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Project Number 4725

983

Mr. Robert Krivinskas
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Reference: CLEAN Contract No. N62472-90-D-1298
Contract Task Orders No. 254 and 197

Subject: Minutes to EAB Meeting No. 7

Dear Mr. Krivinskas:

Enclosed are four copies of the minutes to the seventh Ecorisk Advisory Board (EAB) meeting, which was held April 17, 1996. These minutes have been distributed to the EAB members as appropriate.

If you have any questions about this material, please do not hesitate to contact me.

Very truly yours,

Hector Laguette

for Stephen S. Parker
Project Manager

SSP/gmd

Enclosures

c: B. Wheeler, NETC Newport (w/enc. - 4)
K. Keckler, USEPA (w/enc. - 4)
P. Kulpa, RIDEM (w/enc. - 4)
T. Prior, USF&W (w/enc.)
K. Finkelstein, NOAA (w/enc.)
J. Trepanowski/M. Turco, B&R Environmental (w/enc.)
File 4725-3.2 (w/o enc.), 4725-4.7 (w/enc.)

MINUTES OF THE SEVENTH ECORISK ADVISORY BOARD MEETING
NAVY INSTALLATION RESTORATION PROGRAM
NAVAL EDUCATION AND TRAINING CENTER (NETC)
NEWPORT, RHODE ISLAND

April 17, 1996

BROWN & ROOT ENVIRONMENTAL
CONTRACT NO. N62472-90-D-1298
CONTRACT TASK ORDER NO. 0173

Prepared by:
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MINUTES OF THE SEVENTH ECORISK ADVISORY BOARD MEETING
April 17, 1996

The seventh meeting of the Ecorisk Advisory Board (EAB) for Naval Education and Training Center (NETC) sites was held in Building 1 of the NETC in Newport, Rhode Island, on April 17, 1996. The meeting was held in order to: 1) discuss the interim data deliverable and present preliminary conclusions for the marine ecological risk assessment (ERA) for Derecktor Shipyard; and 2) discuss, in the context of the marine ERA results and recent revetment construction work, possible approaches to address contaminated sediments related to the McAllister Point Landfill.

The minutes of the meeting are included below, followed by two attachments: Attachment A presents a list of meeting attendants; and Attachment B presents the meeting agenda and handouts.

I INTRODUCTORY REMARKS

At approximately 10:45 am, Bob Krivinskas (Navy) initiated the meeting and introduced Steve Parker (B&R Environmental), who then referred to the agenda and stated the general goals of the meeting.

II DERECKTOR SHIPYARD (DS) DATA PRESENTATION

Steve Parker (B&R Environmental) distributed handout materials which complemented the information contained in the interim data deliverable document for DS (previously distributed by mail to the attendants). The handouts distributed at the meeting contained copies of the overheads to be used in the presentations on the various DS information items identified in the meeting agenda, including summaries of the preliminary conclusions for each presentation (NOTE: The reader is asked to please refer to the interim data deliverable document and the attached handouts, particularly the summaries of preliminary conclusions, for specific information from each presentation).

Chris Kincaid (URI) explained the general goal, methodology and preliminary results of the hydrographic survey of Coddington Cove. The survey was conducted to define the circulation patterns and magnitudes in Coddington Cove, and the exchange of water between the cove and Narragansett Bay. Data was obtained on the velocity of water flow at the mouth of Coddington Cove, and on the circulation patterns inside the cove. The main flow is tidally driven, although the wind is also influential. There is a predominant inflow of water at the south of the mouth of Coddington Cove, while there is an outflow at the north; this pattern remains during both the ebb and the flood tidal cycles. The general circulation inside the cove is counter-clockwise, with areas of high and slow velocity.

Ken Finkelstein (NOAA) asked how close to the bottom had the velocity measurements been made.

> Chris Kincaid (URI) explained that measurements reflected the velocities at the "bottom 1/4" of the specific depth range.

Chris Kincaid (URI) indicated that the wind may overcome the general southern inflow and northern outflow at the mouth of Coddington Cove, and explained that during strong wind events from the southwest a two-layer flow pattern may occur. Chris Kincaid then presented the preliminary conclusions of his investigation.

Ken Finkelstein (NOAA) indicated that a maximum velocity of 15 cm/sec may not be enough to erode; such velocities may keep some particles in suspension in the water column while others may undergo deposition.

> Chris Kincaid (URI) used a literature-derived figure to explain the deposition of particles in relation to water velocities and grain sizes, and agreed with the general statement made by Ken

Finkelstein. Chris Kincaid also indicated that during wind events bottom velocities do increase; John King (URI) then interjected explaining that wave action also plays an important role in the transport and distribution of sediment particles.

Cornell Rosiu (CDM) asked if the model presented by Chris Kincaid (URI) was supported by the geophysical data.

Chris Kincaid indicated that the presentation by John King (URI) would provide the response to the question.

John King (URI) explained the geophysical investigative work conducted for DS, and described the general distribution of sediment grain sizes and the results from vibracore samples. Shallow areas have significant wave influence, which may cause the grain size distribution to not match the general model presented by Chris Kincaid (URI). John King presented the subsurface sediment results for vibracore sample stations V1 and V4, as general examples. John King explained that the lithology results for various vibracore stations evidenced the potential effects of previous dredging operations. Only at station V4, under macroscopic examination, there appears to be blasting sand at the surface; however, other stations may prove to also have blasting sand once microscopic examination of the samples is conducted. Observations of other vibracore samples indicated the presence of presumably oil, at depth, at locations V-10 and V-13; John King commented that additional analyses of this material may be in order. John King then presented the preliminary conclusions of his investigation, and indicated that the construction of the breakwater in 1957 increased the deposition of silt and clay in Coddington Cove.

Sheldon Pratt (URI) indicated that a 1957 report presenting historic dredging locations in Coddington Cove supported John King's results regarding potential evidence of previous dredging operations.

Cornell Rosiu (CDM) asked about the presence of fine sediments at station V3, and whether this was compatible with the model presented by Chris Kincaid (URI) that identified the area of station V3 to be of "high energy".

John King (URI) acknowledged the presence of fine sediments at station V3, which is not in agreement with Chris Kincaid's model. John King provided the following explanations for the presence of fine sediments at station V3: a) there may be a time-scale factor involved, since Chris Kincaid's model addresses only the short-term transport of sediments while the geophysical survey depicts the long-term results of the various factors involved in the transport and distribution of sediments; and b) ship traffic may influence the distribution of sediments in the area of station V3. Chris Kincaid then indicated that station V3 may also be situated at a "stagnant core" surrounded by the general circulation pattern.

Cornell Rosiu then pointed out that, based on the data presented, there is water circulation in the area previously known as the "dead zone".

John King made the comment that the so called "dead zone" may need to be renamed based on the data now available.

Jim Quinn (URI) summarized the analytical results for organic substances detected in the surface sediment samples (top 18 cm). Data for PCBs, p,p'-DDE and PAHs were presented and compared to ER-L and ER-M values (Long *et al.*, 1995); data on TBT were also presented. Sediments at station 29 exceeded ER-M values for both PCBs and PAHs; also, PCB congener 209 was detected at this station. Jim Quinn explained that PCB congener 209 is also known as Deka (*i.e.*, deca-chloro-biphenyl), which was produced in Italy and historically used in ship castings; the presence of this congener in the sediments is very localized and may have been used at DS. The results of elutriate tests indicate that resuspension of sediments is a viable mechanism for the introduction of sediment contaminants into

the dissolved phase. TBT was first made available in 1960, thus the depth of its presence in sediments can be used as a time marker. Jim Quinn explained that the depth at which TBT has been found near DS cannot be explained by normal deposition rates, therefore indicating that dumping may have occurred. Jim Quinn added that high concentrations of contaminants which could be of potential concern do not appear to extend beyond a depth of 1 meter.

Jim Quinn (URI) summarized the analytical results for organic substances in lobster tissues, and made the general comment that the concentrations were below FDA guideline concentrations.

Susan Svirsky (EPA) indicated that a human health risk assessment had not been performed and that concerns may exist regarding lobster consumption by humans. Also, Kymberlee Keckler (EPA) asked if the analysis of lobster tissues had included the hepatopancreas.

> Jim Quinn (URI) agreed with Susan Svirsky's comment, and indicated that only muscle tissues had been analyzed.

Jim Quinn (URI) summarized the analytical results for organic substances in bivalve tissues and indicated that, in general, there was a good correlation by sampling station between tissue concentrations and sediment concentrations. Jim Quinn then presented the preliminary conclusions of his investigation.

Chris Deacutis (RI DEM) asked if there was a value that could be used as a benchmark for TBT in sediments.

> Jim Quinn (URI) responded that apparently a TBT sediment concentration of 5 ppb is considered as a concern under EMAP, and that concentrations in excess of 100 ppb had been detected in deep sediments at some stations around DS.

Bob Richardson (RI DEM) asked for more details about the sediment depths at which TBT had been found at high concentrations.

> Jim Quinn (URI) reiterated that the presence of high concentrations of TBT at depths of as much as 76 cm could not be explained by normal deposition rates, and that probably dumping had been involved. Jim Quinn suspects that dumping of materials from the shore may have occurred, which would explain the high concentrations of TBT near the shore.

John King (URI) summarized the analytical results for metals detected in the surface sediment samples (top 18 cm), and described the general trends in the distribution of metal concentrations. John King also explained that three approaches were followed in the study of metals in sediments: total metal concentrations compared to ER-L and ER-M values; SEM/AVS determinations; and metal concentrations in elutriates compared to saltwater Ambient Water Quality Criteria. In general, high concentrations of several metals (Zn, Ni, Cu and Cr) have a predominant nearshore distribution and are likely to be site-related, while other metals (Pb, Hg and As) are ubiquitous and probably associated with off-site sources (aerosol and sewage treatment plant) in addition to DS. High metal concentrations near DS were generally associated with the finer grain sediments.

John King (URI) indicated that the SEM/AVS ratio had exceeded 1 at stations 33 and 37.

Susan Svirsky (EPA) indicated that there is now some discussion about possible concerns even when the SEM/AVS ratio is below 1.

> John King (URI) indicated that the SEM/AVS ratio for some stations was approximately between 0.5 and 0.7, but added that even at that level the metals affected by sulfides probably would not be bioavailable.

John King (URI) indicated that high metal concentrations are not found beyond a sediment depth of 1 meter, and that most high concentrations do not extend beyond half a meter. John King then presented the preliminary conclusions of his investigation.

Cornell Rosiu (CDM) asked which were the specific metals affected by the SEM/AVS ratio.

> John King (URI) identified the following metals: Hg, Cu, Zn, Ni, Cd, and Pb.

Brad Wheeler (NETC) inquired about the extent of what has been considered to be the "study area" for the investigations related to DS.

> John King (URI) indicated that Coddington Cove is the study area, of which DS represents a small, somewhat confined area.

Greg Tracey (SAIC) summarized the analytical results for metals in biota tissues; he asked the meeting attendants to refer to Section 4.0 of the interim data deliverable document. In general, there is a fairly uniform distribution of concentrations among stations for most metals detected in tissues. In the case of Cu, variations in tissue concentrations were detected which appear to closely match the distribution of Cu concentrations in the sediments. Differences in the concentrations of some metals (*e.g.*, Ni) between the tissues of *Mercenaria mercenaria* and *Pitar morrhauna* clams were detected in spite of the similar habitat requirements of these two species.

Kymberlee Keckler (EPA) asked if organisms had been collected from the same location as the sediment sample stations.

> Greg Tracey (SAIC) indicated that organisms were collected from the area surrounding the sediment sample station, within a distance no greater than 40 or 50 feet from the station.

Greg Tracey (SAIC) continued his presentation. Results for lobster tissue samples were presented for Cr, Ni and Ag. Greg Tracey then presented results for fish tissue samples and indicated that, in general, metal concentrations were not high, with the possible exception of Zn.

Ken Finkelstein (NOAA) expressed concern about not knowing against what to compare the tissue concentrations that were being presented.

> Greg Tracey (SAIC) mentioned the existence of recently reported data in the literature on benchmarks for contaminant residues in tissues, which are based on back-calculations using bioconcentration factors, and can be used to screen tissue concentrations against water quality criteria.

Susan Svirsky (EPA) asked if the contaminant concentrations in biota tissues were reported on a dry weight basis and, if so, the EPA would request to also make the data available on a wet weight basis for use in food chain modeling in the ERA. Susan Svirsky added that tissue data on a wet weight basis is also required in human health risk assessments.

> Greg Tracey (SAIC) confirmed that the tissue data was currently presented on a dry weight basis, and indicated that wet weight equivalences of the tissue data will be calculated and presented in the ERA report as needed for the food chain exposure assessment for avian predators.

Bob Richardson (RI DEM) inquired about the difference in exposure conditions for the indigenous and deployed mussels, and if there were any mussel beds within Coddington Cove.

Greg Tracey (SAIC) explained that indigenous mussels were associated with hard bottom substrate, while deployed mussels were kept at 1 meter off the bottom. Greg Tracey then indicated that no mussel beds were found within the study area, although some do exist in the vicinity of Dutch Island and South Prudence Island.

Ken Finkelstein (NOAA) asked if there were correlations between metal concentrations in sediments and mussel tissue data, and commented that there may be some potential concerns associated with silver.

Greg Tracey (SAIC) indicated that a correlation analysis of the sediment and tissue data had not yet been conducted.

A break to the meeting was called at 12:00 pm. The meeting reconvened at 12:10 pm.

Kymberlee Keckler (EPA) indicated that, since no formal regulator comments were to be submitted in writing on the interim data deliverable document, the EPA wished to clearly identify the major comments that had already been made during the presentations. Kymberlee Keckler and Susan Svirsky (EPA) identified the following as EPA's major comments: 1) Based on ORD's latest data, the threshold ratio value for SEM/AVS to be used in the ERA report should be changed from 1.0 to 0.5; 2) When interpreting the bioavailability of metal concentrations in sediments, the ERA report should be more specific as to the divalent metals that are affected by the SEM/AVS ratio; and 3) Contaminant concentrations in biota tissues should be expressed on a wet weight basis for use in food chain modeling. Kymberlee Keckler and Susan Svirsky indicated that additional comments would be made on the food chain modeling. In addition, Susan Svirsky added that, based on research data from John Mahony (Manhattan College, NY), the EPA usually does not consider Hg as a metal affected by the SEM/AVS ratio.

Greg Tracey (SAIC) indicated that some researchers were now proposing the use of SEM minus AVS to assess the bioavailability of divalent metals in sediments. Greg Tracey proposed to include this approach in the ERA report in addition to the standard SEM/AVS approach.

Paul Kulpa (RI DEM) asked if the SEM minus AVS approach had been used for the Allen Harbor ERA report.

Greg Tracey (SAIC) answered yes, and indicated that the analysis of sediment and tissue data had shown a better correlation under the SEM minus AVS approach than under the SEM/AVS approach. General agreement was reached on the inclusion of both approaches in the ERA report.

Greg Tracey (SAIC) summarized the results of dissolved oxygen measurements obtained at 1 meter off the bottom, and also presented the results for chlorophyll *a* concentrations which, in general, were higher near the shore than at offshore locations. Greg Tracey pointed out that these data appeared to correlate well with the mussel growth data.

Chris Deacutis (RI DEM) asked at what time of year the data for chlorophyll a *had been gathered, and whether there may be a correlation between the chlorophyll* a *data and wind direction.*

Greg Tracey (SAIC) indicated that the measurements took place during October/November, and added that he would look into the possible correlation between chlorophyll *a* data and wind direction.

Greg Tracey (SAIC) continued his presentation. A readily apparent spatial pattern was not detected on the data gathered on suspended solids. Concentrations of total and unionized ammonia were generally low. Greg Tracey explained that fecal pollution indicators were assessed to aide on fate and

transport interpretations for the contaminants found in mussel tissues. In general, the four fecal pollution indicators measured were found at low concentrations, with the exception of total coliforms that were detected at high concentrations in deployed mussel tissues at station 40 (*i.e.*, "dead zone"); however, it is possible that an input of fecal pollution from onshore animals may exist in the area of station 40.

Susan Svirsky (EPA) asked if there was high water circulation in the "dead zone".

> Greg Tracey (SAIC) responded no, and that probably the only major water exchange in the "dead zone" was associated with the tides.

Chris Deacutis (RI DEM) asked if the discussion on fecal pollution indicators referred to water or tissue concentrations.

> Greg Tracey (SAIC) clarified that the discussion referred to deployed mussel tissue concentrations.

Greg Tracey (SAIC) summarized the results of measurements on sediment oxygen demand and indicated that, in general, the values were low and within the range expected for an estuarine environment.

Bob Richardson (RI DEM) asked if there could be episodes of dissolved oxygen depletion in Coddington Cove, particularly in the summer due to algal blooms.

> Greg Tracey (SAIC) said he thinks there is no general problem with the concentration of dissolved oxygen in the area; however, the modeling based on available data will not address potential seasonal algal blooms associated with nutrient input. Greg Tracey added that, based on sediment oxygen demand data, apparently there was not a high deposition of organic material onto the sediments.

Greg Tracey (SAIC) explained that contaminant concentrations in tissues of indigenous and deployed mussels were comparable and, therefore, exposure is probably related to the resuspension of contaminated sediments.

John King (URI) asked if there could be a relation between birds and concentrations of total coliforms; Bob Richardson (RI DEM) interjected to add fecal coliforms.

> Greg Tracey (SAIC) responded yes.

Greg Tracey (SAIC) summarized the determinations of condition indices for indigenous and deployed mussels.

Ken Finkelstein (NOAA) asked what was the source of the deployed mussels, and if determinations of condition indices had been made before deployment.

> Greg Tracey (SAIC) indicated that the mussels used for deployment were obtained from a Cape Cod location, and explained that mussels were classified by growth groups before deployment, which lasted 30 days. Greg Tracey pointed out that the data identified as "Time Zero" correspond to the determinations made before deployment.

Bob Richardson (RI DEM) asked what the water temperature had been during the deployment period.

> Greg Tracey (SAIC) indicated that the water temperature had probably been between 15.5 and 18°C.

Sheldon Pratt (URI) presented a summary of the results of the benthic macroinvertebrate survey. The focus of the survey was to identify gradients in the numbers of species, identify differences in species composition, and compare data from stations potentially impacted by DS to reference and historical data. Grain size and organic content of the sediments were taken into consideration when comparing data between stations. Effects on the benthic community due to wave action and bottom depth are not always readily identifiable. In general, macroinvertebrate species along the nearshore stations are mostly infaunal species associated with sand and silt environments; epifaunal species are scarce probably due to the absence of rocks or other substrates appropriate for epifaunal species.

Kymberlee Keckler (EPA) inquired if sensitive macroinvertebrate species had been found.

> Sheldon Pratt (URI) explained that at stations 40 and 41, which have silty sediments, the infaunal community was very poor, and mainly composed of tolerant species. Tolerant species were also found, in smaller numbers, at some of the other nearshore stations; however, not even tolerant species were found at station 29, indicating the possible existence of highly adverse conditions at this station.

Greg Tracey (SAIC) summarized the results of the amphipod and sea urchin toxicity tests. Amphipod toxicity tests showed high survival for most stations, including station 29 that had 95% of survival. Stations 27 and 28 had the lowest amphipod survival percents (79% and 70%, respectively). Toxicity was detected at several stations based on the sea urchin larval development test on elutriates; higher toxicity was apparent at several nearshore stations, particularly stations 28 and 29, although no toxicity was identified in the "dead zone". Toxicity was not apparent for any of the stations based on the sea urchin fertilization test. Greg Tracey commented that the results from toxicity tests should not be interpreted independently, but in combination with the exposure data.

Greg Tracey (SAIC) summarized and explained the results from the hematopoietic neoplasia assessment on bivalves; the results addressed both incidence and severity of the disease. The neoplasia, which some research suggests is virally induced, is a blood disorder that may be correlated to stress on the bivalves, including that caused by environmental pollution. In general, there appears to be a higher incidence and severity of the disease at the nearshore stations.

Greg Tracey (SAIC) indicated that resampling for fish will be conducted at stations DSY-29 and -36 to perform additional testing for cytochrome P450 induction.

Greg Tracey (SAIC) directed the meeting attendants to refer to Section 3.0 of the interim data deliverable document to follow his presentation on the selection of contaminants of concern (COCs) for the site. Greg Tracey pointed out that the table presenting the selection of COCs followed the format recommended at the previous EAB meeting. Based on a conservative approach, all detected analytes were determined to be COCs.

Paul Kulpa (RI DEM) asked if the table of selection of COCs included data from previous studies.

> Greg Tracey (SAIC) responded no. Historical data was used for the initial identification of analytes for the current field investigations, and these data will be presented in the ERA report; however, the selection of contaminants of concern for the ERA is based only on current field data.
>
> > *Susan Svirsky (EPA) indicated that the historical data should not be combined with the current data because of differences in the sediment sampling depths; Jim Quinn (URI) interjected to indicate that there were also differences in the data quality objectives between the two data sets. Paul Kulpa (RI DEM) then indicated that he wants to see the sediment concentrations from the historical data depicted in an additional map to be included in the ERA report.*

Susan Svirsky (EPA) indicated, for the record, that the EPA normally requires the use of half the detection limit as the concentration for non-detected analytes when calculating summary statistics; however, because of the very low detection limits used in the current analyses, there will be no need of including half detection limit values and, therefore, no changes to the current analytical data are required. Susan Svirsky then indicated that, in future reports, the detection limit should be used as the concentration for non-detected analytes when calculating summary statistics.

Paul Kulpa and Chris Deacutis (RI DEM) requested that, on the map figures, the actual contaminant concentrations at each sediment sampling station be included in addition to the information currently presented on exceedances of ER-L and ER-M values. This information will be useful to easily identify areas of high concentrations.

An agreement was reached on attempting to present on the same map figures the numeric concentrations next to the corresponding sediment sampling stations; or, alternatively, companion figures will be prepared to indicate the concentrations by station locations if the first approach does not allow for clear presentation of the information.

Cornell Rosiu (CDM) asked about the possibility to perform multivariate analysis (e.g., principal components analysis, and cluster analysis) to rank stations by bioassay results and potential ecological impacts. Cornell Rosiu pointed out he has multivariate analysis procedures amenable for use with SAS databases, and that he could provide these procedures to Greg Tracey (SAIC). Bioassay data can be entered into the multivariate analysis and then, for example, be compared to field data on the benthic macroinvertebrate community.

Greg Tracey (SAIC) indicated that the data for DS are currently in Paradox databases, but expressed his interest on obtaining the multivariate analysis procedures from Cornell Rosiu to explore the possibility of using them with the DS data.

Bob Richardson (RI DEM) expressed concern about the threshold used to identify toxicity based on bioassay results.

Greg Tracey (SAIC) indicated that work reported by Gerald Ankley (EPA, Duluth, MN) also considered 50% of endpoint response as a threshold to identify toxicity. Greg Tracey then explained that bioassay data is not interpreted independently, but should be correlated with exposure data. Greg Tracey also indicated that ammonia concentrations will also be considered in the interpretation of bioassay results. Finally, Greg Tracey commented that the concurrence of various bioassay endpoints provide the weight-of-evidence necessary to reduce the uncertainty in the interpretation of results from the ERA.

Cornell Rosiu (CDM) inquired if the 95% UCL values had been calculated based on EPA's 1992 guidance.

Greg Tracey (SAIC) responded no, and explained that the 95% UCL values were calculated according to the procedures described in a general reference book of statistics.

Susan Svirsky (EPA) indicated that the current 95% UCL values for DS were acceptable and no changes were required, but the EPA guidance should be followed for the marine ERA for the Old Fire Fighting Training Area.

Lunch break was called at 1:15 pm. The meeting reconvened at 2:15 pm.

III APPROACH TO THE McALLISTER POINT LANDFILL (MPLF) SEDIMENTS

Three new attendants arrived for this portion of the meeting. Steve Parker (B&R Environmental) introduced Gordon Bullard, Liyang Chu and Bob Sanda (all from B&R Environmental) to the other meeting attendants.

Steve Parker (B&R Environmental) indicated that a summary of the geophysical information currently available for the MPLF area would be presented by John King (URI), followed by a presentation by Greg Tracey (SAIC) on a proposed zonation of the site based on the results from the marine ERA.

John King (URI) presented a side-scan sonar mosaic of the surface sediments off of MPLF (NOTE: The sonar mosaic corresponded to that of the geophysical survey performed on August 25-30, 1994). The coast is mostly rocky along the landfill, with boulders, cobbles, and very coarse gravel; finer grain sediments are very scarce and patchy. As distance from the shore increases, sandy sediments are present, and then silts and clays exist as the distance from the shore increases further. In general, the material on the shore of the landfill is mostly gravel, there is very little fine-grained sediment. At sample station S2B, which has high concentrations of contaminants, no fine sediments are found; gravel is the major component present, and core penetration to refusal only reached approximately 30 cm. At station MCL-11, fine grain material extends down to a depth of approximately 10 cm, below which there is coarse material. In general, little contamination exists away from the nearshore area.

Kymberlee Keckler (EPA) inquired about the lithology at station MCL-8, for which some potential risk had been identified in the ERA.

> John King (URI) indicated that some contamination does exist in the sediments at station MCL-8, but the fine sediments constitute a very thin veneer above very coarse material.

Greg Tracey (SAIC) distributed a handout presenting a proposed zonation of risk for the study area based on the results from the marine ERA for MPLF. Greg Tracey explained that a weight-of-evidence approach had been used in the ERA for the site and that, based on such approach, six zones with different potential risk levels can be identified in the study area (please refer to the handouts). Greg Tracey asked for comments from the Ecorisk Advisory Board members regarding the proposed risk zones.

Bob Richardson (RI DEM) indicated that, based on the RI State Regulations, three parameters are used to determine if ecological impact has or can happen; these parameters are criteria violation, bioassay results, and field observations. Bob Richardson added that, according to the regulations, consideration of ecological impact can be based on any one of the parameters without need to be supported by the other two.

> Greg Tracey (SAIC) responded that the ERA had been very conservative in pursuing various lines of evidence, and that the weight-of-evidence approach is meant to reduce the uncertainty associated with the conclusions of the assessment.

Susan Svirsky (EPA) commented that it was necessary to define the goals of the discussion. Susan Svirsky indicated that the gathering of information for the ERA was scoped to support the assessment of baseline risk; although analytical chemistry data is sufficient to support the zonation of the study area, the biological data is insufficient and was never intended to achieve such goal. Susan Svirsky added that the determination of cleanup numbers was beyond the scope of the ERA, and pertained to the Feasibility Study.

> Steve Parker (B&R Environmental) indicated that the goal of the discussion was to reach, based on the results from the ERA, an agreement on the parameters to be used to identify the sediments that may require remedial action. Steve Parker explained that the zoning approach

presented by Greg Tracey (SAIC) was being proposed to the Ecorisk Advisory Board towards achieving this goal. Steve Parker indicated that the discussion was not meant to identify cleanup numbers; then, Steve Parker asked Greg Tracey to present the preliminary conclusions of the proposed zoning approach.

Greg Tracey (SAIC) explained that the zoning approach was based on the concordance of exposure and effects data for the identification of risk zones. The zone identified as Zone 2 is the one that poses the greatest ecological risk; Zone 3 may pose significant risk; the remaining zones appear to pose minimal or no risk.

Susan Svirsky (EPA) indicated that the ROD for MPLF will not address the site by zones. Susan Svirsky commented that Zone 2 did appear to have the weight-of-evidence to support the conclusion of ecological risk, and that risk may also exist in Zone 3; Zones 4 and 6 may not pose a risk, but would need to look at the available information and potential data gaps in more detail. The ERA investigations had not been defined to be zonal. The chemistry data available do define the nature and extent of contamination for the study area, but the biological data do not have the same areal coverage; for example, Zone 6 has very limited biological data available. If the cleanup numbers were to be biologically-derived, then biological data should be more comprehensive.

Ken Finkelstein (NOAA) expressed concern that, in general, there is not enough biological endpoint data available for the whole study area, and indicated that no pore water data was available for Zone 6. Low level risk may exist in Zone 6; however, due to uncertainty in the ERA and based on the Feasibility Study process, Zone 6 may be eliminated from requiring remedial action.

Bob Richardson (RI DEM) indicated that he does not necessarily agree with the thresholds used to indicate impacts for some of the biological endpoints. Bob Richardson then questioned the correctness of the Ampelisca survival result for station NSB-1 included in the table presented by Greg Tracey (SAIC).

Greg Tracey (SAIC) acknowledged the error in the *Ampelisca* survival result for station NSB-1, and indicated that the correct result for this endpoint was "XX" (Please refer to the attached table entitled "Summary of Exposure and Effects Weight of Evidence for the McAllister Point ERA"). Greg Tracey offered to further discuss with RI DEM representatives, at a later date, the thresholds used for the toxicity endpoints. (NOTE: Subsequent discussions were held with RI DEM representatives on April 19, 1996, during which Greg Tracey agreed to prepare a comprehensive table identifying the evaluation criteria used in the ERA for establishing the thresholds for the interpretation of toxicity test results. An attempt will be made to incorporate the table into the Draft Final ERA report; however, since the request for the table has been made outside of the schedule and framework for regulatory review and comment of the Draft ERA report, the table may be submitted to the EAB at a later date as an individual deliverable. If regulatory comments on the information presented on the table warrant changes to the Draft Final ERA report, these changes will be included in a Final version of the report).

Bob Richardson (RI DEM) pointed out that storm events may be an issue in Zone 6 as they may cause resuspension of sediments and long-term ecological risk. In addition, Bob Richardson indicated that field biota sampling data may not be sufficient for the whole study area, and that the interpretation of available information was complicated because of some insufficiencies in pore water data and toxicity results, as well as the non-uniform distribution of sediments. Zones 2 and 3 appear to be the areas of concern due to potential ecological risks; although Zone 6 does not appear to be of concern, there may be potential ecological risk associated with some individual stations.

John King (URI) indicated that station D3 in Zone 6 had not been directly tested for pore water toxicity, but nearby stations were.

Susan Svirsky (EPA) commented that pore water data should be for the same station where Arbacia fertilization testing showed toxicity effects. There is no need to resample, but the concern is that the original design of the investigation was not meant to support a biologically-based zoning of the study area.

Cornell Rosiu (CDM) asked if stations S2B and S2 were the same station. Cornell Rosiu also pointed out that pore water data was not available for station S2B.

Greg Tracey (SAIC) responded that S2 and S2B are different stations; S2 is in Zone 4, while S2B is in Zone 3. Greg Tracey acknowledged that pore water data did not exist for station S2B; however, he explained, a sediment core sample was collected at the station and the results for the main contaminants of concern are presented in Figure 4.2-8 of the draft ERA report. PAH concentrations are high in station S2B, but are below ER-M values. Jim Quinn (URI) interjected to explain that the types of TPH and PAHs at station S2B give no evidence of contamination from fresh (unweathered) fuel oils, while at stations NSB-3 and -7 the contamination appears to be from fresh No.2 and No.6 fuel oils.

(3:05 pm - Ken Finkelstein, NOAA, left the meeting)

Susan Svirsky (EPA) asked why the avian food chain endpoint had not been considered as part of the weight of evidence in the zonation of the study area.

Greg Tracey (SAIC) indicated that the Navy was still waiting for concurrence on the proposed TRV values submitted to the EPA.

Kymberlee Keckler (EPA) was not aware of the TRV submittal, which appears she never received. Hector Laguette (B&R Environmental) provided her with a copy of the submittal.

Bob Richardson (RI DEM) commented that maybe Zone 1 should be considered in equal standing as Zone 3 due to the error in the Ampelisca test result, and the limited biological data caused by the very rocky shore.

Kymberlee Keckler (EPA) commented that the weight of evidence approach seemed appropriate if all the available endpoints were taken into consideration; she indicated, however, the EPA was not ready to commit to a zonation of the whole study area. Kymberlee Keckler then inquired what was the Navy's position about those sediments that appear in need of remedial action. Susan Svirsky (EPA) interjected to indicate that baseline risk was evident at Zone 2, and asked if a Focused Feasibility Study could be conducted to screen remedial alternatives. Kymberlee Keckler added that it was necessary to initiate the discussion on the approach to derive the sediment cleanup levels.

Steve Parker (B&R Environmental) indicated that the Navy was not yet ready to carry out a Focused Feasibility Study for the site since there was necessary information still missing, particularly the human health risk assessment. Bob Krivinskas (Navy) added that the Navy had proposed the zonation approach at this meeting to facilitate the identification of the sediments that may require remediation due to ecological concerns.

General agreement appeared to exist on the use of the proposed zonation for the purposes of general discussion.

General discussion ensued on the issue of cleanup levels and the endpoints to be considered for their determination. It was agreed that completion of the avian food chain modelling process was necessary.

Susan Svirsky (EPA) indicated that the tissue concentration data should be used as a measurement of exposure, and that comparisons of these data could be made against data from the reference stations. Susan Svirsky expressed some reservation about the screening of the tissue data against the benchmarks for contaminant residues in tissues that Greg Tracey (SAIC) had indicated are available in recent literature.

Greg Tracey (SAIC) indicated that, in the Draft Final ERA report, he will include two new columns in the summary table of the weight of evidence. One column in the exposure section will present the results of the comparison between tissue contaminant concentrations for site stations and those for the reference stations; another column in the effects section will present the comparison of the food chain modeling results for avian predators against the TRVs. John King (URI) commented that, in general, there was a poor correlation between sediment and tissue concentrations in the MPLF study area.

Susan Svirsky (EPA) pointed out that Ken Finkelstein (NOAA) may also want an evaluation of the tissue data under the effects section of the table, and asked Greg Tracey (SAIC) to please contact Ken Finkelstein to inquire.

Greg Tracey (SAIC) said he would contact Ken Finkelstein and proposed that, under the effects section, the tissue data could be evaluated against the literature-derived benchmarks for contaminant residues in tissue.

Sheldon Pratt (URI) commented that, once the landfill is addressed, natural attenuation of contaminant concentrations may occur because of the high energy coast line and the deposition of new sediments; under such scenario, no action may be an option instead of dredging.

Steve Parker (B&R Environmental) described, in general, the existing shore conditions at the landfill after the recent construction of the revetment, and indicated that some of the original sediment that existed at the nearshore stations at the time of sampling had apparently eroded away after the removal of debris.

Susan Svirsky (EPA) commented that resampling would be necessary if the original sediments were no longer present.

Bob Sanda (B&R Environmental) explained the construction of the revetment, and how debris removed from the shore was placed under the revetment before its completion. The nearshore sediment sample stations were not covered by the revetment.

Paul Kulpa (RI DEM) commented that historically there was no beach at the northern portion of the landfill, beach existed at the central portion, and transition from beach to rock existed at the southern portion.

Mary Pothier (CDM) agreed that the nearshore sediment sample stations had not been covered by the revetment. Mary Pothier then asked if the elevation of the sediment had changed at the sample stations.

Steve Parker (B&R Environmental) responded that elevation changes had apparently occurred, and added that a survey of the sediment elevations would be conducted soon. Greg Tracey (SAIC) commented that the intertidal zone had apparently disappeared at stations 2, 3 and 4. Bob Sanda (B&R Environmental) reiterated that all exposed debris had been removed from the shore during the construction of the revetment; then Bob Sanda explained that new debris is now evident apparently due to sediment erosion occurring after the revetment construction. John King (URI) speculated that the sediments probably washed away once the debris and

rocks were removed; John King then indicated that if, for example, sand was added in the future to form a beach, it would also probably be washed away by the ocean.

Susan Svirsky (EPA) indicated that capping of sediments does not represent a remedial alternative for the site.

