MEMORANDUM

CENPS-OP-RG

DATE: 21 April 1989

SUBJECT: Puget Sound Dredged Disposal Analysis (PSDDA) First Annual Review Meeting (21 February 1989), Final Minutes

1. Background and Purpose. Phase I of the Puget Sound Dredged Material Management Analysis (PSDDA) study was completed in December 1988 and is now being implemented via the June 1988 management plan report (MPR). The MPR covers unconfined open-water disposal of dredged material in central Puget Sound at three new unconfined open-water disposal sites located in Port Gardner, Elliott Bay, and Commencement Bay. An annual review by the PSDDA agencies is one of the requirements of the MPR (see chapter 9). Even though we have not experienced a full year of operation under the plan, due to several technical issues that warrant discussion, the first annual review meeting by the agencies responsible for the development of the MPR was held on 21 February 1989 at the Seattle District, Corps of Engineers' office (refer to invitation, agenda, and list of attendees attached as enclosures 1 through 3). The meeting was conducted by the the four PSDDA agencies: US Army Corps of Engineers (COE), Environmental Protection Agency (EPA), Washington State Department of Natural Resources (WDNR) and Washington State Department of Ecology (WDE). The agencies were represented by Ray Schmitz (COE), Ron Lee (EPA). John DeMeyer (WDNR), and Greg Sorlie (WDE).

The purpose of the annual review meeting is primarily to invite public input to the PSDDA agencies on various elements of the dredged material management plan based on experience gained over the previous year. That input will be utilized by the agencies in assessing the need for plan adjustments. Technical issues that have arisen since implementation of PSDDA Phase I that were a focus of discussion at the first annual review meeting included: limits of detection related to PSDDA screening levels for organic compounds; metals extraction techniques and implications for PSDDA quality assurance; the possible addition of tributyltin (TBT) to the list of PSDDA chemicals of concern; and the possible reinstatement of the geoduck test (as called for in PSDDA documents). The first annual review meeting also served as a forum to provide the public with a status report on PSDDA Phase II, the PSDDA Data Base Management System, baseline monitoring, chronic sublethal test development, and sampling and testing costs. The minutes of each year's annual review meeting will be written as a memorandum, reviewed in draft form by the PSDDA agencies, and provided to meeting attendees in final form.

2. Process for Change. Ray Schmitz began the meeting with introductions, a review of PSDDA agency responsibilities, and a discussion of the processes (existing and proposed) for making changes to the PSDDA Phase I management plan (refer to handout attached as enclosure 4). PSDDA agency responsibilities and annual due dates are as outlined below:

a. Data Compilation.

(1) Corps of Engineers.
*Dredged material sampling, testing, and disposal guidelines application report (July)
*Physical monitoring report (August)

(2) Washington Department of Natural Resources
*Chemical/biological monitoring report (September)
*Disposal site use report (September)

b. Data Evaluation.
(1) Washington Department of Ecology
*Environmental monitoring summary report (November)

Schmitz then outlined the procedure for making changes to the PSDDA evaluation procedures as embodied in the MPR. Note that a proposed change may be more or less restrictive than the evaluation procedures in effect at the time of the annual review meeting.

Step 1. WDE prepares an assessment report presenting the results of the data evaluation and recommended changes (December).

Step 2. All PSDDA agencies and other interested parties review the assessment report (January).

Step 3. PSDDA agencies determine the proposed changes that will be considered at the annual review meeting.

Step 4. Proposed changes are discussed with the public at the annual review meeting (February).

For the first annual meeting, the following schedule applies:

Step 5. PSDDA agency staff review public input on technical issues and determine changes (if any) that need to be made (March).

Step 6. PSDDA staff proposed changes are submitted to agency heads for approval (April).

Step 7. Following agency head approval, Corps issues public notice of changes to become effective at date of public notice (May).

Schmitz explained that the annual review process was currently the only avenue for changes to be made to the PSDDA evaluation procedures. However, departures from the procedures can be made on a case by case (project specific) basis by Regulatory staff, provided that the departures are arrived at as a concensus of the PSDDA agencies and that the departures are documented and justified per the established PSDDA procedures for departures. Schmitz then presented for consideration a possible additional avenue for effecting plan changes. This could be through a nonannual review (special nonproject specific situations; i.e. glitches in the evaluation procedures that surface during implementation). Case by case departures would require justification and appropriate documentation by the COE Regulatory staff in coordination with the other PSDDA agencies. The process for the nonannual review developed changes would include:

Step 1. The head of the PSDDA agency proposing the change initiates the change by letter to all PSDDA agency heads.

Step 2. PSDDA agencies consider the change and develop the specifics of the proposed change.

Step 3. The Corps publishes the public notice of the change for a 30 day public review and comment.

Step 4. PSDDA agencies consider all comments; prepare final changes as appropriate, review, and reach agreement.

Step 5. The Corps publishes a public notice of the change.

Step 6. The change is implemented as of the date of the public notice.

Schmitz concluded the meeting introduction with a request for comments on the nonannual review procedures that he had presented.

3. PSDDA Study and Implementation Status Report.

a. Phase I. Frank Urabeck, PSDDA study director, COE, then presented a summary of the PSDDA Study and its implementation. Phase I PSDDA was completed in December and is now being implemented. The date that the PSDDA Record of Decision was signed was December 20, 1988, by the COE and EPA. To date, the Commencement Bay and Port Gardner unconfined open-water disposal sites are open and available for use. Elliott Bay site is expected to be available soon. The State's Blake Island dredging project, now underway, is the first project to utilize one of the Phase I sites (Commencement Bay).

b. Phase I Database Management Program. Dave Kendall, COE, presented a summary of the PSDDA database management program that is under development, called the Dredge Analysis Information System (DAIS). The primary purpose of the DAIS is to store and analyze chemical and biological test data necessary for conducting PSDDA agency regulatory reviews and for making permit decisions. Another important function of the DAIS will be to analyze and report important dredging related statistics for dredgers and for disposal sites as part of the annual review reporting requirements for the PSDDA program. The short term goal is to implement the system during August/September 1989. This system would be a SEDQUAL based system with modules outside SEDQUAL for storing and analyzing administrative data and conducting quality assurance (QA) checks and relevant output reports for permit decisionmaking. An additional module, the Geographical Locator System (GLS) will interface with SEDQUAL to access environmental data within project dredging and/or monitoring areas. This system will be utilized for one year and the development of the new DAIS for PSDDA wil begin in August 1990. The new DAIS will store environmental data, administrative data, and QA1 checking and analysis routines within one database system and will be directly coupled with the GLS/GIS. Target date for implementation of the new DAIS is August 1991. The goal would be to have a system configured to unique PSDDA data input/analysis requirements compatible with the SEDQUAL database and Puget Sound Water Quality Authority (PSWQA) database systems (refer to enclosure 5 for additional information).

Jim Thornton, WDE, presented a summary of what the state was doing in terms of database management. He explained that WDE was working with the Corps to ensure compatibility of the Corps database with the state's program responsibilities. He explained that the Corps' responsibilities relative to database management relate to storage of the environmental and other data for use in regulatory decisionmaking, including conducting the first QA check (QA1). WDE's responsibilities deal with conducting the second level of QA (QA2) for determining adequacy of data for use in recalculating Apparent Effects Thresholds (AET's). The data that passed the QA2 would then be stored on WDE's SEDQUAL system and used for periodic recalculation of the AET's. It is conceivable that data received from the dredger may be acceptable for use in making a regulatory decision and be placed into the Corps' DAIS, but not pass QA2 and therefore, not be placed into the state's SEDQUAL system. WDE has entered into a contract through the Department of Interagency Services to develop a data management plan of how PSDDA agencies will interface in terms of data management. The contracted effort is examining needs, assessing current systems, creating data entry modules, and developing a recommended plan for the future.

c. Phase I Environmental Monitoring Baseline Studies. Paula Ehlers, WDE, presented a summary of the status of the PSDDA sites baseline monitoring. As part of the PSDDA program, WDE, via a contract to PTI, conducted baseline field surveys at all PSDDA Phase I sites between May and June, 1988. The purpose of the baseline surveys was to characterize physical, chemical, and biological conditions in and near the disposal sites. The resulting data will be used for later assessment of the distribution and impact, if any, of material disposed at each site. The primary functions of the disposal site monitoring plan are to ensure compliance with Section 404(b)(1) of the Clean Water Act and to field-verify PSDDA study predictions of site conditions following dredged material disposal. Monitoring data will enable direct response to agency and public concerns regarding site conditions and environmental impacts. The focus of the monitoring plan is to verify assumptions regarding (1) site conditions; (2) site boundaries and movement of disposed material or chemicals of concern across those boundaries; (3) adverse impacts on biological communities beyond the site boundary; and (4) onsite biological, chemical, and physical changes. The hypotheses made under PSDDA that will be tested by the monitoring plan are:

*Hypothesis No. 1. Dredged material stays within the disposal site boundary.

*Hypothesis No. 2. Chemical concentrations at offsite monitoring stations do not measurably increase over time due to dredged material disposal.

*Hypothesis No. 3. Sediment chemical concentrations at onsite monitoring stations do not exceed the chemical concentrations associated with Site Condition 2 chemical disposal guidelines due to dredged material disposal.

*Hypothesis No. 4. Sediment toxicity within the disposal site does not exceed Site Condition II chemical disposal guidelines due to dredged material disposal.

*Hypothesis No. 5. No significant increase in chemical body burden of benthic infauna species collected downcurrent of the disposal site occurs due to dredged material disposal.

*Hypothesis No. 6. No significant decrease in the abundance of dominant benthic infauna species occurs downcurrent of the disposal site due to dredged material disposal.

The results of the Phase I sites baseline monitoring are available from WDE (Puget Sound Dredged Disposal Analysis, Baseline Survey of Phase I Disposal Sites, dated December 1988, prepared by PTI for WDE). Ehlers pointed out that Port Gardner was found to be the cleanest site (no chemicals exceeded ML values; and only Nickel and Diethyl phthalate exceeded SL). In the Commencement Bay disposal site, several PSDDA chemicals of concern exceeded screening levels, although ML was never exceeded. In the Elliott Bay disposal site, several PSDDA chemicals of concern exceeded SL, but only Mercury exceeded ML. Bioaccumulation studies, although done for the other two sites, were not accomplished for Elliott Bay because no macrobenthic species were present in sufficient abundance at any sampling station to provide enough tissue for testing.

DISCUSSION. Some discussion from the audience ensued regarding trend analysis and the need to proceed with caution in drawing conclusions from the monitoring data. Caution must be taken in drawing any conclusions as to dredged material disposal effects at the disposal sites, especially in view of the fact that the material being dumped at the sites may be cleaner than the existing sediments. As the material disposed of mixes with the material existing at the site, the interpretation of monitoring results may be very confusing. One dredger from the audience voiced his opinion that it didn't seem fair that the dredgers should be held responsible for the condition of the disposal sites and that they should have dredged material requirements that are more constraining than the quality of the material existing at the disposal site.

