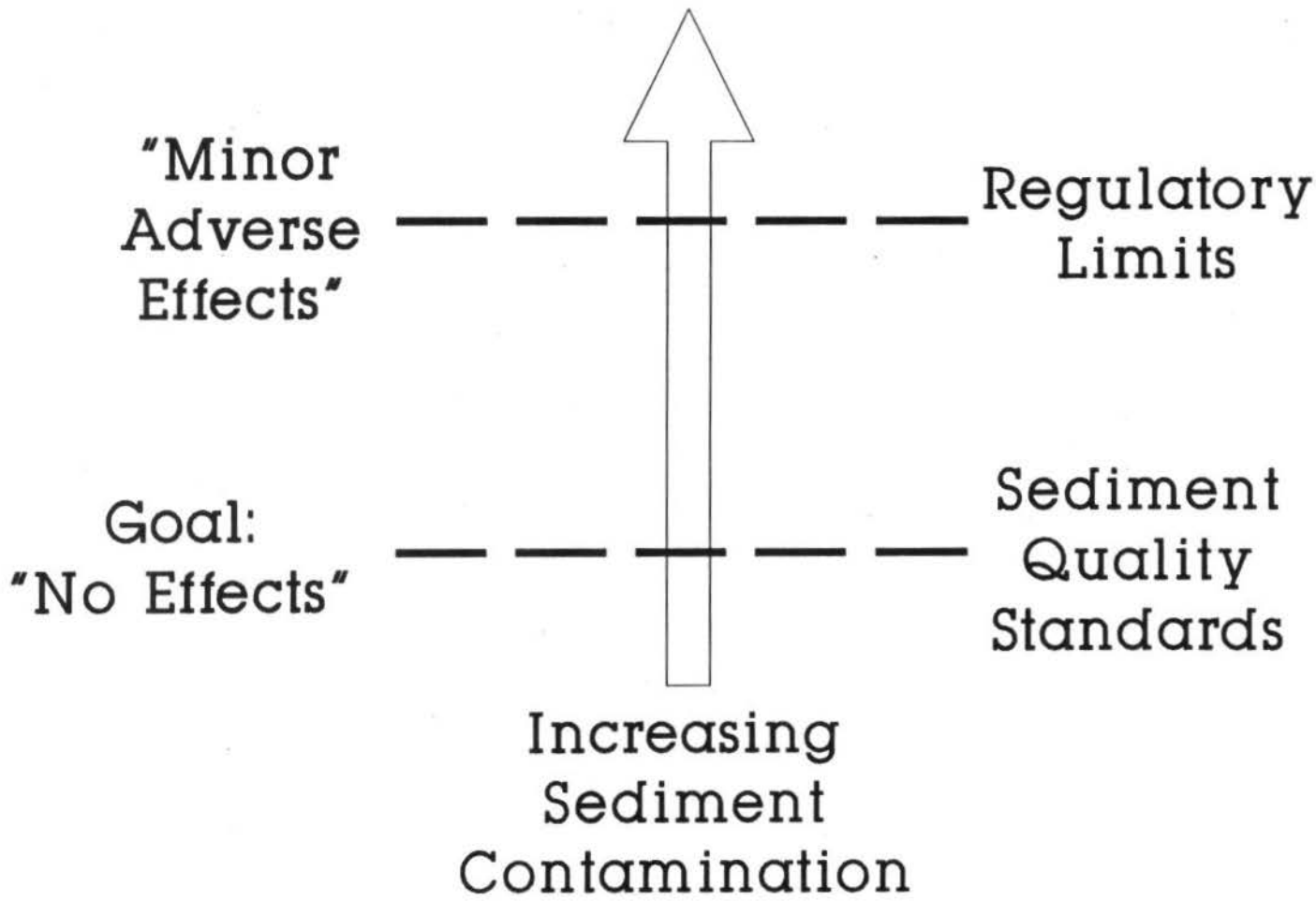
By:
K. Phillips
Ecology

SEDIMENT MANAGEMENT STANDARDS
Chapter 173-204 WAC

- Adopted March 27, 1991
- Effective April 27, 1991
- Scope:
  - Sediment Quality Standards
  - Source Control Standards
  - Sediment Cleanup Standards