Sheldon Pratt (URI) commented that the erosion of beaches followed by the deposition of new sediments are normal seasonal events which have been reported in some parts of the country, and mentioned California as an example. Sheldon Pratt then speculated that the erosion of sediments at MPLF may represent part of typical seasonal conditions whereby new sediments may yet be deposited. John King (URI) mentioned that the scenario described by Sheldon Pratt may be applicable to the southern portion of the landfill shore where the slopes are gentle, but unlikely to occur on the landfill shore facing the west where the slopes are steep.

Steve Parker (B&R Environmental) indicated that the elevation survey of the nearshore sample stations will be conducted during the week of April 22, 1996. Bob Krivinskas (Navy) indicated that no elevation data were available for the stations at the time sampling took place; Bob Krivinskas then explained that, in addition to the elevation survey, field observations will be made to determine if the stations are now permanently under water, which would indicate erosion of the sediments has occurred. Greg Tracey (SAIC) mentioned he thinks there might have been a loss of 1 to 2 feet in sediment elevation at some of the nearshore sample stations.

In response to questions from Sheldon Pratt (URI) and Bob Krivinskas (Navy), Bob Sanda (B&R Environmental) indicated that he does not think there is a revetment stability problem due to the apparent erosion of sediments at the base of the revetment.

Susan Svirsky (EPA) asked how far out from the revetment had debris been collected.

Bob Sanda (B&R Environmental) responded that removal of debris had extended to approximately 15 feet from the base of the revetment.

Kymberlee Keckler (EPA) expressed her intention to wait for the elevation survey results before deciding how to address the apparent erosion of sediments at the base of the revetment. Kymberlee Keckler indicated that resampling may be necessary to determine the contaminant concentrations in the remaining sediments, and thus to identify what may need to be remediated.

Sheldon Pratt (URI) commented that, based on his observations, there was a limited benthic community in nearshore stations 1 through 4 because of drying out during low tide; the infaunal community at these stations was represented mostly by oligochaete worms. The benthic community at stations 5 through 7 was more complete because the sediments remain wet due to the gentle slope of the shore retaining water and, in places, apparent groundwater discharge.

Bob Richardson (RI DEM) pointed out to Greg Tracey (SAIC) that the RI DEM would like to see Sheldon Pratt's information included in the weight of evidence summary table.

Greg Tracey (SAIC) indicated that information on the benthic community will be brought forward and incorporated into the weight of evidence summary table in the Draft Final ERA report.

Mary Pothier (CDM) pointed out that waiting for the results of the elevation survey seemed appropriate. Mary Pothier then inquired about what the Navy anticipated to be the next step on addressing the apparent loss of sediment from the nearshore sample stations.

Bob Krivinskas (Navy) indicated that probably there will be some additional nearshore sampling, focusing on specific contaminants identified as those of greatest concern based on the ERA for the site. Bob Krivinskas then mentioned he would be doing a walk-over of the shore of MPLF the following week, and told the meeting attendants to contact him if anyone wanted to visit the site with him at another time.

At 4:00 pm, Steve Parker (B&R Environmental) presented a video of the shore of MPLF, which he filmed during a walk-over on April 3, 1996. The EPA and CDM representatives left at the beginning of the video presentation. The meeting adjourned at approximately 4:15 pm.

ATTACHMENT A

List of Meeting Attendants

List of attendants
EAB meeting #7

4/17/96

Individual	Affiliation	Phone #
Hector Laquette	Brown & Root / HNUS	(508) 658-7899
Steve Parker	"	(508) 658-7899
Shannon Behr	Northdiv	610-595-0567 x183
BRAD WHEELER	NETC	401-841-6375
NANCY KUNTZLEMAN	NORTHDIV	(610) 595-0567 x194
Kymberlee Keckler	USEPA	(617) 573-5777
Susan Svirsky	USEPA	(617) 573-9649
John King	GSO/URI	401-874-6594
Mary Pothier	COM	617-252-8466
Carmen Rosin	COM	617/252-8221
SHELDON PRATT	URI	401-874-6699
Bob Richardson	RI DEM	401-277-6529 ext 7240
Paul Kulp	RIDEM	401-277-3872
Chris Deacutis	RIDEM/NBEP	401-277-3165 x7270
Raymond Roberge	NER	(401) 841-3735
JIM QUINN	GSO/URI	401-874-6219
BOB KRIVINSKAS	NORTHDIV RPM	(610) 595-0567 X134
Ken Finkelstein	NOAA	617-223-5537
GREG TRACEY	SAIC	401 782-1900
Chris Kincaid	URI	401 874 6571
TODD BOOER	NORTHDIV	610-595-0567 x160
Gordon Bullard	BRE	508-658-7899
LIYANG CHU	B&RE	508-658-7899
Bob Sandia	B&RE	508-658-7899

2nd part of meeting: McWilliams

ATTACHMENT B

Meeting Agenda and Handouts

MEETING AGENDA
ECORISK ADVISORY BOARD MEETING NO. 7
BUILDING 1, NAVAL EDUCATION AND TRAINING CENTER (NETC)
NEWPORT, RHODE ISLAND
APRIL 17, 1996

CONVENE 10:00 AM

1. Introductory Remarks

2. Derecktor Shipyard Data Presentation (10:00 AM - 11:30 AM)

   - Physical Oceanography Data
   - Geophysical Data
   - Chemistry Data < Jim Quinn (URI) – organics / John King (URI) – inorganics
   - Biological Data, Toxicity Data

(Break)

   - Contaminants of Concern
   - Preliminary Conclusions

3 Discussion (11:30 - 12:15)

LUNCH (12:15 PM - 1:30 PM)

4. Approach to McAllister Point Sediments (1:30 PM - 2:30 PM)

   - Review of geophysical surveys
   - Review of extent of contamination and fate and transport of contaminants of concern
   - Exposure pathways
   - Zonation of site
   - Review of construction action and current conditions

(Break)

   - Discussion/Development of Remedial Objectives (2:45 PM - 3:45 PM)

ADJOURN 4:00 PM

CONCLUSIONS

Coddington Cove Hydrographic Survey

1) Dominant circulation pattern across the mouth and within the cove is a counterclockwise, vertically coherent flow.

- Flow in to the South at Coddington Point
- Flow out to the North by the breakwater

2) Maximum flow magnitudes recorded across the mouth range from +/- 25 cm/s.

3) Variations from this dominant flow pattern are also recorded:

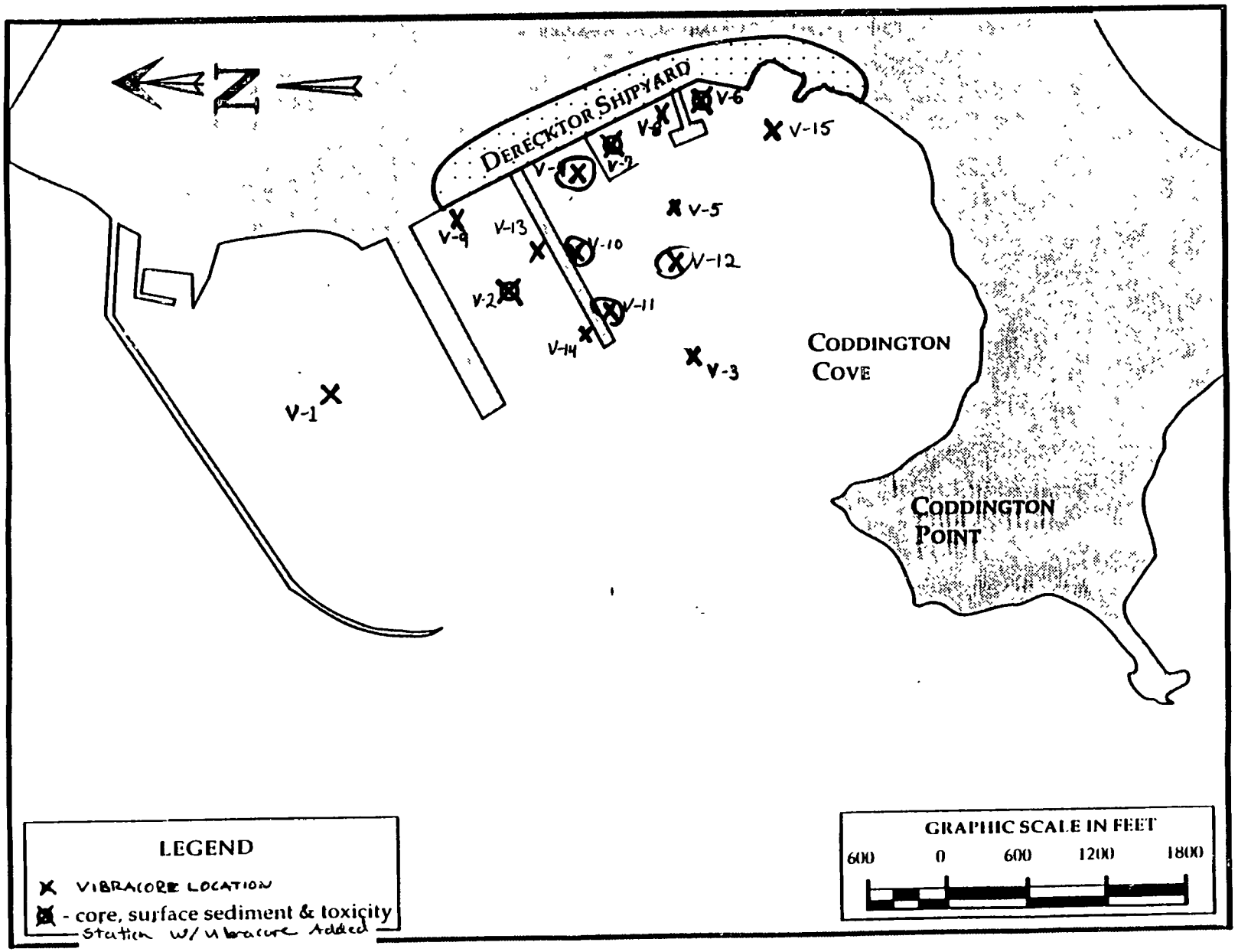
- Wind events produce 2-layer flow (surface with the wind, deep flow at an angle to the wind)
- At the start of the ebb the inflow is centered in the mouth and migrates south

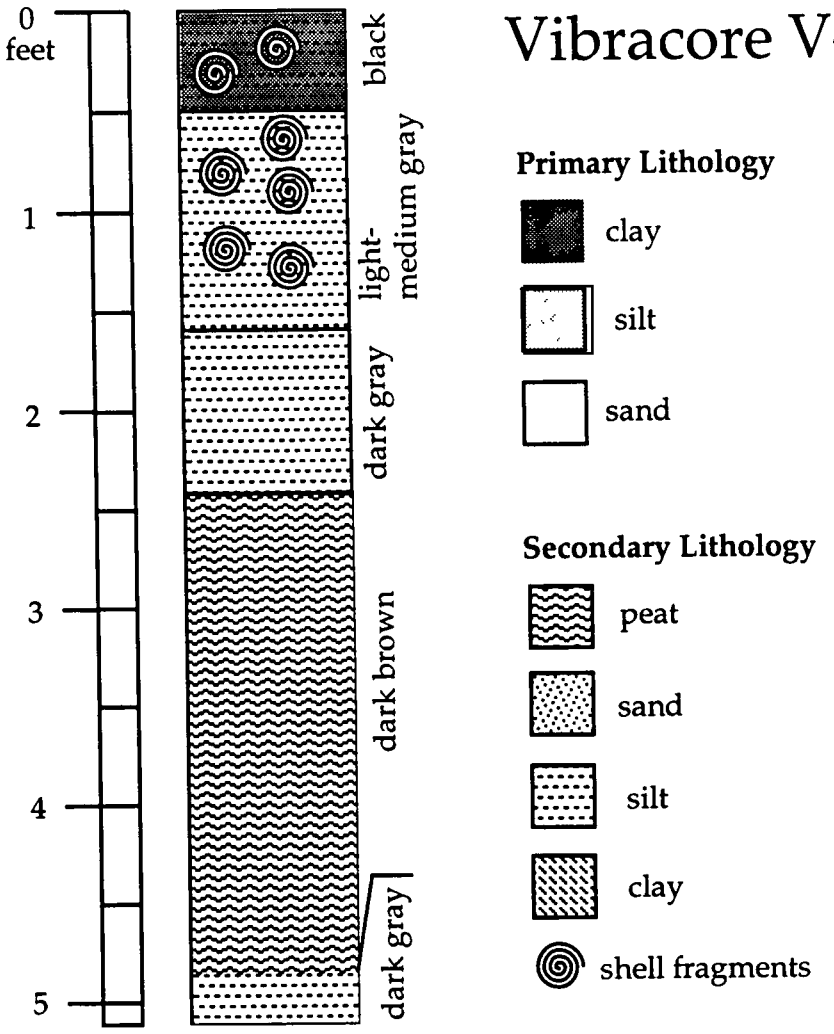
4) Flow characteristics recorded within the cove include:

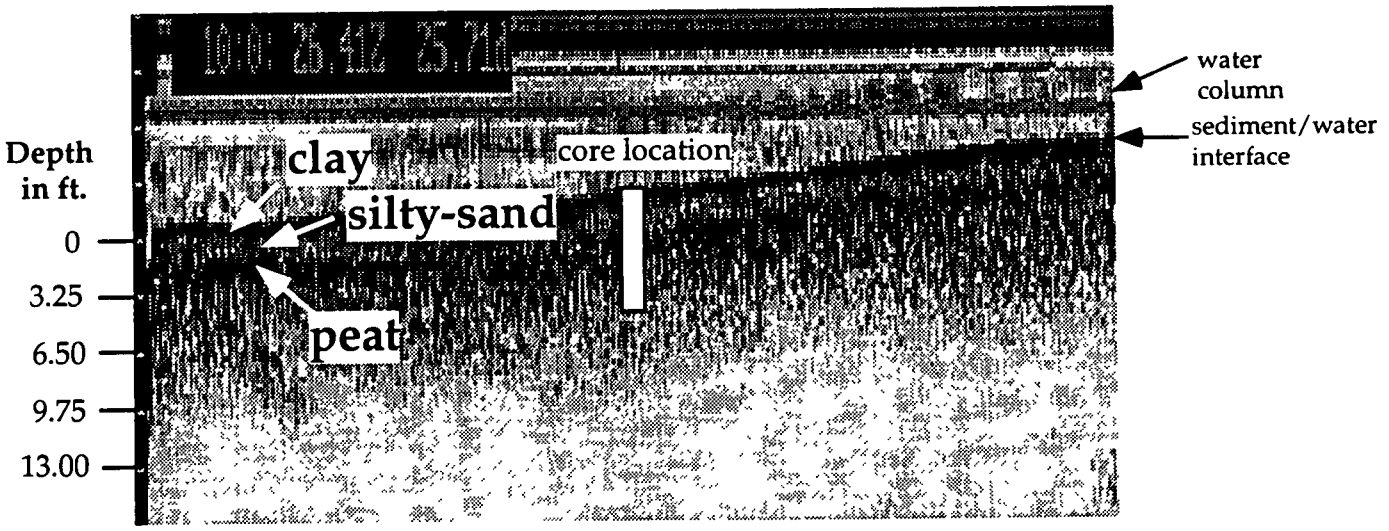
- Dominant counterclockwise flow
- Core of maximum flow magnitude extends east-southeast into the cove, approaching the "dead zone".
- Regions of low velocity magnitude are (i) southernmost section cove, (ii) between the piers, (iii) eastern end of the section of cove bounded to the north by the breakwater.
- Velocity magnitudes within the "dead zone" are recorded in the range of 4-11 cm/s depending on the stage of the tide. However, flow orientations averaged over a 10 minute sampling period produce zero net transport (e.g. swirling flow).

5) Estimates of expected sediment deposition/erosion, based on average bottom velocity magnitude, suggest patterns of erosion within the southern cove, transport in a counterclockwise fashion, and potential deposition of 0.1-0.8 mm diameter material in the northern cove. Fine grained material should be transported from the estuary.

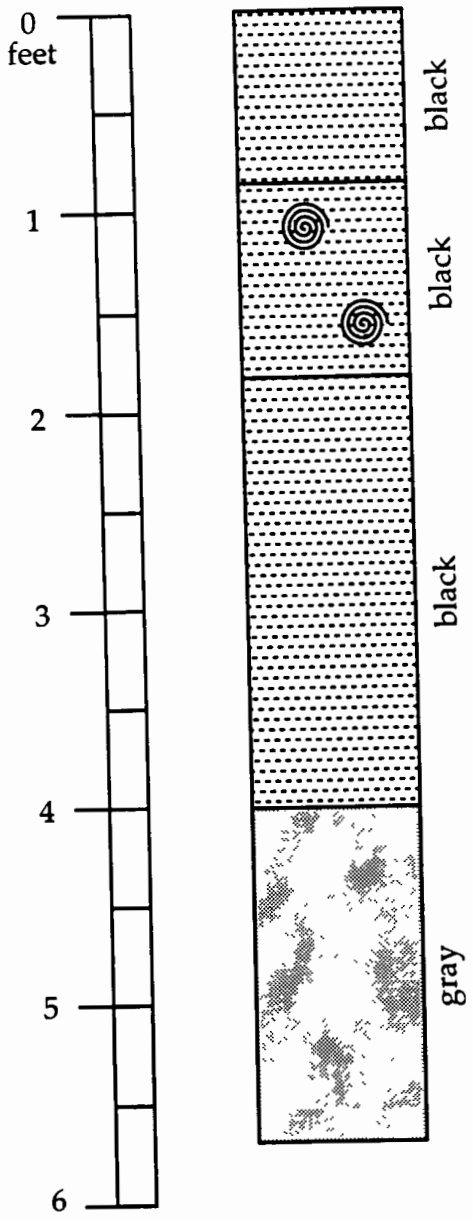
(Note: Easternmost portions of northern and between piers sections of cove not well sampled. Trends suggest these regions are low velocity and potential sediment traps).


N
DERECKTOR SHIPYARD
V-6
V-15
V-5
V-9
V-13
V-10
V-12
V-2
V-11
V-14
V-3
V-1
CODDINGTON COVE
CODDINGTON POINT
LEGEND
VIBRACORE LOCATION
- core, surface sediment & toxicity station w/ vibracore added
GRAPHIC SCALE IN FEET
600 0 600 1200 1800


Vibracore V-1
0 feet
1
2
3
4
5
black
light-medium gray
dark gray
dark brown
dark gray
Primary Lithology
clay
silt
sand
Secondary Lithology
peat
sand
silt
clay
shell fragments


Depth in ft.
0
3.25
6.50
9.75
13.00
clay
silty-sand
peat
core location
water column
sediment/water interface

Vibracore V-4

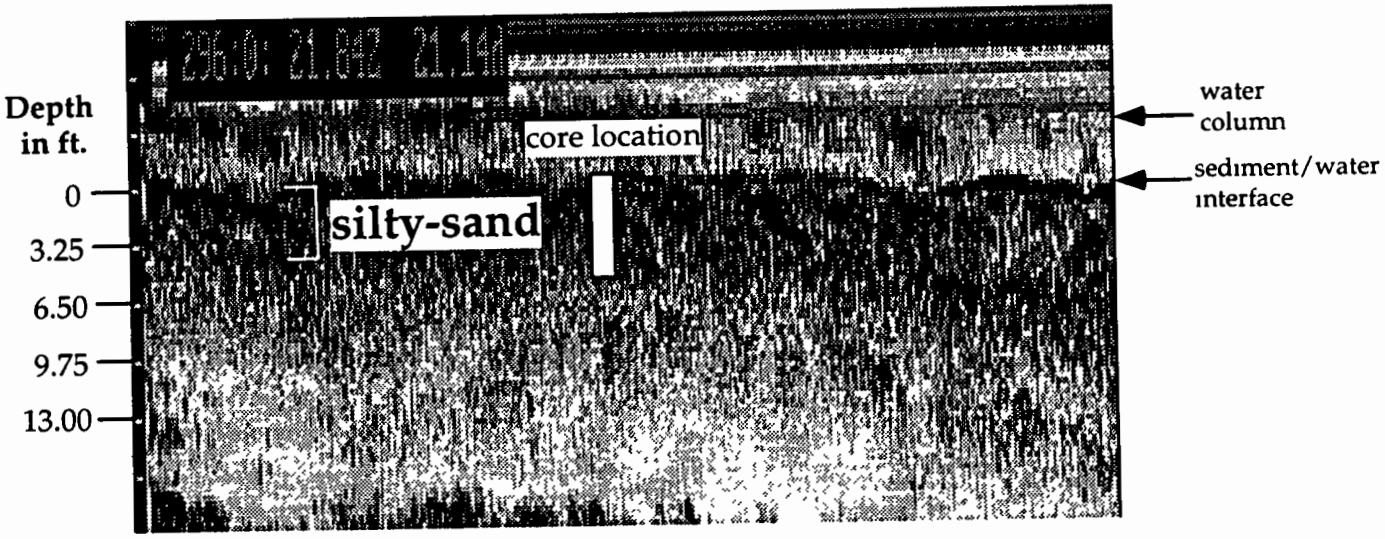


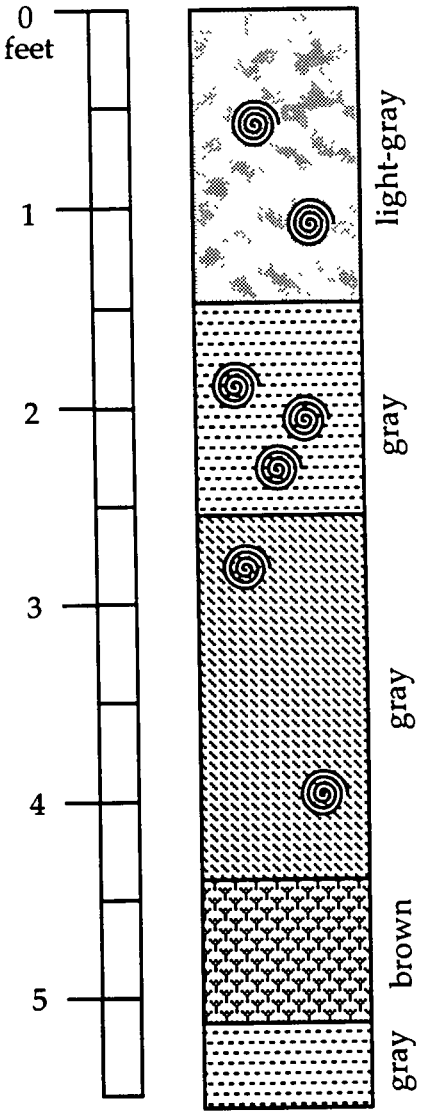
Primary Lithology

- clay
- silt
- sand

Secondary Lithology

- peat
- sand
- silt
- clay
- shell fragments





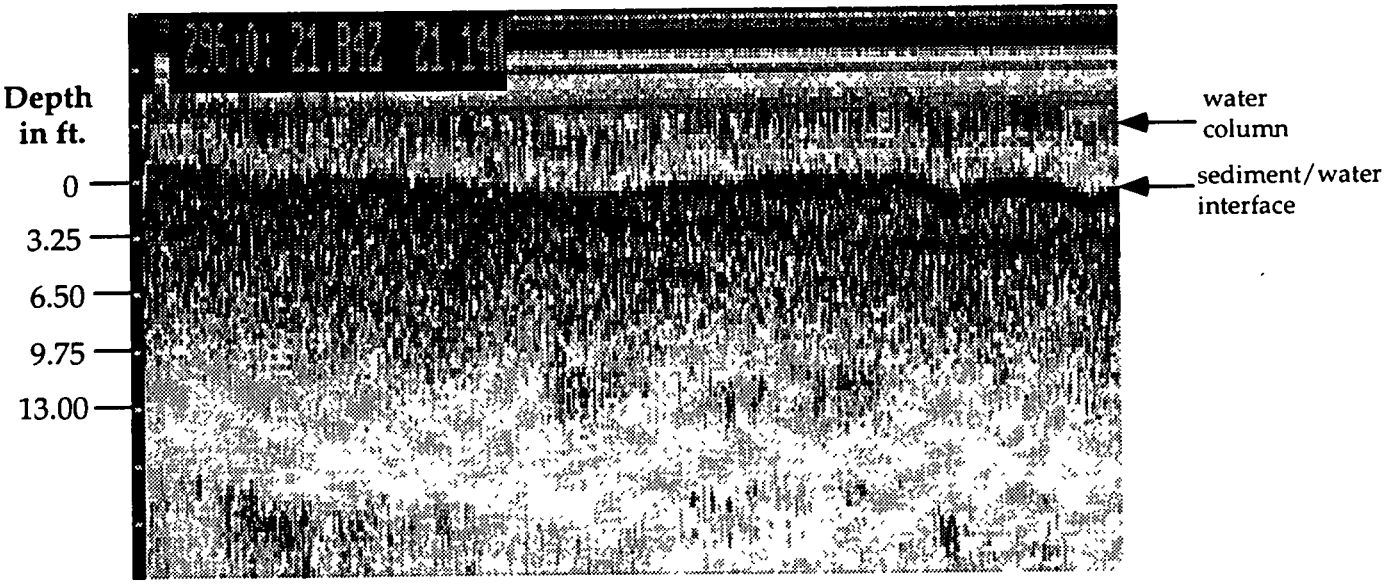
Vibracore V-2

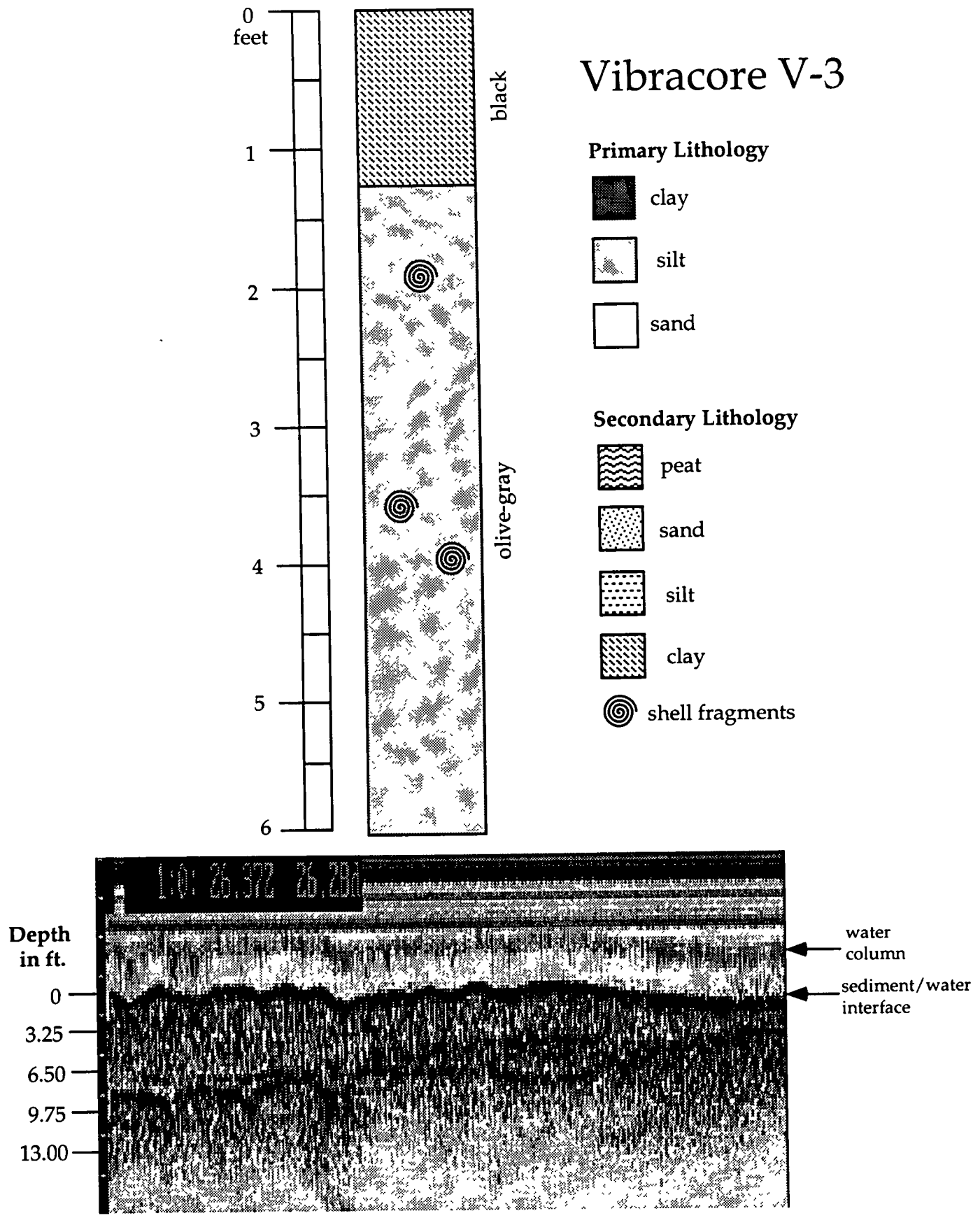
Primary Lithology

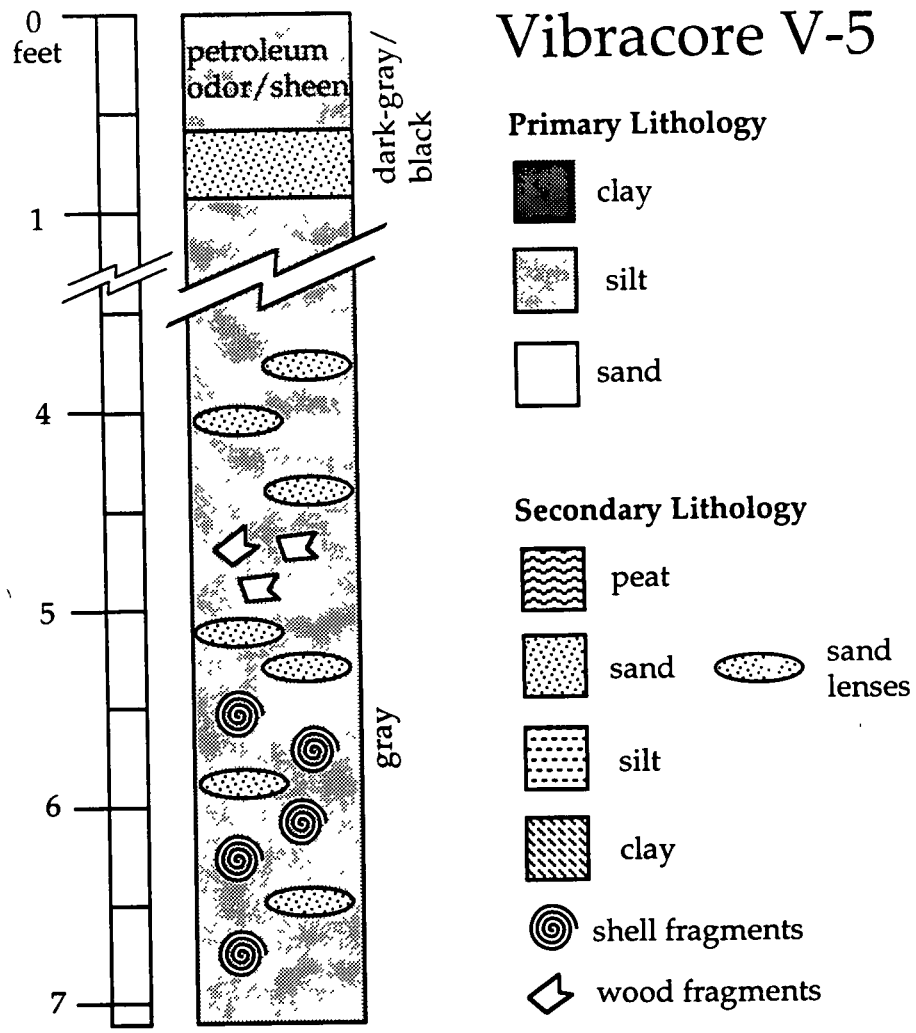
- clay
- silt
- sand

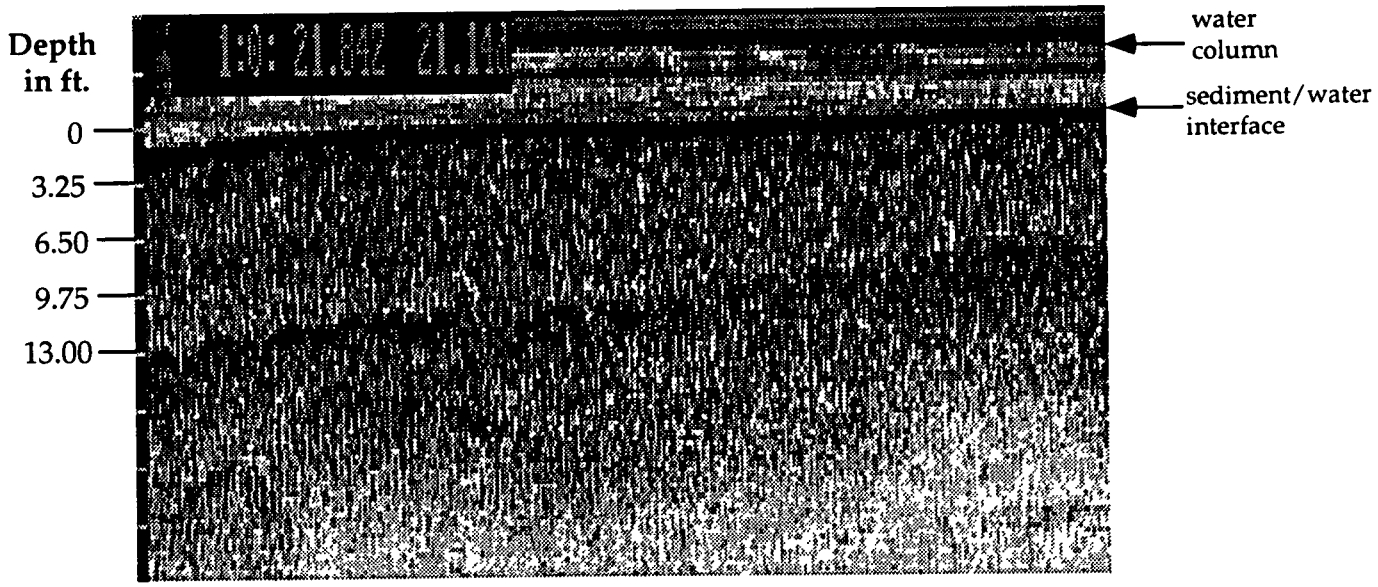
Secondary Lithology

- peat
- sand
- silt
- clay
- shell fragments
- organic material

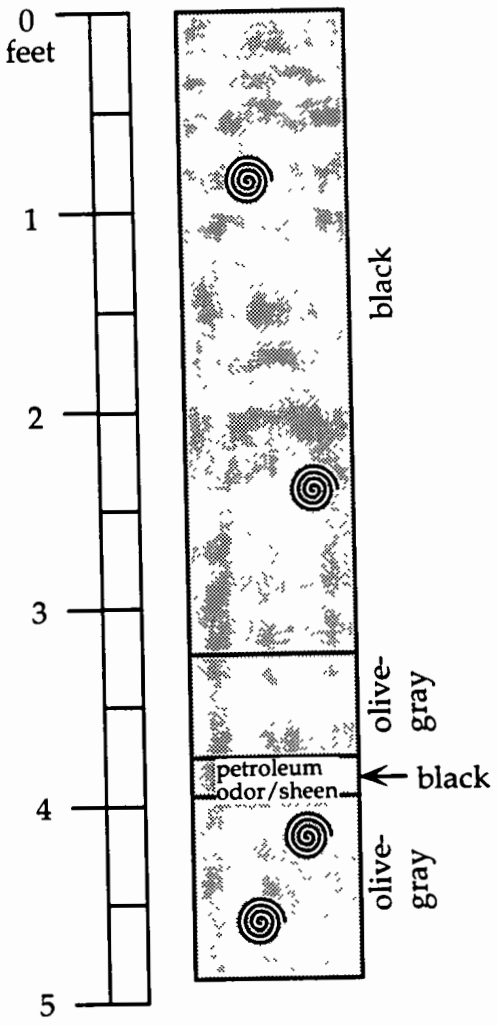



0
feet
1
2
3
4
5
6
black
olive-gray
Vibracore V-3
Primary Lithology
clay
silt
sand
Secondary Lithology
peat
sand
silt
clay
shell fragments
Depth
in ft.
0
3.25
6.50
9.75
13.00
water
column
sediment/water
interface


