U.S. Department of the Interior
U.S. Geological Survey

K1-95-HW: CRUISE REPORT 1995 - PRELIMINARY RESULTS
PHASE III: SEDIMENT CHEMISTRY AND BIOLOGICAL SAMPLING SURVEY

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Open-File Report 95-839

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SUMMARY

Mamala Bay, off the south shore of the island of Oahu, has been used as a repository of dredged material primarily from Pearl and Honolulu Harbors for over a century. The U.S. Geological Survey, U.S. Army Corps of Engineers, and the U.S. Environmental Protection Agency are conducting an integrated study on the distribution and character of dredged materials as well as the effects of dredged material on the marine environment. A three phase study is providing information to evaluate the effects on seafloor substrate and the benthic fauna. The studies include geophysical profiling and imaging, bottom photography, sampling, chemical and physical analyses of sediment, and evaluations of the benthic population, population density, and adverse impacts to the benthic fauna.

Phase 1, conducted in 1993, inventoried the seafloor via remote sensing. Sidescan sonar and subbottom profilers characterized the seafloor in and around the disposal sites, and the resulting products reveal the character and extent of the dredged material. These data were used to plan Phase 2 in 1994, a sampling program that employed subbottom profilers, video and still photography, and seafloor sampling to ground truth the sonar mosaic and identify the seafloor substrates responsible for the various acoustic signatures on the sonar images and subbottom profiles. Box coring provided the samples necessary to distinguish dredged material from native sediment, and for the chemical analyses used to determine contaminant concentrations. Phase 3 studies conducted in June of 1995 consisted of box core sampling for chemical and biological analyses. Specific studies include: infaunal taxonomy and population density, bioassay/bioaccumulation, sediment chemistry, and post-disposal resuspension and transport.

The 1995 survey, conducted June 14 through 17, resulted in the collection of 39 box cores from 20 different stations. Multiple box cores were composited at 7 different locations occupied in 1994, to provide the material required for the 7 bioassay and bioaccumulation analyses currently underway (Figure 1). Seventeen of the 20 stations occupied provided the biological samples for the benthic infaunal identification and population density study conducted by Dr. Julie Brock of the University of Hawaii, and the sediment chemistry analyses conducted (and completed) by Quanterra Environmental Laboratories (Figure 1). Seven of the 20 stations occupied in 1995 were occupied in 1994, and provide the data for direct comparison of sediment chemistry at the same sites from two consecutive years. The sum total of the data collected from all three phases of the monitoring program will provide the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency with the information required to make informed decisions as to the management of the South Oahu disposal site in Mamala Bay.

Results acquired to date show the effectiveness of integrated assessment. Sidescan sonar shows that the dredged material is characterized by isolated, high-backscatter, circular to subcircular footprints interpreted

as individual disposal events. The footprints are concentrated over the sites and form a high-backscatter blanket that covers the low-backscatter native sediment mantling the seafloor. These data imply that much of the disposed material reaches the seafloor, and does not completely disperse in the water column.

Box cores and x-radiographs differentiate the dredged material from the native sediment. Dredged material comprises a heterogeneous mixture of cohesive, olive-gray mud that is mixed with sand to cobble-size rubble, which is responsible for its high-backscatter character. Low backscatter native sediment is a beige, bioturbated, muddy carbonate sand, generally devoid of coarse clasts. Bioturbation is ubiquitous in native sediment, and in some instances is present in the overlying dredged material. This implies that at least some organisms are capable of surviving in the dredged material. Video and still photographs and some 3.5-kHz profiles show that much of the seafloor is covered by a variety of wavy bedforms, ranging from symmetrical to asymmetrical ripples. The bedforms show that current activity, possibly internal waves, may be a mechanism for secondary transport. Photography also shows that the bottom is littered with a variety of debris types including wire, barrels, military ordnance, refuse, and carbonate reef debris.

The chemical analyses conducted on seafloor sediment and dredged materials do not yield definitive results, but generally, analyte concentrations are low to nondetectable. In some instances specific contaminants exhibit higher concentrations in native sediment, relative to dredged material and vice versa. In other instances certain analytes show both higher and lower concentrations in both native sediment and dredged material. Conclusions regarding the biological analyses are pending completion of those studies.

INTRODUCTION

Cruise K1-95-HW was the third survey in a multi-year program designed to monitor active and inactive deep ocean disposal sites in Mamala Bay, Honolulu, Hawaii, used for the disposal of harbor dredged materials (Figure 1). The survey was conducted by the U.S. Geological Survey (USGS) Branch of Pacific Marine Geology for the U.S. Army Corps of Engineers (COE) and the U.S. Environmental Protection Agency (EPA). The ultimate goal of the program is to determine if the disposal activities at the South Oahu disposal site adversely affect the benthic environment and ecosystem of Mamala Bay. The primary objectives of the K1-95-HW survey were to collect box core samples for four specific types of analyses: (1) Biological studies composed of benthic species identification in the upper 7 cm of the seafloor; (2) surficial sediment sampling for high-resolution chemical analyses to compare with identical data collected in 1994 (Quanterra, 1995a-f); (3) Sediment sampling for bioassay and bioaccumulation studies conducted by Battelle Pacific Northwest Division, Marine Sciences Laboratory; and (4) sediment samples collected along transects both south and west away from the South Oahu disposal site to determine if any post disposal, secondary transport of dredged material and associated contaminants is occurring. This four-pronged analysis combined with the acoustic, camera, and sampling surveys conducted in 1993 and 1994 (Torresan and others, 1993a, 1993b; Torresan and others 1994a; 1994b; 1995) will aid the COE and the EPA in assessing affects of disposal activities on the ecosystem of Mamala Bay, thus allowing both agencies to make informed decisions on disposal site management in Mamala Bay.

STUDY AREA

Mamala Bay is the embayment situated between Diamond Head on the east and Barbers Point on the west, along the south coast of the island of Oahu, Hawaii (Figure 1). The disposal sites are located in the north portion of Mamala Bay, about 5 km south of Honolulu International Airport, in the north–central reaches of a broad, gently sloping trough that slopes to the southeast (Figure 1). The trough is bounded on the west by submerged reefs and banks, and on the east by an escarpment that defines the seaward edge of the narrow and shallow (< 50 m) insular shelf that hugs the south Oahu coast. The bay is floored

primarily by a tan to beige colored, medium to fine grained carbonate sand. Water depths at the sites range from 300 m to nearly 600 m. The South Oahu disposal site has a mean water depth of about 450 m. For a detailed review of the seafloor geology and sonar mosaic consult Torresan and others (1995), and the references cited therein.

PREVIOUS STUDIES

Site Designation Studies

The South Oahu disposal site designation studies were conducted during 1977 and 1978 for the COE and EPA. The primary purpose of the 1977–1978 studies was to collect field and laboratory data to define the baseline environmental conditions, with the aim of documenting the environmental impact of the ocean disposal of harbor dredged material in Mamala Bay (Chave and Miller 1977a, 1977b, 1978a, 1978b, Neighbor Island Consultants, 1977; Tetra Tech, 1977; Goeggel, 1978). The three topics examined were the biological effects to the benthic and demersal communities, the geological effects on the existing bottom sediment regimes, and the effect on water quality. The results are summarized in a 1980 Environmental Impact Statement (EIS) prepared by the EPA (U.S. Environmental Protection Agency, 1980). The site designation studies led the EPA and COE to conclude that dredged material disposal would not have adverse effects on the environment of Mamala Bay, and that the South Oahu disposal site is a suiTable disposal site (U.S. Environmental Protection Agency, 1980).

Cooperative Disposal Site Monitoring Studies

The surveys conducted by the USGS in conjunction with the COE and EPA in 1993 and 1994 "inventoried" the seafloor with acoustic techniques and bottom sampling to determine the character of the seafloor and near–surface substrate, to delimit the extent and potential transport pathways of dredged material and any associated contaminants, and to determine the values for specific contaminants of concern in near-surface seafloor sediment in and around disposal sites. The first seafloor monitoring study commenced in February 1993, and culminated with the production of a sidescan sonar mosaic of the seafloor and a detailed bathymetric map (Torresan 1993a, 1993b, 1994, and 1995). The 1994 survey

focused on "ground truthing" the 1993 sonar and seismic–reflection data. Employing reflection profiling, seafloor video and still photography, and bottom sampling, the focus of the 1994 work was on ascertaining what the composition of the seafloor at specific sites was, thus verifying the nature of the acoustic signatures visible on the sidescan sonar mosaic. Results are summarized below.