A question was asked about what was going to be done in terms of bioaccumulation data for Elliott Bay. Urabeck stated that reliance would be placed on chemical and biological testing of the sediments as bioaccumulation testing was not possible for the Elliott Bay site.

d. Phase I Implementation-Experience to Date.

(1) Overview. John Malek, EPA, provided an overview of our experience to date with Phase I implementation. His message was one of good news. Out of five projects reviewed under PSDDA, 3 have been found to be acceptable for open-water disposal at a PSDDA site. Although there was some gap between planning and implementation, we are up and running now and as we gain experience, the process is working smoother and smoother. Some of the biological tests (e.g. oyster larvae) are not working as well as originally expected; however, steps are being taken to remedy this situation. Malek pointed out that partial characterization has been exercised by some as a means to possibly downrank areas under PSDDA and reduce sampling and analysis requirements under full characterization. In the future, he sees that the PSDDA agencies will be harsher on QA requirements and will continue to rely on a strict application of PSDDA guidelines with some flexibility for professional judgment. Malek commented in closing that the PSDDA

agencies have been working together very well in implementing PSDDA and getting information back to dredgers in a timely manner.

(2) Sampling and Testing Costs. In an effort to give the audience a preliminary idea of what PSDDA was costing, Dave Kendall provided a summary of PSDDA sampling and testing costs based on what few projects we've processed to date. He pointed out that costs were related to primarily two keys aspects of any project: (1) volume of dredged material; and (2) the area ranking under PSDDA. Average costs to date have been: $1300/sample (field collection); $1400-1700/analysis(excluding biological testing); and $1700/analysis for biological testing including microtox, amphipod, and oyster larvae. He emphasized the preliminary nature of these figures due to the small amount of cost data we have so far and the learning curve for labs in PSDDA procedures and protocols. The analysis cost per project averaged for all five projects examined to date under PSDDA was calculated to be $.62/cubic yard of dredged material (refer to enclosure 6 for additional cost information).

DISCUSSION: Several questions were posed by the audience. The question of why the geoduck test was so expensive was raised. The answer was the difficulty in getting the geoduck larvae, the short reproductive season, and the fact that the testing protocol is in the development stage. Another question related to cost of labs relative to QA (i.e., were the results from less expensive labs passing the QA requirements). It is too early to give a definitive answer except to say that there have been QA problems with some of the data we've received to date. A third question asked was whether there would be a PSDDA certification process for laboratories. Jim Thornton, WDE, explained that the state was working on that and within a year, such a program for PSDDA should be in effect. Other questions were raised regarding PSDDA protocols, process time, and program cost effectiveness.

e. Phase II Study.

(1) Disposal Site Identification/Draft Phase II EIS. Urabeck provided a status of the Phase II study. While Phase I covers Puget Sound's major urban centers (Tacoma, Seattle, and Everett), Phase II covers the identification of unconfined open-water disposal sites for the north and south Puget Sound area and includes Olympia, Port Townsend, Port Angeles, Anacortes, Bellingham, and other locations. Phase II has identified five unconfined disposal site locations. In contrast to Phase I which identified only nondispersive sites, three of the Phase II sites are dispersive sites: Rosario Strait, near Port Angeles, and near Port Townsend. Phase II nondispersive sites include: south sound in the Nisqually reach between Anderson and Ketron Islands, and in north sound in Bellingham Bay. It was necessary in Phase II to select some dispersive sites as all nondispersive environments in the service regions of Rosario Strait, Port Angeles, and Port Townsend were generally inshore and in shallow water. Ehlers, WDE, commented that environmental baseline monitoring of the Phase II nondispersive sites is scheduled to begin in April 1989. Urabeck commented that the Draft Environmental Impact Statement (EIS) and draft Management Plan for the Phase II study is expected to be distributed for public review in March 1989.

STATUS UPDATE: PSDDA Phase II documents were distributed for public review on 24 March 1989. Comments are due by 15 May 1989 to the Corps (Frank Urabeck).

(2) Proposed Adjustments in Dredged Material Evaluation Procedures. John Wakeman, assistant PSDDA study director and chairman of the Evaluation Procedures Work Group, Corps of Engineers, provided a summary of adjustments being proposed to the PSDDA evaluation procedures (EP) as a part of the Phase II study (refer to enclosure 7). Some of these would affect the evaluation procedures of PSDDA Phase I; others are unique to Phase II.

CHANGES THAT WOULD ALSO AFFECT PHASE I EP

*Adjustment to Some SL and ML Values. The PSDDA sediment quality value (SQV) refinement report (Puget Sound Estuary Program, 1988. Sediment Quality Values Refinement: Volume II, Evaluation of PSDDA Sediment Quality Values, Final Report. Prepared by Tetra Tech for EPA, Seattle, Washington) recommended modification of several ML's and concluded there was no reason to modify most of the SL's. The nature of the proposed changes are that for 25 chemicals of concern, the ML's be raised; for 8 they be lowered; and for 25 they stay the same. Regarding SL's, the proposed change is to either eliminate the SL for Nickel or raise it to 140 ppm (current value proposed by PTI, 1988) and to change the SL for DNO phthlate from 69,000 ppb to 6,200 ppb. TBT is being proposed as a limited area chemical of concern with no SL. The issue of TBT is discussed as one of the technical papers in paragraph 4. The SQV report also concludes that a series of tests is preferable to one evaluative test for dredged material.

*Limits of Detection for Organics and Metals. It appears that limits of detection may not be achievable with some organic and metal compounds in a standard laboratory technique. The issue of whether PSDDA should recommend higher LOD's to fit the method and how to deal with the possibility that achievable LOD's may approach or exceed the screening levels is discussed as one of the annual review technical papers (refer to paragraph 4).

Wakeman explained that the process for making the changes proposed could be through one of three methods: (1) the annual review meeting recommendations (for TBT and LOD's); (2) through the Evaluation Procedures Working Group; or (3) through the Phase II documents.

CHANGES UNIQUE TO PHASE II

*Initial Area Rankings for PSDDA Full Characterization. In the Phase II documents, area rankings have been assigned to Phase II areas. These will form the basis of developing PSDDA requirements for full characterization and will facilitate review of project information. The rankings will be implemented through approval of the Phase II documents (i.e., EIS and Management Plan).

*Disposal Guidelines for Phase II Sites. The Phase II study recommends the use of the Phase I disposal guidelines for nondispersive sites. For dispersive sites, a more restrictive guideline is recommended

due to the difficulty of monitoring and the difficulty of predicting where the material goes, as well as the high cost associated with field verification studies. For chemical testing, the guideline for dispersive and nondispersive under Phase II is the same as for Phase I: When all 58 chemicals of concern are less than SL, material is deemed suitable for unconfined open-water disposal and no biological testing is required. When chemicals are greater than the SL value, biological testing is required; when chemicals exceed trigger values, special biological testing is required. For biological testing for dispersive sites, Phase II recommends the following guideline for suitability of material for unconfined open-water disposal at a PSDDA site: No more than 1 (of 3) bioassays statistically significant over reference, and no greater than 10% absolute mortality over reference. This is compared to the Phase I biological guideline (and Phase II for nondispersive sites) : No more than 1 (of 3) bioassays statistically significant over reference, and no greater than 30% absolute mortality over reference <u>or</u> no more than 2 (of 4) bioassays statistically significant over reference.

ISSUES THAT MERIT FURTHER ATTENTION-PHASE I AND II

*<u>Reference and Control Areas.</u> The need for the identification of a reference sediment, as well as controls, in conducting PSDDA biological testing was discussed. The difference between control (the sediment in which a bioassay organism normally lives) and reference sediment (a physical (grain size) match for test sediment/ clean area for comparison of chemical effects) was clarified. The PSDDA quality assurance guidelines for bioassays relative to the reference and control are controls can be no greater than 10% mortality (absolute) and the reference no greater than 20% mortality over controls. Unfortunately, reference sites that meet the PSDDA performance criteria are not that easily identified. Potential solutions include a massive study requiring extensive analysis, or a learn as you go approach, compiling information from other programs. An interim solution is to learn from reference site evaluations done as part of large Federal dredging projects and to continue evaluation of the performance criteria.

*<u>Chronic Sublethal Test.</u> Section 404 evaluation guidelines, state water quality standards, and the PSDDA management plan identify the need to evaluate the chronic sublethal effects of dredged material at disposal sites. Chronic sublethal effects (and even some acute toxicity) are permitted at nondispersive sites as "acceptable" adverse effects. Currently, PSDDA evaluation procedures permit limited assessment of chronic sublethal effects through the existing suite of acute toxicity and bioaccumulation tests. Available chronic sublethal effects tests were sought during PSDDA Phase I and no reliable test was identified. It was concluded that additional efforts should be spent in Phase II in developing a test. Efforts have continued in that regard, however, there is still no widely accepted test for assessing chronic sublethal effects. Several direct tests including bioaccumulation, polychaete growth, amphipod growth, amphipod reproduction, sand dollar growth, and geoduck have been examined. The most promising organism (<u>Neanthes</u>) and a draft protocol have been selected as the result of Phase II studies. The PSDDA agencies have been asked for money to fund further evaluation of <u>Neanthes</u>. When a test is ready for use, the PSDDA agencies will consider how such a test will be

interpreted relative to disposal guidelines used to make decisions on the acceptability of dredged material for discharge at the PSDDA disposal sites.

DISCUSSION: Thornton, WDE, commented that the development of the chronic sublethal test was very important to the state and that he hoped we would have a standard protocol available by the end of April. Interpretation of the test results still remains to be determined. He added that he does not expect every project to use such a test; but prefers a case by case determination be made. Malek stated that EPA will defer decision regarding use of the test until a protocol is developed. EPA supports the state, but shares the concerns of the Corps relative to interpretation of the test results.

Comments from the audience related to cautionary notes regarding results received from a lab test versus field research. The commentor believed it was irresponsible to require a test without extensive field verification. He did not recommend that the test be dropped, but wanted the difficulty in developing a test protocol to be recognized. Another commentor pointed out some of the problems in interpreting chronic sublethal effects. Organisms may exhibit a general response to stress that cannot be specifically traced to the cause (e.g., the cause of that general stress response could be a physical or a chemical factor). The Port of Seattle asked who would pay for the Neanthes test.