0
feet
1
4
5
6
7
petroleum
odor/sheen
dark-gray/
black
gray
Vibracore V-5
Primary Lithology
clay
silt
sand
Secondary Lithology
peat
sand
sand
lenses
silt
clay
shell fragments
wood fragments


Depth
in ft.
0
3.25
6.50
9.75
13.00
water
column
sediment/water
interface

Vibracore V-10

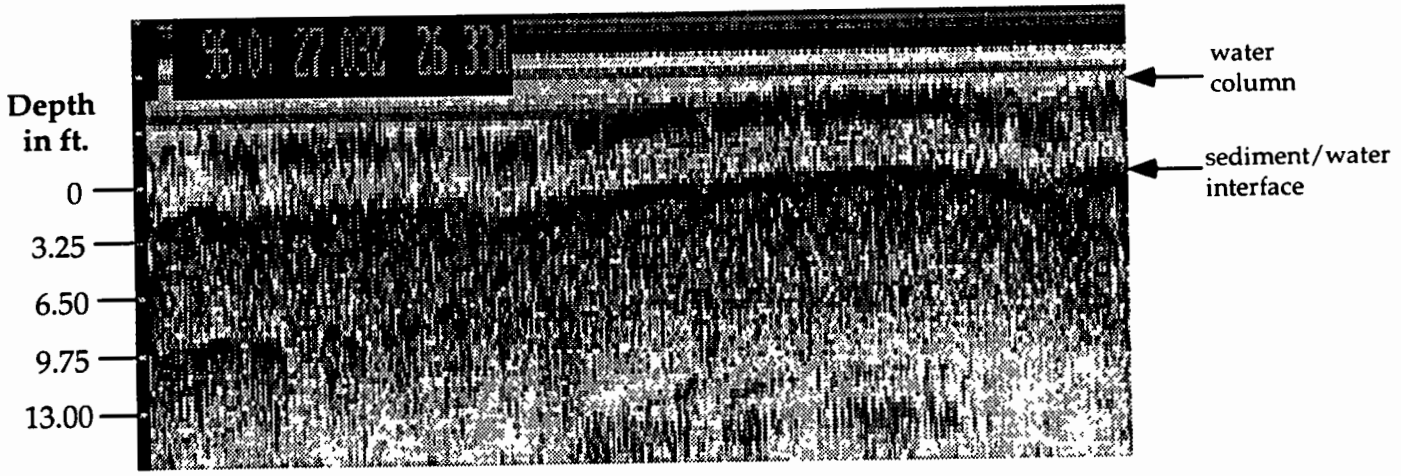


Primary Lithology

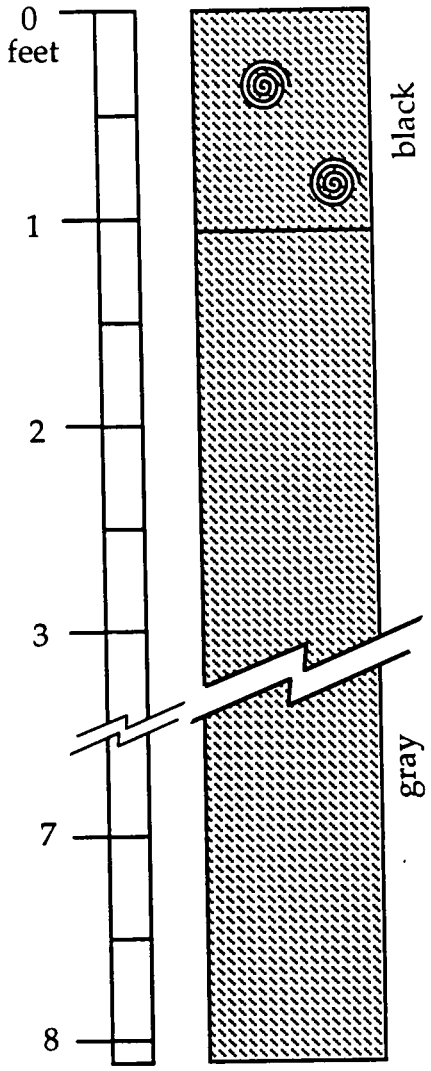
- clay
- silt
- sand

Secondary Lithology

- peat
- sand
- silt
- clay
- shell fragments



Vibracore V-11

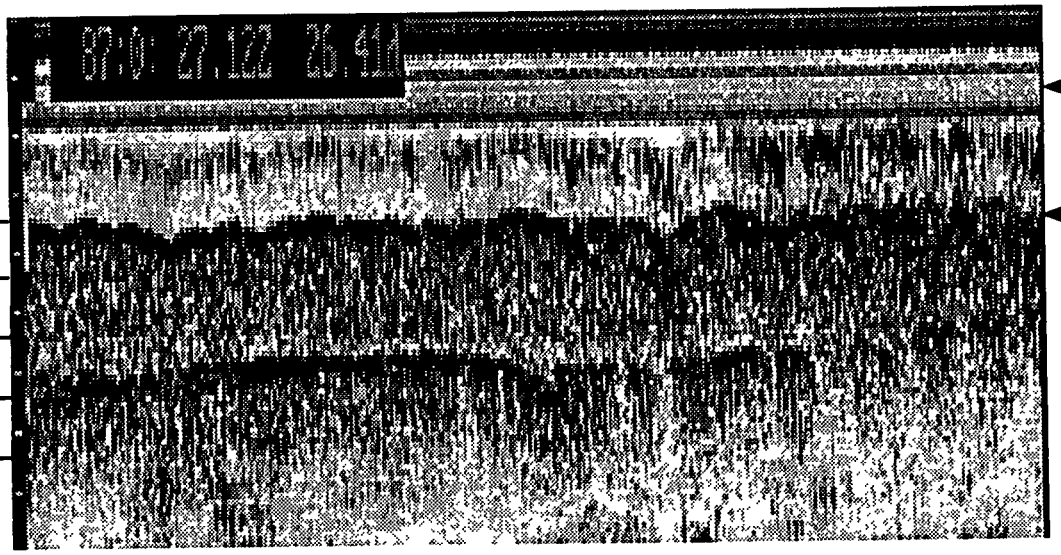


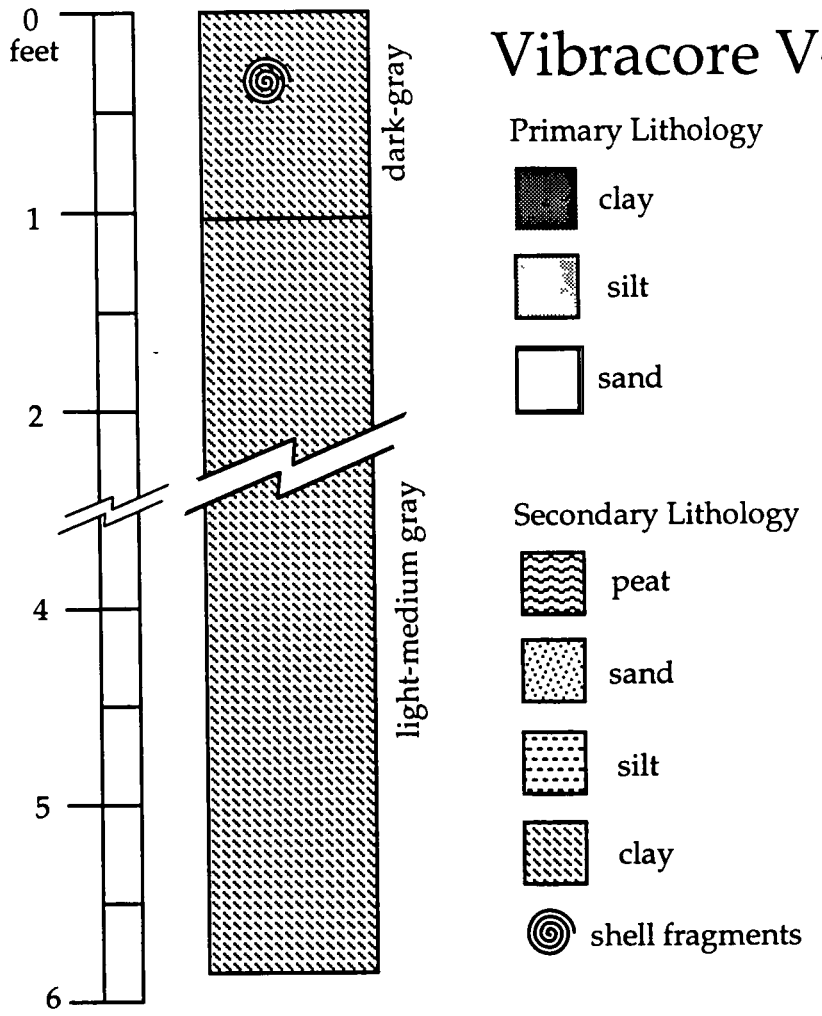
Primary Lithology

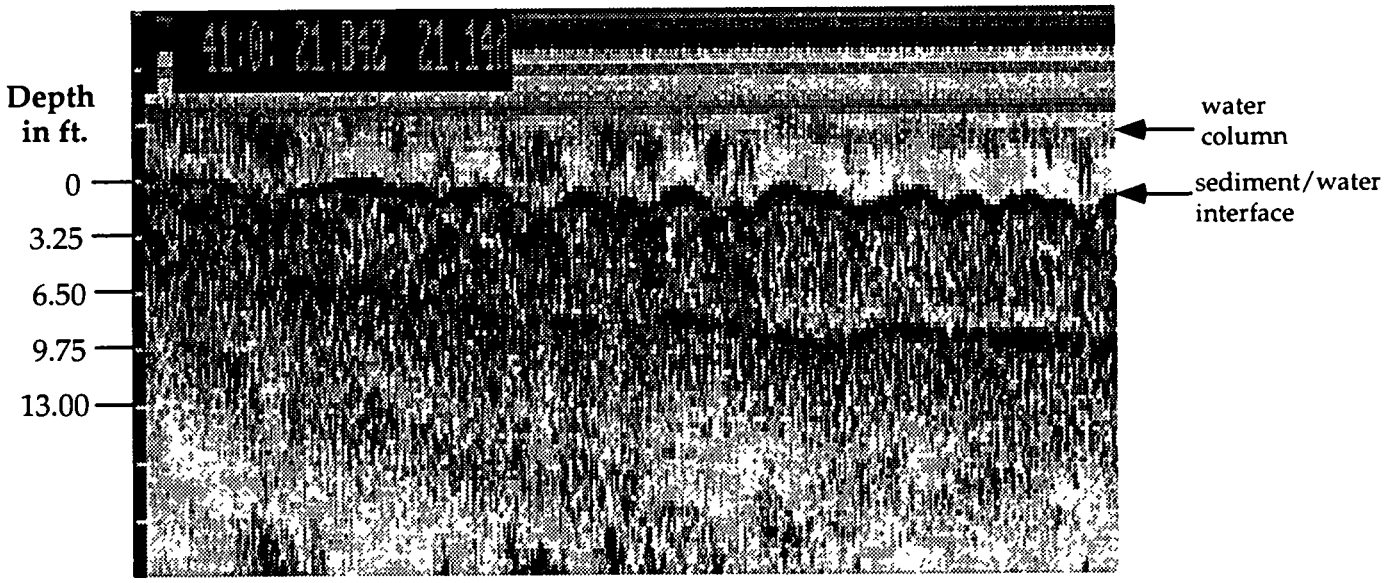
- clay
- silt
- sand

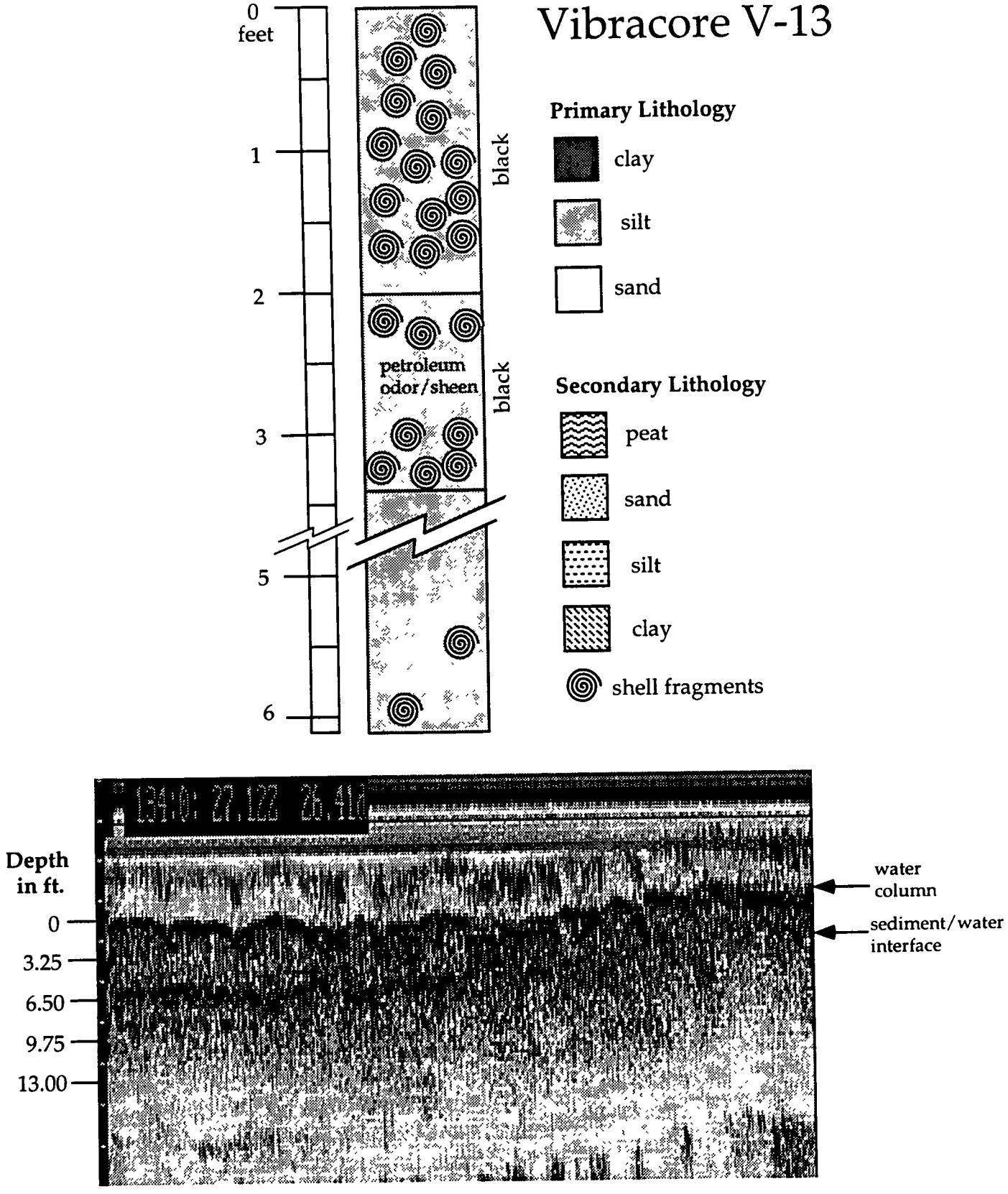
Secondary Lithology

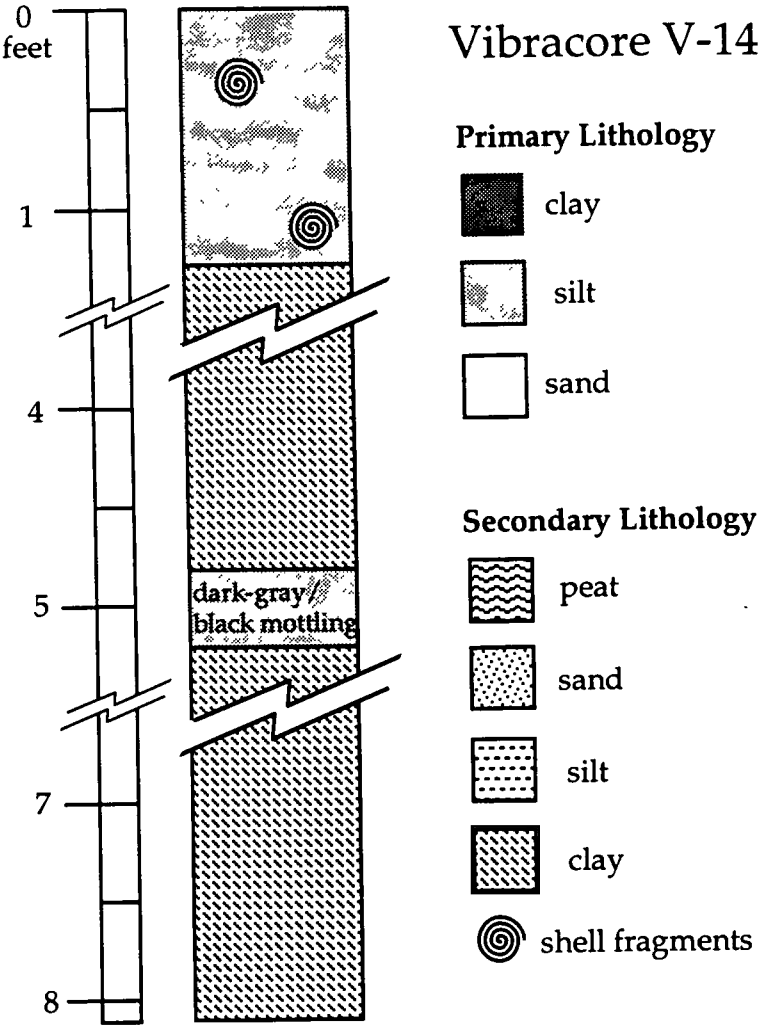
- peat
- sand
- silt
- clay
- shell fragments

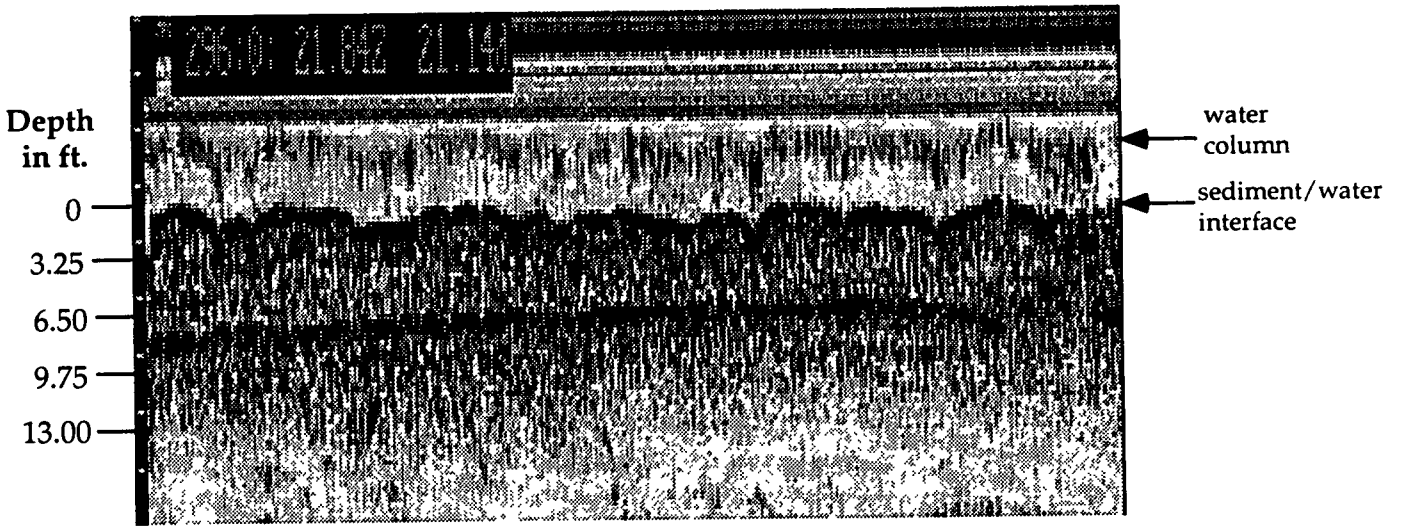



0
feet
1
2
4
5
6
dark-gray
light-medium gray
Vibracore V-12
Primary Lithology
clay
silt
sand
Secondary Lithology
peat
sand
silt
clay
shell fragments

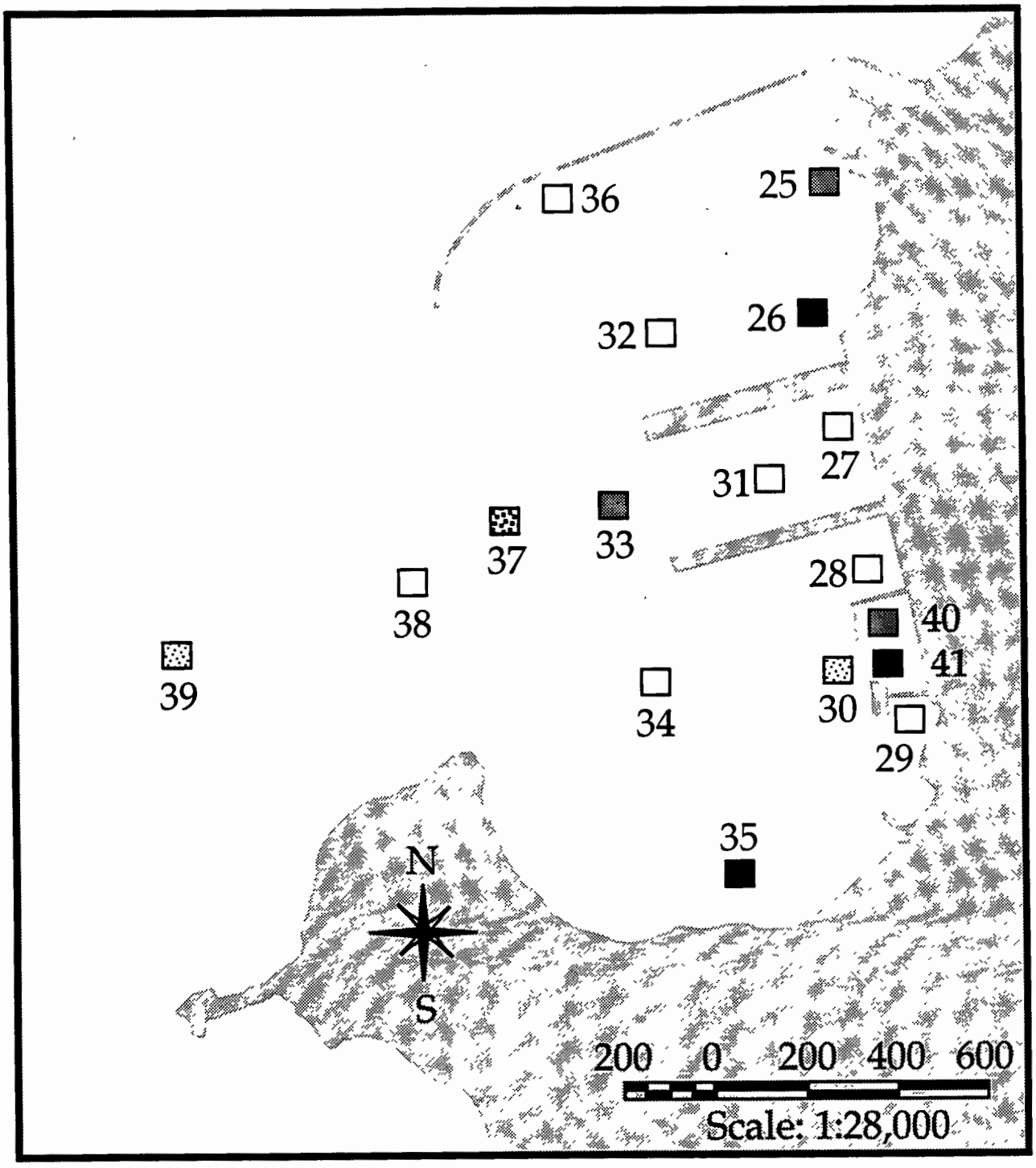

Depth
in ft.
0
3.25
6.50
9.75
13.00
water
column
sediment/water
interface


Vibracore V-13
0
feet
1
2
3
5
6
black
petroleum
odor/sheen
black
Primary Lithology
clay
silt
sand
Secondary Lithology
peat
sand
silt
clay
shell fragments
Depth
in ft.
0
3.25
6.50
9.75
13.00
water
column
sediment/water
interface


0
feet
1
4
5
7
8
dark-gray/
black mottling
Vibracore V-14
Primary Lithology
clay
silt
sand
Secondary Lithology
peat
sand
silt
clay
shell fragments


Depth
in ft.
0
3.25
6.50
9.75
13.00
water
column
sediment/water
interface

Derecktor Shipyard/Coddington Cove
Grain Size: % Sand



< 20% sand

20 - 40% sand

40 - 60% sand

60 - 80 % sand

> 80% sand

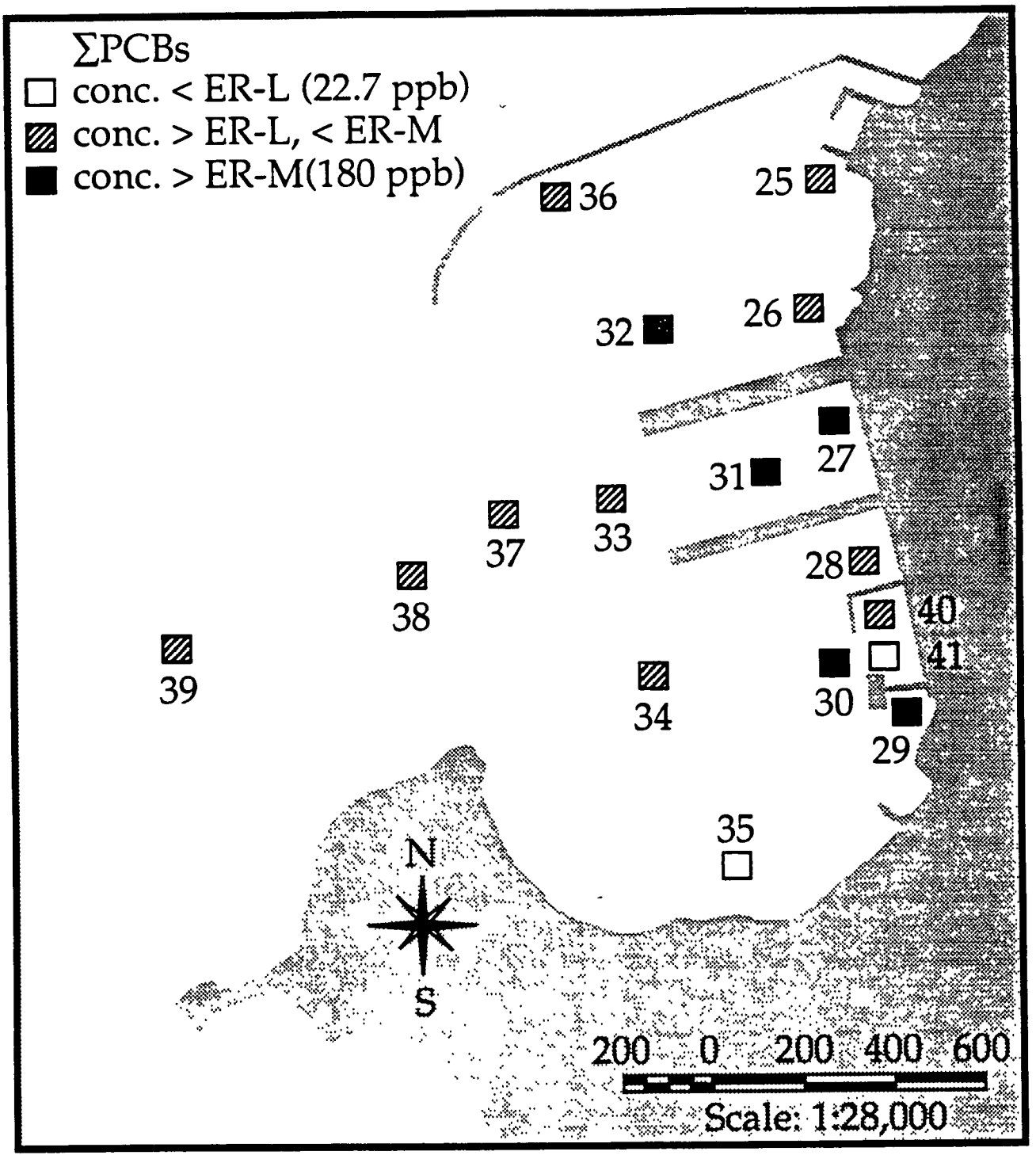


Figure 1a. Concentration (ng/g dry wt. sediment) of ΣPCBs in surface sediments (0-18cm) from Derecktor Shipyard/Coddington Cove.

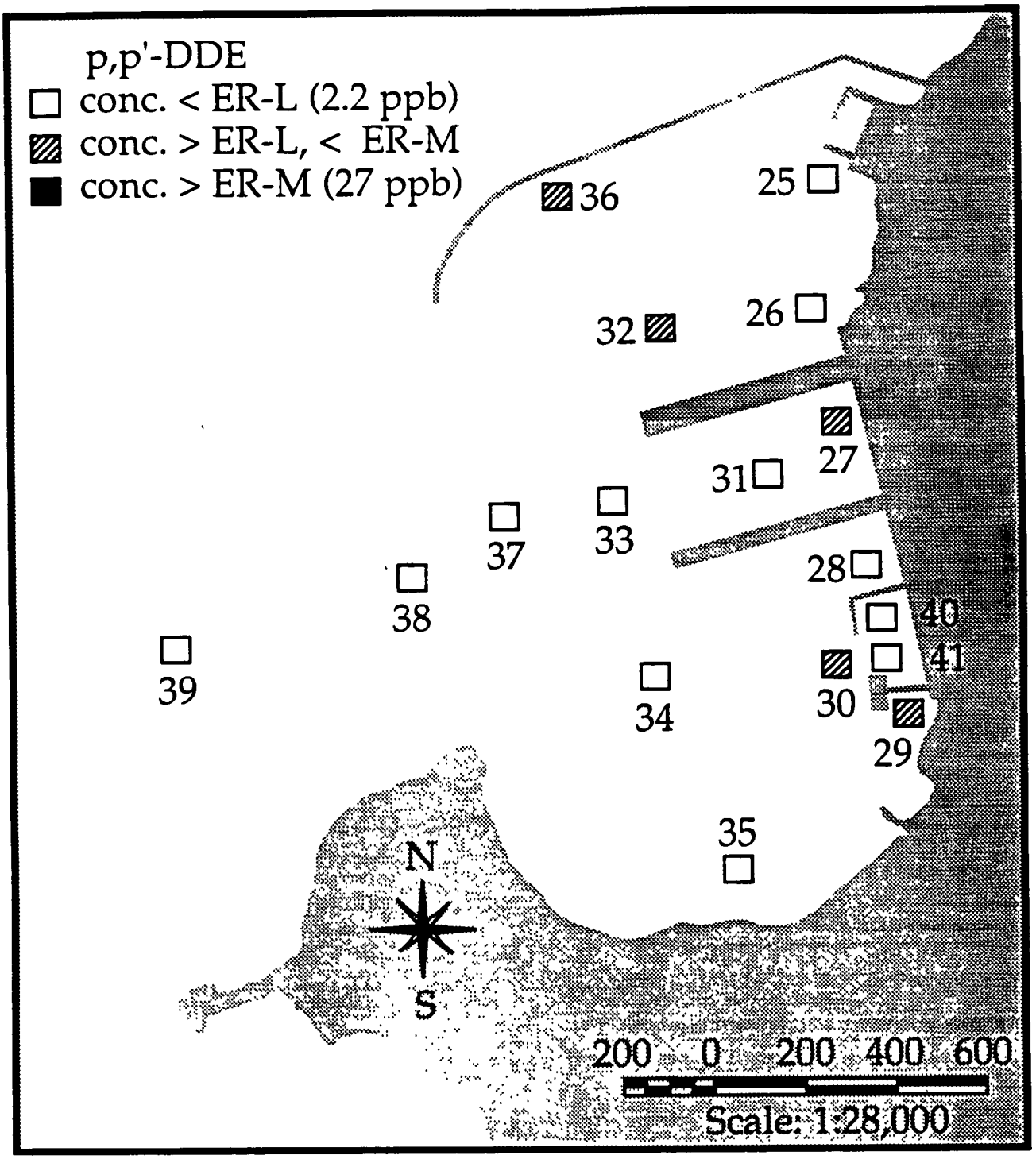


Figure 1b. Concentration (ng/g dry wt. sediment) of p,p'-DDE in surface sediments (0-18cm) from Derecktor Shipyard/Coddington Cove.

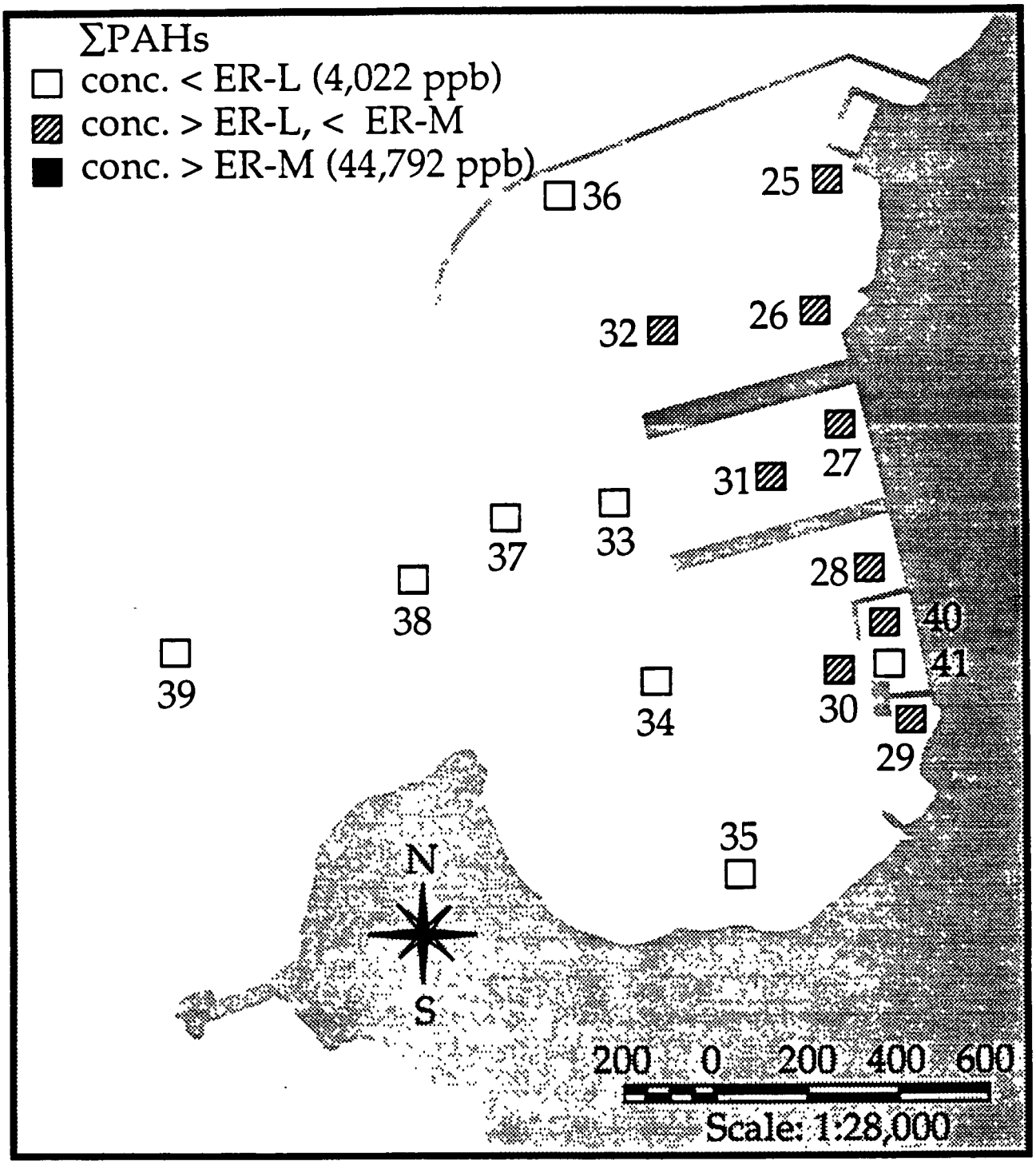


Figure 1c. Concentration (ng/g dry wt. sediment) of ΣPAHs in surface sediments (0-18cm) from Derecktor Shipyard/Coddington Cove.