The sidescan sonar mosaic displays three backscatter signatures that indicate different types of seafloor substrate. Each has been verified by seafloor sampling during the 1994 and 1995 sampling surveys. The dark-toned low backscatter regions that characterize most of the sonar mosaic are comprised of tan to beige colored carbonate sand (Figure 1; and Torresan and others, 1995- plate 1). The sonar mosaic also shows a light–toned high backscatter region that extends along the western and southwestern portion of the mosaic shown in Torresan (1995). This region is part of a drowned carbonate platform associated with reef growth during lower sea level (Kroenke and Woolard, 1966; Gregory and Kroenke 1982). The intermediate–toned, high-backscatter region centered over the disposal sites (Figure 1 and Torresan 1995) is the imprint of dredged-material deposits. Figure 1 shows that dredged materials form two major deposits that cover an area about three times the size of the designated disposal sites. The dredged material is characterized by high-backscatter, circular to subcircular footprints 25-150 m in diameter, spaced up to 300 m apart at the extremities of the deposits (Figure 1, and Torresan 1995). The footprints are apparently formed by individual disposal events; they coalesce to form a high–backscatter blanket over each disposal site. The blanket completely covers the natural, low–backscatter carbonate sediment that mantles the Mamala Bay seafloor. Subbottom seismic–reflection profiles show that the dredged material can form mounds up to 1 m high and spaced up to 300 m apart (Torresan and other, 1995).

Box cores collected during 1994 and 1995 show that the dredged material extends beyond what is visible on the sonar mosaic, comprising a heterogeneous deposit of cohesive gray mud that is admixed by the dredging process with coarse sand to cobble–size rubble. The rubble consists of limestone, shell, and coral fragments, and man–made detritus. The dredged material is easily distinguished from the native sediment, which is low backscatter, tan to beige colored, burrowed and bioturbated, clean to muddy carbonate sand. Bioturbation is ubiquitous in the native sediment, and some is present below the dredged

material. Video and still photographs show that the seafloor is characterized by wavy bedforms, and is littered with carbonate rubble and man-made debris that includes tires, barrels, and military ordnance. Bedforms that range in size from ripples to mega-ripples to sand waves. There is a broad spectrum of ripple types, including symmetrical and asymmetrical forms, and fresh looking to degraded ripple types (Hampton and others, in prep). At times, sections of the 3.5- kHz profiles have closely spaced hyperbolic diffractions that correlate with and indicate the presence of rippled bedforms (Torresan and others 1995; Hampton and others, in preparation). The natural roughness of the seafloor (in the form of bedforms as seen on video and still photography), the abundant rubble, and the coarse carbonate component of the dredged materials are likely responsible for the high-backscatter nature of the dredged material.

METHODS

Research Vessel

The survey was conducted aboard the University of Hawaii's R/V Kila, a 192 ton, 104 foot long research vessel. Kila has a 24 foot beam and 12' 11" draft when fully loaded, and was used for all three surveys for the monitoring program that commenced in 1993. Kila has a spacious 16 x 18 ft work deck and is outfitted with a 5-ton deep-sea winch that has 1/2'' torsion-balanced wire and a 10-ton A-frame that allowed deployment of the USGS box corer. The vessel and the crew performed flawlessly during the survey.

Navigation

Ship navigation employed a GPS system in either an autonomous or differential mode, with nominal accuracies of about 100 m and 5 m respectively. Details of navigation and GPS technology can be found in Torresan and others (1995), and references cited therein.

Sampling

All bottom samples were collected with a USGS-modified NEL box corer (Figure 2). The box corer is the industry and academic community standard for obtaining undisturbed samples of the upper 20-40 cm of the sediment column. USGS modifications to the NEL box corer include a smaller box (20x30x45 cm vs the standard 20x30x60 cm), lighter weight (1300 lbs vs the standard 1500 lbs), and shorter height (7 ft rather than 9 ft). The most prominent modification is that the box corer is outfitted with a Benthos Model 374, 35 mm bottom camera, a 100 watt-seconds flash unit, a laser light system, and a trigger weight. The camera is loaded with a 50 ft roll of 35 mm film capable of 400 exposures. The camera and flash are mounted to the box core frame and the system takes a photograph of the seafloor directly below the corer, just prior to sampling. The laser beam light system marks two spots on the seafloor that are 7.5 cm apart, and are used for scale.

The box corer is constructed of mild steel and is coated with an inorganic zinc compound and an epoxy primer and overcoat to protect against rust and deterioration. The unit holds a 0.06 m^2 stainless steel sample box that has a maximum effective penetration of about 40 cm, and a total volume of 0.027 m^3. Special features of this box include quick release cams for removing the box, and removable face plate to expose the sample for descriptive, photographic and subsampling purposes. Special features also include a flow-through head design with closing door flaps. The spade is fixed in position and a removable base plate is attached to the sample box before the corer is opened and the sample removed.

Sample Handling and Subsampling

Upon recovering the box corer, the box was immediately removed from the box core frame and placed in a special processing box. Cylindrical subcores were then hand pushed by biologists into the upper 5-7 cm of core, to provide the material necessary for benthic species identification and population density. Two (non-mollusc) subcores, about 10.7 cm diameter x 7 cm long, and two (mollusc) subcores about 3 cm diameter x 10 cm long were placed into the central portion of the box and excess water, if present, was siphoned off the core surface. Following placement of the biological subcores, the box core face plate was removed and the core was photographed with a digital camera. Each digital photograph

was stored on disk for post-cruise processing and enhancement purposes. The digital photographs were processed with Adobe Photoshop software between stations, and printed out with the aid of a laptop computer and a portable photographic printer. The system negates the use of standard wet chemical photographic processing, and allows post-cruise manipulation for enhancement purposes. Each photograph was then affixed to the box core description forms for archival purposes. Digital photographic data were then stored on 1.3 GB optical discs following the survey for future presentation on CD-ROM. Each box core was then visually described prior to sampling for sediment chemistry and removal of the biological subcores. Appendix 1 is a color-coded visual core description similar to those produced following the 1994 survey. Owing to time and personnel constraints no core slabs were taken, therefore precluding the collection of digital x-radiographs.

Following core photography and description, and prior to the removal of the biological subcores, subsamples were taken for sediment chemistry to determine the concentration of specific EPA-COE-defined contaminants of concern (U. S. Army Corps of Engineers and U.S. Environmental Protection Agency, 1994; Quanterra 1995a-k). Figure 1 and Table 2 shows that a number of the samples were collected from sites occupied in 1994, allowing direct comparison to the 1994 data base. Methodology and protocols employed for the chemical determinations are defined in detail in Table 3 and the Quanterra analytical reports (Quanterra 1995a-h). Sediment chemistry subsampling protocols required detailed and precise sampling procedures to insure against contamination and to guarantee that specific intervals were sampled (dredged material vs native sediment). Subsampling required the use of clean, teflon-coated spatulas. Spatulas were first cleaned with a biodegradable soap and rinsed in distilled water, which was followed by two rinses with reagent grade anhydrous ethyl alcohol. After air drying, spatulas were then rinsed again twice with reagent grade dichloromethane and allowed to air dry. Once dry, the spatulas were used to extract distinct intervals to keep the dredged material separate from native sediment. All samples were then stored in I-CHEM SUPERFUND-ANALYZED, 250 ml jars that include certificates of analysis. A traceable production number, item number, and jar number is provided with each container, and the product meets or exceeds analyte specifications established in the EPA "Specifications and Guidance for Contaminant-Free Sample Containers" for use in Superfund and other hazardous waste

programs. The jars meet all EPA specifications for use in the analysis of metals, semivolatiles, pesticides, PCBs, and volatile organics.

Subsamples designated for sediment chemistry analysis were stored in the I-CHEM labeled jars. The lids contain teflon liners, and each lid was tightly closed and sealed with tape. Each jar was then placed in a freezer located in Kila's laboratory and maintained at -4° C. Following the survey the frozen samples were packed in coolers, surrounded with blue ice and shipped to Quanterra Environmental Laboratories, in Arvada, Colorado, via priority overnight delivery. Figure 1, Table 1, Table 2 and appendices 1 and 2 show the samples and sample locations that were used for sediment chemistry. All of the sediment chemistry samples were collected in conjunction with biological samples, and many of the samples were collected from sites occupied in 1994 to allow for direct comparison of data from the same site on successive years.