STATUS UPDATE: Subsequent to the annual review meeting, an experts workshop was sponsored by WDE and EPA to develop a protocol for use of Neanthes as a bioassay species in Puget Sound. Initially, the focus of the protocol development was directed toward use of Neanthes for a sublethal chronic test by WDE as part of their marine sediments management program. Use of the test in any regulatory program was deleted as a topic at the experts workshop. Focus was limited to determining whether enough was known to develop an interim protocol at this time and what additional research was considered necessary to (1) refine the interim protocol in the short term and (2) to answer long term questions. The consensus of the experts was that Neanthes had a promising potential for use as a bioassay species for testing marine sediments. No problems were identified that would preclude development of an interim protocol now, although several issues were identified that should be addressed soon to refine the protocol (e.g., number of organisms, static vs non-static, etc.). Funding of this refinement work is planned by EPA to begin this year. The interim protocol is expected to be included in the Puget Sound Estuary Program (PSEP) Protocols manual. Development and refinement of the interim protocol for Neanthes sublethal chronic test is expected to aid in refinement and use of Neanthes 10-day acute bioassay test.

*Sediment Bioassay Holding Times. The PSDDA evaluation procedures recommend that biological testing begin not later than six weeks after sample collection and that the samples be stored at 4 degrees C under nitrogen gas. In contrast, the PSEP protocols recommend holding sediment in the dark at 4 degrees C for a maximum of 2 weeks. PSDDA enables dredgers to limit testing to the minimum required for project evaluation (i.e., a six week holding time allows time to accomplish chemical testing and then make a decision as to whether biological testing would be required). This would not be possible under the PSEP specification for maximum biological holding time, since typical turnaround times for analysis of sediment chemicals is

at least 3 to 4 weeks. Therefore, in all cases, both chemical and biological testing wld have to be accomplished concurrently. Presently, no definitive data are available to support or refute the need for restricted sediment holding times. Data are mixed regarding the influence of extended storage on marine sediment toxicity. Experience by the Corps' Waterways Experiment Station suggests that the longer holding time does not substantially affect the toxicity of properly stored sediments. However, their data have not been released or reviewed by all the PSDDA agencies or by PSEP. Both PSDDA and PSEP will consider new information on this topic as it becomes available. At this time, changes to the recommendations of either program are not anticipated. There is agreement that the PSDDA recommended maximum allowable sediment holding time of 6 weeks should not substantially compromise our ability to determine regulatory acceptability of a dredged sediment. PSDDA does recommend that all sediment be collected at one time (for both chemical and biological testing).

DISCUSSION: The question of the applicability of holding times to reference sediment was asked. The response was that they apply as a matter of consistency and and quality assurance. The concern was also raised that chemical analysis of reference sediment may be appropriate to eliminate the possibility of selecting a reference sediment that was less clean than the test sediment. It was cautioned that the concentration of Nickel can vary greatly in crustal materials, including reference sediments. A recommendation to have several ML's tied to specific substrate types was made.

4. PSDDA Technical Issues. John Wakeman, COE, moderated the discussion of technical issues for this annual review. Issues discussed included organics and metals protocols, presented by Dave Kendall, COE; tributyltin, presented by Justine Smith, COE; and the use of geoduck as the juvenile bivalve test under PSDDA biological testing, presented by Justine Smith (refer to enclosure 8 for issue papers and copies of viewgraphs).

a. Organics Protocols. Low limits of detection are important for PSDDA data for consistency with associated programs such as the Puget Sound Estuarine Program's sediment quality database. With some analytic techniques currently in use in the Puget Sound region, comments have been received that for PSDDA organic compounds, recommended limits of detection may not be routinely achievable and may even approach or exceed the SL's. Should PSDDA then recommend a higher LOD when it appears that the recommended limits of detection may not be routinely achievable? Further, what if achievable LOD's approach or exceed the SL? Contract laboratories performing PSDDA required chemical testing normally use the EPA Contract Laboratory Program (CLP) methods and modified CLP. The measurement of some organics has problems when using these techniques. Another method is isotopic dilution which for some chemicals may be more precise, although expensive. Using this method, all PSDDA SL's are routinely achievable. Another concern raised relates to high prices being charged by labs to reach LOD's consonant with the SL's. This is consistent with the PSDDA evaluation procedures; higher per-test chemical unit prices for isotopic dilution were chosen for cost analysis in the evaluation procedures.

PROPOSED MODIFICATIONS/CLARIFICATION: PSDDA should recommend that LOD's meet PSEP specified ranges and require that analyses of specific organic compounds result in detected/undetected/qualified values below the SL.

DISCUSSION: Concerns from the audience were raised relative to the recovery problems related to sediment analysis (i.e., the sediment matrix), the meaning of the data and the ability to achieve LOD's. A problem regarding use of the isotopic dilution method was raised and a suggestion was made that there was a need to revisit why we use isotopic dilution and how we interpret the results. A question was asked regarding the origins of the SL's (i.e., How many were created using hard data?). The cost differential between the isotopic dilution technique ($1700 for evaluation for metals and organics versus $1300 using the CLP or a modified CLP) was mentioned. However, if CLP is used, there may be QA problems. It was also pointed out that, to date, government labs have not had a problem achieving LOD's. Some members of the audience felt that it was necessary to specify the protocol to be used in order to allow comparison of test results and trend analysis. It was recognized that we are finding that some SL's are unnecessarily low and we are reevaluating these (e.g., nickel).

b. Metals Protocols. For chemical testing of sediment samples, metals must be extracted prior to quantitative analysis. PSDDA evaluation procedures recommend the Total Acid Digest (TAD) method for extraction. Using this method, all mineral-bound metals are made available for instrumental analysis. The Strong Acid Digest (SAD) is also allowed under the PSEP protocols. This procedure does not break down all mineral (matrix) components.

*Advantages of TAD:

Comparability among data sets is improved.
More reproducible among different laboratories.
Standard reference material can be included as an element of quality assurance (not generally possible with SAD).
Potential loss of volatile metals during digestion is minimized by using an enclosed digestion chamber.

*Advantages of SAD:

Matrix interference during atomic absorption analysis is less of a problem than for total digest.
Laboratory safety is improved.

PSDDA adopted PSEP recommended LOD's for metals based on the SAD method. These LOD's are achievable with the SAD method, but may not always be realistically achievable with the TAD method. The reasons for this are matrix interference problems and method-imposed sample size limitations in the TAD protocol. As a result, some contract laboratories have encountered problems in achieving the recommended PSEP LOD's for metals in sediment using the TAD protocol, especially for Antimony, Cadmium, Copper, Nickel, Zinc, and Arsenic.

PSDDA has two options regarding the metals LOD's:

(1) Adopt SAD in lieu of TAD protocol and maintain existing metals LOD's for sediments. The concern with this alternative is that the data generated using this protocol may not always be comparable to that entered into the Puget Sound Sediment Quality Data Base (which uses the TAD protocol).

(2) Adopt higher LOD's consistent with achievable and practicable LOD's for the TAD protocol, perhaps recommending the NMFS/NOAA suggested modification of increasing sample size extraction, which would push TAD LOD's down to lower levels.

PROPOSED MODIFICATIONS/CLARIFICATION: Proposal one was discussed at the annual review as the recommended option.

DISCUSSION: The pros and cons of the SAD versus the TAD were discussed by various members of the audience. Some preferred SAD because it was more compatible with PSDDA prescribed LOD's; others favored TAD because it was more precise and accurate and SAD is not any ecologically sounder. The importance of having a very specified list of methods prescribed by PSDDA was discussed as was being consistent. One commentor asked about the status of the user manual which, in his view, should specify the methods to be used in implementing the PSDDA evaluation procedures. It was clarified by Catherine Krueger, EPA, that the reason PSEP allowed options was that the agencies and laboratories advising PSEP couldn't reach concensus on specific methods.

STATUS UPDATE: Subsequent to the annual review meeting, as a result of the 6 March Evaluation Procedures Work Group meeting, the decision was made to retain TAD and strongly recommend the following modifications:

(1) Extracted sample size be increased from 0.2 to approximately 0.3 grams to provide a stronger signal.

(2) National Bureau of Standards Certified or Standard Reference Materials (CRM's or SRM's) be run using the matrix matching technique for quality control.

(3) The associated LOD's for this technique must fall within a factor of 2 of the PSEP LOD's.

Note that the dredger still has the option to use SAD, but its use will be discouraged by the PSDDA agencies.

c. Addition of Tributyltin (TBT) to the General List of PSDDA Chemicals of Concern or to the List of Chemicals of Concern for Limited Areas. TBT is the most toxic of the butyltins. Its source is largely from the use of antifouling agents in marine paints. TBT's distribution in Puget Sound is not well known. During 1988, PSDDA produced two reports on TBT which were discussed within the Evaluation Procedures Work Group. The first report (Varanasi et al, 1988) described the chemistry results from limited sampling areas in Puget Sound. TBT was found in shallow areas within and near marinas, and some elevated levels of the chemical occurred in areas with evidence of boat maintenance activity. The second report (Cardwell, 1989) recommended that PSDDA adopt TBT as a chemical of concern in limited areas

for a limited period of time and a 48-hour test using Pacific oyster larvae or a 96-hour test using a mysid would be suitable for routine monitoring.

PROPOSED MODIFICATIONS/CLARIFICATION: The recommendation discussed at the PSDDA annual review meeting was to adopt TBT as a chemical of concern in limited areas; to specify what these areas are; and to determine a schedule for review and update. It was pointed out that there is currently not enough information on TBT in Puget Sound to propose a screening level nor maximum level for adoption at this time.

DISCUSSION: The major concern expressed by the audience relative to this issue was that the dredgers are being required to conduct TBT research. Wakeman clarified that the results of the TBT chemical test (costing approximately $220-260) would not be used as a basis for requiring biological testing since biological testing would normally be expected to occur based on co-occurrence of other chemicals resulting from boat maintenance (or other activities). He added that the proposal is that TBT testing be required only when there is a reason to believe that a prospective dredging area has a likelihood of TBT contamination, which could have effects at the disposal site.

d. Modification of the Organism used in the Juvenile Bivalve Bioassay. The PSDDA evaluation procedures state that the preferred species for the 10-day duration juvenile seed clam bioassay is the geoduck (*Panope generosa*), but that *Macoma* may also be used. During implementation of PSDDA, problems surfaced with the geoduck test and it was recognized also that there was no standardized geoduck bioassay methodology. Accordingly, it had been temporarily removed from the required PSDDA regulatory bioassays until it could be shown to be routinely workable. Two labs had been retained by the PSDDA agencies to develop a suitable geoduck test. PTI/EVS ran three tests using both 2 and 5 mm length clams. Results suggested that the 5 mm geoduck seed clam is a relatively insensitive species to sediment chemicals.