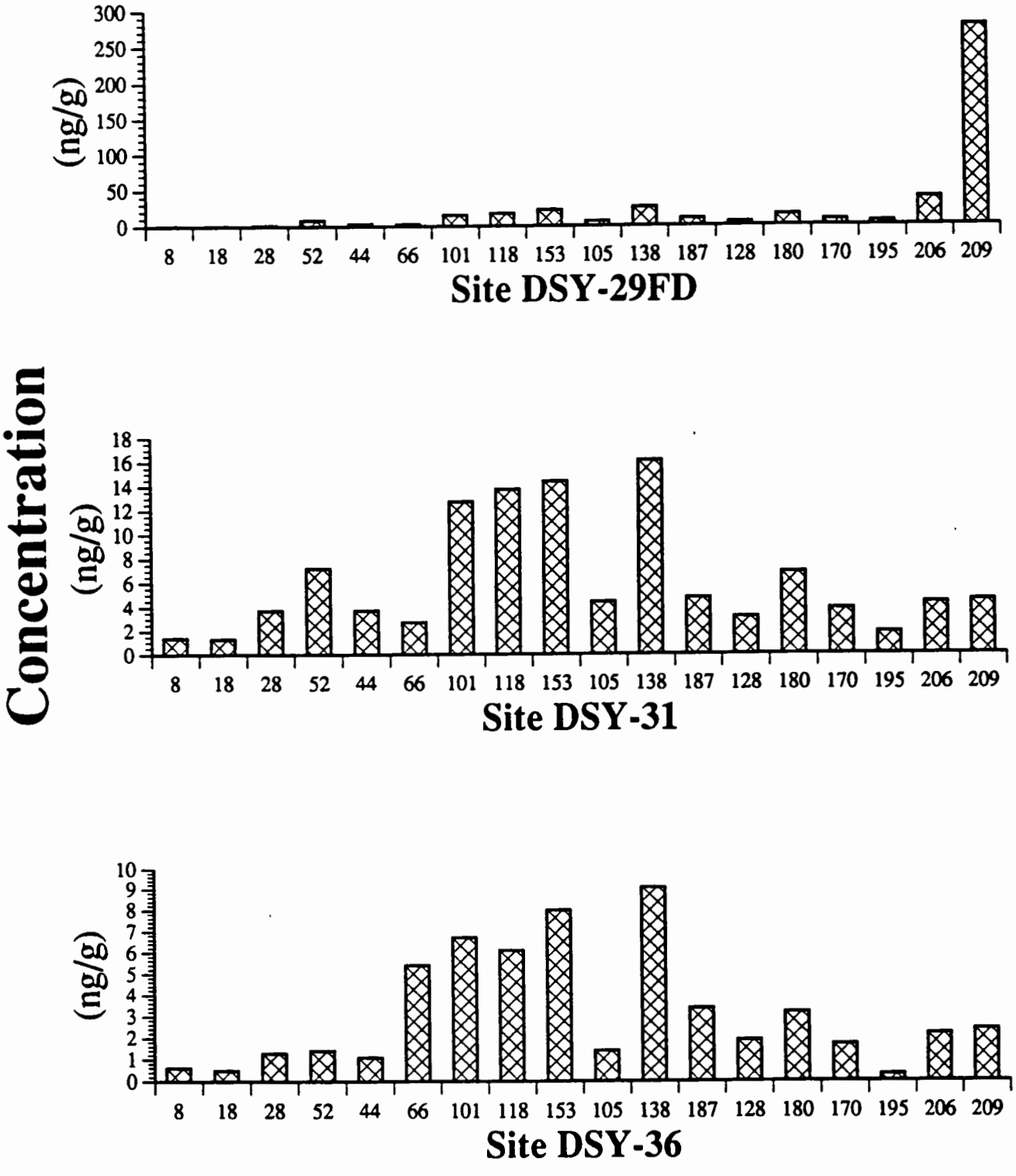


Figure 3. Concentration (ng/g dry wt. sediment) of PCB congeners in surface sediments(0-18cm) from Derecktor Shipyard.

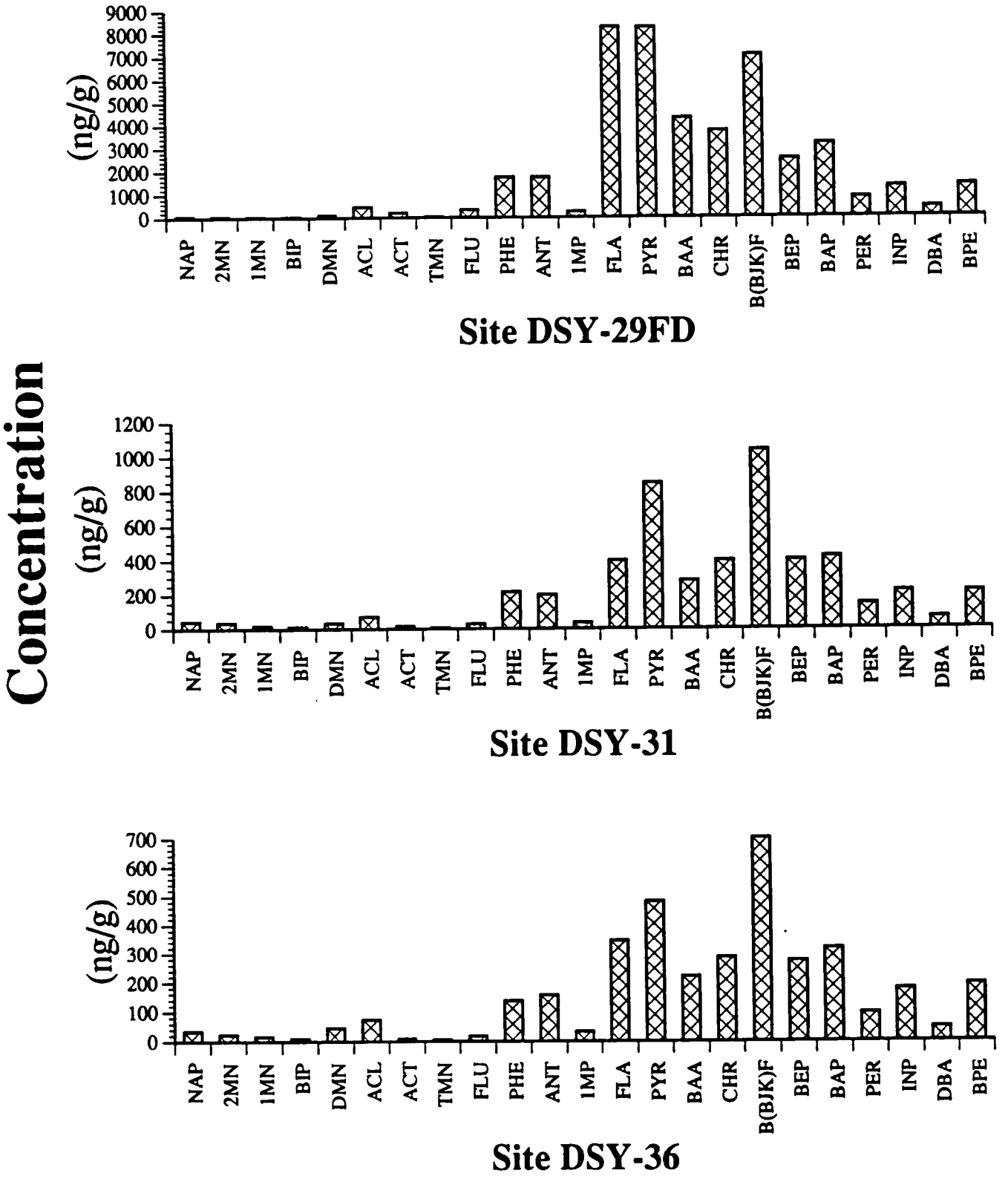


Figure 4. Concentration (ng/g dry wt. sediment) of PAH components in surface sediments(0-18cm) from Derecktor Shipyard.

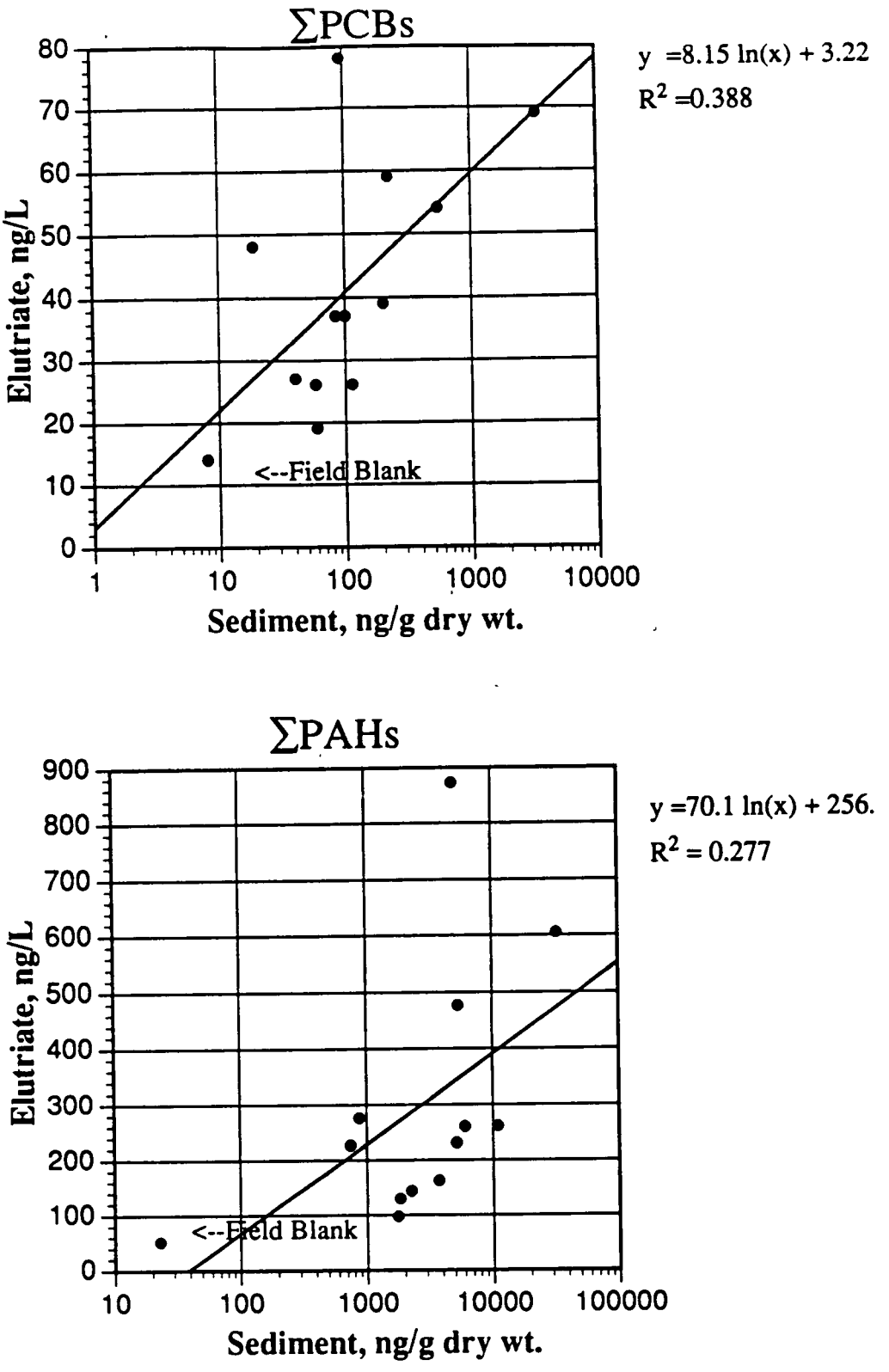


Figure x.2-13. Plot of ΣPCBs and ΣPAHs in elutriate versus surface sediments(0-18cm) from twelve Derecktor Shipyard sites and one field blank.

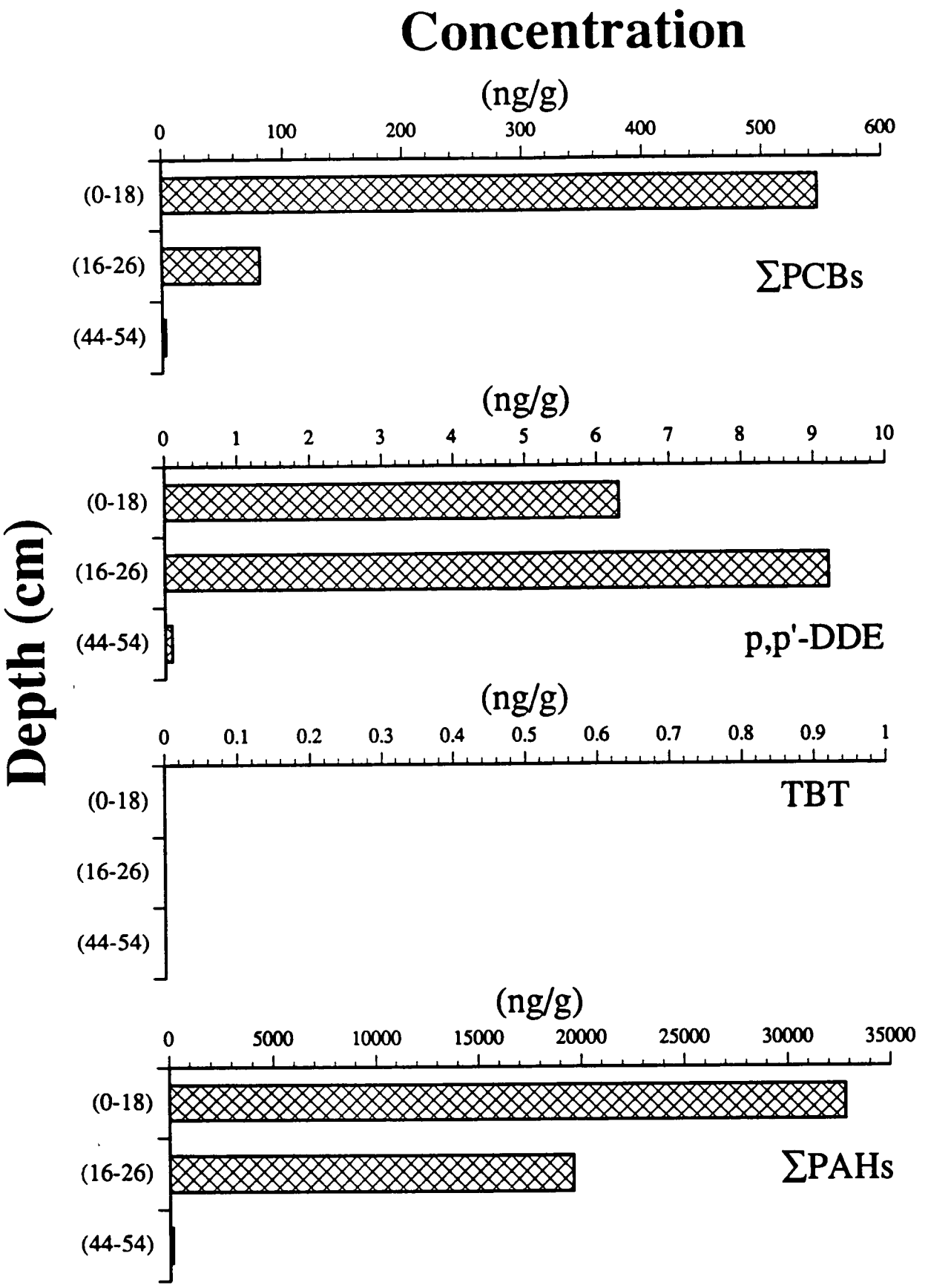


Figure 6. Concentration (ng/g dry wt. sediment) of organic contaminants in Site DSY-29 sediment core from Derecktor Shipyard.

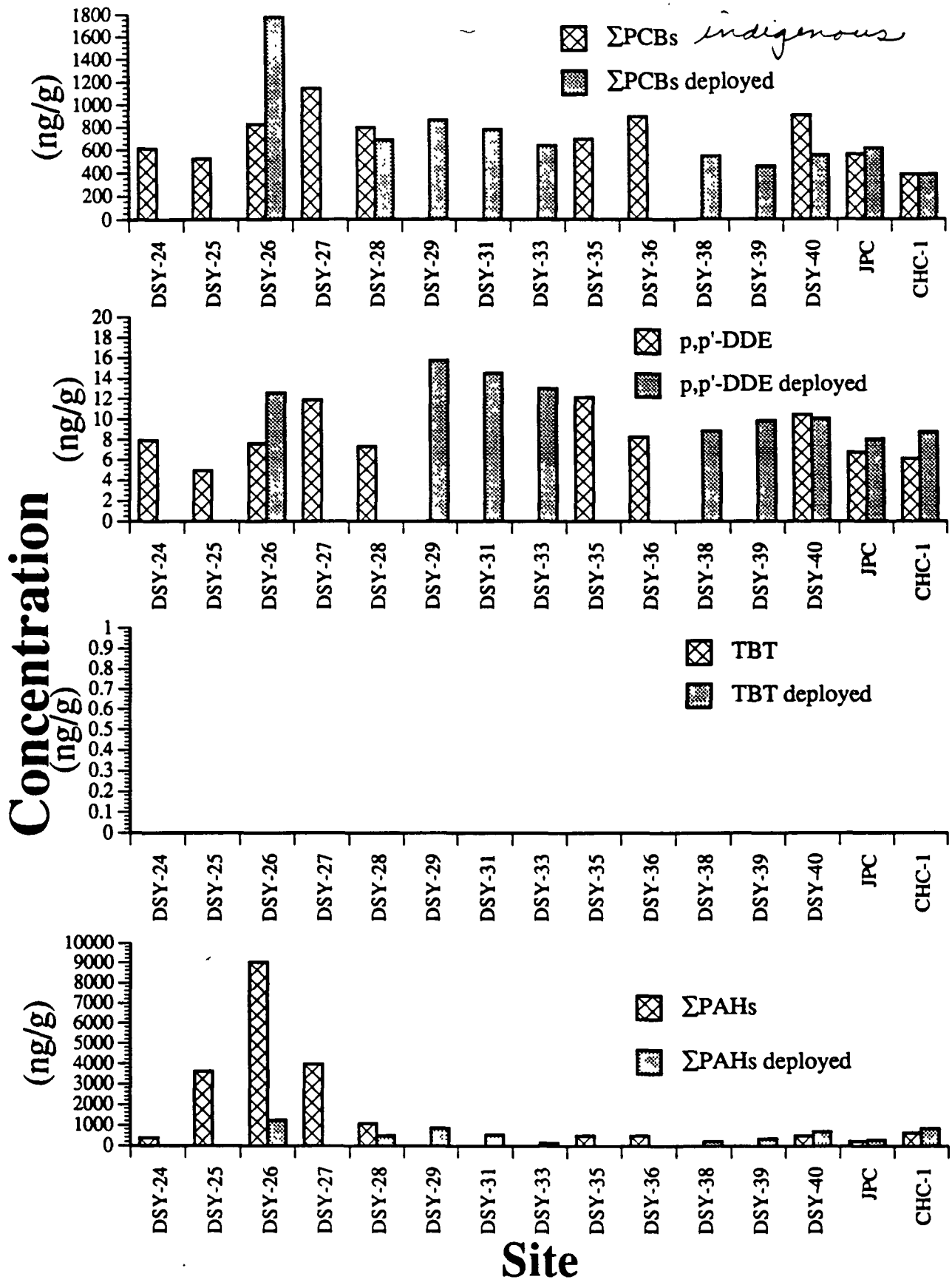


Figure 9. Concentration (ng/g dry wt. tissue) of organic contaminants in indigenous and deployed blue mussels from Derecktor Shipyard.

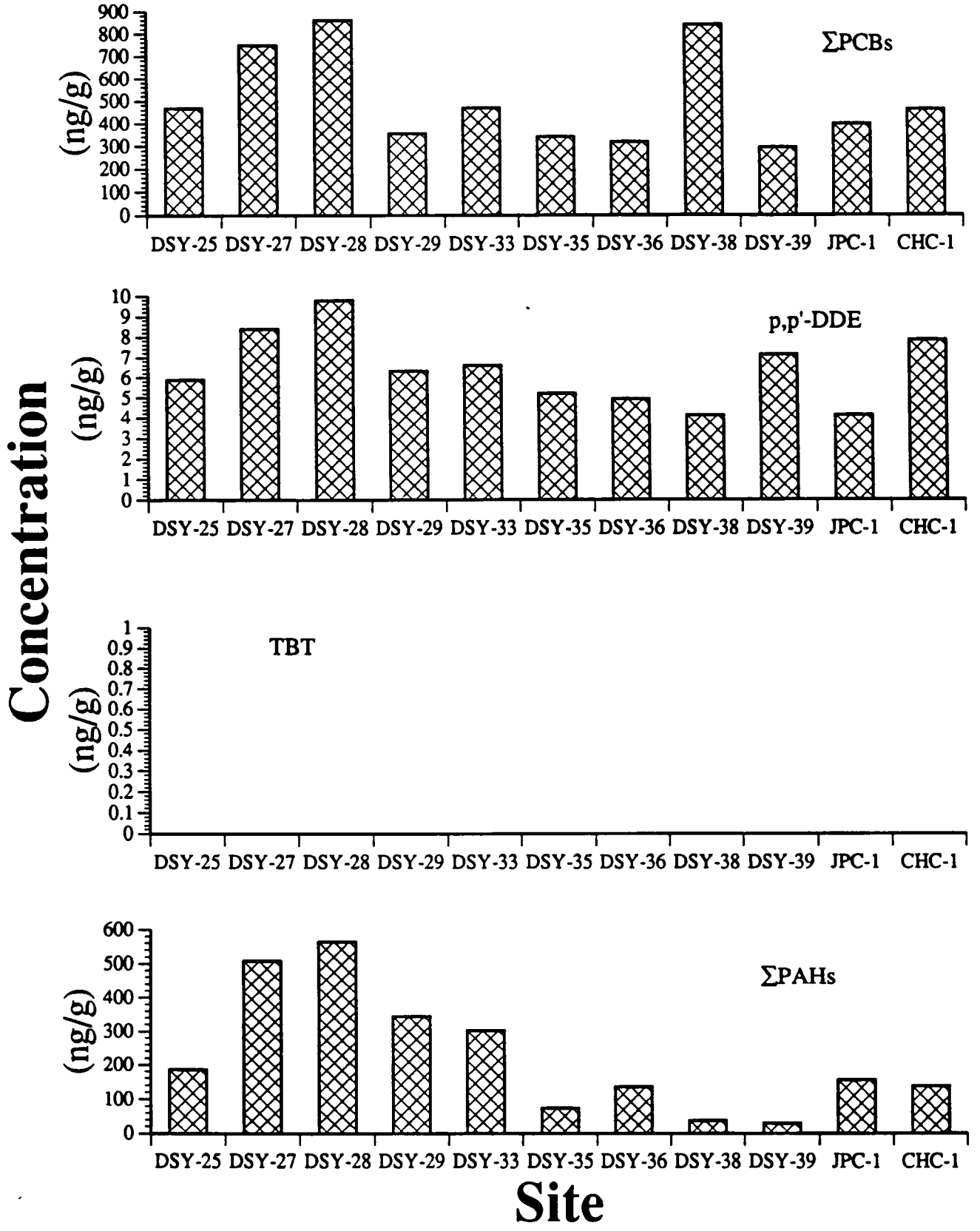


Figure 12. Concentration (ng/g dry wt. tissue) of organic contaminants in lobster muscle tissue from Derecktor Shipyard.

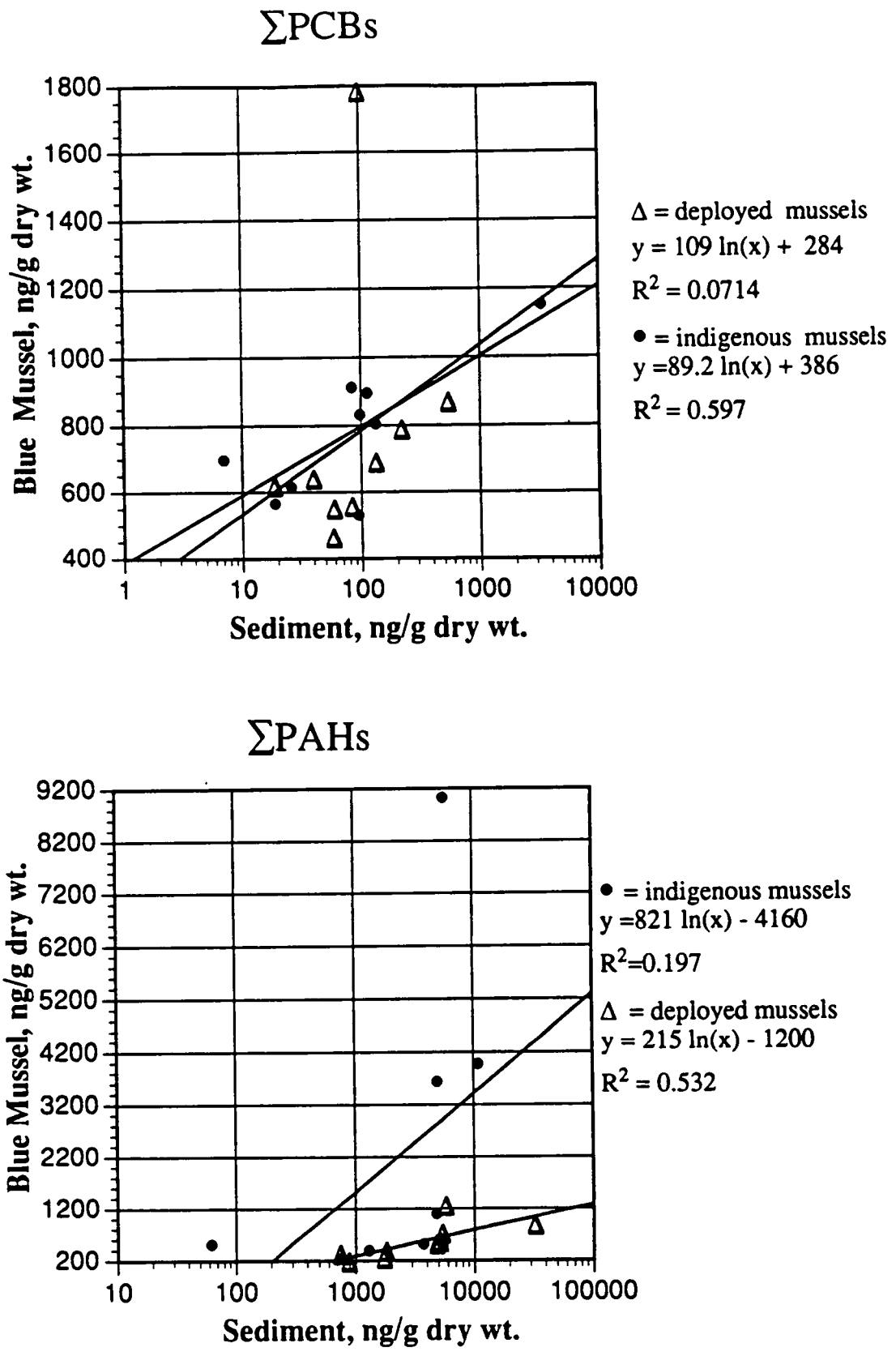


Figure x.2-15. Plot of ΣPCBs and ΣPAHs in nine indigenous and nine deployed blue mussels versus surface sediments from Derecktor Shipyard sites.

Conclusions for Organic Contaminants at Derecktor Shipyard

1) For surface sediments:

   - The highest concentrations of PCBs (>ERM) and pp'-DDE (>ERL) were found at stations DSY-27 to DSY-32,

   - Stations DSY-29 (>ERM), DSY-27 (>ERL) and DSY-30 (>ERL) had the highest level of PAHs,

   - Stations DSY-28 and DSY-29 had the highest concentrations of TBT.

2) The qualitative distribution of PCB congeners in surface sediments was similar at most stations and consisted mainly of CBs with 3 to 6 chlorine atoms. Station DSY-29 was unique in that the major congener was CB-209.

3) PAH distribution in surface sediments were about the same at all stations and were dominated by 3 to 5 ring aromatics. The chromatographic distribution of components indicated that the source was used crankcase oil and/or weathered petroleum products.

4) Concentrations of contaminants in elutriate samples generally followed the trends of the corresponding surface sediments. Only the PCBs exceeded the saltwater chronic criteria of 30 ng/L.

5) The levels of all contaminants generally decreased with depth in sediment core from surface sections (0-18cm) to depths of 130-140 cm. In some cases there was a subsurface maximum concentration at anywhere from 16-26cm to 76-86cm.

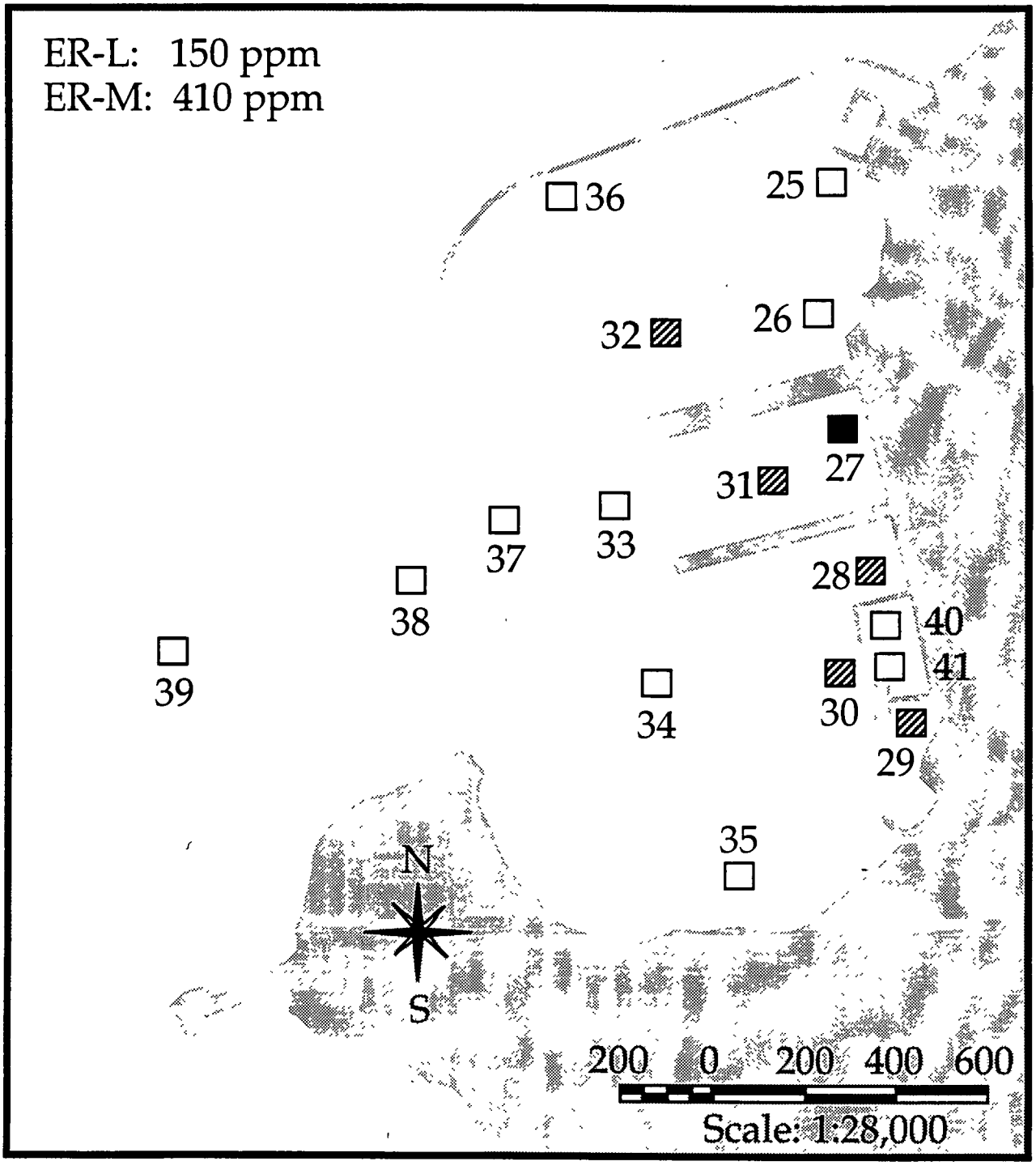
6) Concentrations of contaminants in deployed and indigenous blue mussels from the same station were in fairly good agreement with the exception of station DSY-26. Highest values for all mussels were usually observed at stations DSY-26 to DSY-33. Clam samples had generally lower concentrations than the mussels; and highest clam values were at stations DSY-31, DSY-32 and DSY-36.

7) Fish samples had considerable amounts of PCBs and pp'-DDE.

8) Lobster muscle samples had highest levels of PCBs and pp'-DDE at stations DSY-27 and DSY-28.