Following collection of the sediment chemistry samples, the biologists then removed and extruded each subcore into labeled plastic containers. The non-mollusc cores were split into two approximately equal fractions, and were treated with 100-150 ml of a solution of 100% formalin and Rose Bengal dye, and stored in the shade. The mollusc cores were removed and transferred to single 4 oz containers. Sea water was added if necessary and the containers were immediately stored in coolers filled with an ice bath. Biological samples were taken back to the laboratory at the end of each sampling day for further processing at the University of Hawaii. See the progress report by Bailey-Brock and others, (1995) for details of the biological sampling and taxonomic procedures.

Following the removal of the biological subcores at stations sampled for bioassay and bioaccumulation studies (Figure 1, Table 4, Appendix 1 and Appendix 3), the remaining sediment was sampled with clean, stainless steel spatulas (cleaned as described above) and stored in coolers. Sampling protocols included the following procedures. While transiting to each site, the designated cooler was rinsed three times with sea water. The cooler was then lined with two plastic bags, each of which was also rinsed three times with sea water. About eight gallons of either dredged material or native sediment (site dependent- Table 4, Appendices 1 and 3) were placed into the plastic bag, and the top of each bag was then twisted and closed with rubber bands. Four to six blue ice packs were then added to surround the

sediment in each cooler. The blue ice packs were placed in ziploc bags to prevent leakage into the cooler should they rupture. Chain of custody forms for the bioaccumulation samples were filled out (Appendix 3), placed into ziploc bags and taped to the inside of the cooler lid. Duct tape was then used to tape the edges around the entire lid of the cooler, and two straps were taped around the cooler itself to prevent any material or water from leaking out of the coolers during shipping. At the end of the sampling day each cooler was then stored in a walk-in freezer located at the University of Hawaii Marine Center, and maintained at -4°C until the survey was complete. All coolers were then sent via overnight express delivery to Battelle Marine Sciences Laboratory, Pacific Northwest Division, Sequim, Washington.

PRELIMINARY RESULTS

The 1995 survey, conducted June 14 through 17, resulted in the collection of 39 box cores from 20 different stations. Multiple box cores were composited at 7 stations to provide the material required for the bioassay and bioaccumulation analyses currently underway (Figure 1). Seventeen of the 20 stations occupied provided the biological samples for the benthic infaunal identification and population density study conducted by Dr. Julie Brock of the University of Hawaii, and the sediment chemistry analyses conducted by Quanterra Environmental Laboratories (Figure 1). The sediment chemistry analyses are documented in reports by Quanterra Environmental Services (Quanterra, 1995h-k). Seven of the 20 stations occupied in 1995 were occupied in 1994, and provide the data for direct comparison of sediment chemistry at the same sites from two consecutive years. The sum total of the data collected from all three phases of the monitoring program will provide the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency with the information required to make informed decisions as to the management of the South Oahu disposal site in Mamala Bay.

The 1995 box core descriptions shown in Appendix 1 corroborate the data collected in 1994, and verify the various acoustic signatures visible in the sonar images shown in Torresan and others (1995) and Figure 1. The high-backscatter material centered over the disposal sites is a heterogeneous mixture of olive-gray to gray-brown mud that acts as a binding matrix for the coarser sand to cobble-size material. The natural sediment, seen as the low back scatter region surrounding the disposal sites and most of the

study area, is predominantly a beige-colored muddy carbonate sand. The high-backscatter region that is visible on the west and southwest side of the mosaic shown in Torresan and others (1995) is exposed carbonate reefs and associated sediment.

Chemical analyses completed to date do not yield definitive results, but generally, analyte concentrations are low, and many of the analytes chosen from the list of contaminants of concern are non-detecTable. In some instances specific contaminants exhibit higher concentrations in native sediment, relative to dredged material and vice versa. In other instances certain analytes show both high and low concentrations in both native sediment and dredged material. Conclusions regarding the biological analyses are pending completion of those studies.

Suggestions for further studies include deployment of oceanographic instrumentation to evaluate the types of current activity responsible for the array of wavy bedforms observed in the sonar images, subbottom profiles and video and still photographs. This will allow the quantification of the bottom flow that can potentially resuspend and redistribute the dredged material and any associated contaminants.

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TABLES

Table 1. Shipboard Station Location and Comment Log (Note that cores have two designations, a 1995 ID (95B1) and a consecutive ID for all cores collected in 1994 and 1995

Day/Time (JD GMT)	Latitude/Longitude	Depth (m)	Comments
164 22:18:27	21°15.21179'N/157°56.88029'W		On Station 95B1 (B72)
164 22:51:47	21°15.15060'N/157°56.84989'W	428	On Bottom 95B1 (B72)
164 23:01:52	21°15.04640'N/157°56.83010'W		Printer on line
164 23:06:19	21°14.98390'N/157°56.81129'W		95B1 (B72) on surface, wire caught on nut.
164 23:13:14	21°14.98120'N/157°56.76879'W		On Deck 95B1 (B72)
164 23:25:39	21°15.15800'N/157°56.22839'W		B1 (B72) forgot to insert bale on base plate.
165 00:28:19	21°15.24070'N/157°56.90860'W		On station 95B2 (B73)
165 00:28:46	21°15.24510'N/157°56.89050'W	420	Current water depth 420 m
165 00:30:40	21°15.24569'N/157°56.87880'W		95B2 (B73) in water
165 00:46:54	21°15.16040'N/157°56.85110'W	428	Water depth 428 m.
165 00:49:02	21°15.14350'N/157°56.85120'W	426	95B2 (B73) on bottom.
165 01:03:13	21°15.01100'N/157°56.91269'W		95B2 (B73) on deck
165 01:55:30	21°15.18599'N/157°56.95300'W		95B3 (B74) In water
165 02:11:35	21°15.13200'N/157°56.89300'W	423	95B3 (B74) on bottom
165 02:24:50	21°14.98400'N/157°56.93099'W		95B3 (B74) did not trip, repositioning for another drop.
165 02:38:59	21°15.16400'N/157°56.97100'W		On station 95B4 (B75); going down.
165 02:48:58	21°15.15199'N/157°56.83699'W	?	95B4 (B75) on bottom
165 03:04:07	21°15.05900'N/157°56.78899'W		95B4 (B75) on deck
165 04:07:17	21°15.20100'N/157°56.94099'W		95B5 (B76) in water
165 04:09:01	21°15.20600'N/157°56.93200'W	422	Water depth 422 m
165 04:30:19	21°15.04600'N/157°57.06999'W		Question about wire bounce on sheave, bring in to 350 m and payout again.
165 04:47:16	21°5.15199'N/157°56.86199'W	422	95B5 (B76) On bottom we think
165 05:05:12	21°14.93300'N/157°56.80599'W		95B5 (B76)On deck
165 06:30:36	21°8.99000'N/157°53.16199'W		Back at Snug Harbor- end day one.
166 17:52:01	21°15.10600'N/157°56.03699'W	443.8	95B6 (B77) on station; day two.
166 17:52:25	21°15.09999'N/157°56.02800'W	445.3	95B6 (B77) in water
166 18:35:39	21°15.19300'N/157°56.01900'W	441.2	95B6 (B77) on bottom
166 18:36:03	21°15.19500'N/157°56.02100'W	440.6	95B6 (B77) off bottom
166 18:55:12	21°15.34300'N/157°56.19900'W	433.6	95B6 (B77) on deck
166 19:13:01	21°15.24299'N/157°56.07500'W	439.3	95B7 (B78) in water
166 19:25:00	21°15.22200'N/157°55.94700'W	442.7	95B7 (B78) on bottom
166 19:25:46	21°15.21699'N/157°55.93799'W	442.2	95B7 (B78) off bottom
166 20:15:56	21°15.32800'N/157°55.99300'W	439.6	95B8 (B79) in water

Table 1. Shipboard Station Location and Comment Log (continued)