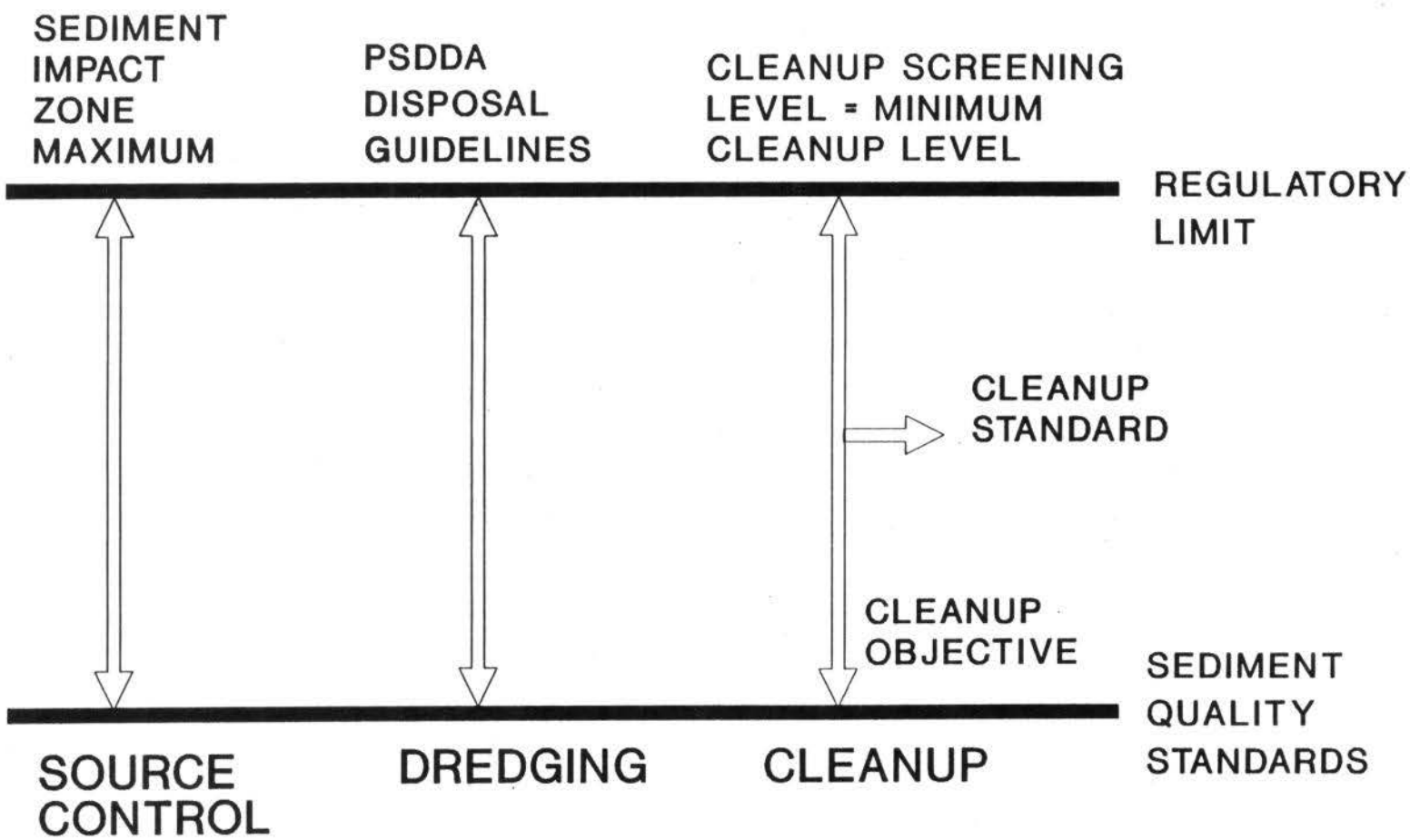
Encl. 110

SEDIMENT MANAGEMENT STANDARDS
- APPLICATION MODEL -



Encl. III

"REGULATORY BEAUTY"



Encl. 112

GENERAL APPLICABILITY OF SMS TO DREDGING PROGRAMS

- Future CWA Section 303 approval as part of state "water quality standards"
- Application of rule:
  - Section 401 water quality certifications
  - Administrative orders
- General deferral to dredging programs

Encl. 113

APPLICATION OF THE RULE TO THE EXISTING PSDDA DISPOSAL SITES

- Rule language directly incorporates PSDDA reports
- Administrative order(s) will be issued for the PSDDA sites
- Order(s) will directly incorporate PSDDA requirements
- Target Date: December 1991