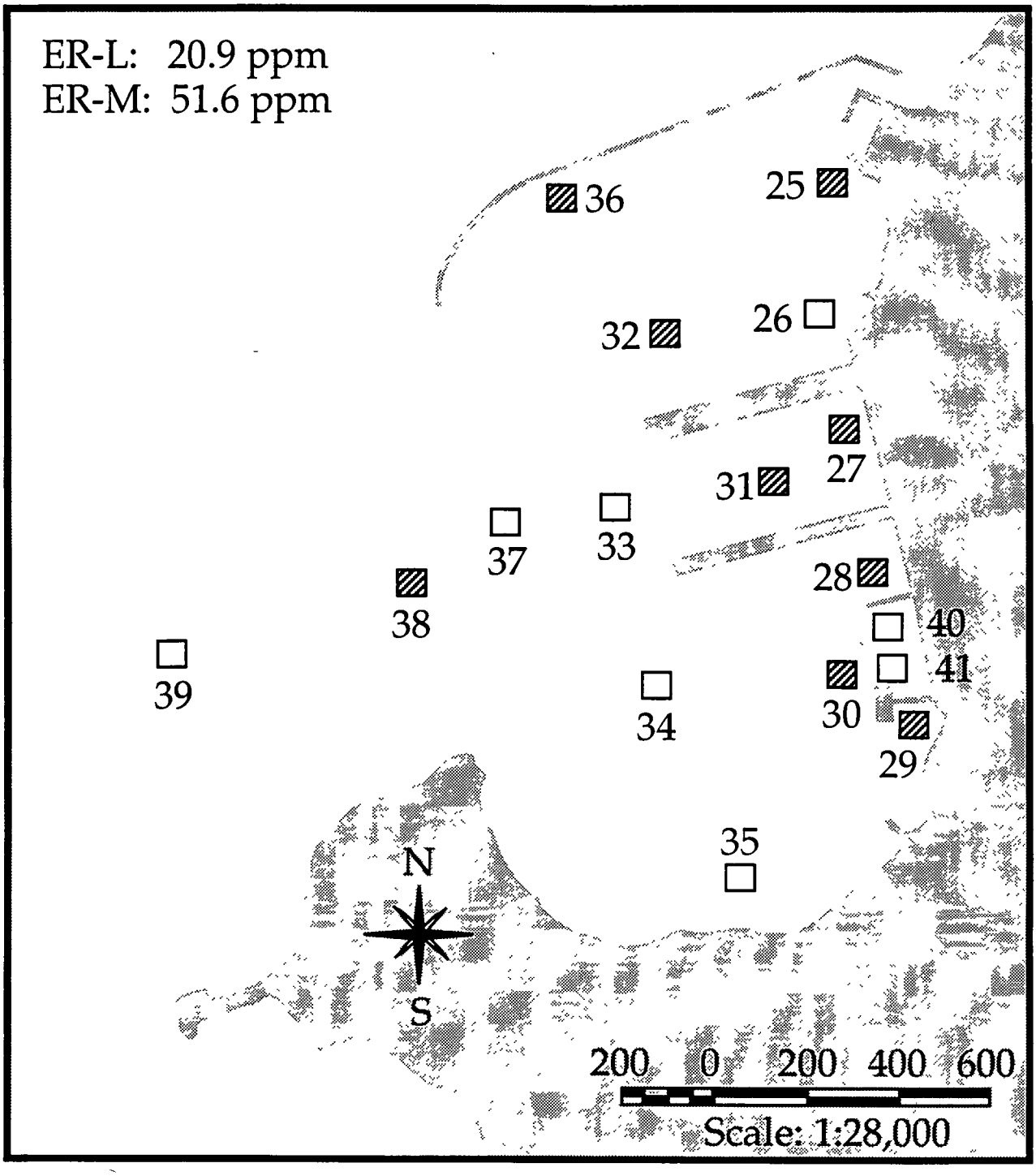
9) Concentrations of PCBs in indigenous mussels and PAHs in deployed mussels followed the trends of the corresponding surface sediments.

Derecktor Shipyard/Coddington Cove
Concentration of Zinc in Sediments



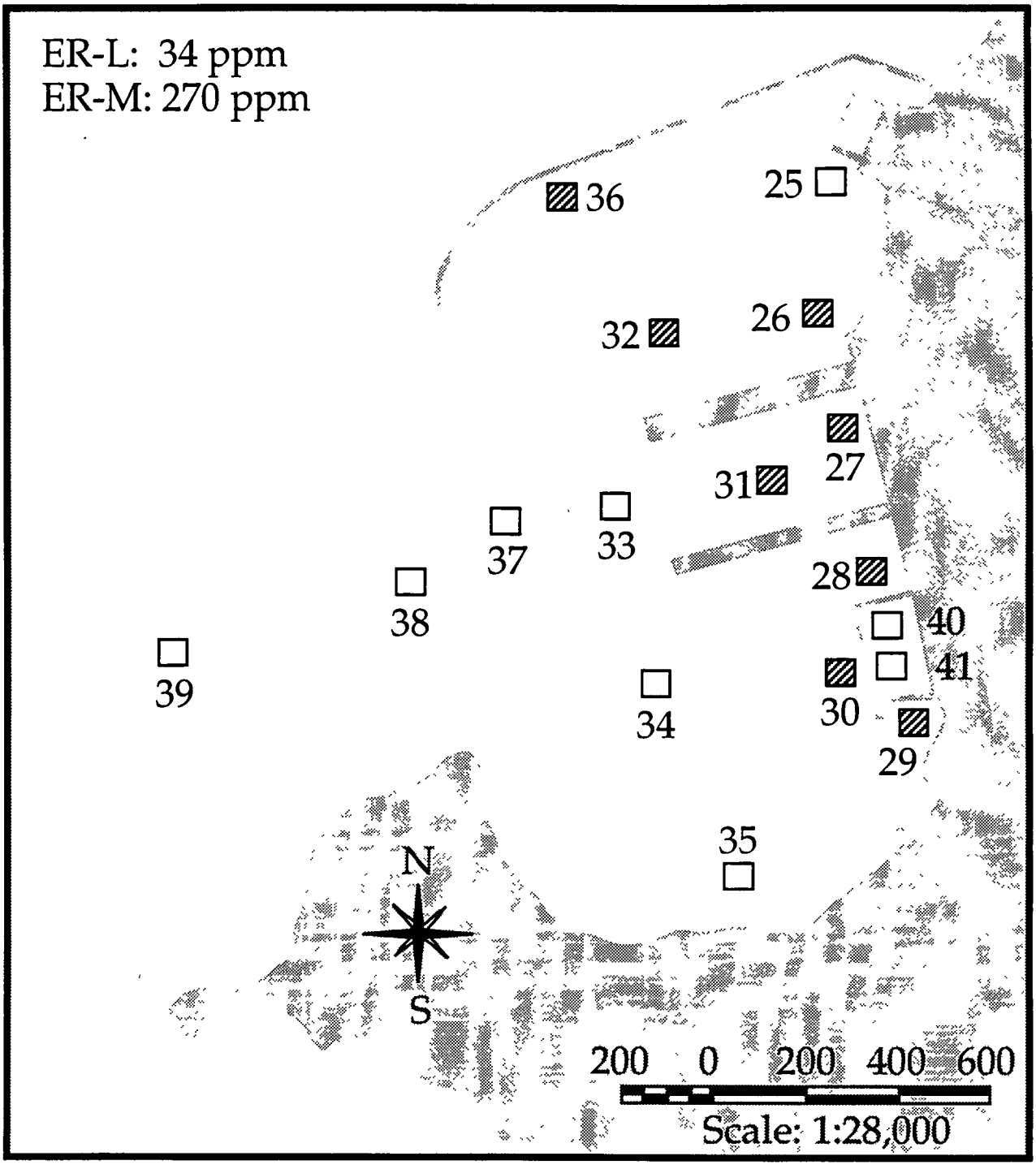
□ concentration less than ER-L
▨ concentration greater than ER-L but less than ER-M
■ concentration greater than ER-M

Derecktor Shipyard/Coddington Cove
Concentration of Nickel in Sediments



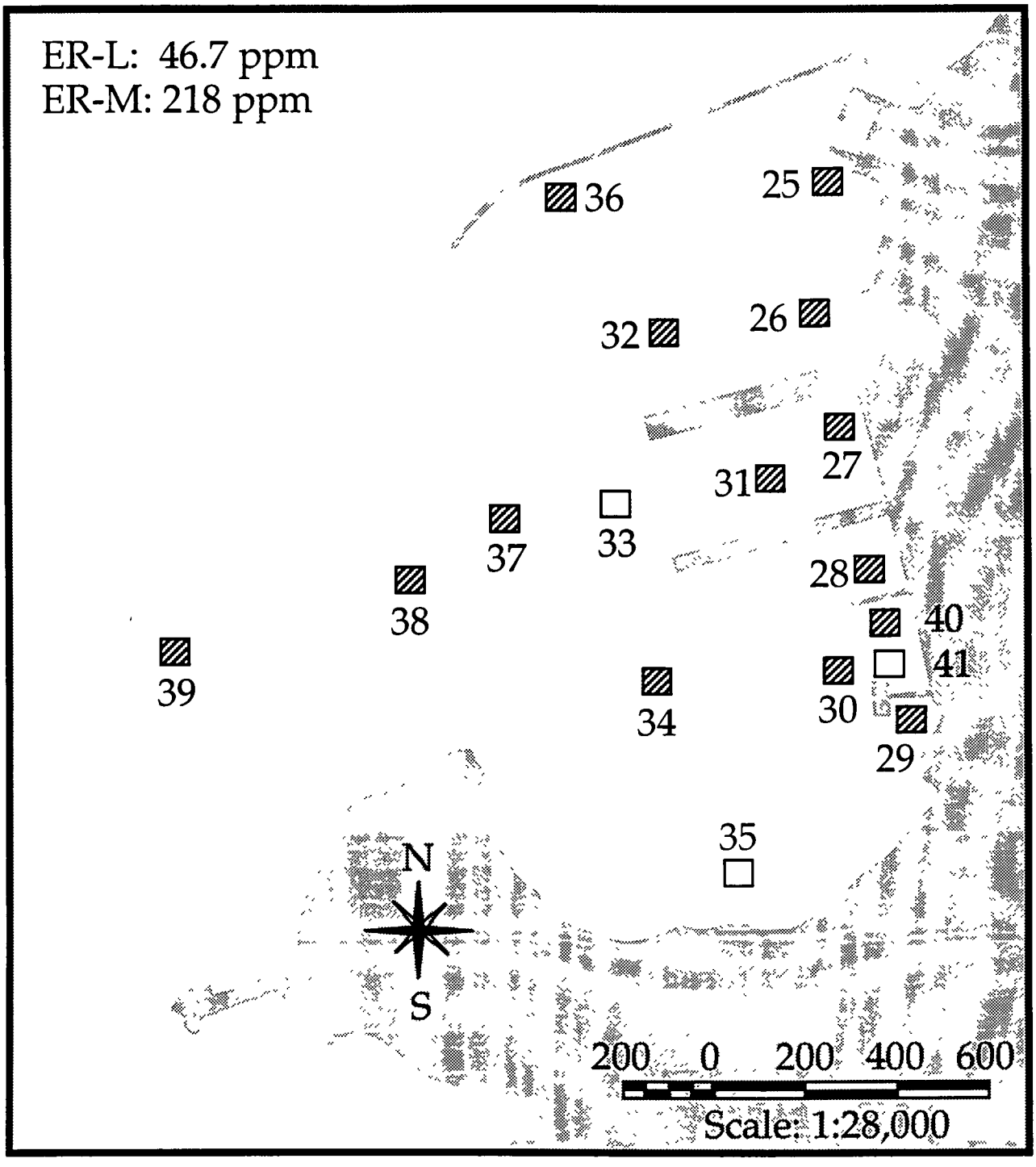
☐ concentration less than ER-L
▨ concentration greater than ER-L but less than ER-M
■ concentration greater than ER-M

Derecktor Shipyard/Coddington Cove
Concentration of Copper in Sediment



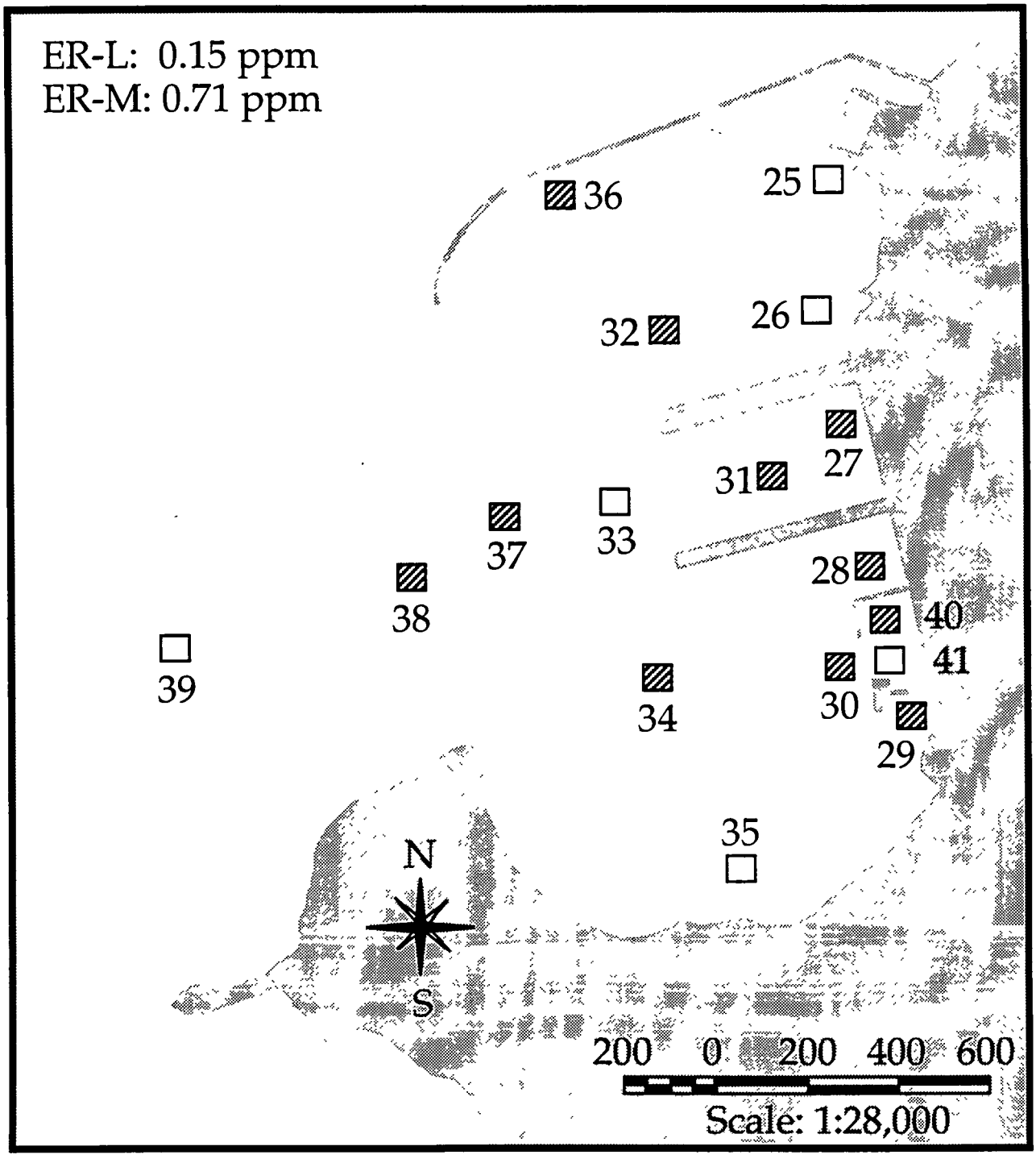
□ concentration less than ER-L
▨ concentration greater than ER-L but less than ER-M
■ concentration greater than ER-M

Derecktor Shipyard/Coddington Cove
Concentration of Lead in Sediments



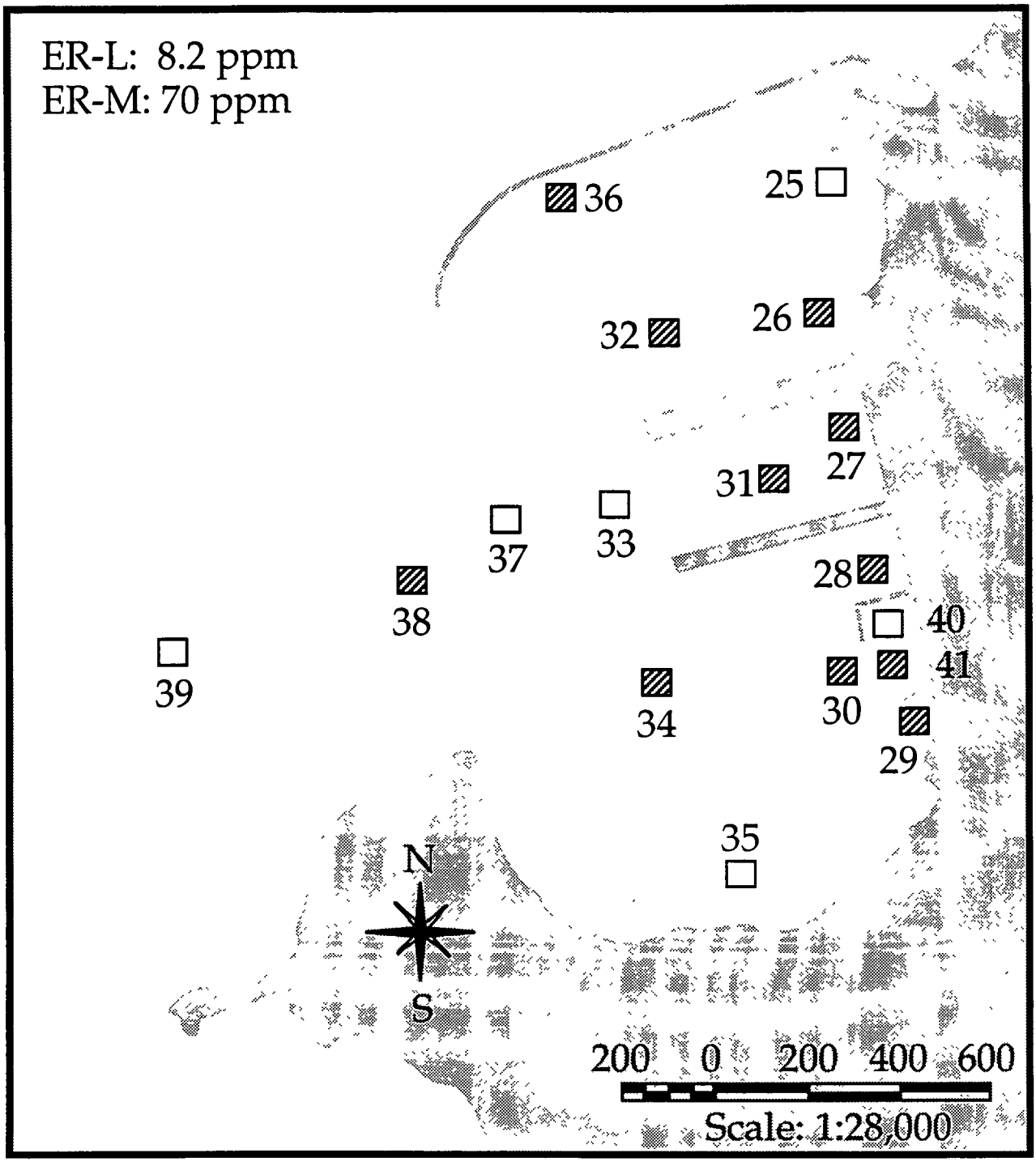
□ concentration less than ER-L
▨ concentration greater than ER-L but less than ER-M
■ concentration greater than ER-M

Derecktor Shipyard/Coddington Cove
Concentration of Mercury in Sediments



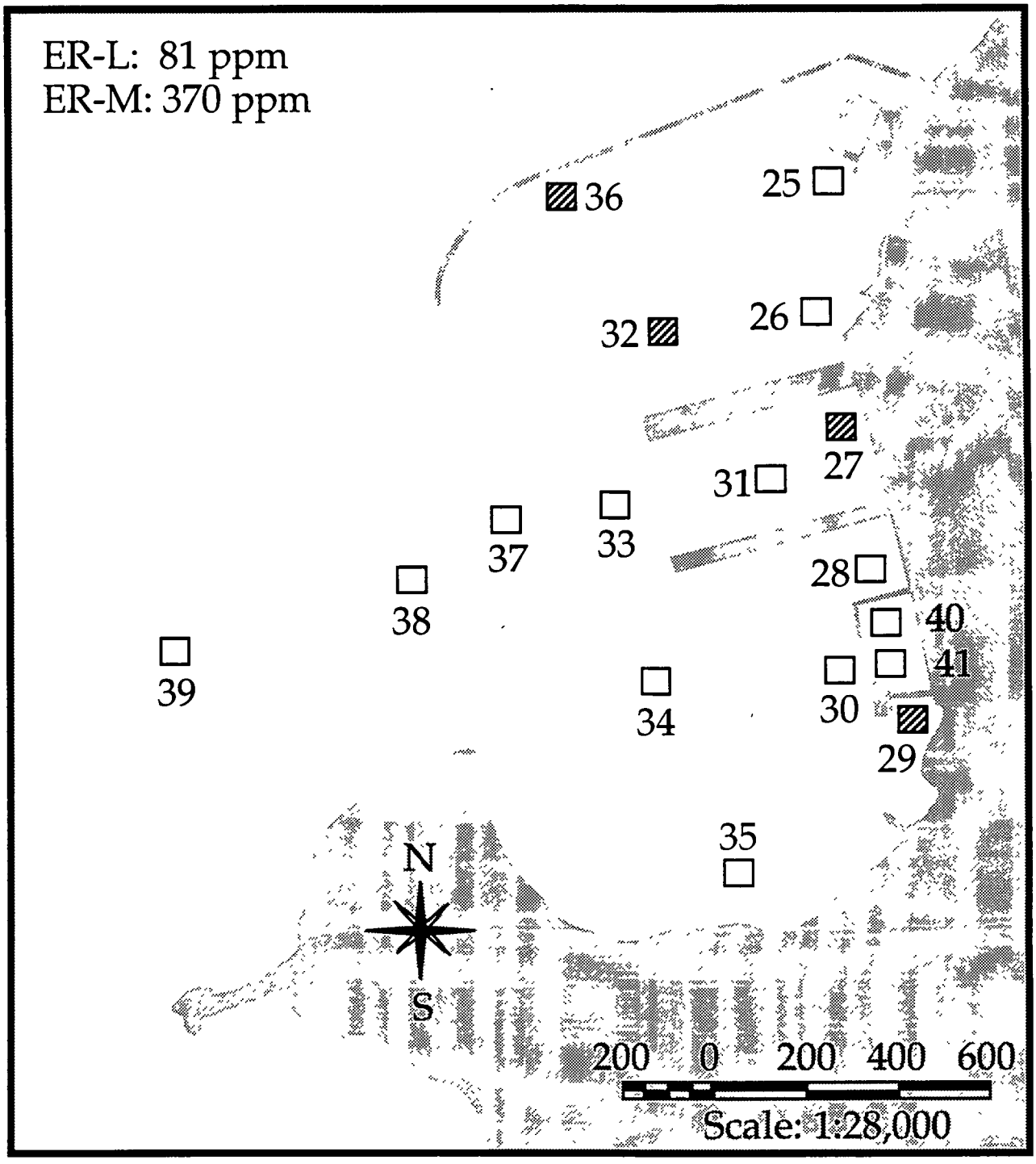
□ concentration less than ER-L
▨ concentration greater than ER-L but less than ER-M
■ concentration greater than ER-M

Derecktor Shipyard/ Coddington Cove
Concentration of Arsenic in Sediments



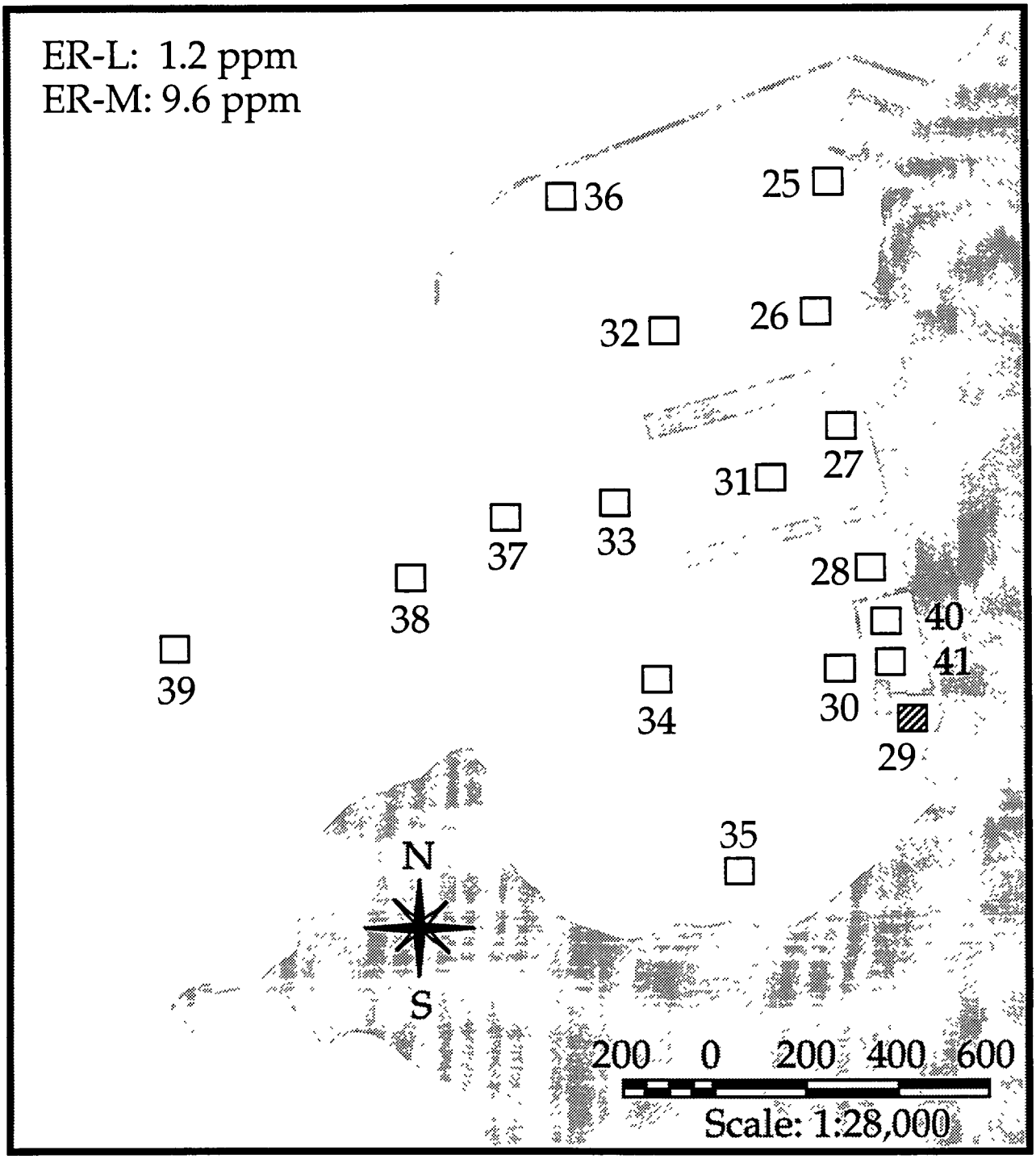
□ concentration less than ER-L
▨ concentration greater than ER-L but less than ER-M
■ concentration greater than ER-M

Derecktor Shipyard/Coddington Cove
Concentration of Chromium in Sediments



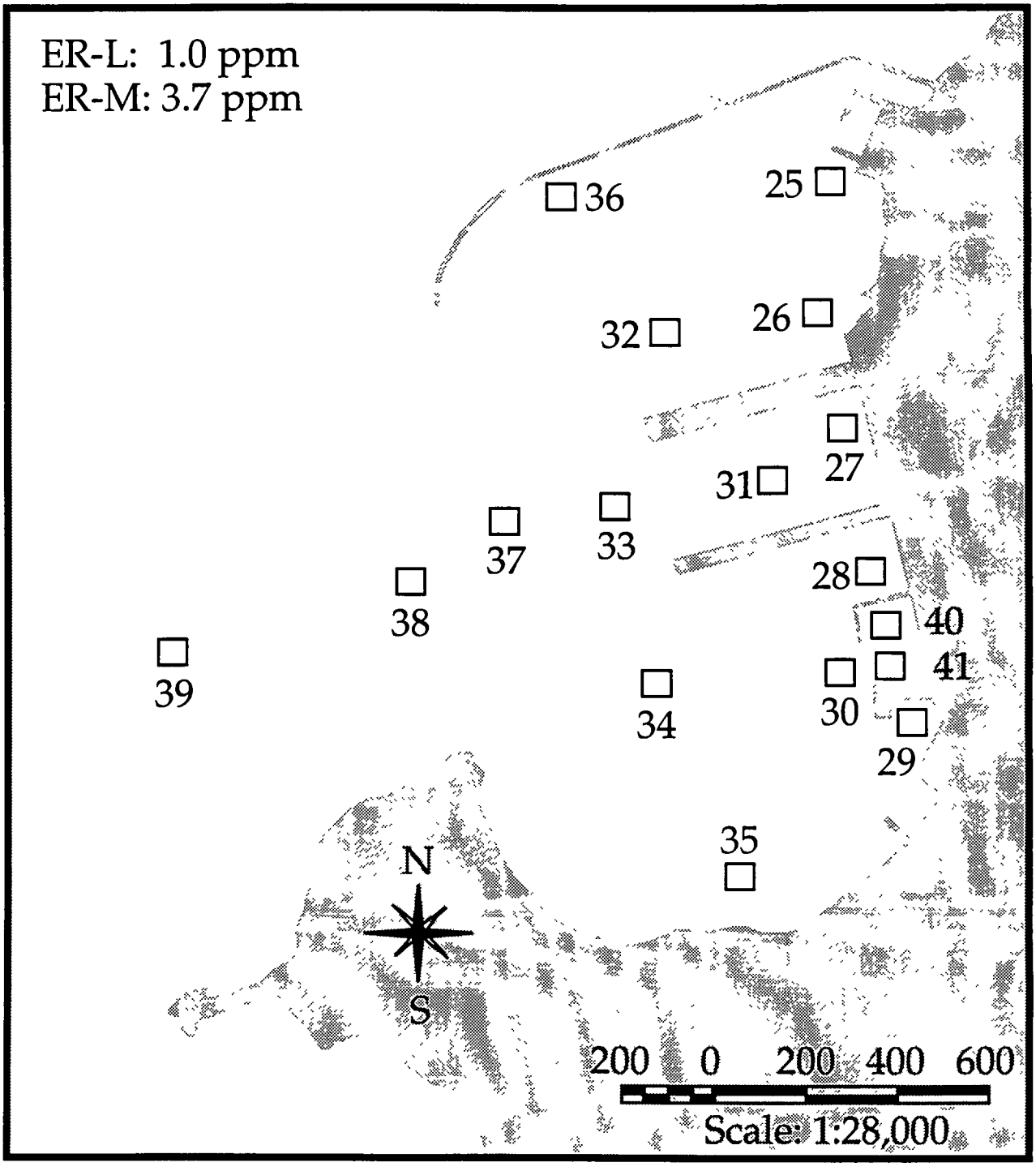
□ concentration less than ER-L
▨ concentration greater than ER-L but less than ER-M
■ concentration greater than ER-M

Derecktor Shipyard/Coddington Cove
Concentration of Cadmium in Sediments



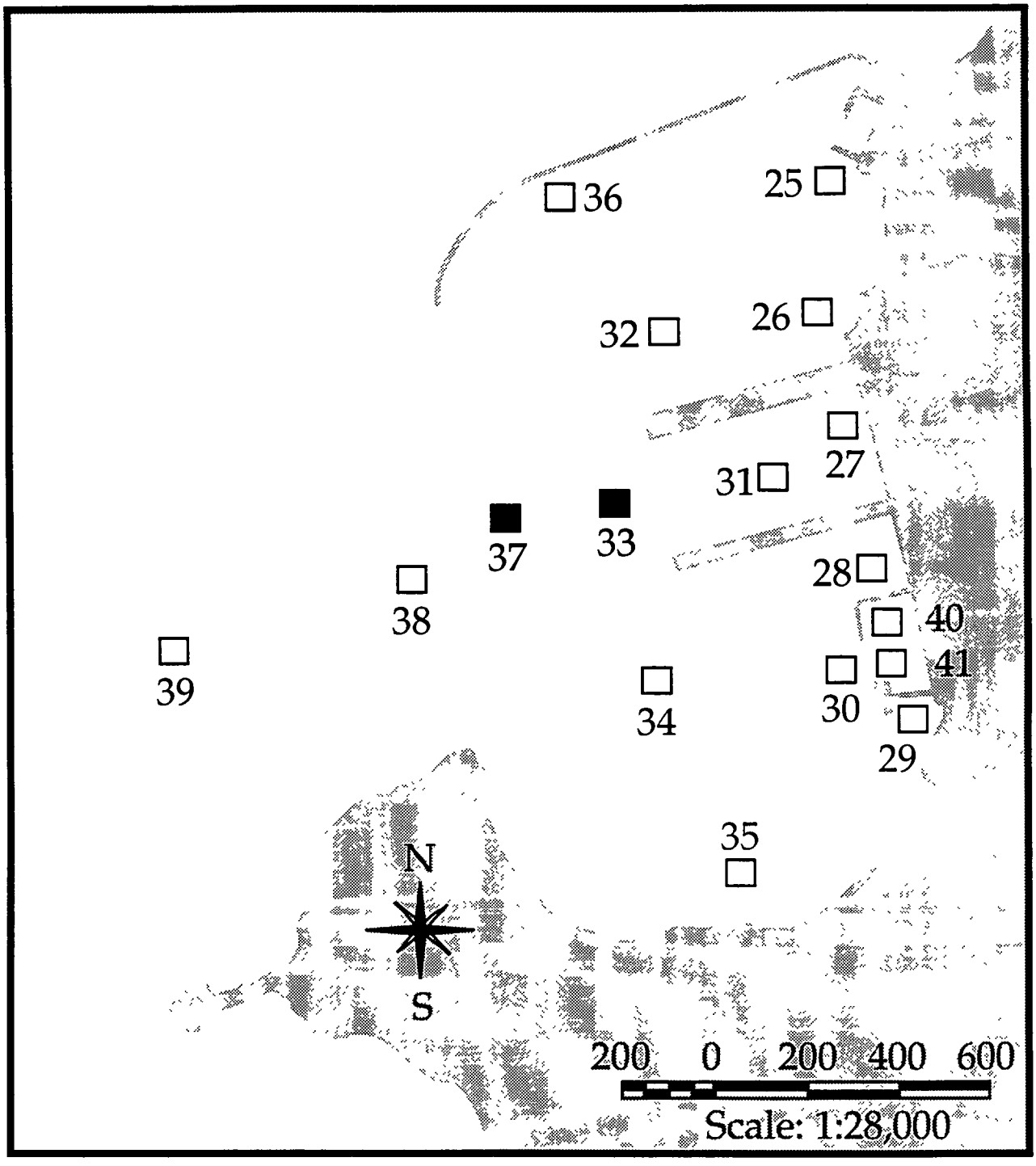
☐ concentration less than ER-L
▨ concentration greater than ER-L but less than ER-M
■ concentration greater than ER-M

Derecktor Shipyard/Coddington Cove
Concentration of Silver in Sediments



□ concentration less than ER-L
▨ concentration greater than ER-L but less than ER-M
■ concentration greater than ER-M