Day/Time (JD GMT)	Latitude/Longitude	Depth (m)	Comments
166 20:27:50	21°15.17600'N/157°56.04100'W	440.6	95B8 (B79) on bottom
166 20:28:54	21°15.16200'N/157°56.03300'W	443.2	95B8 (B79) off bottom
166 20:38:11	21°15.06800'N/157°55.87999'W	449	95B8 (B79) on deck
166 20:52:30	21°15.20299'N/157°56.10099'W	439.6	95B9 (B80) in water
166 21:12:42	21°15.19200'N/157°56.02500'W	442.2	95B9 (B80) on bottom
166 21:13:32	21°15.18999'N/157°56.02900'W	441.9	95B9 (B80) off bottom
166 21:24:44	21°15.25599'N/157°56.34300'W	433.9	95B9 (B80) on deck
166 22:11:28	21°15.21000'N/157°56.11299'W	440.6	95B10 (B81) in water
166 22:25:09	21°15.18900'N/157°56.00600'W	442.5	95B10 (B81) On bottom
166 22:25:50	21°15.18400'N/157°56.01699'W	443	95B10 (B81) off bottom
166 22:39:07	21°15.15500'N/157°56.38900'W	436.2	95B10 (B81) on deck
166 23:15:26	21°14.39400'N/157°54.54900'W	492.5	95B11 (B82) in water
166 23:31:33	21°14.50300'N/157°54.49599'W	491.4	95B11 (B82) on bottom
166 23:46:39	21°14.40700'N/157°54.85999'W	487.2	95B11 (B82) on deck
167 00:38:07	21°14.52100'N/157°54.69800'W	488	95B12 (B83) in water
167 00:53:14	21°14.49000'N/157°54.51099'W	492.5	95B12 (B83) on bottom
167 01:04:37	21°14.42799'N/157°54.86900'W	487	95B12 (B83) on deck
167 02:17:58	21°13.87500'N/157°52.47299'W		Kila Fathometer down
167 02:32:35	21°13.87200'N/157°52.28500'W	523.2	Fathometer back up; may be flaky.
167 02:35:54	21°13.90600'N/157°52.28700'W	522.1	95B13 (B84) in water
167 04:11:28	21°14.04400'N/157°52.22900'W	516.9	95B14 (B85) in water
167 04:30:29	21°13.99699'N/157°51.98400'W	518	95B14 (B85) on bottom
167 04:42:26	21°13.99500'N/157°51.96400'W	519.3	95B14 (B85) on deck
167 04:44:45	21°14.06400'N/157°52.00499'W	514.8	Heading to Snug end day two
167 16:52:17	21°14.07000'N/157°52.26699W	514.1	95B15 (B86) box core in water
167 16:55:15	21°14.07800'N/157°52.21699'W	514.1	95B15 (B86)
167 17:06:32	21°13.96500'N/157°52.08399'W	520.6	Fathometer failing out again
167 17:18:18	21°14.00199'N/157°51.98199'W	519.3	95B15 (B86) on bottom
167 17:31:11	21°13.95000'N/157°52.36300'W	520.3	95B15 (B86) on deck
167 17:52:26	21°13.92800'N/157°52.14600'W	521.4	95B16 (B87) in water
167 18:06:55	21°13.99400'N/157°51.98599'W	518	95B16 (B87) on bottom
167 18:18:05	21°13.98800'N/157°52.29600'W	519	95B16 (B87) on deck
167 19:05:03	21°13.89000'N/157°52.22799'W	523.7	95B17 (B88) in water
167 19:23:31	21°13.97400'N/157°51.93700'W	519.5	95B17 (B88) on/off bottom; subtle
167 19:35:36	21°13.97600'N/157°52.15500'W	519.8	95B17 (B88) on deck
167 20:21:26	21°16.04400'N/157°56.70799'W	393.8	95B18 (B89) in water
167 20:34:27	21°16.00900'N/157°56.47600'W	408.1	95B18 (B89) on bottom
167 20:45:38	21°15.87099'N/157°56.64300'W	400.5	95B18 (B89) on deck
167 21:12:39	21°15.99900'N/157°56.66600'W	398.7	95B19 (B90) in water
167 21:28:23	21°15.99200'N/157°56.50100'W	407.6	95B19 (B90) on bottom
167 22:16:14	21°13.49600'N/157°57.26500'W	491.7	95B20 (B91) in water
167 22:43:24	21°13.32500'N/157°57.08300'W	499.2	95B20 (B91) on deck
167/22:29:06	21°13.32800'N/157°57.09500'W	498.7	95B20 (B91) on bottom

Table 1. Shipboard Station Location and Comment Log (continued)

Day/Time (JD GMT)	Latitude/Longitude	Depth (m)	Comments
167 23:01:37	21°13.47900'N/157°57.20000'W	493	95B21 (B92) in water
167 23:17:25	21°13.52000'N/157°57.00600'W	493	95B21 (B92) on bottom
167 23:30:50	21°13.59200'N/157°57.44900'W	490.6	95B21 (B92) on deck
167 23:47:44	21°13.42800'N/157°57.20300'W	495.1	95B22 (B93) in water
168 00:02:23	21°13.52000'N/157°57.00600'W	494.5	95B22 (B93) on bottom
168 00:15:32	21°13.24600'N/157°56.98499'W	502.6	95B22 (B93) on deck
168 00:47:39	21°13.99300'N/158°00.24099W	412.5	95B23 (B94) in water
168 01:03:37	21°13.98600'N/158°00.05400'W	415.9	95B23 (B94) on bottom
168 01:46:18	21°14.01099'N/158°00.02499'W	416.2	95B24 (B95) on bottom
168 02:06:19	21°14.11000'N/158°00.46199'W	409.6	95B24 (B95) on deck
168 02:22:11	21°13.97400'N/158°00.25500'W	413.3	95B25 (B96) in water
168 02:34:35	21°14.00400'N/158°00.01599'W	416.4	95B25 (B96) in water
168 02:34:45	21°14.00299'N/158°00.01799'W	416.7	95B25 (B96) on bottom
168 03:00:29	21°14.06100'N/158°00.21199'W	411.2	95B26 (B97) in water
168 03:16:21	21°14.02400'N/157°59.97700'W	418.2	95B26 (B97) on bottom
168 03:16:57	21°14.02400'N/157°59.97700'W	419.3	95B26 (B97) off bottom
168 03:31:39	21°14.05700'N/158°00.31599'W	411.7	95B26 (B97) on deck
168 03:31:49	21°14.06300'N/158°00.31799'W	411.2	Heading for the barn end day three
168 17:37:16	21°14.54100'N/157°59.07399W	415	Fathometer failing
168 17:41:20	21°14.51400'N/157°59.01300W	420.8	95B27 (B98) on bottom
168 17:42:04	21°14.51600'N/157°59.00599W		95B27 (B98) off bottom
168 17:51:52	21°14.58199'N/157°59.196.0W	415.4	95B27 (B98) on deck
168 18:25:34	21°17.08700'N/157°59.04699W		95B28 (B99) in water; fathometer down.
168 18:26:41	21°17.08800'N/157°59.04600W		95B28 (B99) on bottom
168 19:05:50	21°14.53800'N/158°01.65299W	331.5	95B29 (B100) in water
168 19:15:35	21°14.50700'N/158°01.51699W	333.2	95B29 (B100) on bottom
168 19:15:56	21°14.50700'N/158°01.51399W	332.7	95B29 (B100) off bottom
168 19:51:50	21°13.24900'N/158°01.39699W	382.2	95B30 (B101) in water
168 20:03:00	21°13.19300'N/158°01.19899W	388.7	95B30 (B101) on bottom
168 20:13:06	21°13.19000'N/158°01.39400W	383.1	95B30 (B101) on deck
168 20:50:07	21°12.50599'N/157°57.29300W	522.7	95B31 (B102) in water
168 21:04:00	21°12.50699'N/157°56.99200W	520.1	95B31 (B102) on bottom
168 21:25:48	21°12.71200'N/157°57.15000W	513.5	95B31 (B102) on deck
168 21:32:36	21°12.99700'N/157°57.25699W	506	95B32 (B103)in water
168 21:46:58	21°13.01100'N/157°56.99700W	507.6	95B32 (B103) on bottom
168 21:47:21	21°13.01100'N/157°56.99999W	507.8	95B32 (B103) off bottom
168 22:27:42	21°13.78900'N/157°57.22199W	483.3	95B33 (B104) in water
168 22:41:10	21°13.83699'N/157°57.00300W	481	95B33 (B104) on bottom
168 22:41:29	21°13.83699'N/157°57.00300W	481	95B33 (B104) off bottom
168 23:15:06	21°14.89599'N/157°57.95099W	430.5	95B34 (B105) on station
168 23:26:35	21°14.93000'N/157°57.76100W	426.8	95B34 (B105) on bottom
168 23:26:54	21°14.93399'N/157°57.76200W	426.8	95B34 (B105) off bottom