Further experience came from work done by Battelle, in which 8 mm geoduck were run with unacceptable control and reference mortalities (Ward, J.A. and J.Q. Word, 1988. Results of Biological Testing of Sediment for the Olympia Harbor improvement project: Geoduck, Amphipod, and Echinoderm Tests. Draft Report submitted to the Corps by Battelle's Pacific Northwest Laboratories, Marine Sciences Laboratory).

Unresolved issues relating to the geoduck test include:

* The larger juvenile geoducks are thought to be less sensitive to sediments as measured by mortality.

* There is a tradeoff between clam sizes available and workable (the small sizes have not been very successful) and the sensitivity of the test.

* There is a problem with geoduck availability. The sole supplier is the WDF's Point Whitney Lab, which produces over 7 million geoduck annually in their nursery. Demand may eventually exceed supply. Also, geoduck are generally available from mid-April through mid-August. It is desirable that geoduck be available for a longer period of time in the

future. Should geoduck not be considered an adequate organism, it will be necessary to choose an alternate organism. Costs for the geoduck test have been $1200 -1500. Once the methodology is worked out, it is expected that prices could drop to $850-1200 per test.

PROPOSED MODIFICATIONS/ CLARIFICATION: The recommendation presented for discussion at the annual review meeting was that the geoduck bioassay should not be used until it can be clearly demonstrated that the test can be performed successfully. Until that time, another organism for the 10-day acute toxicity test should be considered.

DISCUSSION: The need to continue looking at the geoduck test was raised by WDNR. Wakeman clarified that PSDDA has indicated that a juvenile bivalve test is one of the standard suite of bioassays to be performed on Puget Sound dredged material. The relative merits of the geoduck as a test organism were discussed. The possibility of using Neanthes as the 10-day acute toxicity test was mentioned. As a result of discussions immediately following the annual review meeting, the PSDDA agencies concluded that it was time to drop geoduck and substitute Neanthes as the 10-day acute toxicity test organism.

STATUS UPDATE: At the 6 March 1989 EPWG meeting, it was decided that the polychaete Neanthes arenaceodentata (Los Angeles karyotype) is the preferred species for the 10-day acute lethality test; geoduck is not recommended. Neanthes has been used as a 10-day acute lethality bioassay in the Los Angeles area, and a test protocol has been developed for its use (Reish, D.J. and J.A. Lemay, 1988. Bioassay Manual for Dredged Sediments. Corps, Los Angeles District). A description of the proposed protocol for use of Neanthes is contained in chapter 5 of the draft Phase II MPR. It represents the Los Angeles Corps protocol with a few adjustments/ improvements.

5. **Open Discussion.** The audience was invited by Ray Schmitz to present any other comments to the PSDDA agencies by 28 February 1989. Eric Johnson, Washington Public Ports Association (WPPA), submitted written comments (enclosure 9) as well as presented an oral summary of those comments to the group. Johnson reviewed several questions relative to the PSDDA evaluation procedures and added that he believed that the PSDDA agencies should begin development of an overall plan for statewide management of all dredged materials-including those materials that would not be disposed of at a PSDDA site. Johnson commented that he did not expect answers to all the Port Association's questions at this time, but wanted the questions to become a part of the meeting record and subsequent PSDDA annual review discussions as we gain more experience through PSDDA implementation. The questions raised included:

a. How will the results of the monitoring at each disposal site control the refinement of the disposal criteria, tightening the criteria if the site condition has been underachieved and loosening the criteria if the site condition has been overachieved?

b. How will the analysis of patterns in the data collected from the potential dredging projects be used to improve the cost-effectiveness of the disposal criteria?

c. How will review of the permit program (testing costs, system efficiency, processing times, etc.) be used to refine the program?

d. How will the review of actual management of each site (traffic flow, dumping schedules, site restrictions, etc.) improve the practicality and public acceptability of the PSDDA program?

e. How is the program affecting marine and related industries in the Puget Sound region? Is the program impacting the Puget Sound economy in general?

Urabeck responded that there will be annual monitoring and evaluation reports that will address the questions of site effects and disposal guidelines. He added that the annual review meeting was not the forum to analyze the COE regulatory program, but certainly as PSDDA implementation continues, we would be happy to provide feedback on how the program is progressing with PSDDA. Further, he added that the PSDDA agencies would not be assessing overall economic impacts from implementing the PSDDA management plan. However, if the Ports chose to do so, we would consider pertinent information from that assessment. Urabeck noted that impacts should be tied to specific projects. WDF expressed a concern with the idea of a dredged material plan and its basic assumption that all material the Ports want to dredge will be dredged. This certainly may not be the case. PSWQA asked the Ports what actions they are currently taking to prevent further pollution of Puget Sound waters. Johnson pointed out that the Ports are in favor of cleaning up the Sound. Port of Tacoma (POT) commented that the assumption is that the Ports have direct control over all sources of pollution into the Sound. This is clearly not the case. Stormwater outfalls were cited as an example. POT explained the importance of looking at the big picture and the problems in finding suitable upland sites for the disposal of material that is not suitable for unconfined open-water disposal. POT was in favor of a dredged material management plan, but thought perhaps the PSDDA requirement was too restrictive.

The PSDDA agency representatives each expressed the desire to continue to work together with the Ports and others regarding total dredged material management (i.e., dealing with contaminated sediments and confined disposal in addition to PSDDA). Ray Schmitz, COE, thanked the Ports for their comments and reinforced the intent of the PSDDA program to be sensitive to the Ports' concerns. Ron Lee, EPA, explained that PSDDA was developed with multiple goals in mind-environmental protection and support for the economy. Greg Sorlie, WDE, emphasized that the Ports are viewed as the state's partners. John DeMeyer, WDNR, reinforced the need to work together in ensuring the process and goals of the PSDDA program keep moving ahead and added that we've all come a long way in dealing with the problems of contaminated sediments.

8. <u>Closing Remarks.</u> Ray Schmitz closed by emphasizing the dynamic, fluid nature of PSDDA and the importance of the annual meetings in serving as a forum to air technical and policy issues that warrant reexamination and possible modification to the PSDDA evaluation procedures. He thanked all for attending and participating in the discussions and explained that the next action would be preparation and review of the meeting minutes after which the PSDDA agencies would decide what changes, if any, need to be made

to the PSDDA evaluation procedures. The public would be informed of any changes via a public notice. Schmitz said that the record would remain open until 28 February 1989 to receive any further written comment. A follow-on letter, dated 24 February 1989, was received from the Washington Public Ports Association (enclosure 10).

Comments from the WPPA. WPPA documented their understanding that the PSDDA agencies have committed to answering the following questions:

a. How the monitoring results from each disposal site will be used to refine the disposal criteria;

b. How the agencies will analyze data patterns from the dredging projects to improve the cost effectiveness of the disposal criteria;

c. How review of site management experiences will improve the practicality and public acceptability of the PSDDA program.

WPPA further commented that they believed the only appropriate process for making changes to the PSDDA procedures at this time is through the annual review. They believe that this is the only process that ensures the appropriate level of public participation in the PSDDA process. Further, they believe it is too early to make substantial deviations from the PSDDA Phase I documents in terms of the process for making changes. They emphasized that they want to go on record as opposing any deviation from the established PSDDA programmatic review procedures at this time. WPPA encouraged the rapid completion of the users' manual and looked forward to continued cooperation with the PSDDA agencies in the implementation of PSDDA.

Karen Northup

Karen Northup
Biologist/Environmental Analyst
Regulatory Branch
Seattle District, Corps of Engineers

cc
All Attendees

REFERENCES

1. Evaluation Procedures Work Group, 1988. PSDDA Reports-Evaluation Procedures Technical Appendix-Phase I (Central Puget Sound). Prepared for Puget Sound Dredged Disposal Analysis. Seattle, Washington.

2. PTI Environmental Services, 1988. Puget Sound Dredged Disposal Analysis-Baseline Survey of Phase I Disposal Sites. Prepared for Washington Department of Ecology. Olympia, Washington.

3. Seattle District Corps of Engineers, Environmental Protection Agency, Washington Department of Natural Resources, and Washington Department of Ecology, 1989. NEPA/SEPA Draft Environmental Impact Statement-Unconfined Open-Water Disposal for Dredged Material, Phase II (North and South Puget Sound). Seattle, WAshington.

4._____, 1989. Draft Management Plan Report-Unconfined Open Water Disposal of Dredged Material, Phase II (North and South Puget Sound). Seattle, Washington.

5. Puget Sound Dredged Disposal Analysis First Annual Review Meeting, 21 February 1989. Meeting notes and handouts. Seattle, Washington.

PUGET SOUND DREDGED DISPOSAL ANALYSIS (PSDDA)

FIRST ANNUAL REVIEW MEETING

February 21 and 22, 1989

Joint-Use Auditorium
Federal Center South

A G E N D A

I. Welcome, Introductions, Purpose, Format - Ray Schmitz

II. PSDDA Study and Implementation Status Report - Frank Urabeck

A. Phase I Implementation

1. Data Base Management System (Kendall/Thornton)

2. Baseline Studies for Environmental Monitoring (Ehlers)

3. Experience To Date With PSDDA Dredged Material Evaluation Procedures Including Sampling and Testing Costs (Kendall/Malek)

B. Phase II Study

1. Disposal Site Identification (Urabeck)

2. Proposed Adjustments in Dredged Material Evaluation Procedures (Wakeman)

3. Chronic Sublethal Biological Test Development (Wakeman/Phillips)

4. Public Review of Draft Environmental Impact Statement (DEIS) (Urabeck)

III. Technical Issues - John Wakeman

A. Chemical Testing - Organics Protocols (Kendall)

B. Chemical Testing - Metals Protocols (Kendall)

C. Chemical Testing - Tributyltin (Smith)

D. Biological Testing - Juvenile Bivalve (Geoduck) (Smith)

E. Summary and tentative conclusions (Wakeman)

IV. Other Issues - Frank Urabeck

A. WPPA Questions For Annual Review (Dave Aggerholm)

B. Total Dredged Material Management (regional and statewide) (Eric Johnson)

V. Closing Remarks - Ray Schmitz

P S D D A

FIRST ANNUAL REVIEW MEETING

* Change via "DUE PROCESS"

a. Compile data from operating experience
   1. Dredge material sampling, testing and disposal guideline application report
      Corps Responsibility - JULY
   2. Physical monitoring report
      Corps Responsibility - AUGUST
   3. Chemical/biological monitoring report
      Dept. of Nat'l Resource - SEPTEMBER
   4. Disposal site use report
      Dept. of Nat'l Resource - SEPTEMBER

b. Analyze data from operating experience and from other relevant sources
   1. Environmental monitoring summary report
      Dept. of Ecology - NOVEMBER

c. Proposed Change to evaluation procedures
   1. May be more or less restrictive than procedures in effect AT TIME OF THE ANNUAL REVIEW MEETING
   2. Present analysis and proposed changes in an assessment report
      Dept. of Ecology - DECEMBER
   3. Review of assessment report
      ALL PSDDA agencies & other interested parties - JANUARY
   4. Proposed changes for consideration at Annual Meeting
      PSDDA Agencies
   5. Discussion at Annual Meeting in FEBRUARY