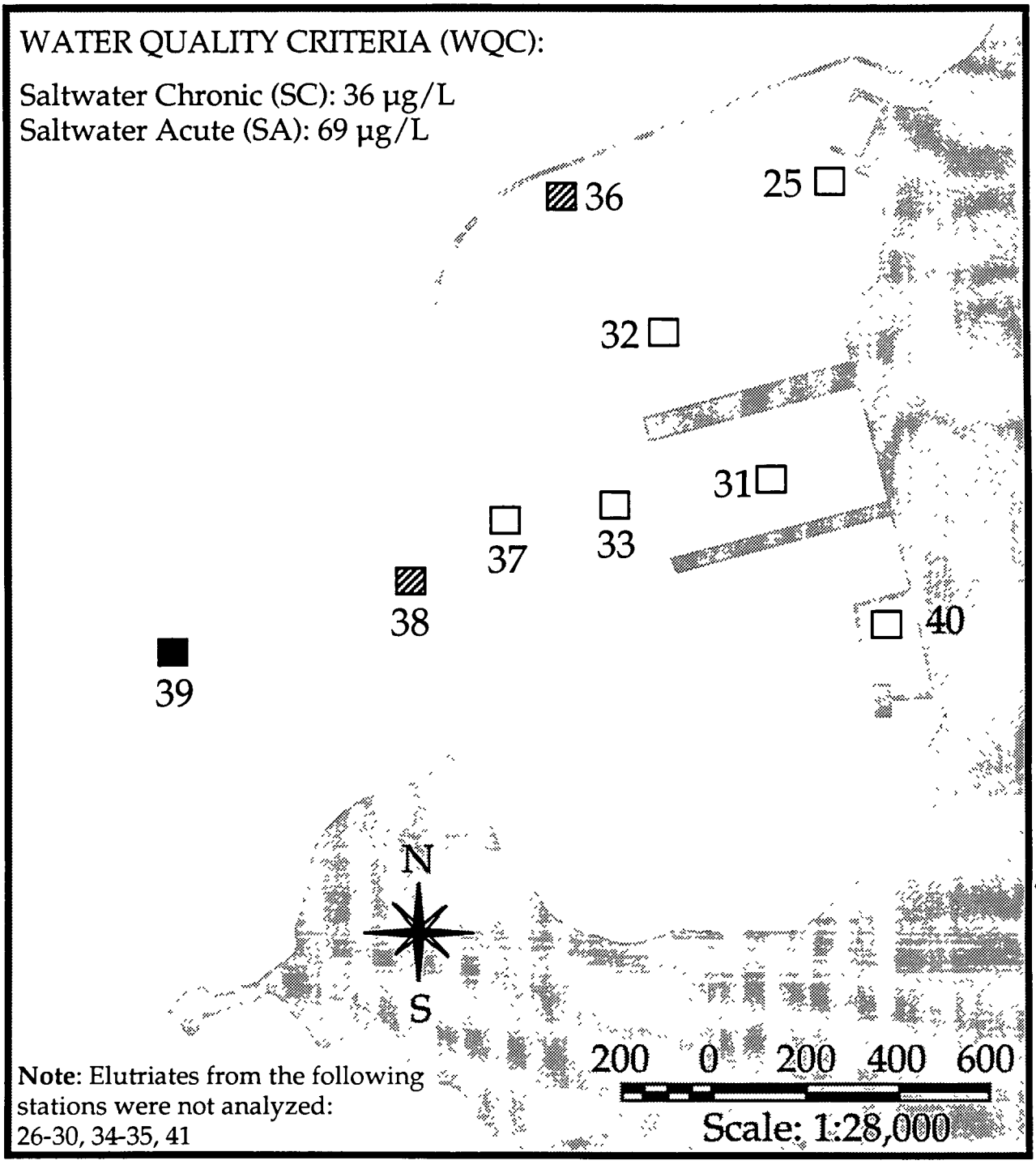
Derecktor Shipyard/Coddington Cove
SEM/AVS



□ SEM/AVS ratio < 1

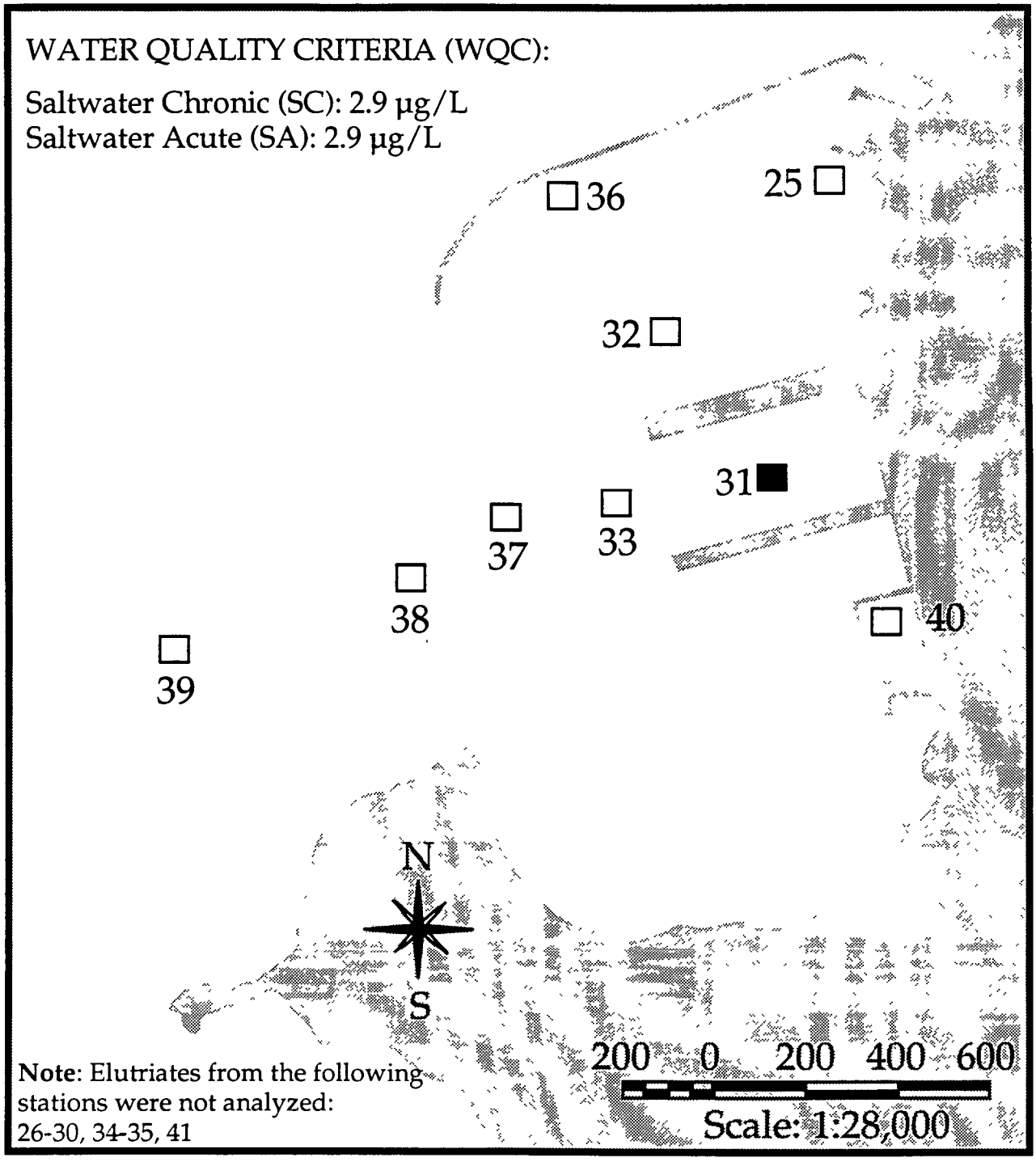
■ SEM/AVS ratio > 1

Derecktor Shipyard/Coddington Cove
Concentration of Arsenic in Elutriates



☐ concentration less than WQC-SC
▨ concentration greater than WQC-SC but less than WQC-SA
■ concentration greater than WQC-SA

Derecktor Shipyard/Coddington Cove
Concentration of Copper in Elutriates

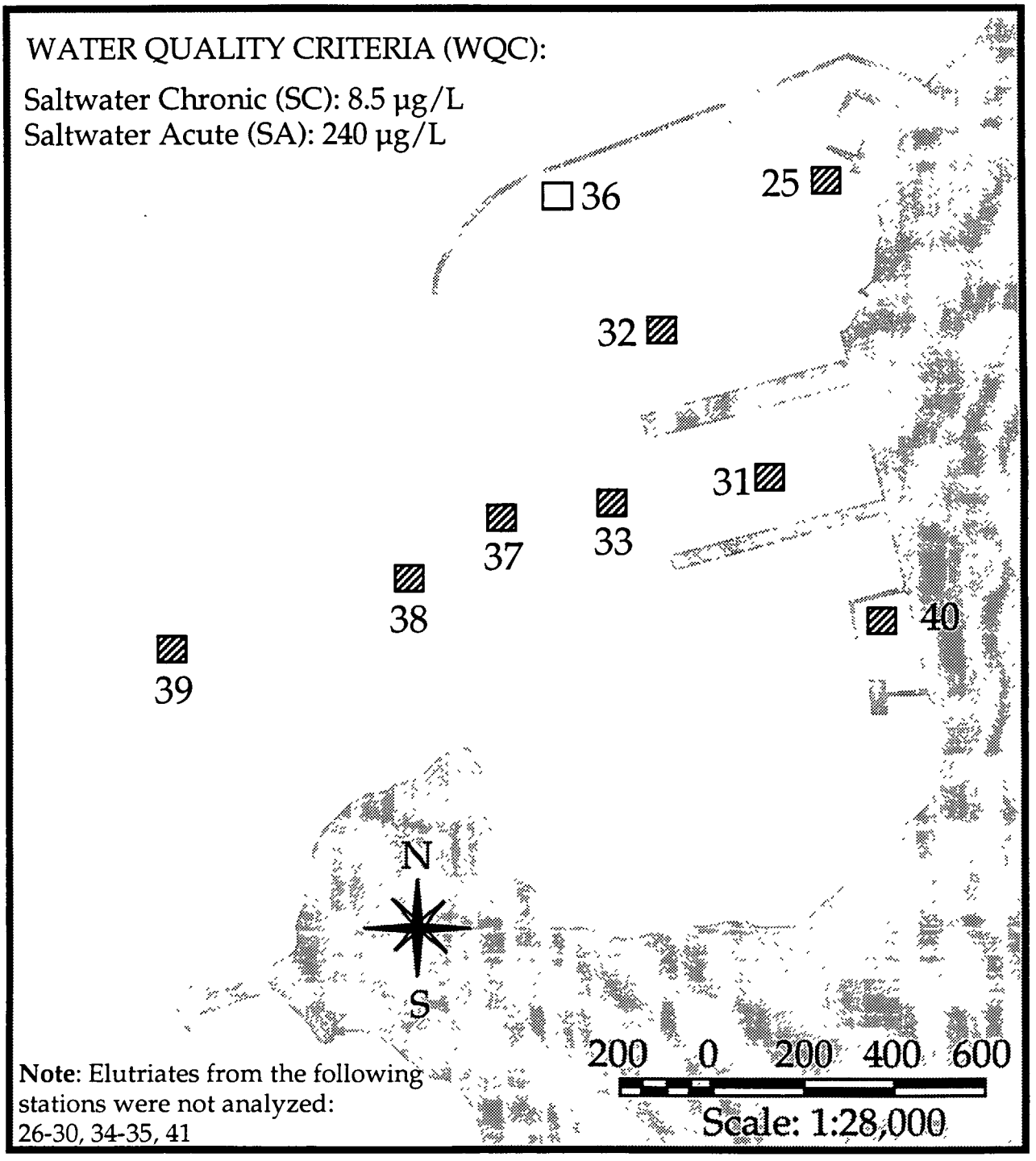


□ concentration less than WQC-SC

▨ concentration greater than WQC-SC but less than WQC-SA

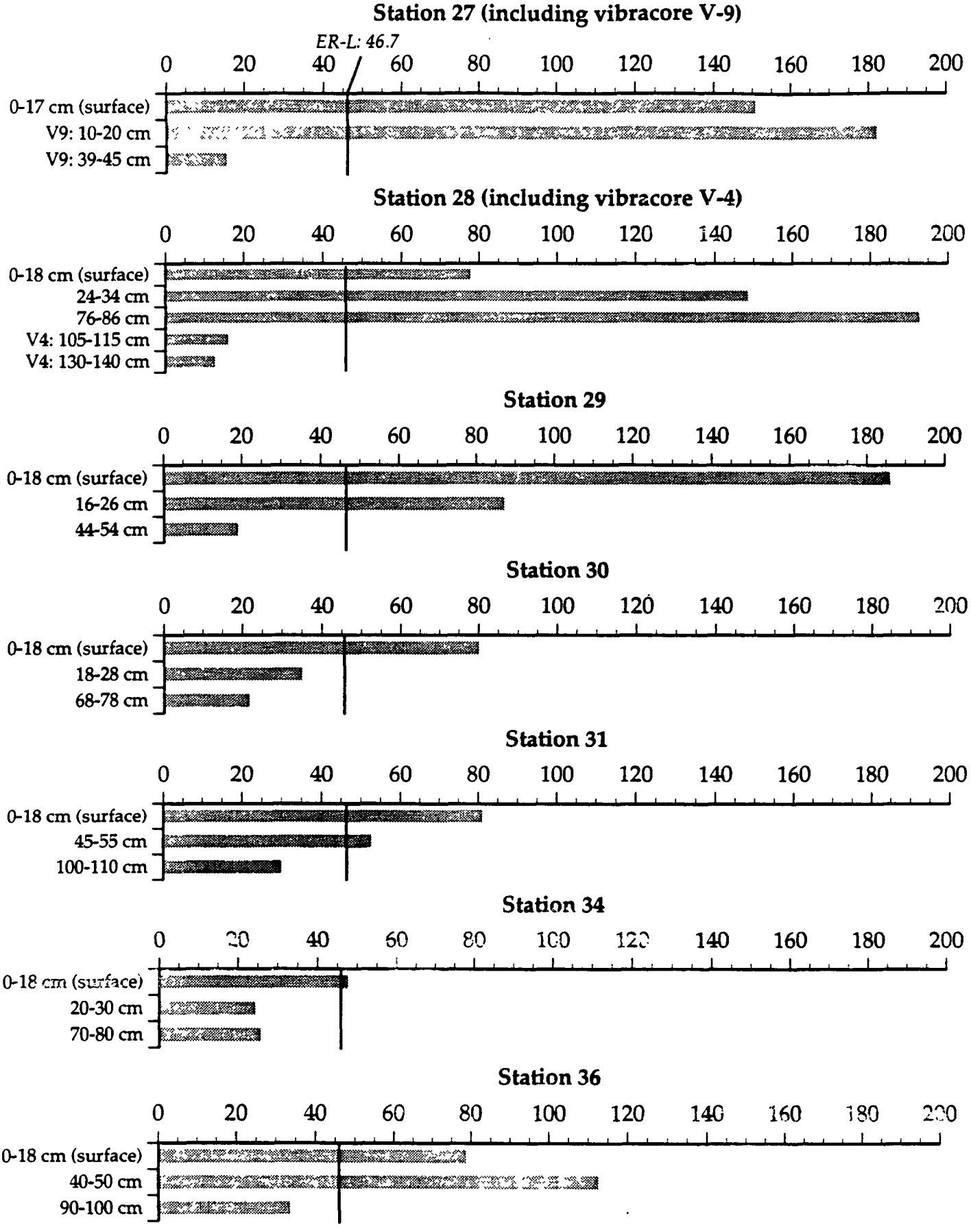
■ concentration greater than WQC-SA

Derecktor Shipyard/Coddington Cove
Concentration of Lead in Elutriates



☐ concentration less than WQC-SC
▨ concentration greater than WQC-SC but less than WQC-SA
■ concentration greater than WQC-SA

Derecktor Shipyard/Coddington Cove: Concentration of Lead (µg/g) in Sediment Cores



Conclusions Derecktor Shipyard

— Geophysical Studies
— Metal Contamination

1. High-resolution geophysical studies and vibracore studies were able to resolve and determine the lateral extent of subbottom lithologic units.

2. Most sites contain finer surficial sediments indicating that Coddington Cove has recently become a more depositional environment, probably due to construction of the breakwater in 1957.

3. Metal contamination was evaluated by three approaches: (1) Comparison of total concentration to NOAA sediment quality guidelines, (2) SEM/AVS, and (3) comparison of elutriate concentrations to EPA guidelines.

4. NOAA guidelines indicate potential problems for zinc, nickel, copper, lead, mercury, arsenic and chromium.

5. SEM/AVS studies indicate metals are not generally bioavailable in the study area.

6. Elutriate studies indicate potential problems for arsenic, copper, and lead.

7. Metal contamination is confined to the upper meter of sediments.

Coddington Cove — Benthic community Survey / Preliminary Conclusions

1) Figure 1 (map). The bottom throughout most of the cove is silt. Sand is found near shore, except in the dredged and bulkheaded central area (stations 27, 28, and 30). A patch of sand is found outside the piers (station 33).

2) Figure 2 (map). Station data has been placed in 3 groups based on organisms present. "Sand" stations are found near shore and at the Jamestown Potter Cove reference stations. Derecktor stations 40, 41, and 29 are not included since significant amounts of organic silt is found at the surface and characteristic sand species are not present. "Silt" stations have been divided into an offshore and nearshore group and Derecktor stations compared primarily with the nearshore.

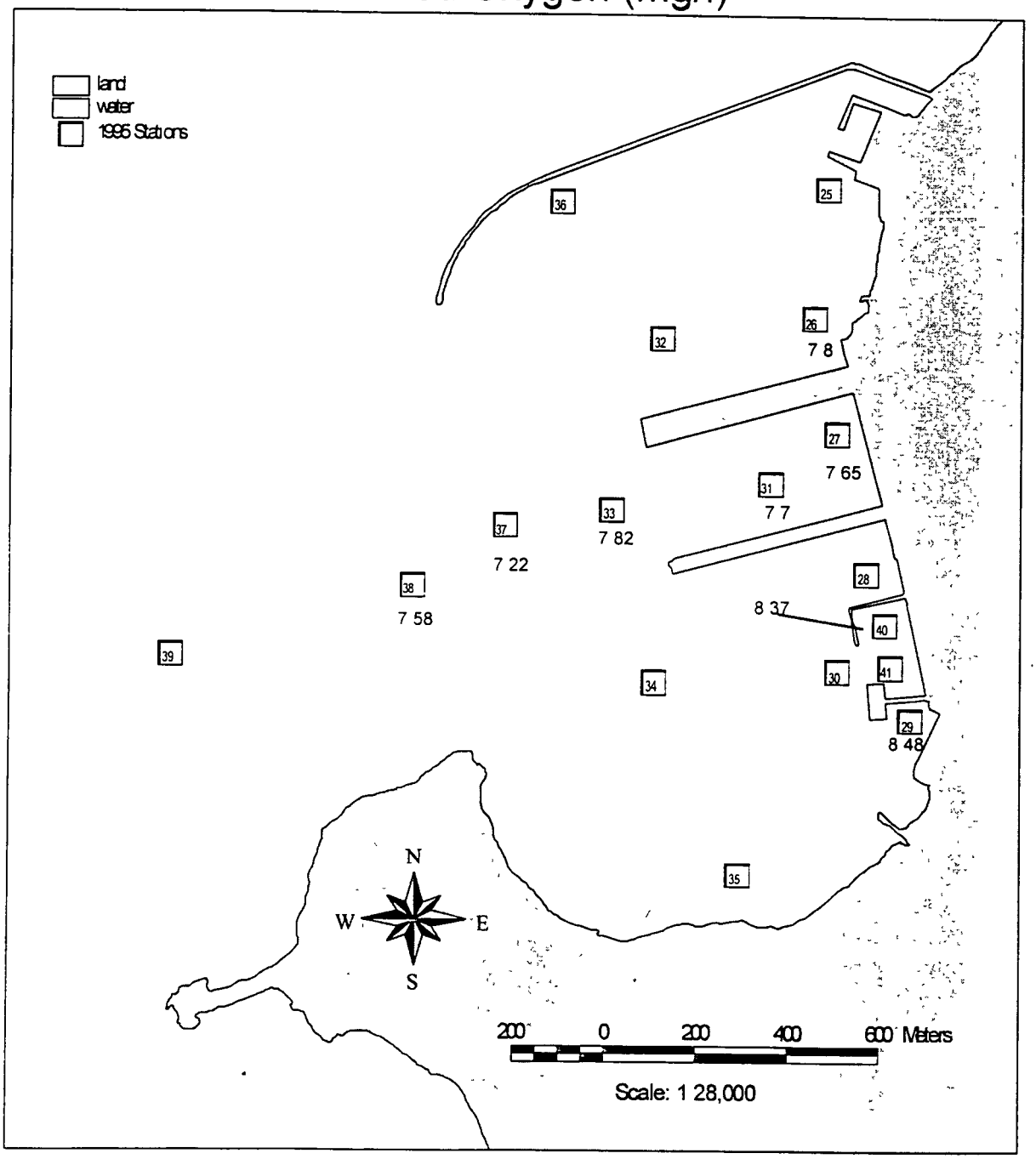
3) Figure 3 (table). A summary of counts in sand stations shows some characteristic species (highlighted). These demonstrate a similarity with the reference sites. Only a few individuals were found on a bottom of decomposing *Ulva* at station 25. Species number for most samples is over 30.

4) Figure 4 (table). Offshore silt samples had a relatively uniform population of species characteristic of deep silt-clay habitats in Narragansett Bay, Long Island Sound, and Buzzards Bay (the *Nephtys nucula* community). Most of the species and individuals present are deposit feeding infauna. The limitation in number of trophic and life form types results in a reduced species number (20-30).

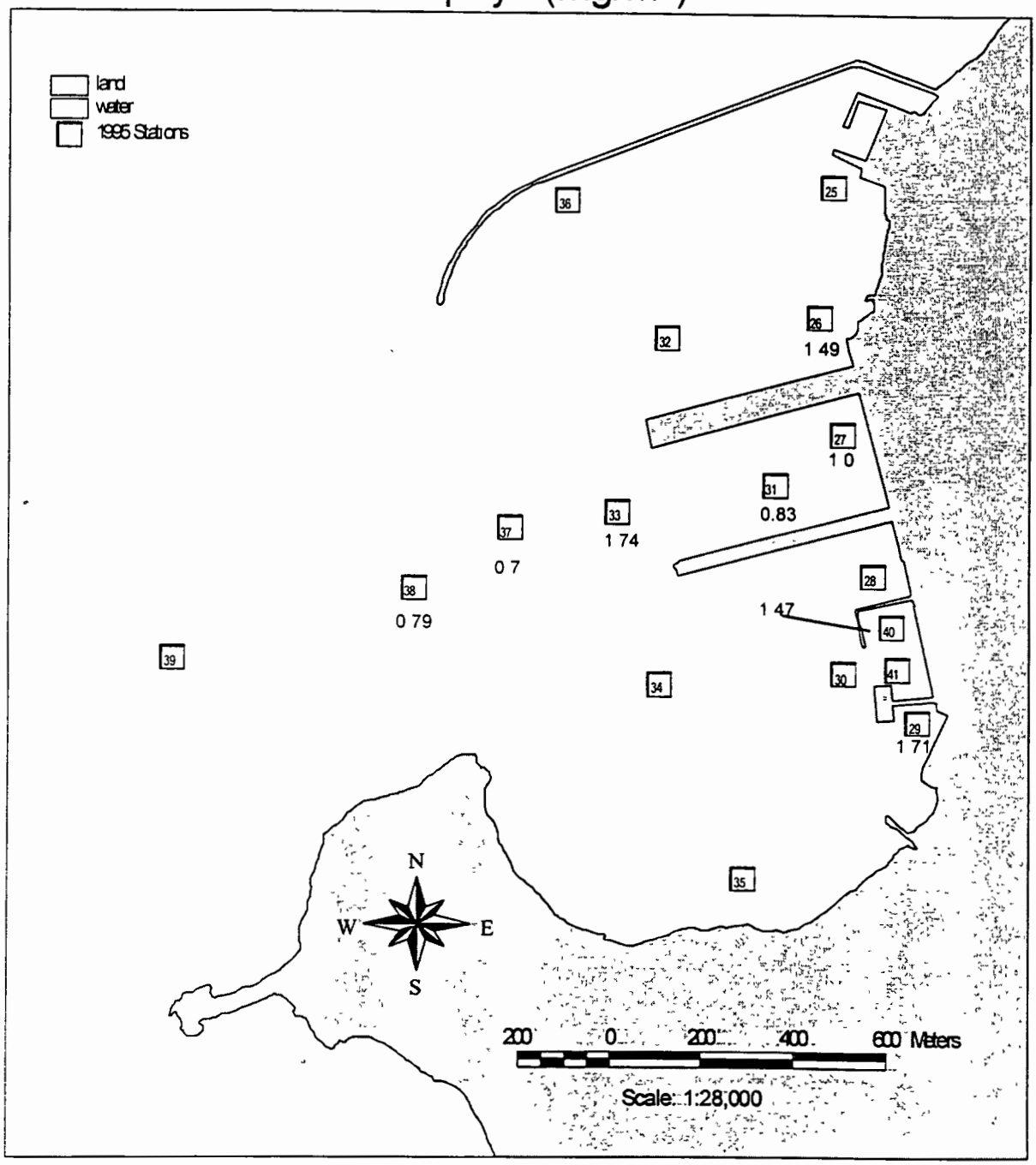
5) Figure 5 (map). Although relatively uniform, some of the dominant species show spatial gradients. The bivalve, *N. annulata* decreases in density towards shore. Figure 6 (map). The polychaete *M. ambiseta* is most abundant in the central portion of the Cove.

6) Figure 7 (table). Derecktor data is compared with surrounding stations. Figure 8 (graph). The dominant silt-bottom species are low or absent from Derecktor stations. Figure 9 (graph). A group selected subdominant species were absent from Derecktor stations. Figure 10 (graph). A group of stress tolerant species were found in Derecktor stations. These include *Glycera*, which may be responding to presence of sand. The polychaetes *N. succinea*, *P. cornuta* and *S. benedicti* are familiar indicators of stressors including high organic particle loads and low oxygen content. *Ampelica amphipods* are relatively sensitive to sediment contamination. The amphipods at the Derecktor sites may be in contact only with recently deposited sediment from uncontaminated sources. Tolerant species were found in low numbers in other near-shore stations but not offshore. Species diversity in surrounding stations was the same as offshore (20-30); it was 12 and 18 at stations 40 and 41, but only 5 and 2 at station 29 (10 and 5 individuals). No basis for the near absence of organisms at station 29 (such as *Ulva* at station 25) was observed.

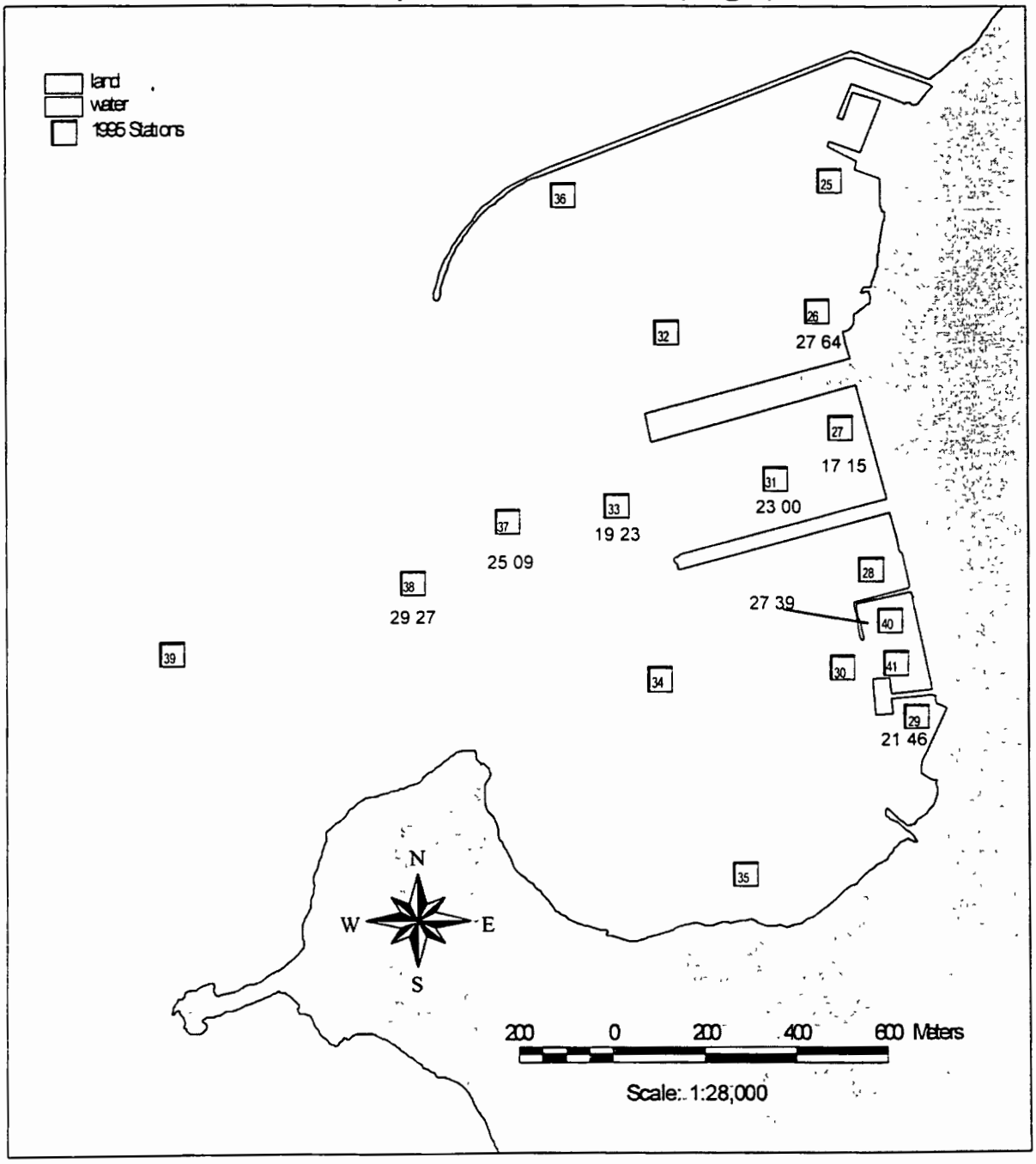
DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT:
Dissolved Oxygen (mg/l)



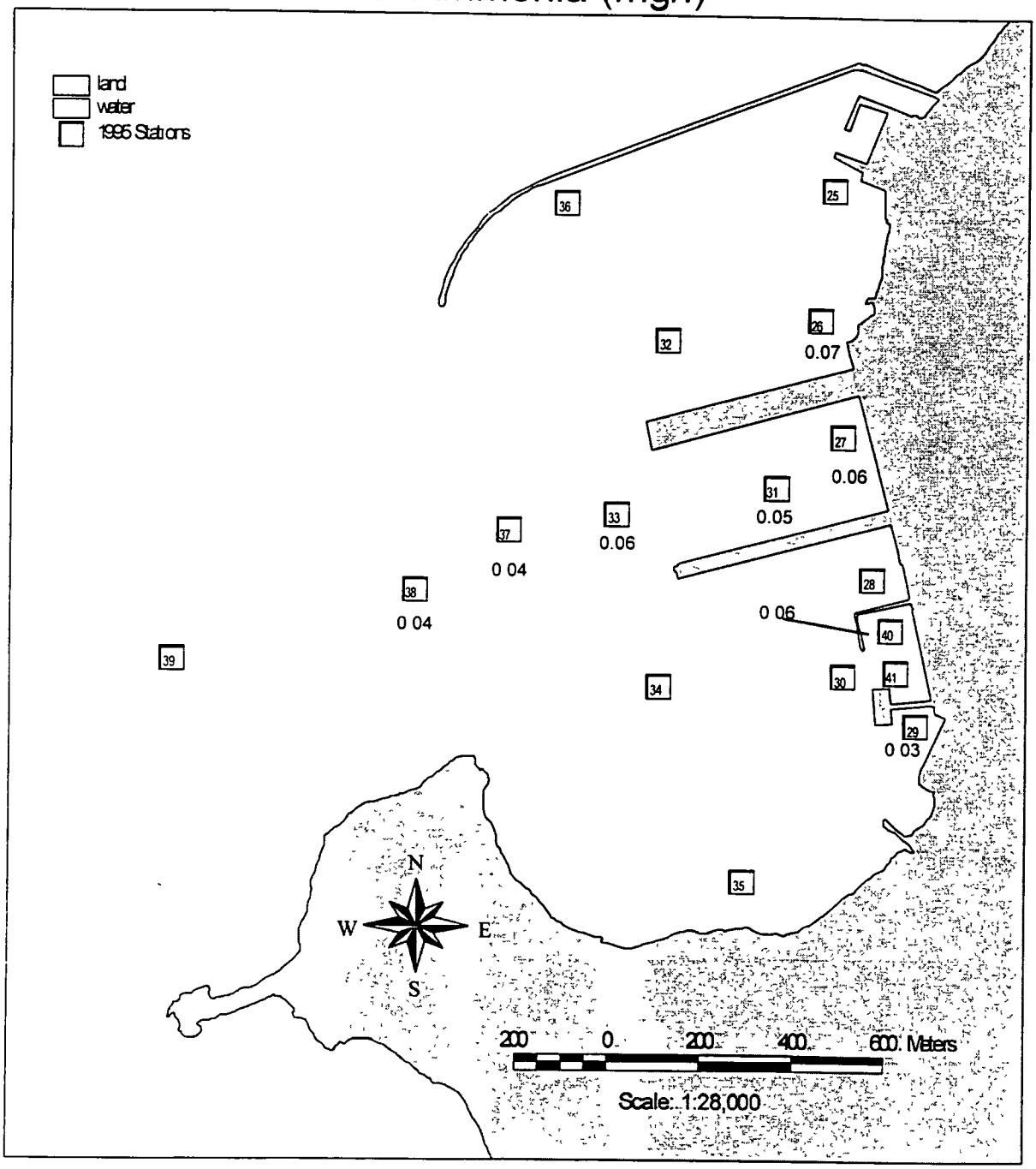
DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT: Chlorophyll (mg/m^3)



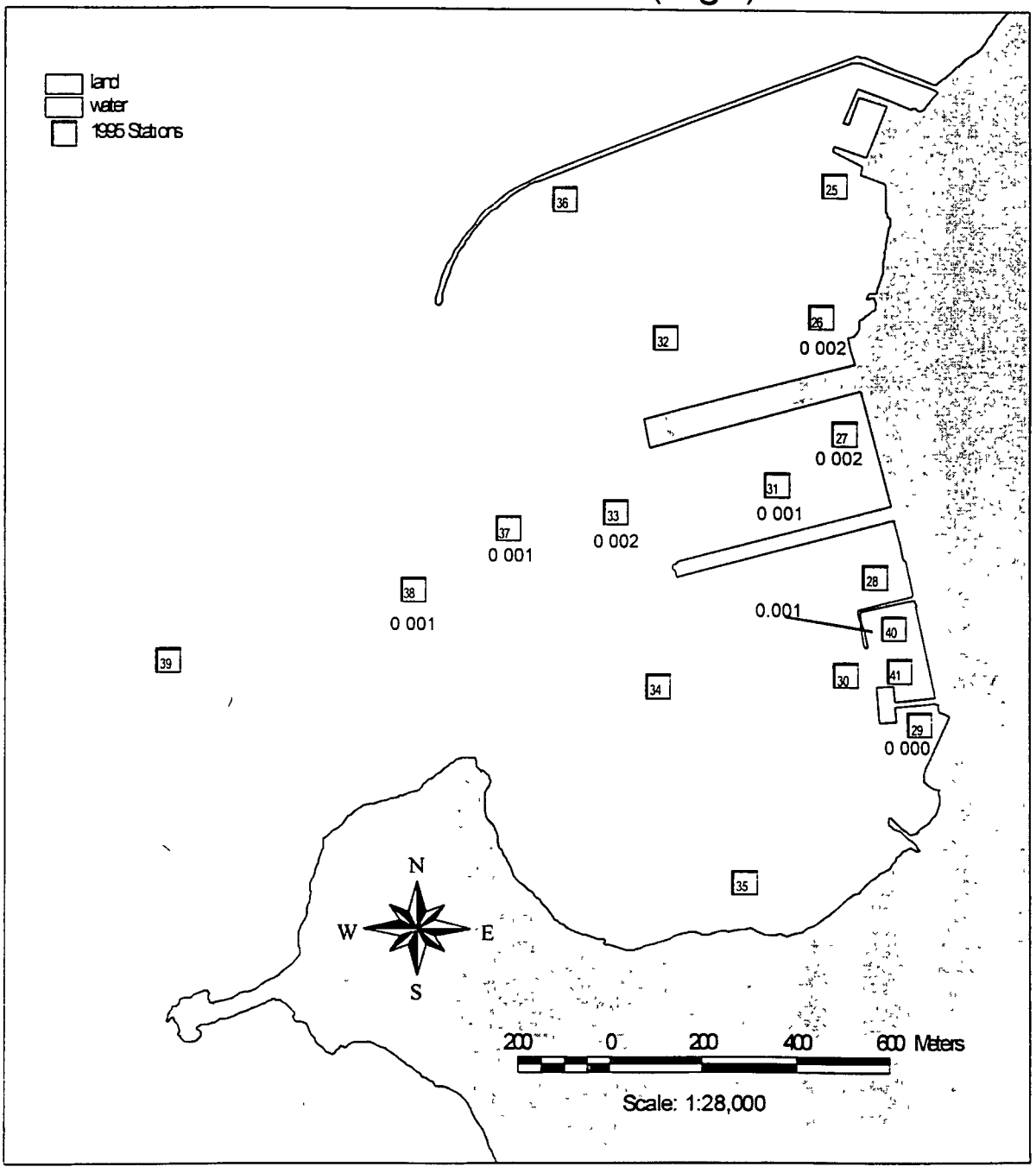
DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT:
Total Suspended Solids (mg/l)



DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT:
Total Ammonia (mg/l)

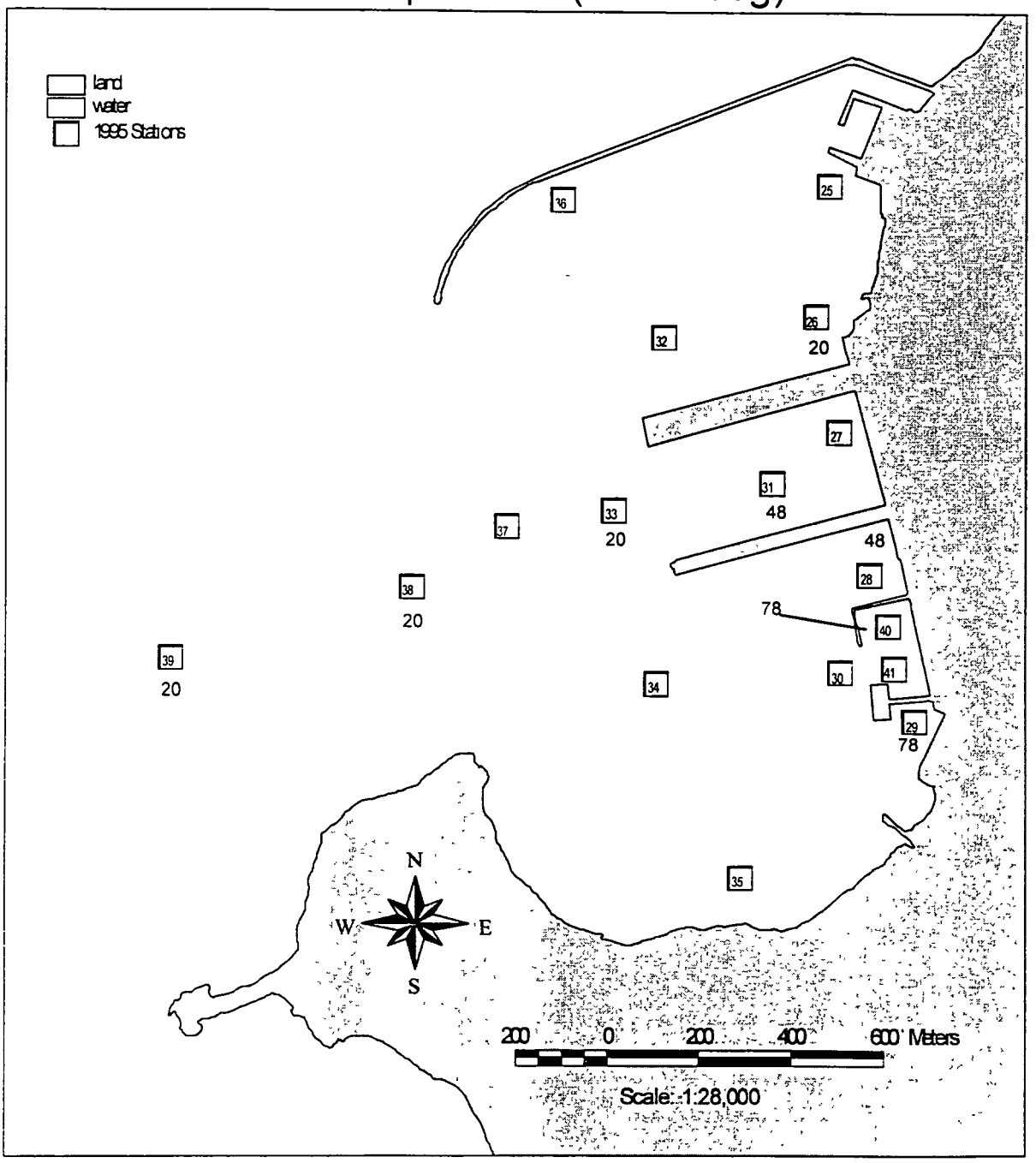


DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT:
Un-Ionized Ammonia (mg/l)



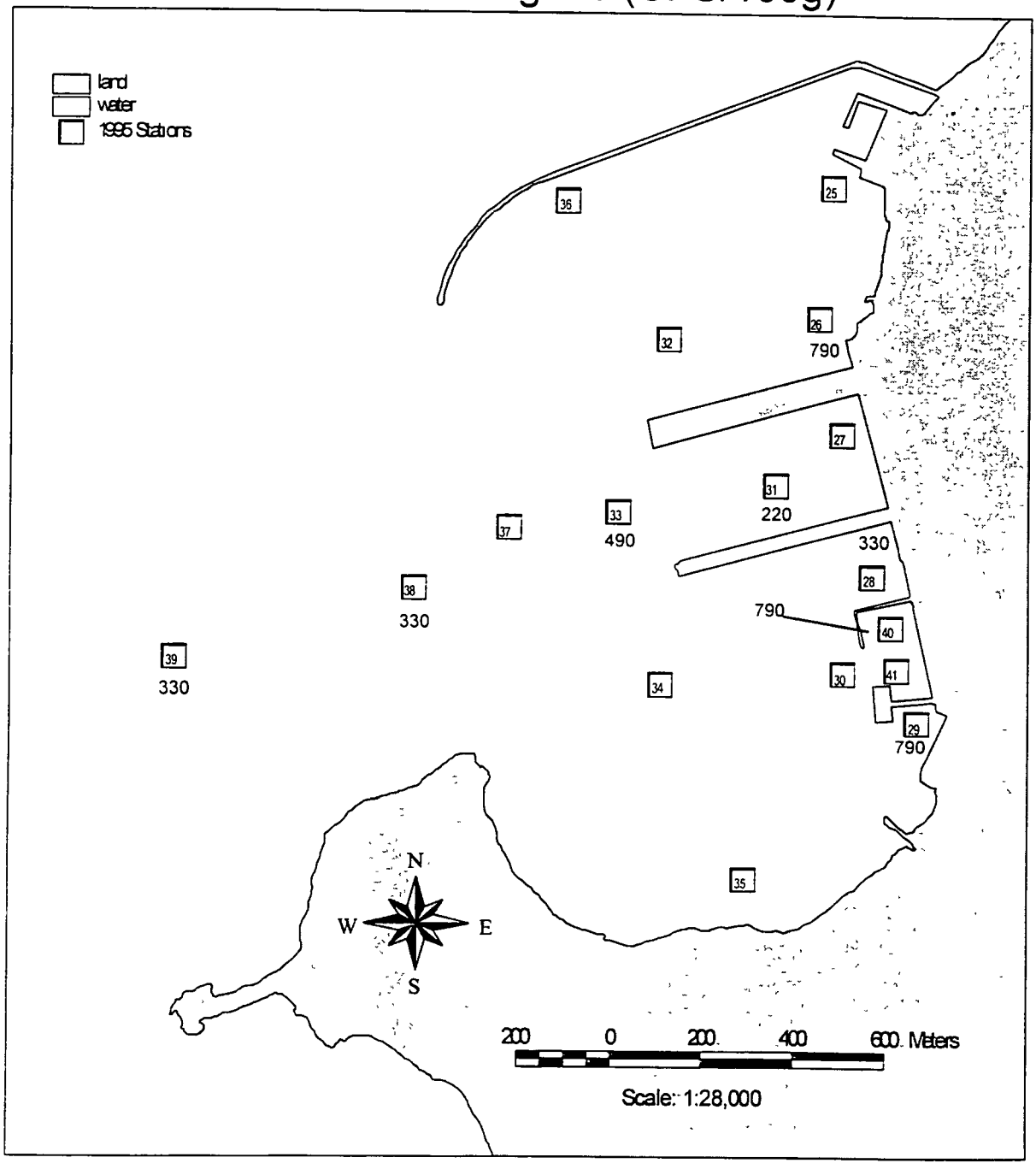
DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT:

Fecal Streptococci (CFU/100g)

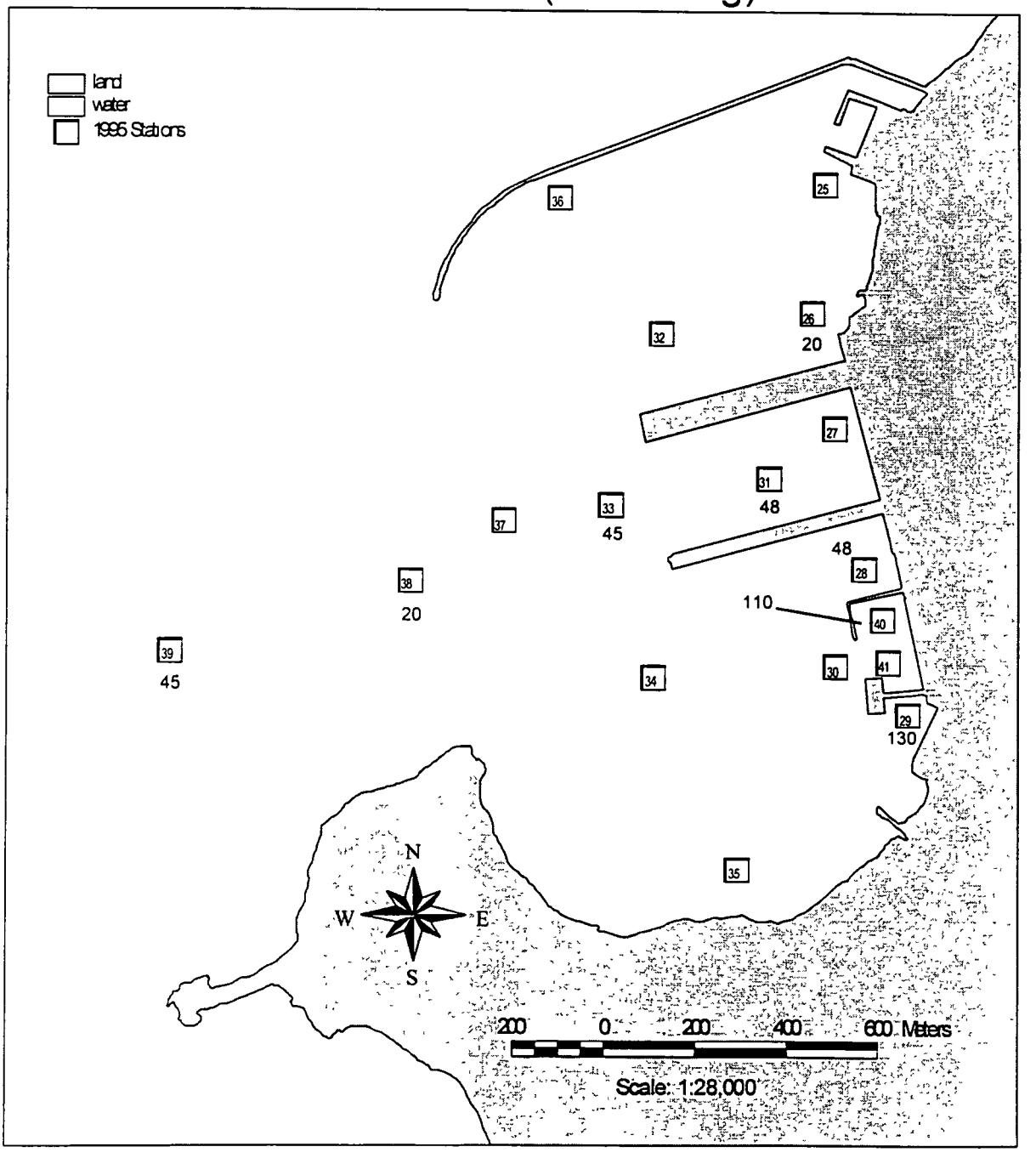


DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT:

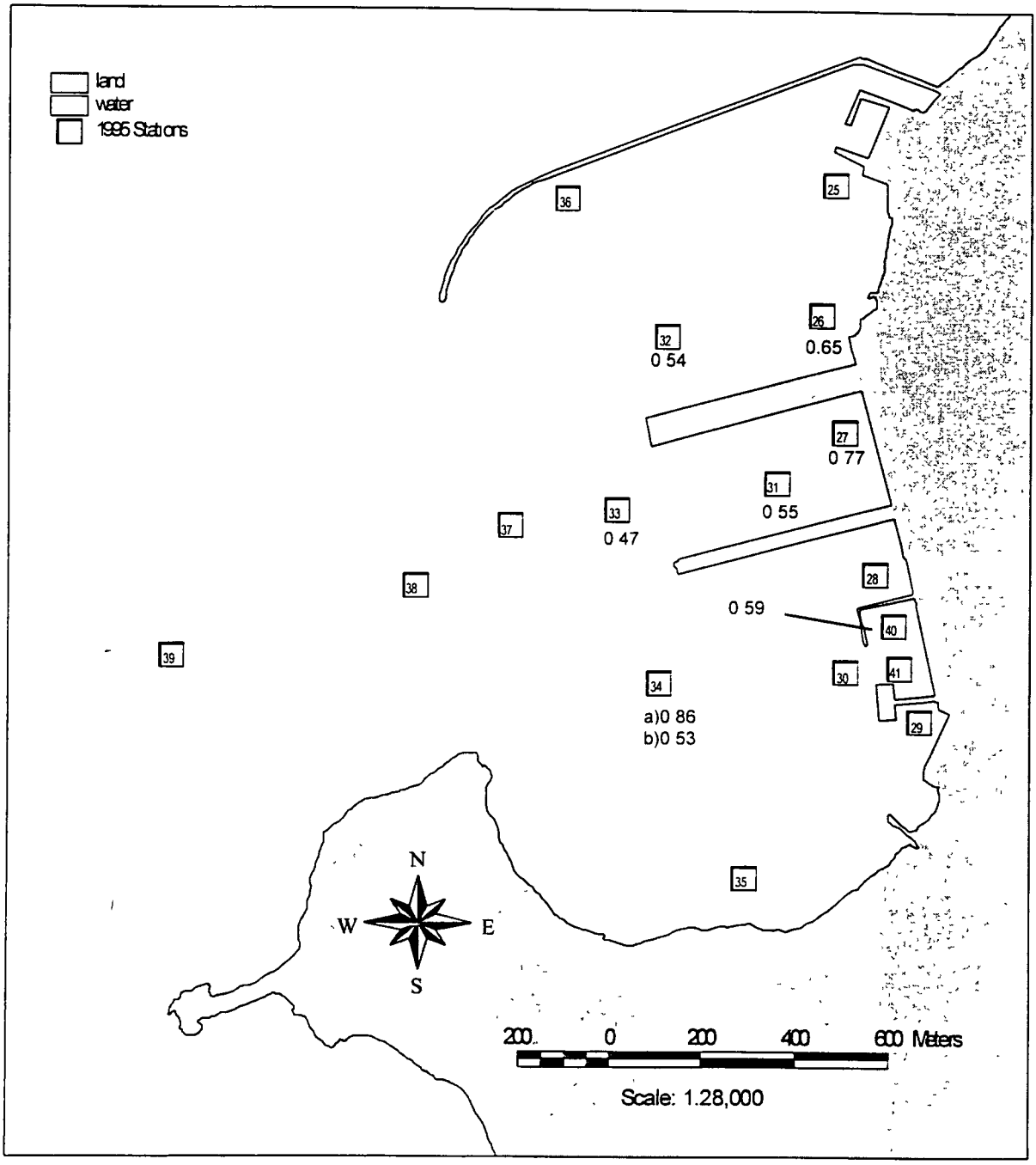
Clostridium Perfringens (CFU/100g)

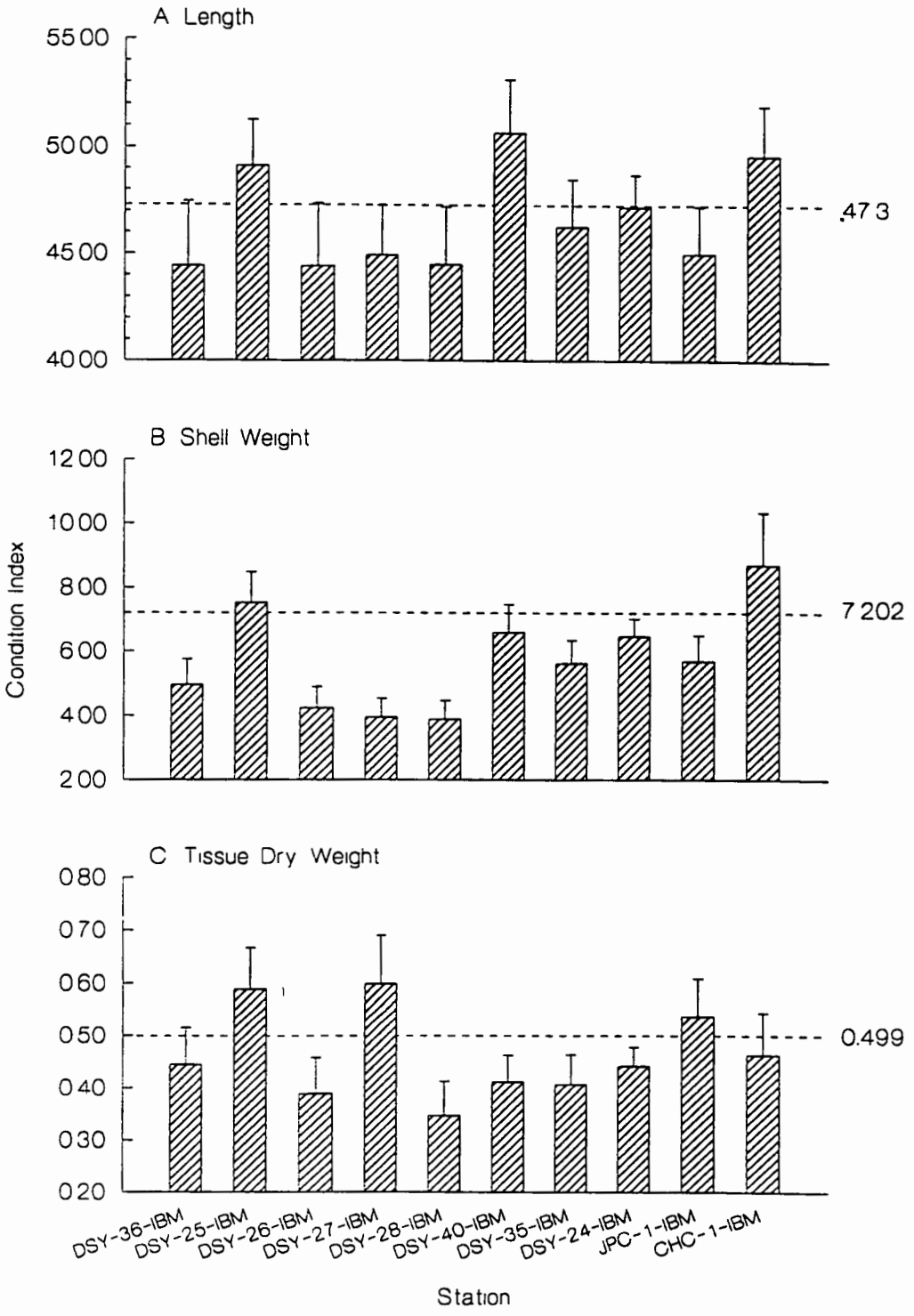


DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT: Fecal Coliforms (CFU/100g)

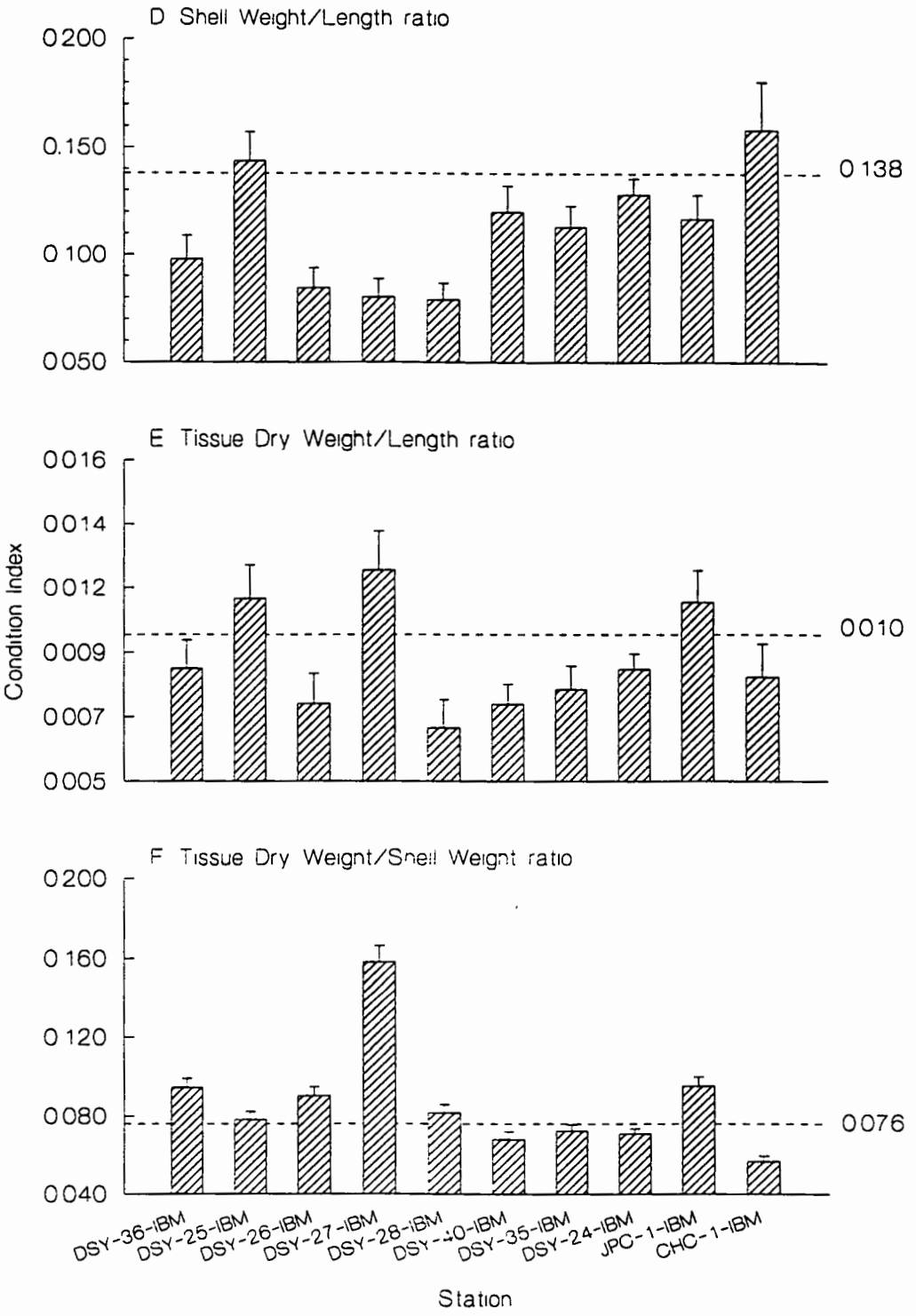


DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT: SOD Results ($g/m^2/day$)

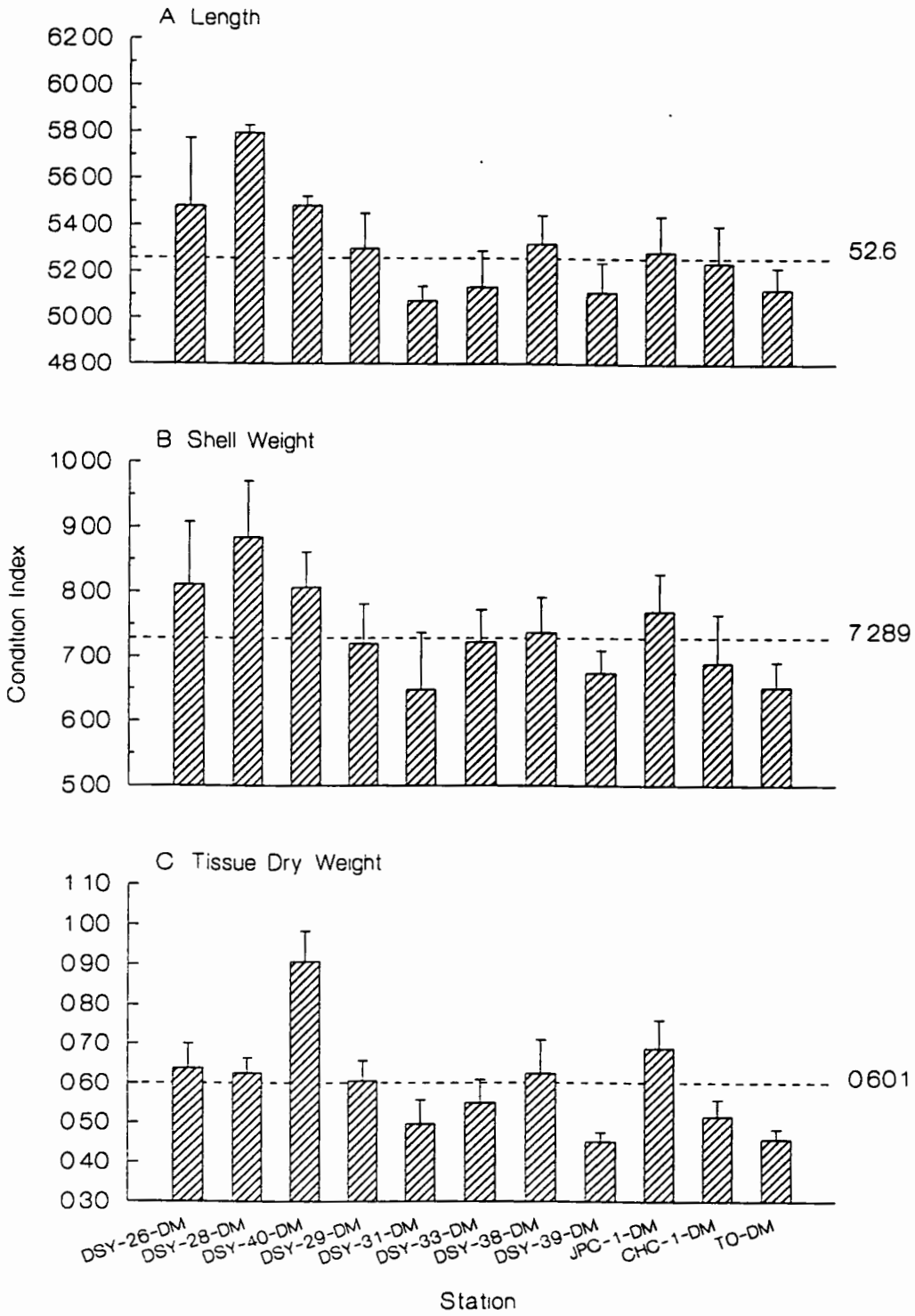




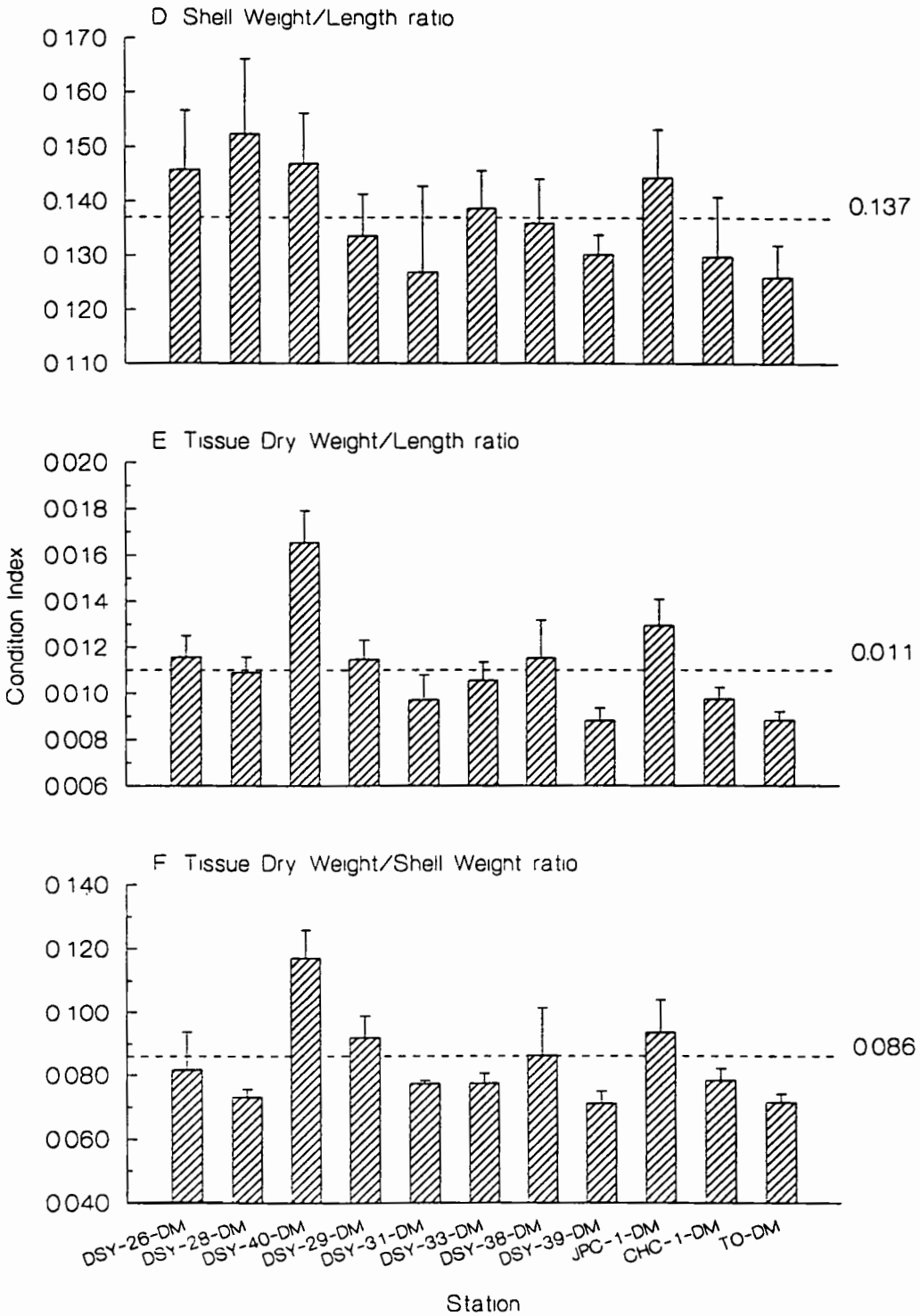
Condition indices for Indigenous Blue Mussels in Derecktor Shipyard. A) length, B) shell weight, C) tissue dry weight, D) shell weight to length ratio, E) tissue dry weight to length ratio, and F) tissue dry weight to shell weight ratio. Dashed line indicates median across reference stations. Values are ± the Standard Error of the mean.



Condition indices for Indigenous Blue Mussels in Derecktor Shipyard. A) length, B) shell weight, C) tissue dry weight, D) shell weight to length ratio, E) tissue dry weight to length ratio, and F) tissue dry weight to shell weight ratio. Dashed line indicates median across reference stations. Values are ± the Standard Error of the mean.

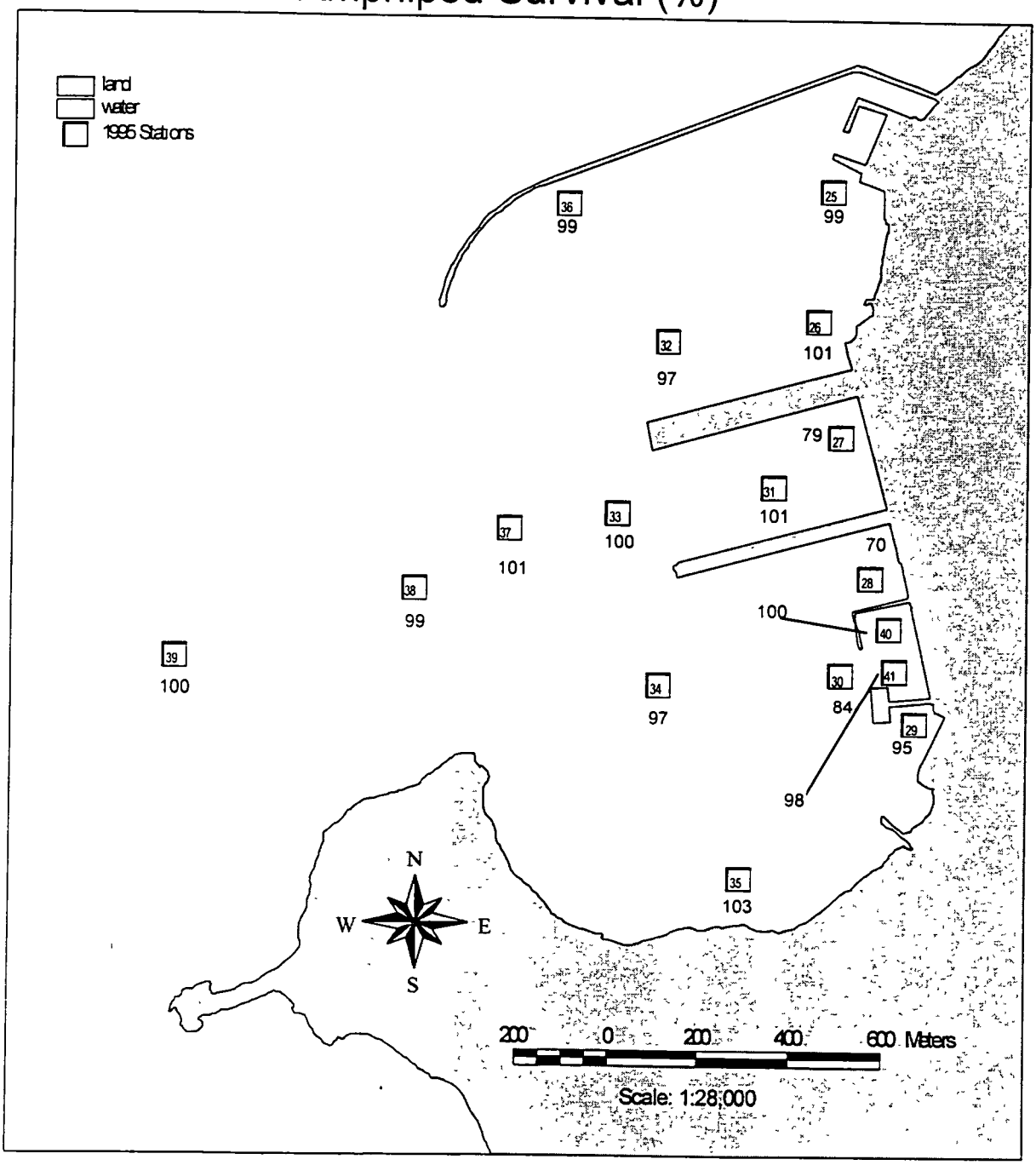


Condition indices for Deployed Blue Mussels in Derecktor Shipyard. A) length, B) shell weight, C) tissue dry weight, D) shell weight to length ratio, E) tissue dry weight to length ratio, and F) tissue dry weight to shell weight ratio. Dashed line indicates median across reference stations. Values are ± the Standard Error of the mean.