Table 1. Shipboard Station Location and Comment Log (continued)

Day/Time (JD GMT)	Latitude/Longitude	Depth (m)	Comments
169 00:06:39	21°14.88900'N/157°58.50200W	421.6	95B35 (B106) in water
169 00:19:55	21°14.91900'N/157°58.23900W	426.3	95B35 (B106) on bottom
169 00:20:41	21°14.92099'N/157°58.22500W	427.3	95B35 (B106) off bottom
169 00:33:38	21°14.85000'N/157°57.96400W	431.3	95B35 (B106) on deck
169 01:24:36	21°14.91800'N/157°58.97400W	410.7	95B36 (B107) in water
169 01:36:25	21°14.89800'N/157°58.74900W	417.7	95B36 (B107) on bottom
169 01:37:19	21°14.90100'N/157°58.74599W	418	95B36 (B107) off bottom
169 01:49:13	21°14.89599'N/157°58.77800W	416.2	95B36 (B107) on deck
169 02:05:50	21°14.97000'N/157°59.69600W	389.1	95B37 (B108) in water
169 02:16:11	21°14.90200'N/157°59.53300W	397.1	95B37 (B108) on bottom
169 03:22:01	21°14.38600'N/157°53.23800W	503.7	95B38 (B109) in water
169 03:37:25	21°14.39900'N/157°53.00999W	502.9	95B38 (B109) on bottom
169 03:48:54	21°14.35100'N/157°53.20000W	506	95B38 (B109) on deck
169 04:13:14	21°14.40500'N/157°52.51800W	500.3	95B39 (B110) on bottom
169 04:26:03	21°14.31200'N/157°52.56100W	504.4	95B39 (B110) on deck
169 04:30:56	21°14.36400'N/157°52.82600W	502.6	Steam for Snug Harbor
169 04:31:22	21°14.37200'N/157°52.83200W	502.1	End cruise K1-95-HW

Table 2. Samples collected for Sediment Chemistry and Post-Disposal Secondary Transport Study (Samples have two designations: Column one shows the sample ID when cores are numbered consecutively from 1994 cores, as seen on Figure 1. Column two shows the K1-95-HW ID.)

CONSECUTIVE SAMPLE NUMBER	K1-95-HW CRUISE SAMPLE ID (interval)	LOCATION Latitude/Longitude	COMMENTS AND PURPOSE
B72 B75	B2 (O-4cm) B4 (0-4cm)	21°15.15'N/157°56.86'W	South Oahu Site; Dredged Material Composite
B77 B78 B81	B6 (0-6cm) B7 (0-4.5cm) B10 (bulk)	21°15.17'N/157°55.99'W	South Oahu Site; Dredged Material Composite
B82 B83	B11 (0-5cm) B12 (0-5cm)	21°14.50'N/157°54.51'W	Old Honolulu Harbor Site; Dredged Material Composite
B84 B87	B13 (0-4cm) B16 (0-4cm)	21°14.00'N/157°51.98'W	East of Old Honolulu Harbor Site; Native Sediment Composite
B89	B18 (0-5cm)	21°16.00'N/157°56.50'W	Old Pearl Harbor Site; Dredged Material
B91 B92	B20 (0-5cm) B21 (0-5cm)	21°13.51'N/157°57.00'W	South of South Oahu Site; Native Sediment Composite
B95 B96	B24 (0-5cm) B25 (0-5cm)	21°14.00'N/158°00.01'W	West of South Oahu Site; Native Sediment Composite
B98	B27 (0-4cm)	21°14.51'N/157°59.01'W	West of South Oahu Site; Native Sediment
B101	B30 (0-4cm)	21°13.19'N/158°01.20'W	Submerged Bank Sites; Native Sediment
B102	B31 (0-4cm)	21°12.51'N/157°56.99'W	South of South Oahu Site; Native Sediment; Secondary Transport Study

Table 2 (continued)

CONSECUTIVE SAMPLE NUMBER	K1-95-HW CRUISE SAMPLE ID (INTERVAL)	LOCATION (Latitude/Longitude)	COMMENTS AND PURPOSE
B103	B32 (0-4cm)	21°13.01'N/157°57.00'W	South of South Oahu Site; Native Sediment; Secondary Transport Study
B104	B33 (0-4cm)	21°13.84'N/157°57.00'W	South of South Oahu Site; Native Sediment; Secondary Transport Study
B105	B34 (0-4cm)	21°14.93'N/157°57.76'W	West of South Oahu Site; Native Sediment; Secondary Transport Study
B106	B35 (0-4cm)	21°14.92'N/157°58.23'W	West of South Oahu Site; Native Sediment; Secondary Transport Study
B107	B36 (0-4cm)	21°14.90'N/157°58.75'W	West of South Oahu Site; Native Sediment; Secondary Transport Study
B108	B37 (0-4cm)	21°14.90'N/157°59.50'W	West of South Oahu Site; Native Sediment; Secondary Transport Study
B109	B38 (0-4cm)	21°14.40'N/157°53.00'W	East of Old Honolulu Harbor Site; Native Sediment

Table 3: Analyses and methodologies employed for sediment chemistry.

PARAMETER	METHOD
Total Solids	E160.3
Nitrogen, Ammonia	E350.1
Sulfide	E376.2
Acid Digestion, Total Metals (ICP)	SW3010
Acid Digestion, Total Metals (Furnace)	SW3020
Acid Digestion, Total Metals (As, Se)	SW3020
Arsenic, Furnace	SW7060
Cadmium, Furnace	SW7131
Chromium, Total, Furnace	SW7191
Copper, ICP	SW6010
Lead, Furnace	SW8015
Mercury	SW7471
Nickel, ICP	SW6010
Selenium, Furnace	SW7740
Silver, Furnace	SW7761
Zinc, ICP	SW6010
Diesel Range Organics	SW8015
Sonication Extraction (Method 8015)	SW3550
Organochlorine Pesticides and PCBs	SW8080
Sonication Extraction (Method 8080)	SW3550
Semivolatile Organics (GC/MS) Capillar	SW8270
Sonication Extraction (Method 8270)	SW3550
Total PCDDs Screen (C1-4 through C1-8)	SW8280
Total Cyanide	SW9012
Total Organic Carbon	SW9060
PCB Congeners	E680 (Modified)
Organic Tin Compounds	Unger
Particle Size Distribution	ASTM D422
Polynuclear Aromatic Hydrocarbons	SW8270/SIM