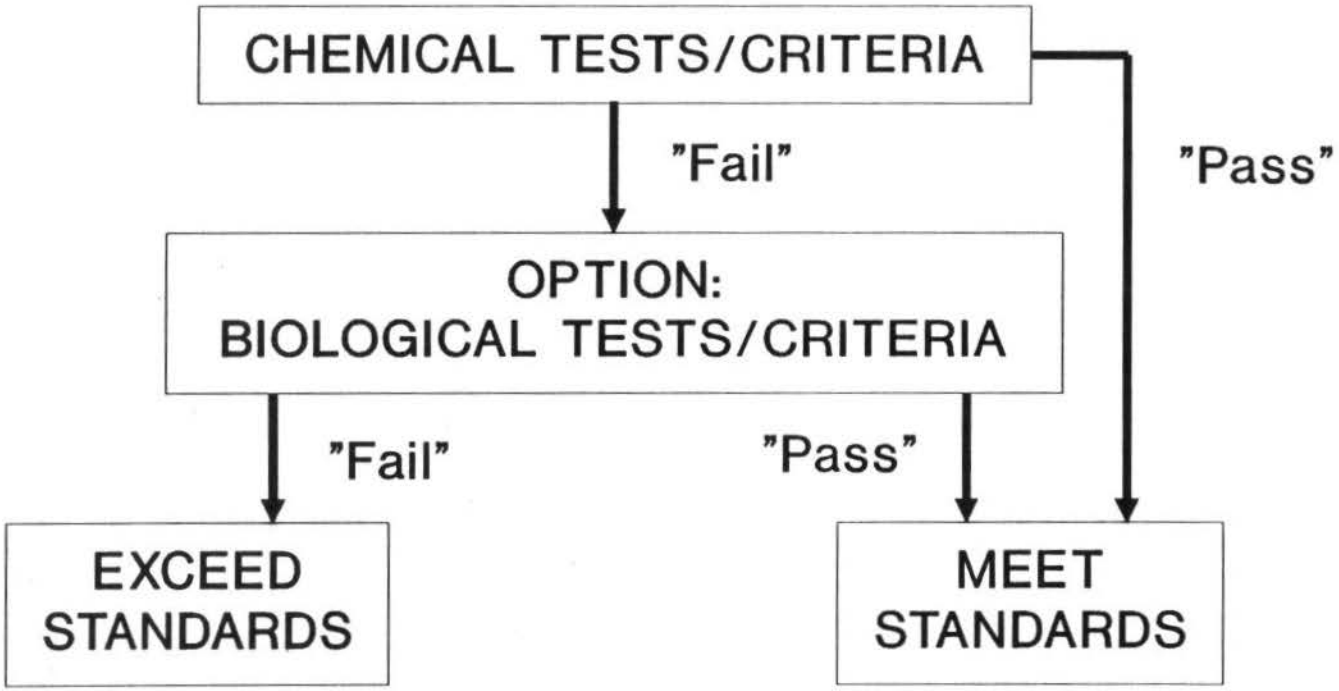
Encl. 114

APPLICATION OF THE SMS TO OTHER DREDGING ACTIVITIES

- Establish requirements via use of project Section 401 Water Quality Certifications
- Redistribution of contaminated sediments to cleaner areas
- Exposure of buried contaminated sediments
- Requirements for cap material quality

Encl. 115

SEDIMENT QUALITY STANDARDS



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Sediment Management Standards
Chapter 173-204 WAC

Rule Language Related to Dredging
March 1991

"(7) Dredged material and fill discharge activities subject to authorization under Section 401 of the federal Clean Water Act via chapter 90.48 RCW and chapter 173-225 WAC, establishment of implementation procedures of application for certification, are not subject to the standards of WAC 173-204-415, but are subject to the standards of WAC 173-204-400 through 173-204-410 and 173-204-420 as follows:

(a) Requirements for dredging activities and disposal sites shall be established by the department using best available dredged material management guidelines and applicable federal and state rules. These guidelines shall include the Puget Sound dredged disposal analysis (PSDDA) dredged material testing and disposal requirements cited in:

(i) **Management Plan Report - Unconfined Open-Water Disposal Of Dredged Material, Phase I, (Central Puget Sound), June 1988**, or as amended;
(ii) **Management Plan Report - Unconfined Open Water Disposal Of Dredged Material, Phase II, (North And South Puget Sound), September 1989**, or as amended; and
(iii) **User's Manual For Dredged Material Management In Puget Sound, November 1990**, or as amended.

(b) In coordination with other applicable federal and state and local dredged material management programs, the department may issue administrative orders to establish approved disposal sites, to specify disposal site use conditions, and to specify disposal site monitoring requirements.

(c) The department may authorize sediment impact zones for dredged material disposal via federal Clean Water Act Section 401 certification actions.

(d) As determined necessary by the department, the department may authorize sediment impact zones for dredged material disposal via administrative orders issued under authority of chapter 90.48 RCW. The department shall authorize sediment impact zones for all Puget Sound dredged disposal analysis disposal sites via administrative orders issued under authority of chapter 90.48 RCW.

(e) Administrative orders and certifications establishing sediment impact zones for dredged material disposal sites shall describe establishment, maintenance, and closure requirements for the authorized site, consistent with the requirements described in (a) of this subsection."

Encl. 117

Sediment Management Standards vs PSDDA
Comparison of Biological Testing Requirements

PSDDA Requirements

Biological Testing -- routinely required when chemical concentrations are between SL and ML chemical disposal guidelines (expanded biological testing allowed over ML)

Four biological tests are done:

Amphipod	10-d mortality
Larval	normal survivorship
Microtox	15-m bioluminescence
Neanthes	10-d mortality

SMS Requirements

Biological Testing -- proponent or agency option when chemical criteria are exceeded.

Three biological tests are done:

Amphipod	10-d mortality
Larval	normal survivorship
<u>Plus one of</u>:	
Microtox	15-m bioluminescence
Neanthes	20-d biomass
Benthos	Major taxa abundance

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