2/21/89

P S D D A

FIRST ANNUAL REVIEW MEETING

* SCHEDULE for making changes resulting from FIRST annual review meeting

    a. MARCH - PSDDA agency staff review public input on technical issues and determine changes (if any) to make

    b. APRIL - PSDDA staff proposed changes submitted to agency heads for approval

    c. MAY - Following agency head approval, Corps & EPA issue public notice of changes to become effective at date of Public Notice

2/21/89

P S D D A

FIRST ANNUAL REVIEW MEETING

* CASE BY CASE Departures

    a. Accomplished by Regulatory Staff
    b. Requires Justification & appropriate documentation

* NON-ANNUAL REVIEW CHANGES

    a. For special, non-project specific type situations

    b. Initiate by letter from head of a PSDDA Agency

    c. PSDDA agency deliberates & develops proposed changes

    d. Publish public notice of proposed change
        1. Public review and comment
        2. 30 days total

    e. PSDDA agency deliberates & considers all comments
        1. Preparation of final changes
        2. Submitted to & agreed to by all PSDDA agencies

    f. Publish public notice of change

    g. Implementation of change enacted
        DATE OF PUBLIC NOTICE

PSDDA DATA BASE MANAGEMENT SYSTEM:
DREDGE ANALYSIS INFORMATION SYSTEM (DAIS)

- **PRIORITIES FOR DEVELOPMENT AND IMPLEMENTATION**
- **HARDWARE AND SOFTWARE DESIGN**
- **PRIORITY FOR THE FUTURE**

DREDGE ANALYSIS INFORMATION SYSTEM (DAIS)
PRIORITIES FOR DEVELOPMENT AND IMPLEMENTATION

1. DEVELOP AUTOMATED METHOD OF INPUTING LABORATORY DATA REQUIRED BY PSDDA

   a. Sediment Conventional / Chemistry Data

   b. Biological Data

2. DEVELOP PROGRAM FOR CONDUCTING QA CHECKS

   a. Sediment Conventional / Chemistry Data

   b. Biological Data

3. DEVELOP DATABASE OUTSIDE SEDQUAL FOR STORING ADMINISTRATIVE DATA REQUIRED BY PSDDA AND OTHER AFFILIATED AGENCIES NOT STORED BY SEDQUAL

4. DEVELOP A GEOGRAPHIC LOCATOR SYSTEM (GLS) FOR PSDDA PROJECTS

5. MODIFY SEDQUAL AS NEEDED

6. DEVELOP OUTPUT / REPORTING FORMATS FOR ROUTINE DATA ANALYSIS REQUIREMENTS

DREDGE ANALYSIS INFORMATION SYSTEM (DAIS)
HARDWARE / SOFTWARE DESIGN

HARDWARE: 386 MICROCOMPUTER WITH MATH COPROCESSOR
(Primary and Secured DBMS)

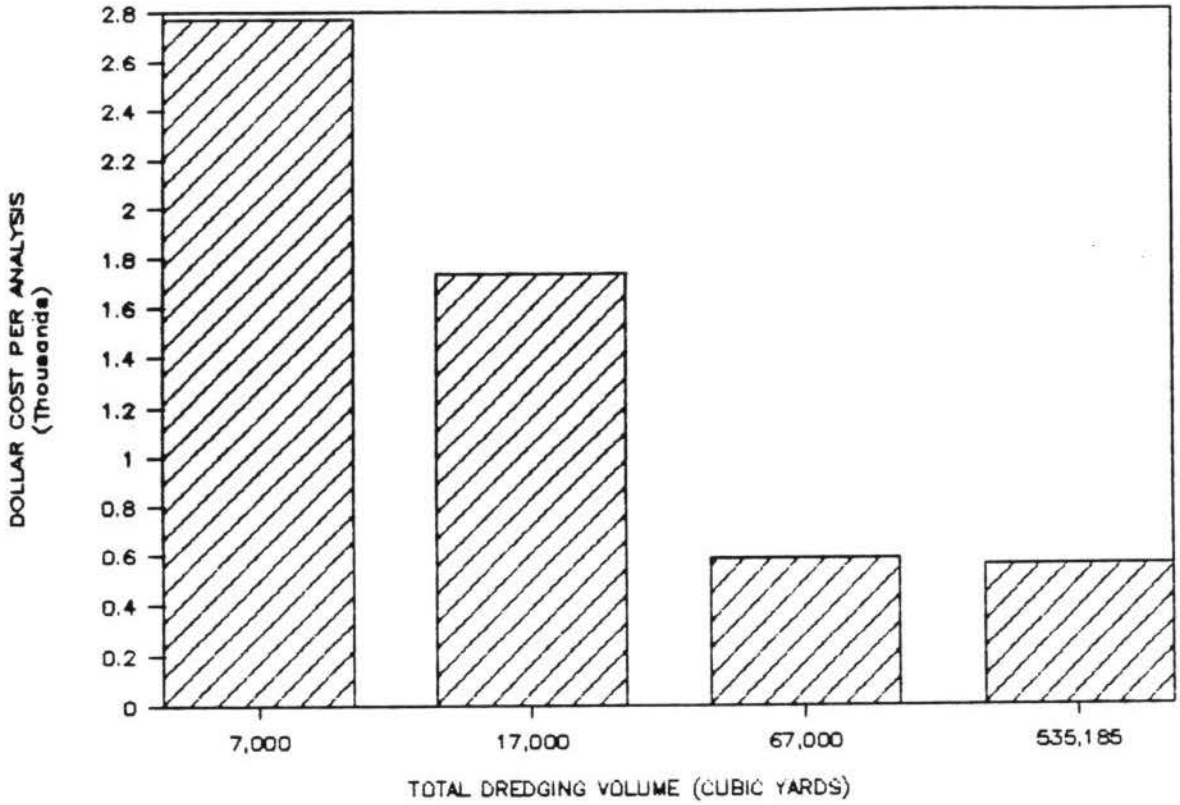
286 MICROCOMPUTER / MATH COPROCESSOR / MODEM (Auxiliary DBMS for downloading data to PSDDA and other Agencies)

SOFTWARE: SEDQUAL
dBASE III+/IV
LOTUS 1-2-3
MAPINFO (GLS)
SPSS (Includes ADVANCED STATISTICAL PACKAGE)
HARVARD GRAPHICS
WORDPERFECT 5.0

DREDGE ANALYSIS INFORMATION SYSTEM (DAIS)
PRIORITIES FOR THE FUTURE

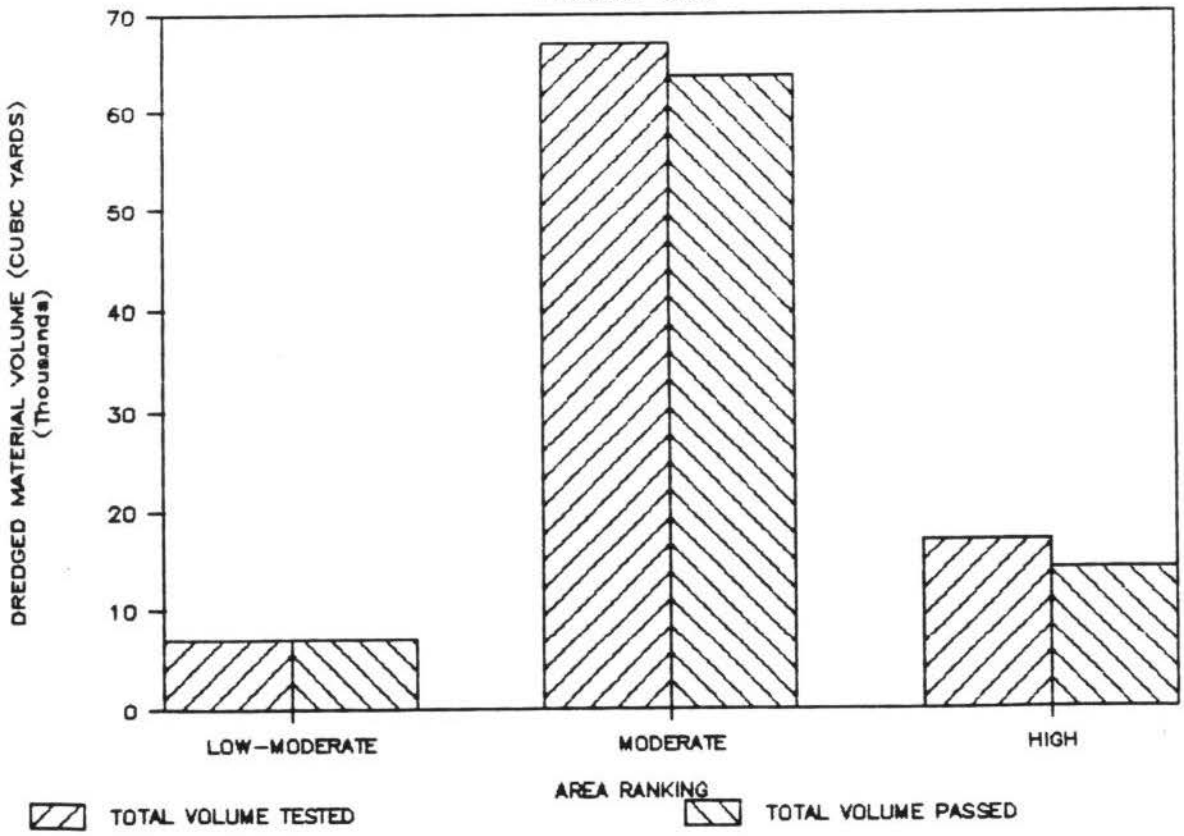
DEVELOP NEW DBM SYSTEM CONFIGURED TO UNIQUE PSDDA DATA INPUT/ANALYSIS REQUIREMENTS COMPATIBLE WITH SEDQUAL DATABASE AND PSWQA DATABASE SYSTEMS.