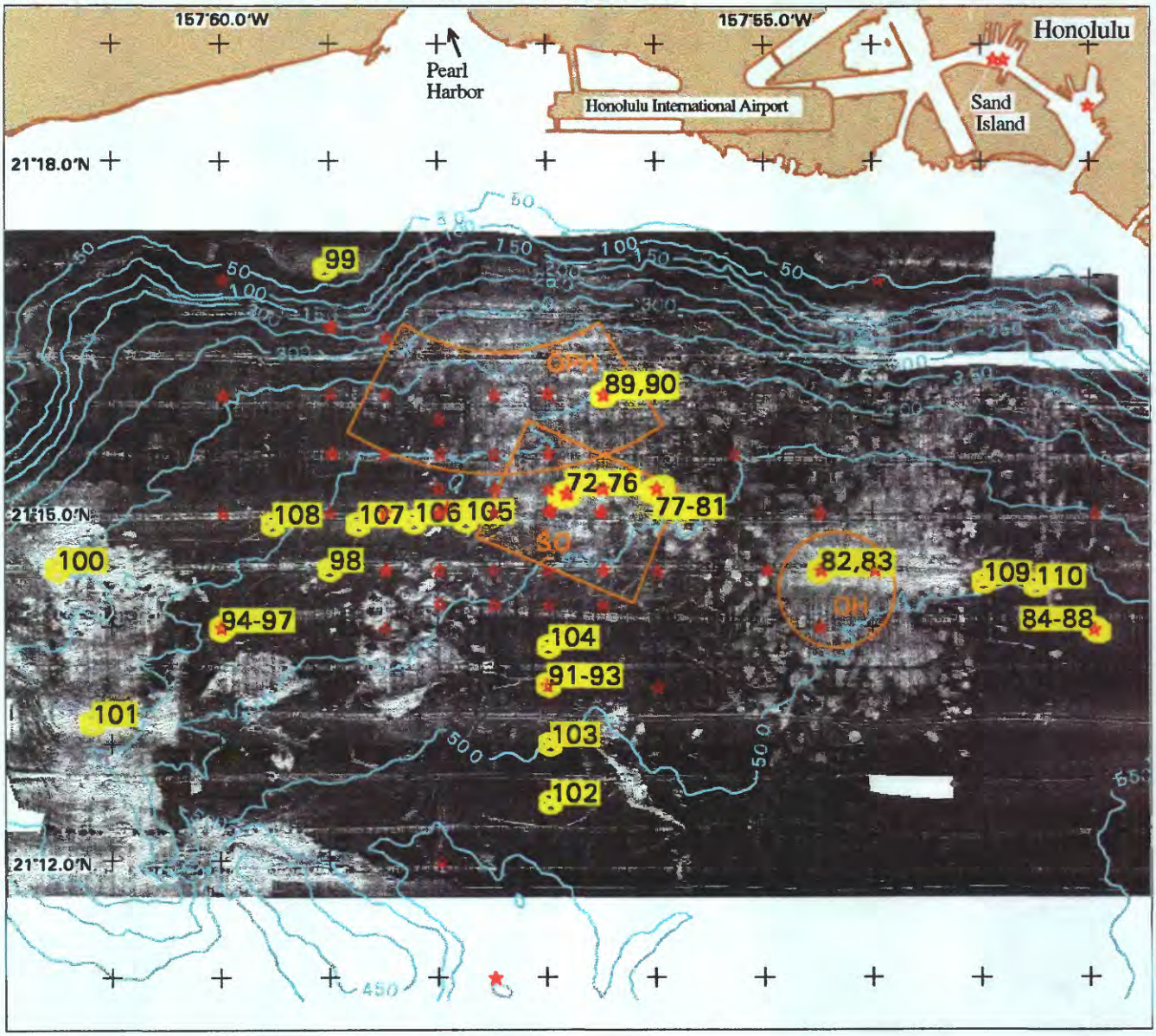
Table 4. Subsamples Collected for Bioaccumulation and Bioassay Analyses

1995 Sample ID	K1-95-HW Cruise Station/Sample ID	Location (Lat/Lon)	Comments Sediment Types
B73; B74; B75; B76	B2; B3; B4; B5	21°15.15'N 157°56.86'W	South Oahu Site; Dredged Material Composite
B77; B78; B79; B80;B81	B6; B7; B8; B9; B10	21°15.17'N 157°55.99'W	South Oahu Site; Dredged Material Composite
B82; B83	B11; B12	21°14.50'N 157°54.51'W	Old Honolulu Harbor Site; Dredged Material Composite
B84; B85; B86; B87; B88	B13; B14; B15; B16; B17	21°14.00'N 157°51.98'W	East of Old Honolulu Harbor Site; Native Sediment Composite
B89; B90	B18; B19	21°16.00'N 157°56.50'W	Old Pearl Harbor Site; Dredged Material Composite
B91; B92; B93	B20; B21; B22	21°13.51'N 157°57.00'W	South of South Oahu Site; Native Sediment Composite
B94; B95; B96; B97	B23; B24; B25; B26	21°14.00'N 158°00.01'W	West of South Oahu Site; Native Sediment Composite

(Note: Samples have two designations: The first column shows the 1995 Sample ID when cores are numbered consecutively from 1994 cores, as shown on Figure 1, the station location Map. The second column shows the K1-95-HW cruise station/sample ID)

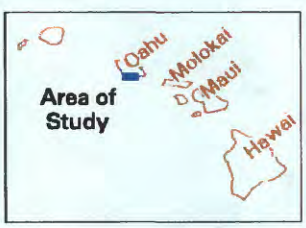
Figure 1. 1995 study area and station location map with bathymetry.

K1-95-HW Core Locations, Mamala Bay, Honolulu, Hawaii



EXPLANATION

- Boundary of disposal site
  - OH Old Honolulu
  - OPH Old Pearl Harbor
  - SO South Oahu
- ★ K2-94-HW core location
- K1-95-HW core location



Mercator Projection, Std Par 21°17'N
Central Meridian 158°W, NAD83
Bathymetric contour interval 50 m

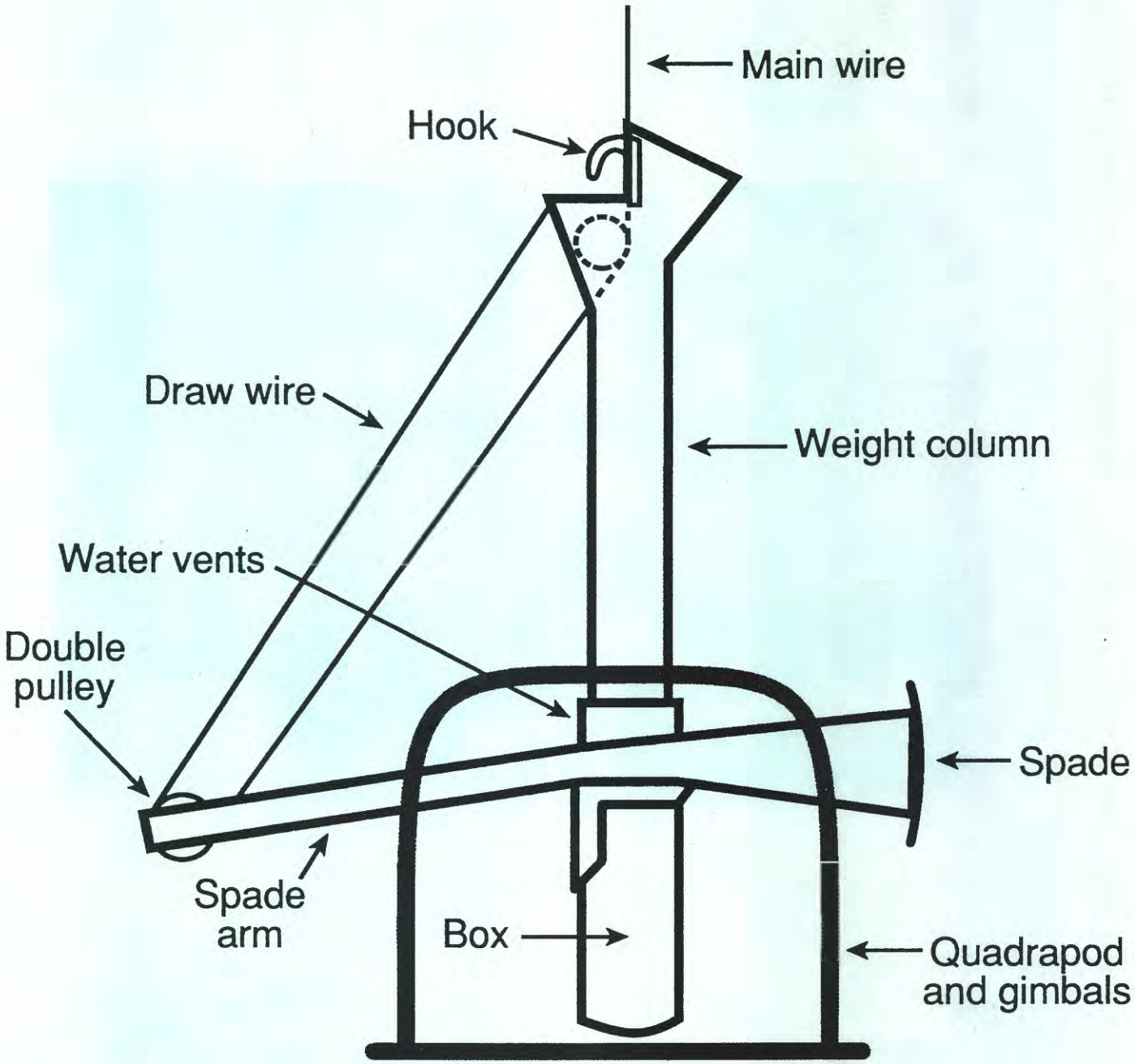


Figure 2A. Diagram of the box core sampler.