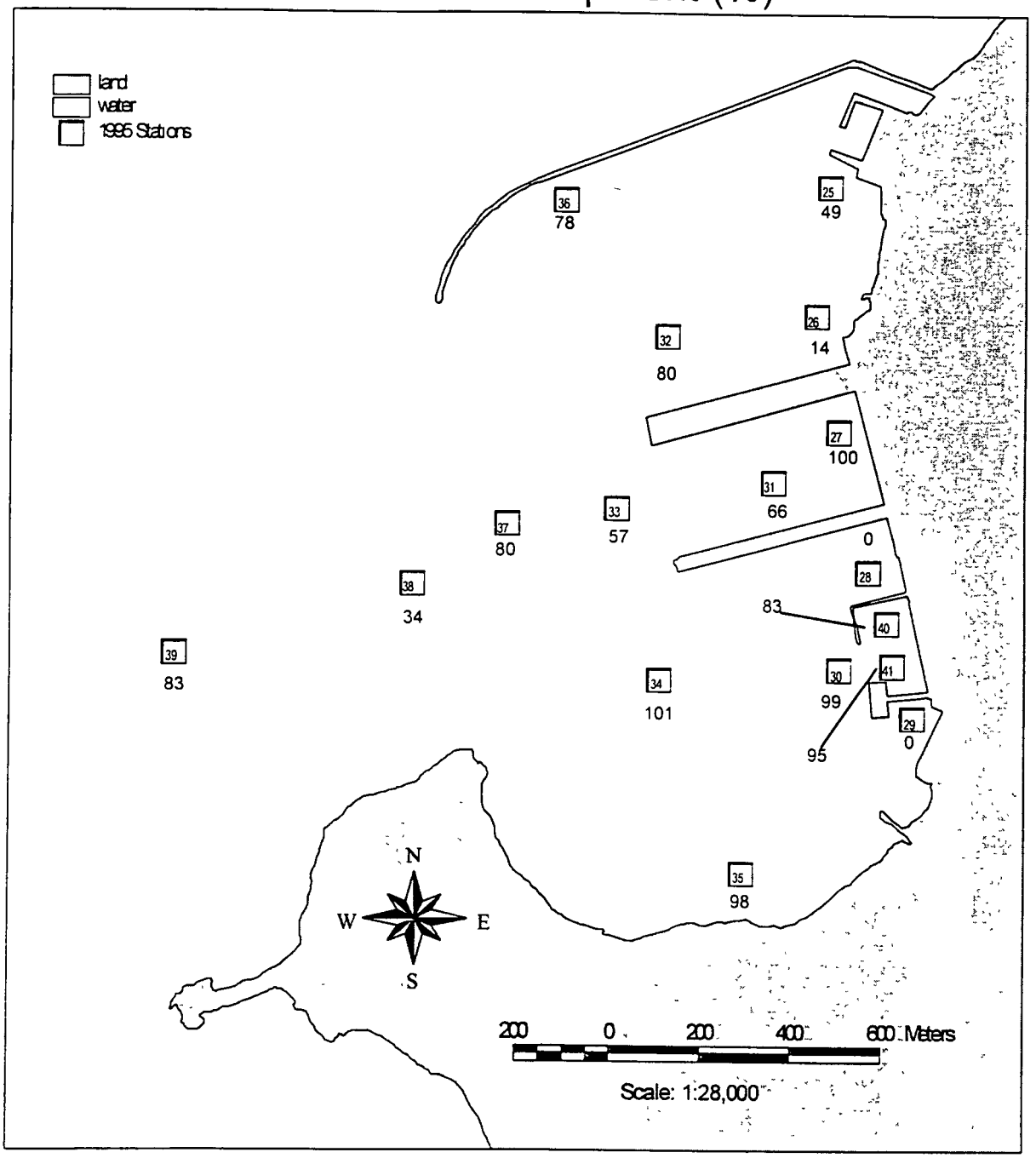
Condition indices for Deployed Blue Mussels in Derecktor Shipyard. A) length, B) shell weight, C) tissue dry weight, D) shell weight to length ratio, E) tissue dry weight to length ratio, and F) tissue dry weight to shell weight ratio. Dashed line indicates median across reference stations. Values are ± the Standard Error of the mean.

DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT: Amphipod Survival (%)

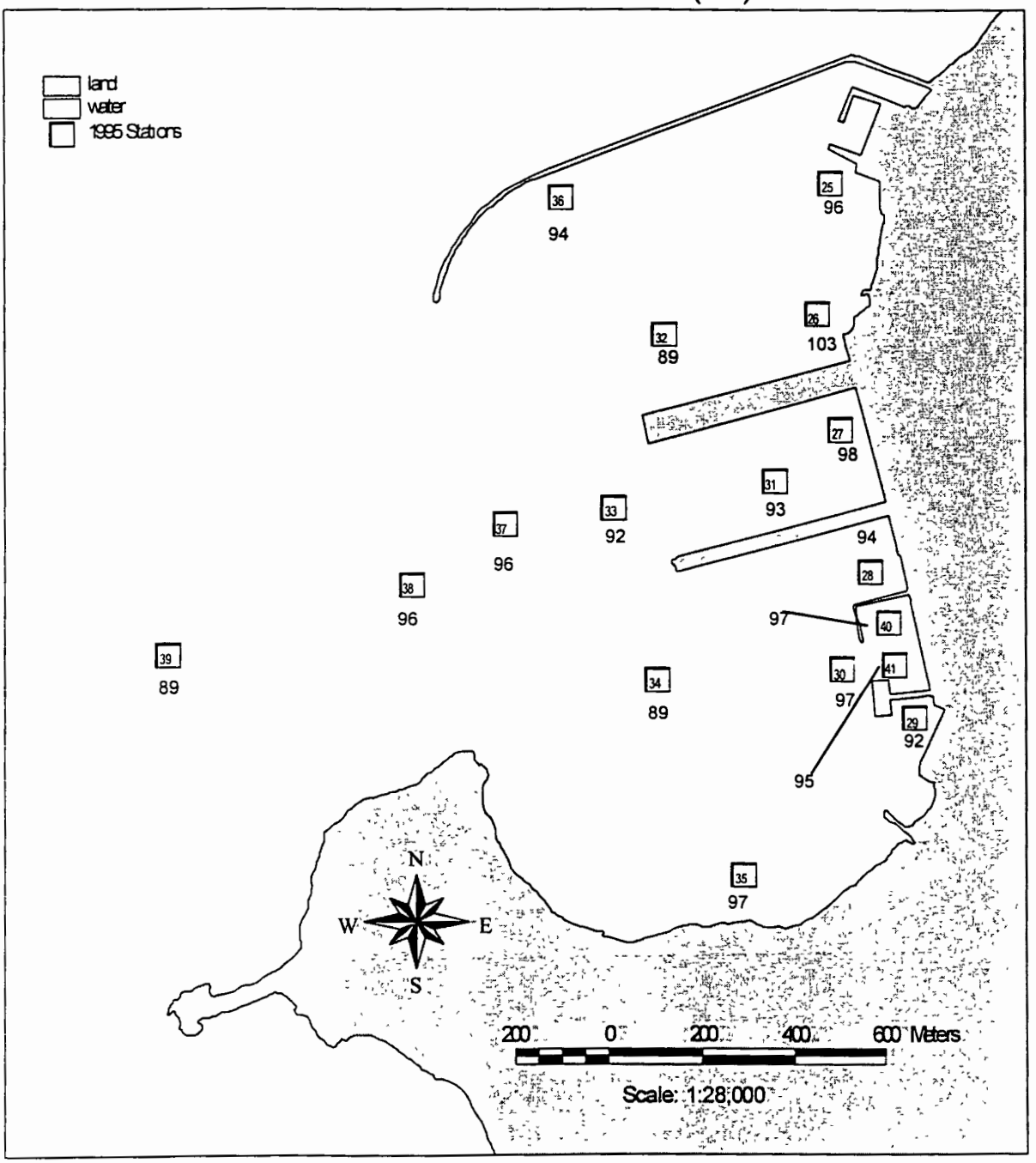


DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT:

Sea Urchin Development (%)

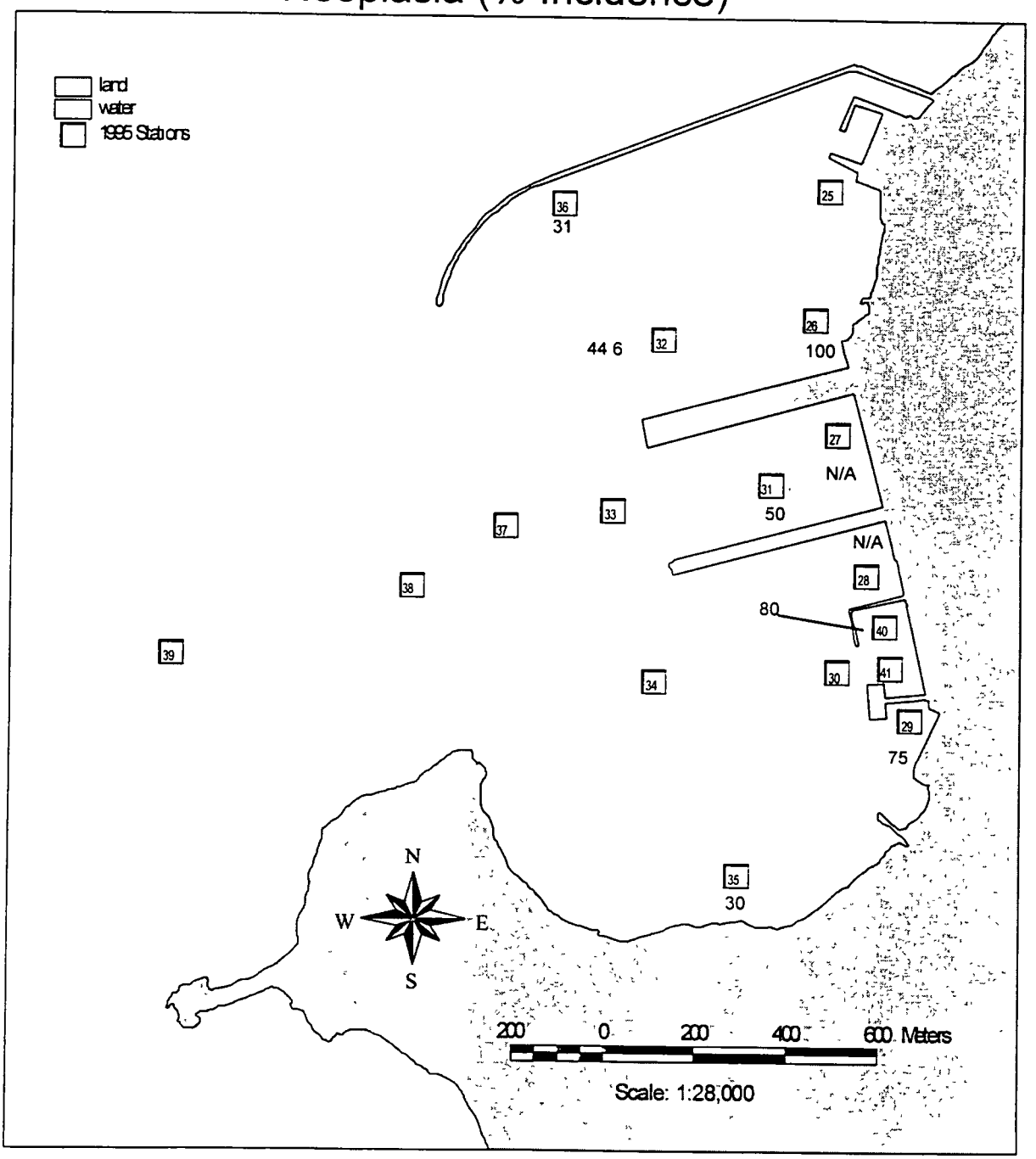


DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT:
Sea Urchin Fertilization (%)

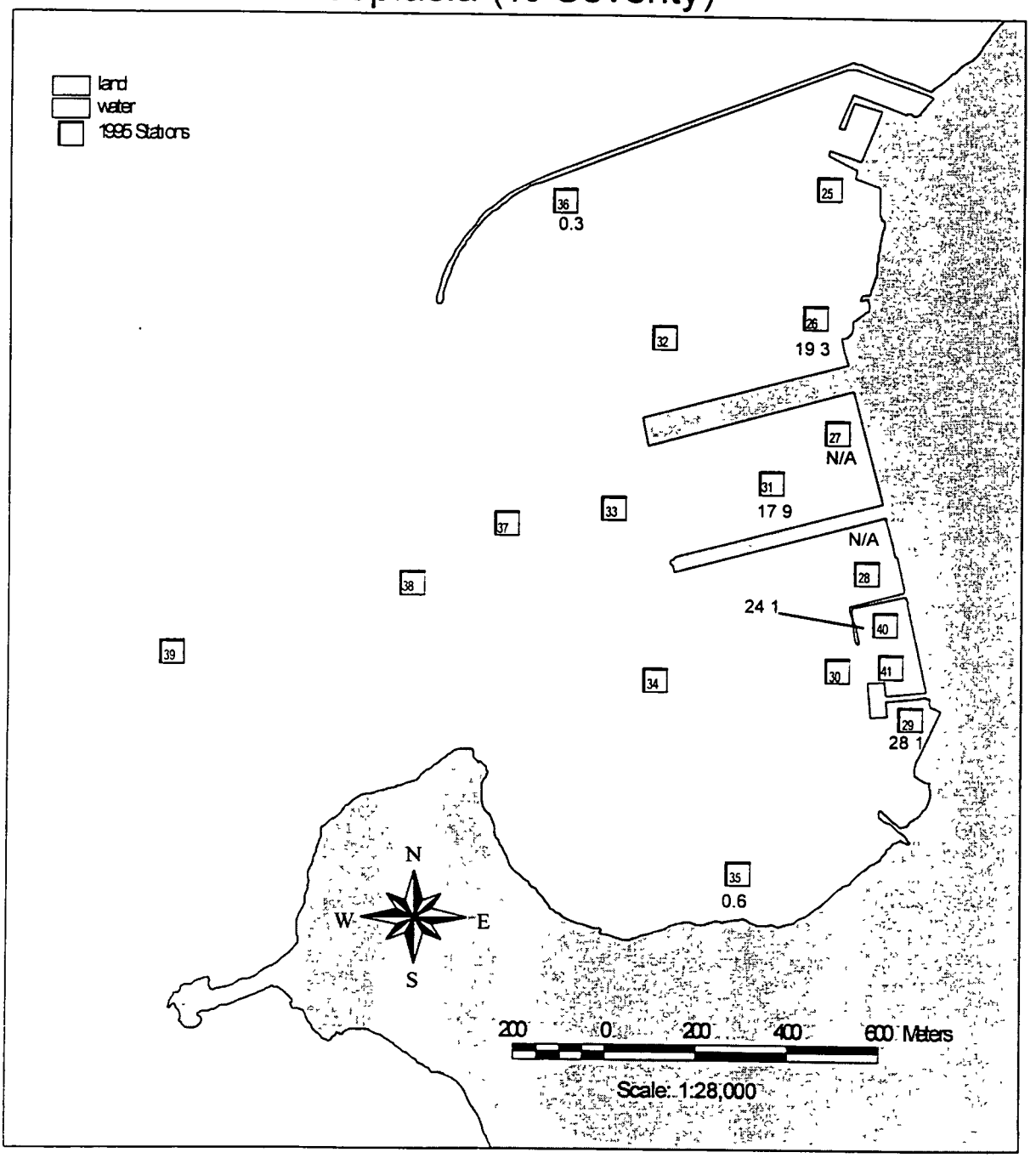


DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT:

Neoplasia (% Incidence)



DERECKTOR SHIPYARD ECOLOGICAL RISK ASSESSMENT: Neoplasia (% Severity)



Derecktor Shipyard Marine Ecological Risk Assessment:
Preliminary Conclusions

Water Quality Results

- o Chorophyll a concentration ranged from ~ 0.2-5 ug/L; higher near Shipyard waterfront.
- o Dissolved oxygen concentration ranged from 7.1 -8.7 mg/L; no apparent spatial pattern across Coddington Cove observed.
- o Suspended solids concentration ranged from 15-40 mg/L; no apparent spatial pattern across Coddington Cove observed.
- o Unionized ammonia concentration low at all stations (<3 ug/L);
- o Pathogen indicator concentrations in deployed mussels do not suggest significant sewage-related contamination in Coddington Cove.
- o Sediment oxygen demand (SOD) measurements ranged from 0.47 - 0.86 g O_2 /m^2/day; values are low but comparable to other estuarine environments.

Bivalve Condition Indices:

- o Enhanced indigenous and deployed mussel growth observed with increasing proximity to Shipyard waterfront; elucidation of adverse impacts will require further analysis (normalization) of water quality data (e.g. food) concentration.

Toxicity Results

- o Amphipod survival in bulk sediment ranged from 70-103% of control; significant toxicity (<80% survival, statistically different from control @ $P \leq 0.05$) observed at two harborfront stations (DSY-27: 79%; DSY-28: 70%).

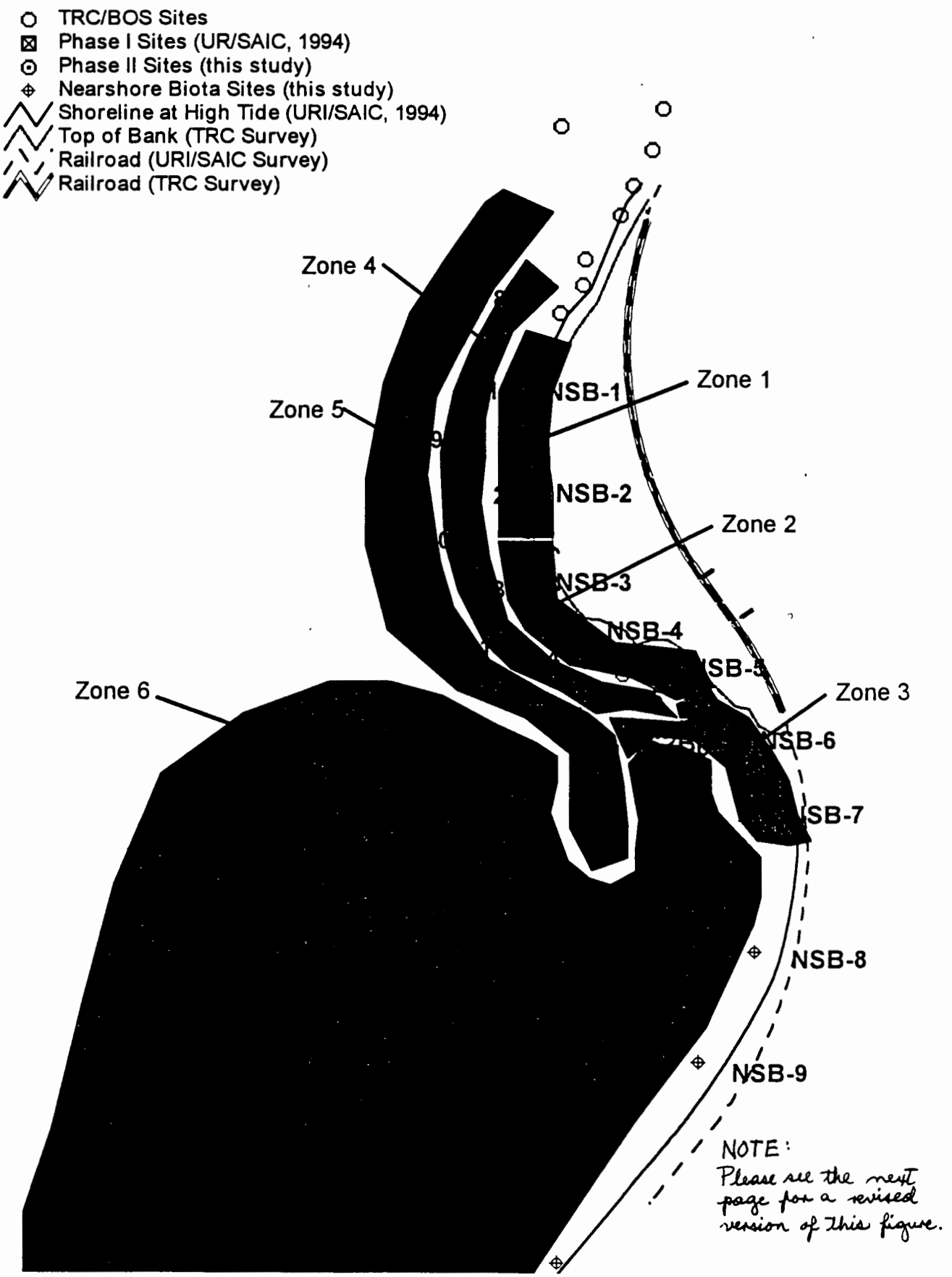
- o Sea urchin larval development in sediment elutriate ranged from 0-101% of control; significant toxicity (<50% normal development, statistically different from control @ $P \leq 0.05$) observed at four stations along waterfront (DSY-25, 26, 28, 29) and one outer harbor station (DSY-38).

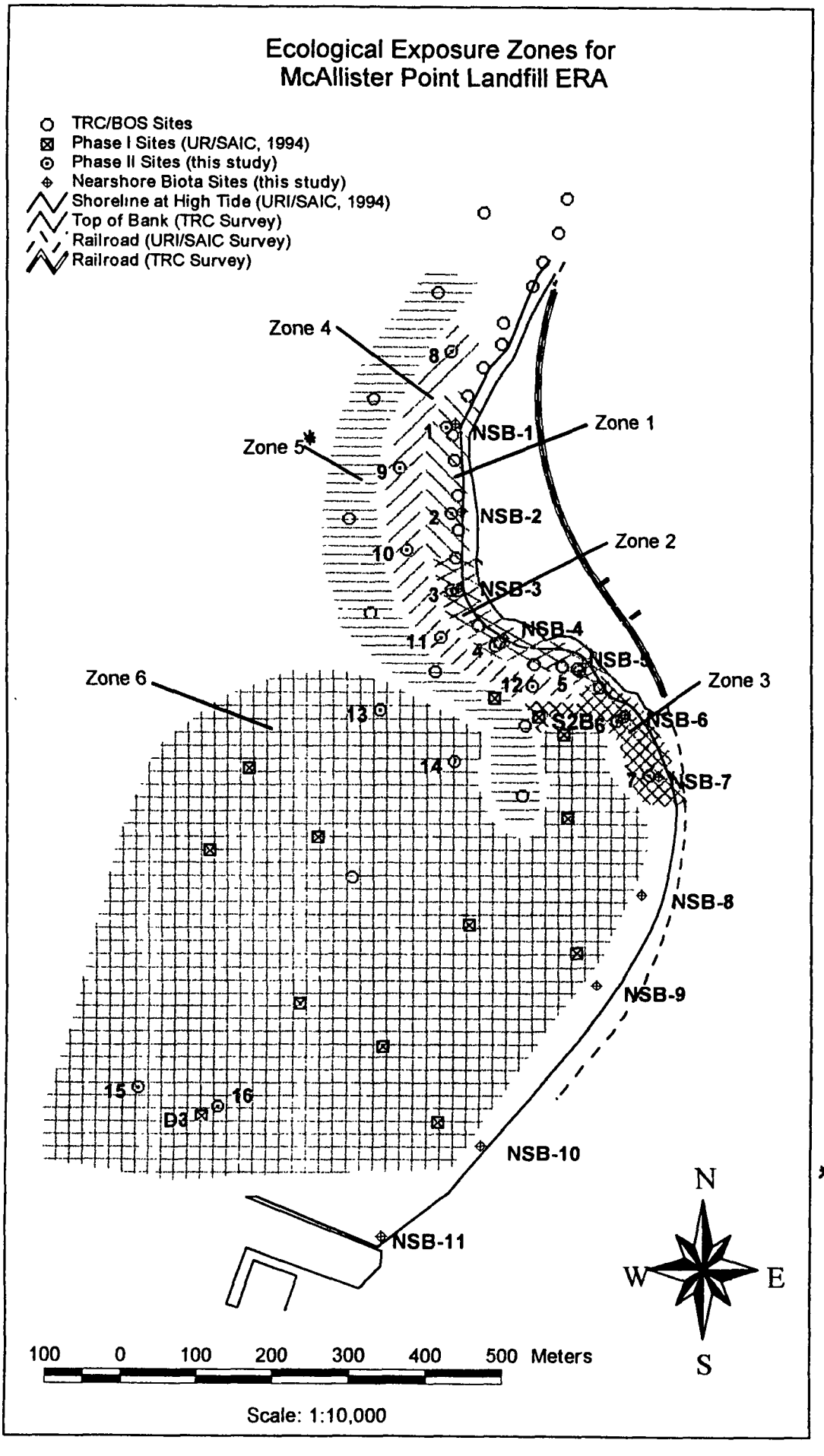
- o Sea urchin fertilzation success in sediment elutriate ranged from 89-103% of control; significant toxicity (<50% fertilization success, statistically different from control @ $P \leq 0.05$) was not observed.

Contaminants of Concern

- o All target analytes included.

Ecological Exposure Zones for McAllister Point Landfill ERA





* Note:
Zone 5 based on the offshore data reported by TRC (October 1994).

Summary of Exposure and Effects Weights of Evidence for the McAllister Point ERA

		EXPOSURE																				EFFECTS							
		ORGANICS[1]			METALS[1]									SEM/ AVS[1]	PORE WATER[2]				FECAL[3] INDICATORS				TOXICITY[2]		FIELD BIOTA[3]		FECAL[3] INDICATORS			
Zone	Station	PCBs	DDE	PAHs	As	Cd	Cu	Cr	Pb	Hg	Ni	Ag	Zn		Cu	Zn	Hg	Ni	TC	FC	FS	CP	AMPELISCA SURVIVAL	ARBACIA FERTILIZATION	STRUCTURE	CONDITION	TC	FC	FS	CP
1	NSB-1	x	-	-	-	-	x	-	x	-	x	x	x	xx	x	-	-	x	xx	-	xx	xx	xX	-	-	-	xx	-	x	xx
1	NSB-2	x	-	-	-	-	x	-	x	-	-	-	x	xx	xx	x	x	x					-	-	-	-				
2	NSB-3	xx	x	x	x	x	x	x	xx	xx	xx	x	xx	x	x	-	-	x	xx	-	xx	xx	x	x	-	-	x	-	x	xx
2	NSB-4	xx	x	x	x	x	xx	x	xx	xx	xx	x	xx	x	x	xx	x	x					xx	xx	-	-				
2	NSB-5	xx	x	x	x	x	xx	-	xx	xx	xx	xx	xx	xx	xx	xx	x	x	-	-	-	-	xx	xx	x	-	-	-	-	xx
3	NSB-6	xx	x	-	x	-	x	x	x	x	xx	-	x	-	x	-	-	-					x	-	x	-				
3	NSB-7	xx	x	x	x	-	x	x	xx	x	xx	x	xx	xx	xx	x	x	x	-	-	-	xx	x	-	-	-	x	x	x	xx
3	S2B	xx	x	x	-	-	x	-	x	x	-	-	x	-									x	xx						
4	MCL-10	xx	x	x	-	-	-	-	x	x	-	-	-	-	-	-	x	-					-	-	-	-				
4	MCL-11	xx	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	x	-	-	xx	-	-	-					
4	MCL-12	x	-	x	-	-	x	-	x	x	-	-	x	-	-	-	-	-	x	-	x	xx	-	-	-	-	x	x		x
4	MCL-8	x	-	x	-	-	-	-	x	x	x	-	-	-	-	-	x	-					-	-						
4	MCL-9	x	-	-	-	-	-	-	x	x	-	-	-	-	-	-	x	-					-	-	-					
4	S2																													
6	D1	x	-	-	-	-	-	-	-	-	-	-	-	x									-	-						
6	D2	x	-	-	-	-	-	-	-	-	-	-	-	x									-	-						
6	D3	x	-	-	x	-	-	-	-	x	-	-	-	x									-	xx						
6	M1	x	x	x	-	-	-	-	x	x	-	-	-	-									-	xx						
6	M2	x	-	x	-	-	-	-	-	-	-	-	-	x									-	-						
6	M3	x	-	-	-	-	-	-	-	-	-	-	-	x									-	-						
6	MCL-13	x	-	-	-	-	-	-	-	-	-	-	-	x	-	-	x	-	-	-	-	xx	-	-		-	xx	xx		x
6	MCL-14	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-					-	-	-					
6	MCL-15	x	-	-	x	-	-	-	-	-	x	-	x	xx	-	-	x	-	-	-	-	xx	-	-						xx
6	MCL-16	x	-	x	-	-	-	-	-	-	x	-	-	x	-	-	x	-					-	-		-	x	x		x
6	OS30A	x	-	-	-	-	-	-	-	-	-	-	-	x									-	-						
6	OS30B	x	-	-	-	-	-	-	-	-	-	-	-	x									-	-						
6	S1	x	-	-	-	-	-	-	-	-	-	-	-	-									-	-						
6	S3	-	-	-	-	-	-	x	-	-	-	-	-	-									-	x						
6	S4	x	-	-	-	-	-	-	-	-	-	-	-	-									-	-						
7	JCC-D1	-	-	x	-	-	-	-	-	-	-	-	-	x									-	x						
7	JCC-M1	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	x	-					-	-						
7	JCC-S1	x	-	-	-	-	-	-	-	-	-	-	-	-									x	xx						

Zones:

1) NSB-1, NSB-2; 2) NSB-3 TO NSB-5; 3) NSB-6, NSB-7, S2B; 4) MCL-8 TO MCL-12, S2, 5) OS-22 to OS-28; 6) S1-S4, M1-M3, D1-D3, MCL13-MCL-15, OS30A-B; 7) JCC-S1, JCC-M1, JCC-D1

1 - Chemistry Codes:
< ER-L = -
ER-L to ER-M = x
> ER-M = xx

2 - Porewater Codes:
<WQC-Chronic = -
WQC-Chronic to -Acute = x
>WQC-Acute = xx

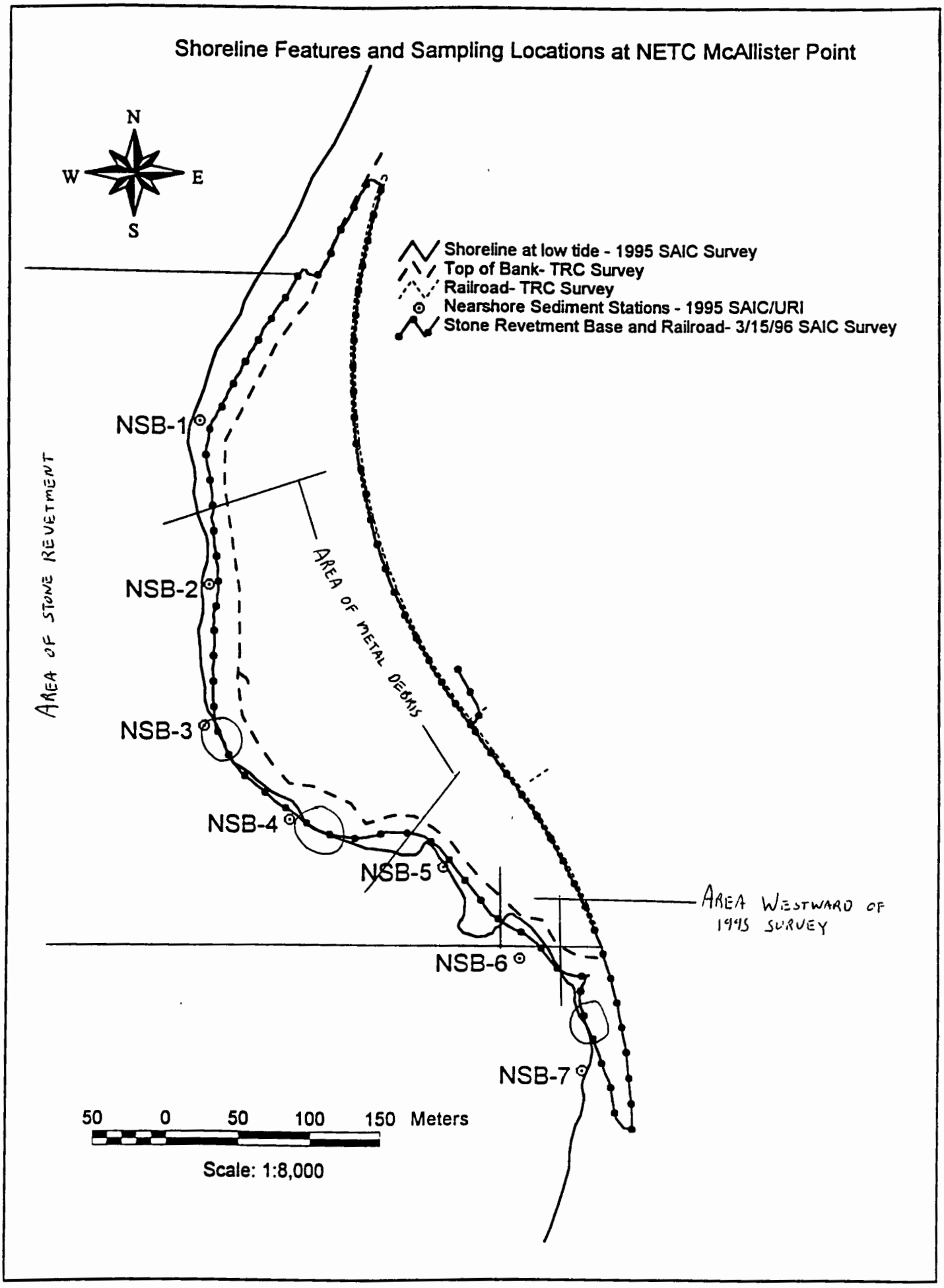
3 - Fecal Indicators
< 100 CFU/100g = -
100-350 CFU/100g = x
>350 CFU/100g = xx

TC = Total Coliforms
FC = Fecal Coliforms
FS - Fecal Streptococci
CP = *Clostridium perfringens*

4 - Toxicity
Ampelisca: 60-80% of Control = +; <60% of Control = ++
Arbacia: 51-70% of Control = +; <50% of Control = ++

5 - Field Biota:
No Effect = -
Possible Efect = x

FIGURE 2


Shoreline Features and Sampling Locations at NETC McAllister Point
N
W
E
S
Shoreline at low tide - 1995 SAIC Survey
Top of Bank- TRC Survey
Railroad- TRC Survey
Nearshore Sediment Stations - 1995 SAIC/URI
Stone Revetment Base and Railroad- 3/15/96 SAIC Survey
NSB-1
NSB-2
NSB-3
NSB-4
NSB-5
NSB-6
NSB-7
AREA OF STONE REVETMENT
AREA OF METAL DEBRIS
AREA WESTWARD OF 1995 SURVEY
50 0 50 100 150 Meters
Scale: 1:8,000