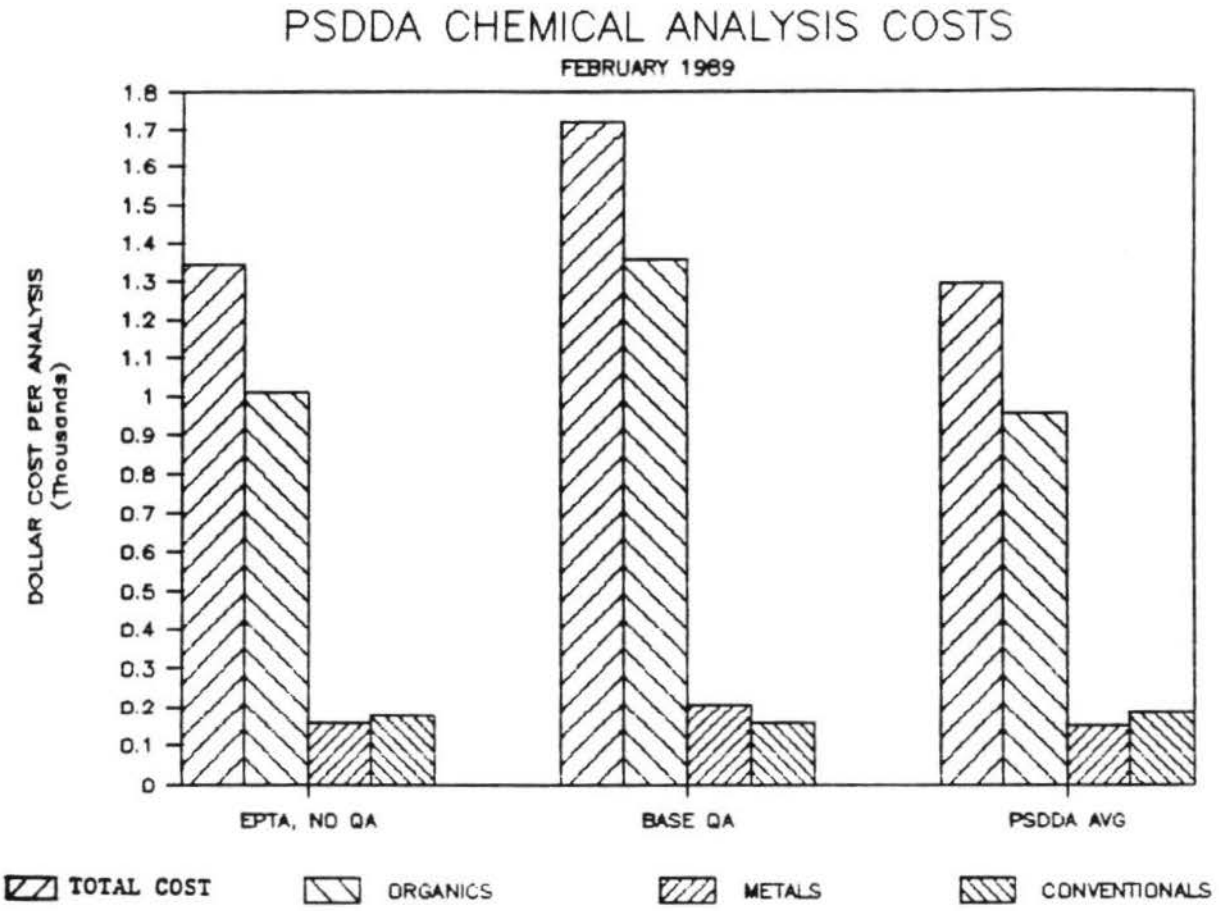
PSDDA SAMPLING COST ANALYSIS



PSDDA SAMPLING/TESTING ANALYSIS

FEBRUARY 1989

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DOLLAR COST PER ANALYSIS (Thousands)
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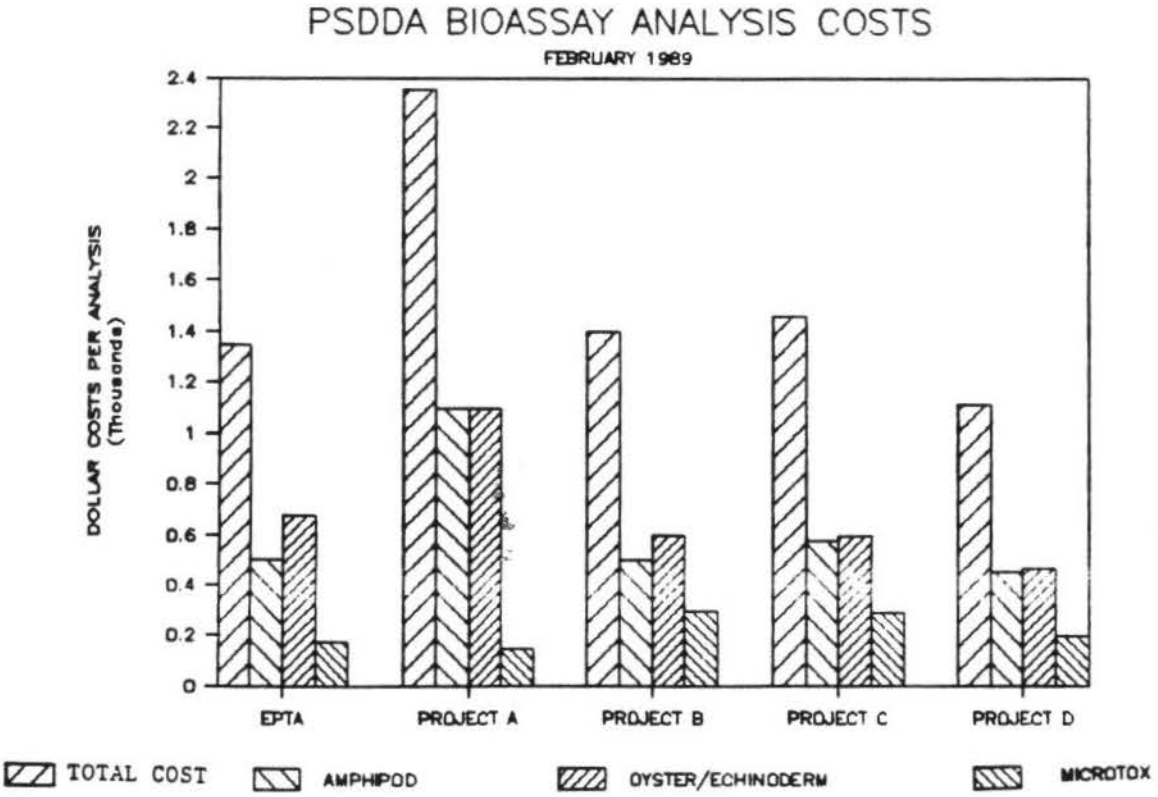
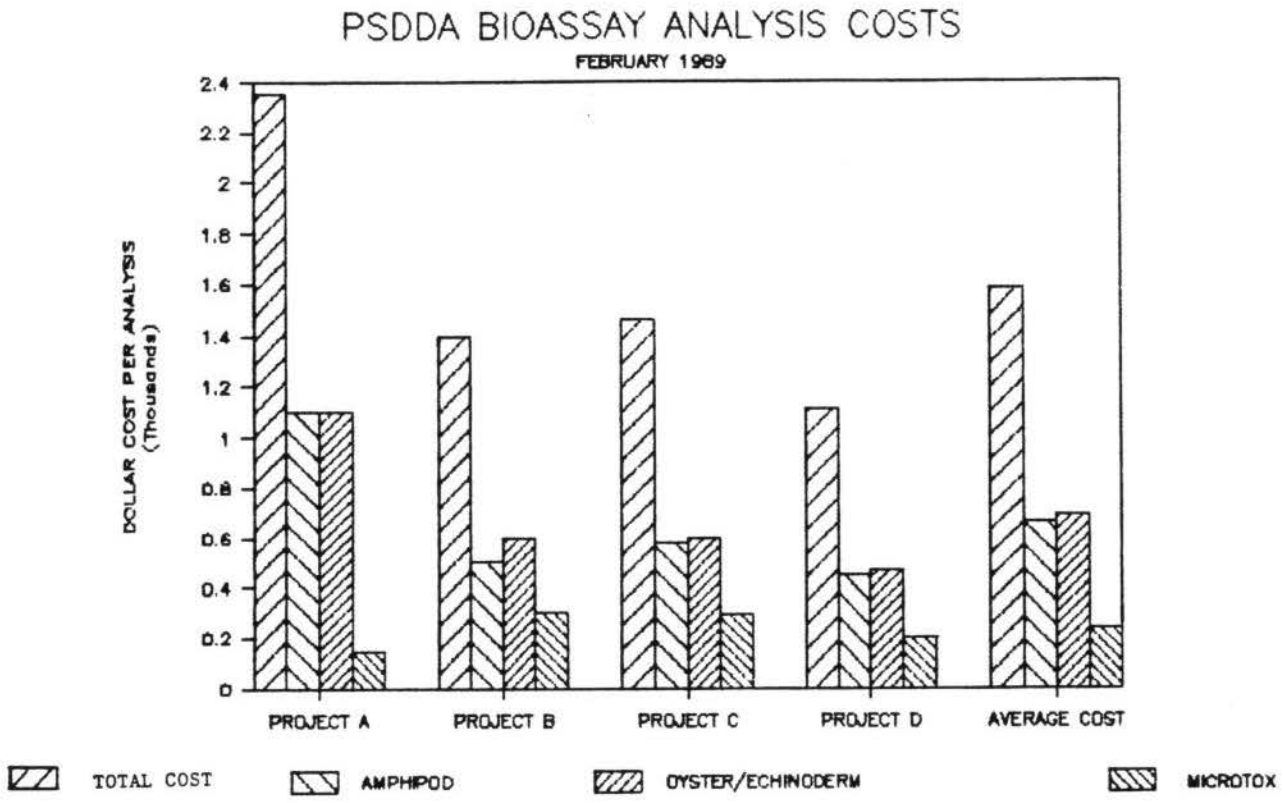
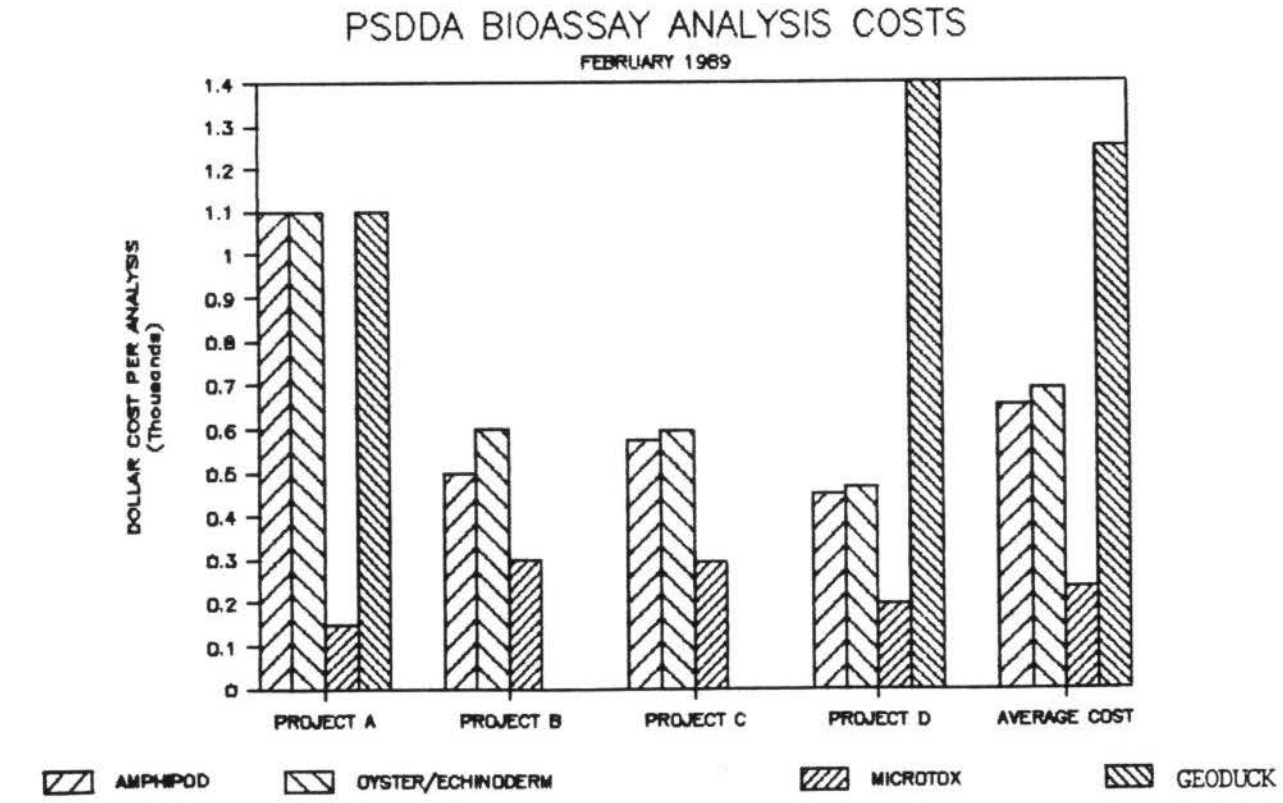
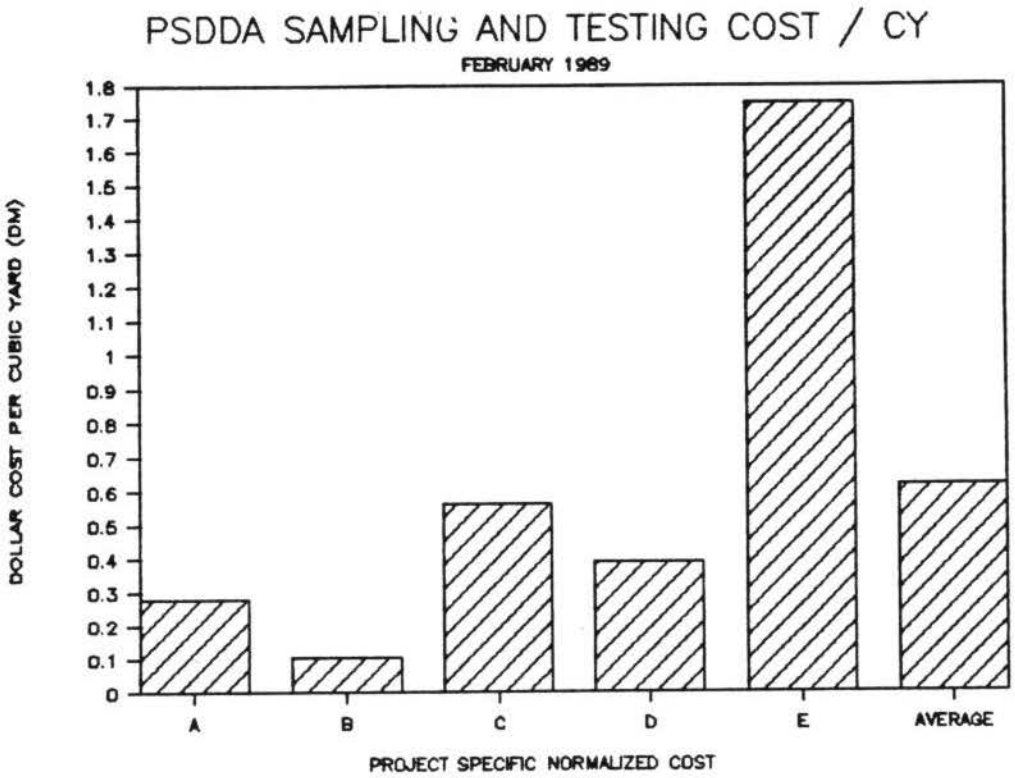
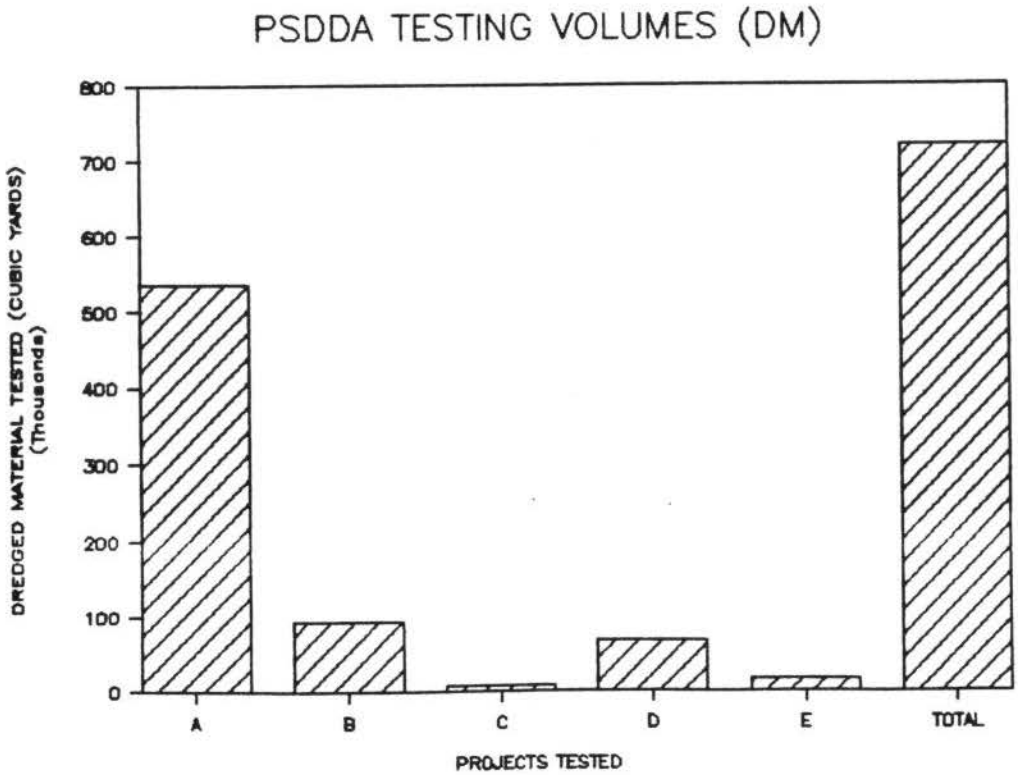
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
EPTA, NO QA
BASE QA
PSDDA AVG
TOTAL COST
ORGANICS
METALS
CONVENTIONALS