Figure 2B. USGS box corer with bottom camera system.

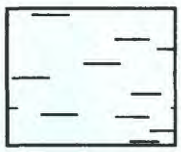
APPENDIX 1

BOX CORE DESCRIPTIONS

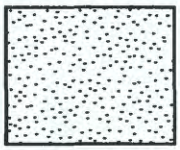
BLANK

K1-95-HW CORE DESCRIPTIONS - LEGEND

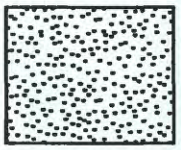
SEDIMENT TEXTURE



mud



fine sand



med-coarse sand

gravel

SEDIMENT COMPONENTS

burrows and bioturbation

shells

SEDIMENT TYPE

native sediment: buff to brownish gray, burrowed and bioturbated, muddy to clean carbonate sand.

dredged material: cohesive gray mud mixed with mudballs and sand-to-cobble-sized rubble composed of coral, shell, limestone, and man-made fragments.

reef debris: pebble-to-cobble-sized rubble composed of coral fragments.

undetermined.

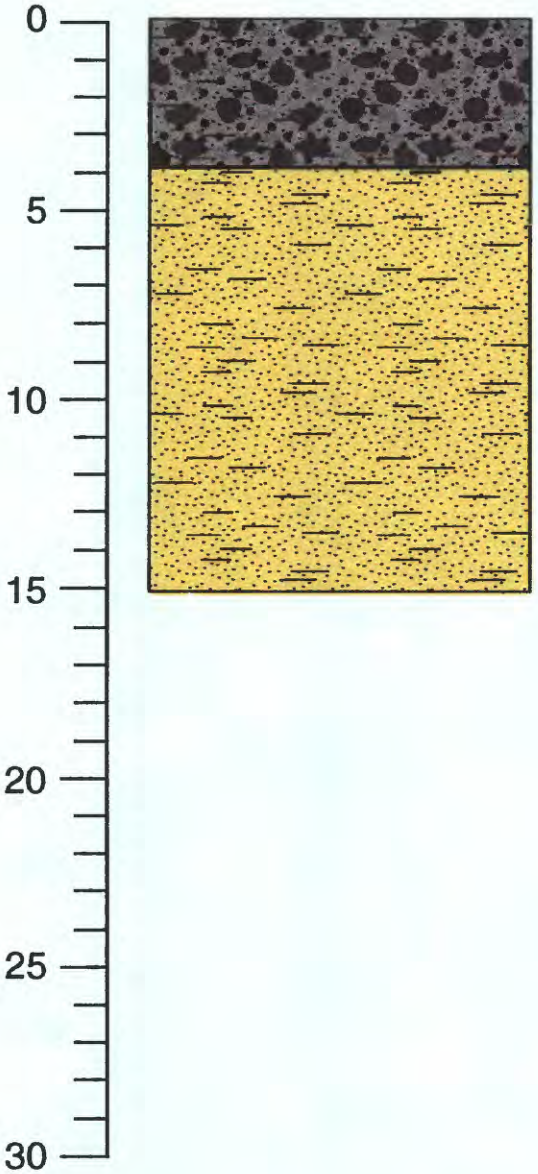
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B1 (B-72) Observer: TORRESAN

Site Description SOUTH OAHU SITE 1 (REOCCUPY 94-B1): 1ST OF 5 TRIES.

Water Depth 428 m (uncorrected) Core Length ~15 cm

Location 21°15.17' N 157°56.83' W



Description

THICKNESSES ARE APPROXIMATE. LOST SAMPLE DUE TO BASE PLATE FAILURE.

0-4 DREDGED MATERIAL.

4-11 NATIVE SEDIMENT.

SUBSAMPLES: NONE.

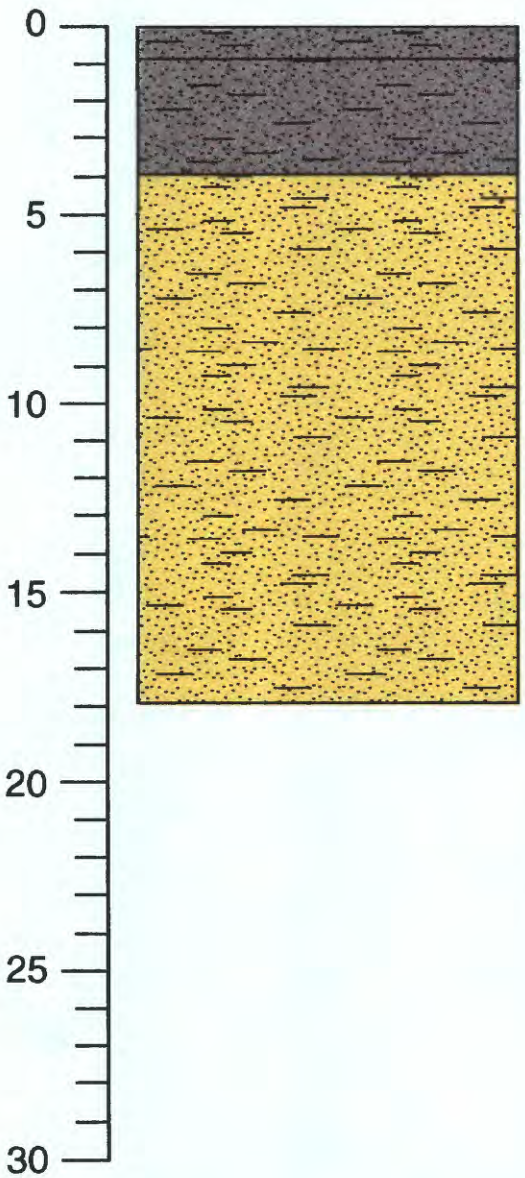
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B2 (B-73) Observer: TORRESAN

Site Description SOUTH OAHU SITE 1 (REOCCUPY 94-B1): 2ND OF 5 TRIES.

Water Depth 428 m (uncorrected) Core Length 18 cm

Location 21°15.14' N 157°56.83' W



Description

DISTURBED AT SURFACE

0-1 SLIGHTLY OXIDIZED LAYER OR DISTINCT FINE SURFACE LAYER, POSSIBLY COMPOSED OF POST-DISPOSAL SEDIMENT.

0-4 DREDGED MATERIAL.

4-18 COARSER SAND WITH MUD - NATIVE SEDIMENT.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL (0-4 CM).

K1–95-HW
Box Core Visual Description Form

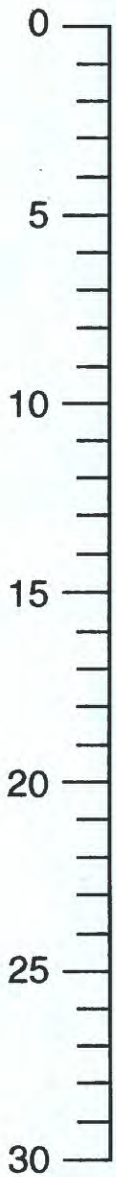
Core ID: 95-B3 (B-74) Observer: TORRESAN

Site Description SOUTH OAHU SITE 1 (REOCCUPY 94-B1): 3RD OF 5 TRIES.

Water Depth 422 m (uncorrected) Core Length 0 cm

Location 21°15.13' N 157°56.89' W

Description



NO RECOVERY - BOXCORE DID NOT TRIP.

K1–95-HW
Box Core Visual Description Form

Core ID: 95-B4 (B-75) Observer: TORRESAN

Site Description SOUTH OAHU SITE 1 (REOCCUPY 94-B1): 4TH OF 5 TRIES.

Water Depth 425 m (uncorrected) Core Length 19 cm

Location 21°15.15' N 157°56.84' W

Description

INCLINED SURFACE - CORE LENGTH ON LEFT SIDE IS 12.5 CM.

0-19 DREDGED MATERIAL, CONTAINING CORAL, WOOD, POTTERY, AND CHARCOAL FRAGMENTS. RIGHT SIDE OF THE BOX IS DOMINATED BY COHERENT CLUMPS OF CLAYEY MUD.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 1 CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL (0-19 CM).