PSDDA BIOASSAY ANALYSIS COSTS
FEBRUARY 1989
DOLLAR COSTS PER ANALYSIS (Thousands)
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
EPTA
PROJECT A
PROJECT B
PROJECT C
PROJECT D
TOTAL COST
AMPHIPOD
OYSTER/ECHINODERM
MICROTOX


PSDDA BIOASSAY ANALYSIS COSTS
FEBRUARY 1989
DOLLAR COST PER ANALYSIS (Thousands)
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
PROJECT A
PROJECT B
PROJECT C
PROJECT D
AVERAGE COST
TOTAL COST
AMPHIPOD
OYSTER/ECHINODERM
MICROTOX


PSDDA BIOASSAY ANALYSIS COSTS
FEBRUARY 1989
DOLLAR COST PER ANALYSIS (Thousands)
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
PROJECT A
PROJECT B
PROJECT C
PROJECT D
AVERAGE COST
AMPHIPOD
OYSTER/ECHINODERM
MICROTOX
GEODUCK


PSDDA SAMPLING AND TESTING COST / CY
FEBRUARY 1989
DOLLAR COST PER CUBIC YARD (DM)
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
A
B
C
D
E
AVERAGE
PROJECT SPECIFIC NORMALIZED COST


PSDDA TESTING VOLUMES (DM)
DREDGED MATERIAL TESTED (CUBIC YARDS)
(Thousands)
800
700
600
500
400
300
200
100
0
A
B
C
D
E
TOTAL
PROJECTS TESTED

PSDDA CHEMICAL TESTING ANALYSIS*

CHEMICAL	TOTAL D > SL	freq	TOTAL D > ML	freq	TOTAL U > SL	freq
METALS						
Sb	1	1				
Cu	4	2				
Ni	40	5	1	1		
Cd	25	3				
Pb	2	1				
Hg	9	3				
Zn	3	1				
ORGANIC CHEMICALS						
Phenol	3	1				
2-Methyphenol	8	1			6	2
4-Methylphenol	8	2	1	1		
2-4-Dimethylphenol					7	
Pentachlorophenal					6	1
Acenaphthene	1	1				
Fluorene	1	1				
Phenanthrene	1	1				
LPAH (total)	3	2				
Pyrene	2	2				
HPAH (total)	6	2				
1,2-Dichlorobenzene					3	1
1,2,4-Trichlorbenzene	1				7	3
Hexachlorobenzene					6	1
Benzyl Alcohol	4	1			7	2
Benzoic Acid	1	1	1	1	10	2
N-Nitrosodiphenylamine					1	1
Dimethyl Phthalates	2	1				
Chlordane					1	1
PCB's	2	1				
Total:	57	5	57	5	57	5

LEGEND:
* Based on results of 57 chemical analyses from 5 projects
D > SL (detected value > PSDDA SL)
D > ML (detected value > PSDDA ML)
U > SL (undetected value > PSDDA SL)
freq - frequency observed

METHOD COMPARISONS
DISADVANTAGES (D) VERSUS ADVANTAGES (A)

	SAD METHOD	TAD METHOD
SAMPLE SIZE	0.5 GRAMS (A)	0.2 GRAMS (D)
MATRIX PROBLEMS	NO TO SLIGHT (A)	YES (D)
ACHIEVE PSEP LOD's	YES (A)	NO (D)
COST	CHEAPER THAN TAD (A)	MORE EXPENSIVE (D)
CERTIFIED REFERENCE MATERIAL (CRM')	NO (D)	YES (A)

TABLE 2-1.
LIMITS OF DETECTION PROPOSED FOR METALS IN SEDIMENTS BASED ON THE TOTAL ACID DIGESTION TECHNIQUE (RANTALA AND LORING, 1975)

Metals	Proposed LOD's mg/kg dry wgt	Current PSEP LOD's mg/kg dry wgt	PSDDA SL
Antimony	1.0	0.1	2.6
Arsenic	2.5	0.1	70
Cadmium	0.25	0.1	0.96
Copper	1.0	0.1	81
Lead	0.5	0.1	66
Nickel	0.5	0.1	28
Silver	0.15	0.1	1.2
Zinc	1.0	0.2	160
Mercury*	0.01	0.01	0.21

* Cold Vapor AAS technique (PSEP Protocol for Metals)

STRONG ACID DIGEST VERSUS TOTAL ACID DIGEST
FACTS RELATED TO THIS ISSUE

✓PSEP (1986) LOD's ADOPTED BY PSDDA/EPTA BASED ON SAD METHOD

✓TAD LOD's GREATER THAN PSEP LOD's BUT LESS THAN PSDDA SL's

✓LOD PROBLEM WITH TAD FOCUSED ON DATA FROM REFERENCE AREAS

✓3 SAD DERIVED PSDDA ML's (As, Cd, Pb)

✓5 TAD DERIVED PSDDA ML's (Sb, Cu, Ni, Ag, Zn)

✓PSDDA GENERALLY USING TAD BUT EPTA FLEXIBLE ON USE OF SAD

✓<u>POTENTIAL</u> FOR FALSE POSITIVE TEST (i.e., FAIL TEST BY EXCEEDING ML USING TAD FOR SAD DERIVED ML's)?

✓<u>POTENTIAL</u> FOR FALSE NEGATIVE TEST (i.e., PASS TEST USING SAD FOR TAD DERIVED ML's)?

ISSUE: METALS PROTOCOL.

✓ METALS EXTRACTION TECHNIQUES AND IMPLICATIONS FOR PSDDA QUALITY ASSURANCE

PROPOSED MODIFICATION/CLARIFICATION: PSDDA HAS TWO OPTIONS REGARDING LOD's

- ✓ ADOPT SAD PROTOCOL AND MAINTAIN EXISTING LOD's FOR SEDIMENTS.
- ✓ KEEP TAD AND ADOPT HIGHER LOD's ACHIEVABLE AND PRACTICABLE FOR TAD, OR RECOMMEND NMFS/NOAA MODIFICATION TO METHOD ALLOWING GREATER SAMPLE SIZE EXTRACTIONS AND LOWER LOD's.

PSDDA ISSUE: **ORGANICS PROTOCOLS:**

LIMITS OF DETECTION (LOD's) AND LIMITS OF QUANTITATION (LOQ's) RELATIVE TO PSDDA SCREENING LEVELS (SL's)

ORGANICS PROTOCOL PROBLEM DEFINITION

1. PSEP RECOMMENDED LOD's

   a. Necessary to accurately and precisely measure organic chemicals routinely found in reference areas of Puget Sound

   b. Generally requires more rigorous analytical method

2. REGULATORY REQUIREMENT UNDER PSDDA TO ACHIEVE DETECT UNDETECTED/ QUALIFIED VALUES BELOW THE PSDDA SL's

   a. Detected/undetected/qualified values exceeding PSDDA SL values, but less than ML values normally trigger Biological Testing requirement

   b. Some Chemical SL values exceed PSEP recommended LOD's

TABLE II.7-3 RECOMMENDED ORGANICS LIMITS OF DETECTION FOR SEDIMENT AND TISSUE MATRICES

Compound Type	Sediment(a)	Tissue(a)	Comments
Volatile	10-20	5-10	All analyses
Semivolatiles	1-50	10-20	Low-level analysis
Pesticides/PCB's	0.1-15	0.1-20	Low-level analysis

(a) ug/kg dry weight.

(b) ug/kg wet weight.

TABLE 1-2:

Selected CLP LOD's versus Modified CLP LOD's[1] and PSDDA Screening Levels[2]. (These values fit the semivolatiles category in Table 1-1.)

	CLP	MOD CLP	Screening Level
Phenols			
4-methylphenol	330	50	10
Pentachlorophenol	1600	250	140
Chlorinated Hydrocarbons			
1,4-dichloro-benzene	330	50	26
1,2-dichloro-benzene	330	50	19
1,2,4-trichloro-benzene	330	50	6.4
Hexachlorobenzene	330	50	23
Miscellaneous Extractables			
Benzyl alcohol	330	50	10
Benzoic acid	1600	250	216
Dibenzofuran	330	50	54
N-nitrosodiphenyl-amine	330	50	22

[1] Araki, Roy 1988. Major Concerns of the Manchester Environmental Laboratory on the Use of the Puget Sound Guidelines.
[2] EPTA Table II.10-3.

ORGANICS PROTOCOL METHOD COMPARISONS

1. EPA CONTRACT LABORATORY PROGRAM (CLP) METHODS
   a. Primarily used for solid waste characterization, where higher LOD's are acceptable
   b. Cannot achieve PSEP recommended LOD's or PSDDA SL's
2. MODIFIED CLP METHODS
   a. Variation of EPA CLP (increases the sample extracted for analysis)
   b. Can achieve PSEP LOD's and PSDDA SL's for some chemicals, although routinely achievable LOD's exceed PSEP LOD's and PSDDA SL's for a number of chemicals of concern
3. ISOTOPIC DILUTION
   a. Method used by PSDDA/EPTA to estimate chemical analysis costs, and strongly recommended by PSEP
   b. Can routinely achieve/exceed PSEP LOD's and PSDDA SL values

PROPOSED MODIFICATION/CLARIFICATION:

✓ PSDDA SHOULD RECOMMEND THAT LOD's MEET PSEP SPECIFIED RANGES AND REQUIRE THAT ANALYSES OF SPECIFIC ORGANIC COMPOUNDS RESULT IN DETECTED/UNDETECTED VALUES < SL

CHRONIC SUBLETHAL TESTING
OUTLINE

1. DEFINITION OF CHRONIC SUBLETHAL EFFECTS
2. NEED FOR CONSIDERATION OF C/SL EFFECTS
3. PSDDA INTERPRETATION OF NEED
4. EPWG DISCUSSIONS ON OPTIONS FOR C/SL
   A. ECOLOGICAL BIOACCUMULATION
   B. EFFORTS IN PHASE I
   C. CONCLUSIONS
5. EFFORTS IN PHASE II
   A. CONTRACTED STUDIES
   B. FRAMEWORK PRESENTATION TO PSEP
   C. WORKSHOP (W/ ECOL. P-2)
6. STATUS
7. VIEWS OF AGENCIES

DEFINITIONS OF CHRONIC SUBLETHAL EFFECTS

1. CHRONIC SUBLETHAL EFFECTS--USU. GROWTH AND REP
2. THEY CAN OCCUR OVER A FEW DAYS, WEEKS, OR MON
3. AT A MINIMUM, THEY OCCUPY A SIGNIFICANT SECTION OF THE LIFE OF A SPECIES (SPECIES DEPEND FOR EXAMPLE, FOR A 3 DAY LIFE CYCLE, CHRONIC IS 2- FOR EXAMPLE, FOR A 30 DAY LIFE CYCLE, CHRONIC IS 2
4. SOME PSDDA TESTS AND CHEMICAL GUIDELINES INCORPORATE MEASURES OF CHRONIC SUBLETHAL EFF

NEED FOR DIRECT C/SL TEST AND PSDDA RESPONSE

1. NEED: GROWTH, REPRODUCTION, PERSISTENT EFFECTS
   - 404(b)(1) GUIDELINES (PERSISTENT, CUMULATIVE)
   - STATE WQ STANDARDS (WATER COLUMN)
   - PSWQA MANAGEMENT PLAN (DEV. OF SED. CRITERIA)
2. PSDDA'S RESPONSE:
   - CONSIDER AVAILABLE DIRECT TESTS
   - IN ABSENCE OF GOOD DT, USE WEIGHT OF EVIDENCE:
     - BIVALVE SOLID PHASE BIOASSAY ABNORMALITY
     - MICROTOX (BACTERIAL LUMINESCENCE)
     - PUGET SOUND DATA BASE (E.G., BENTHIC INFAUNAL ABUNDANCE)

CHRONIC SUBLETHAL TESTS
DIRECT TESTS CONSIDERED

- BIOACCUMULATION - ECOLOGICAL
- POLYCHAETE GROWTH (NEANTHES)
- AMPHIPOD GROWTH (AMPELISCA, OTHERS)
- AMPHIPOD REPRODUCTION
- SAND DOLLAR GROWTH
- GEODUCK

PSDDA EFFORTS TO DEVELOP TEST AS OF FEBRUARY 1989

1. PHASE I
   A. EPWG DISCUSSIONS AND LITERATURE
   B. NMFS RESEARCH--SAND DOLLAR AND GEODUCK
2. PHASE II TO DATE
   A. 20 DAY NEANTHES BIOMASS TEST
   B. AMPHIPOD AMPELISCA TESTS--GROWTH, REPRO
   C. RESULTS ENCOURAGING
   D. REQUESTS FOR FURTHER TEST DEVELOPMENT
      - PSEP OFFICE OF PUGET SOUND
      - CORPS
      - ECOLOGY P-2 PROGRAM PLANS

CURRENT C/SL TEST STATUS

NEEDS FOR DEVELOPMENT AND CONSENSUS

- STANDARD PROTOCOL -- ECOLOGY FUNDING
- MORE EXPERIENCE WITHIN/BET. LABS -- POSSIBILITY OF PSEP AND CORPS FUNDING
- DIFFERING VIEWS ON WHAT STEPS ARE LEFT TO BRING THE TEST UP TO A REGULATORY STATUS
- FURTHER DISCUSSION ON UNCERTAINTIES OF THE TEST WILL OCCUR AMONGST PSDDA AGENCIES

VIEWS OF PSDDA AGENCIES

21 February 1989

PSDDA First Annual Review Meeting
Attendance List

FEDERAL

Army Corps of Engineers

CENPD - James R. Reese

CENPS - Steve Babcock - EN-PL-NC
Warren Baxter - OP-RG
Dave Kendall - OP-RG
Tom F. Mueller - OP-RG
Karen Northup - OP-RG
Raymond G. Schmitz - OP-RG
Justine D. Smith - EN-PL-ER
Tim Sullivan - OP-NP
Frank J. Urabeck - EN-PL
John Wakeman - EN-PL-ER
John D. Welch - EN-PL-CP

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Ron Lee
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Ed Casillas

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