K1–95-HW
Box Core Visual Description Form

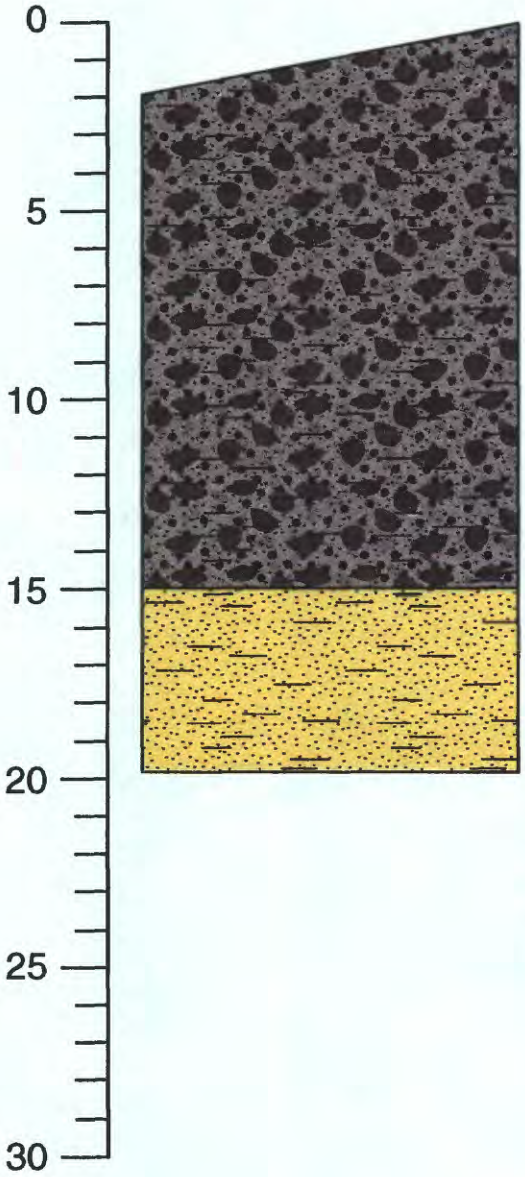
Core ID: 95-B5 (B-76) Observer: TORRESAN

Site Description SOUTH OAHU SITE 1 (REOCCUPY 94-B1): 5TH OF 5 TRIES.

Water Depth 425 m (uncorrected) Core Length 20 cm

Location 21°15.15' N 157°56.86' W

Description



CORE LENGTH = 18 CM LEFT SIDE, 20 CM RIGHT SIDE.

0-15 DREDGED MATERIAL - COARSE CLASTS, SAND, SANDY MUD.

15-20 NATIVE SEDIMENT?

SUBSAMPLES:
COLLECTED 4 BIOLOGY SAMPLES.
COLLECTED NO CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL.

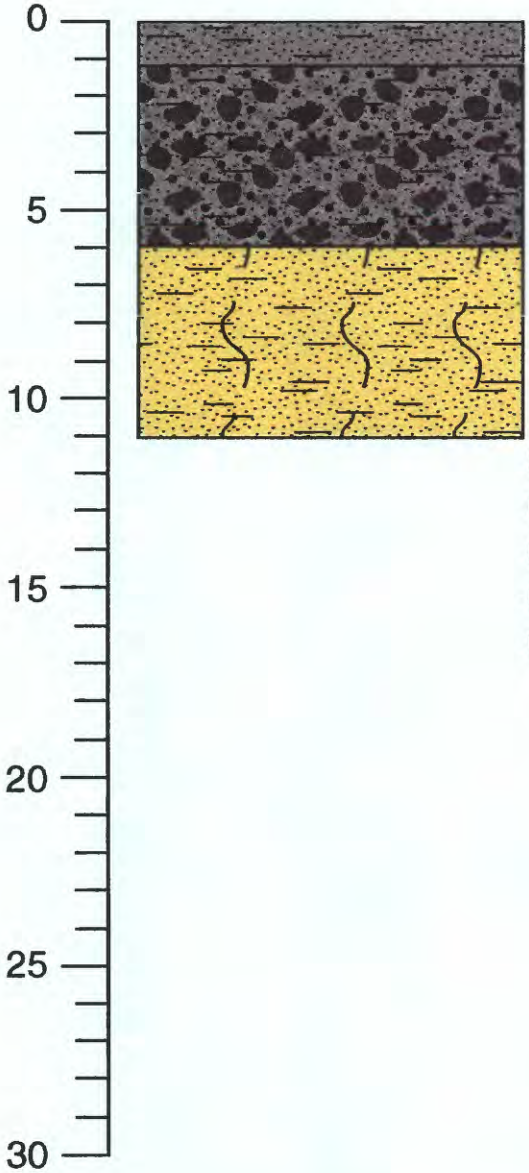
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B6 (B-77) Observer: TORRESAN

Site Description SOUTH OAHU SITE 2 (REOCCUPY 94-B7): 1ST OF 5 TRIES.

Water Depth 441 m (uncorrected) Core Length 11 cm

Location 21°15.19' N 157°56.02' W



Description

0-1 POST-DREDGE MATERIAL MUDDY SAND: BROWN AT SEAFLOOR, BEIGE AT 1 CM.

1-6 DREDGED MATERIAL, CORAL CHUNKS IN MUDDY SAND

6-11 BURROWED NATIVE SEDIMENT THAT IS CLEANER AND LIGHTER COLORED AT BASE.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLES (0-6 CM).
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL (0-8 CM).

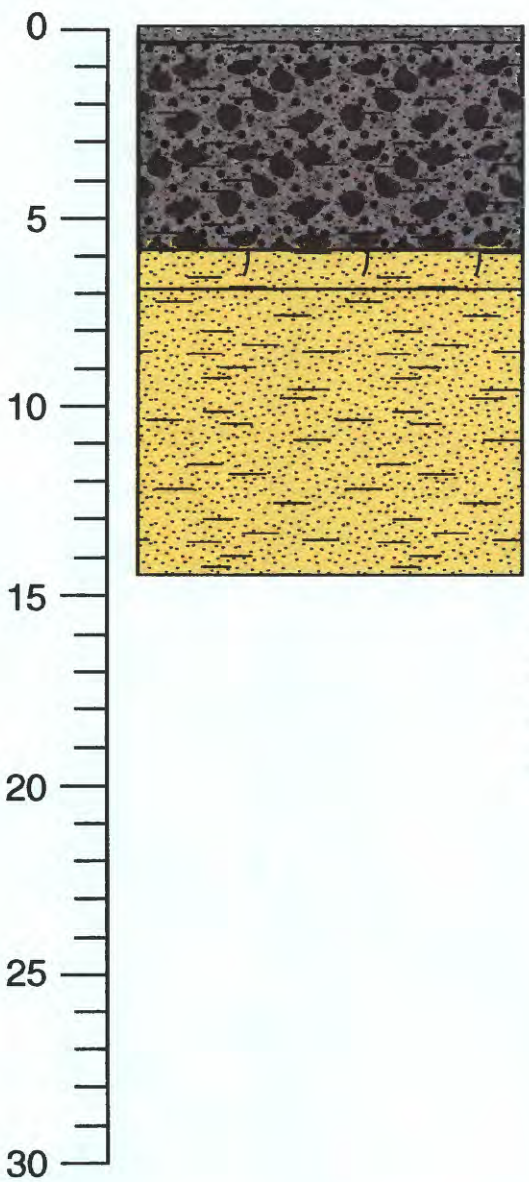
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B7 (B-78) Observer: TORRESAN

Site Description SOUTH OAHU SITE 2 (REOCCUPY 94-B7): 2ND OF 5 TRIES.

Water Depth 443 m (uncorrected) Core Length 14.5 cm

Location 21°15.22' N 157°55.95' W



Description

0-0.3 POST-DREDGED MATERIAL OR VENEER OF MUDDY SAND.

0.3-6 DREDGED MATERIAL, CORAL CHUNKS IN MUDDY SAND.

6-7 MIXED ZONE. NATIVE SEDIMENT WITH BURROWS. SUBTLE.

7-14.5 NATIVE MUDDY SAND - BEIGE COLOR.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 1 CHEMISTRY SAMPLE.
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL (0-6 CM).

K1–95-HW
Box Core Visual Description Form

Core ID: 95-B8 (B-79) Observer: TORRESAN

Site Description SOUTH OAHU SITE 2 (REOCCUPY 94-B7): 3RD OF 5 TRIES.

Water Depth 443 m (uncorrected) Core Length 4 cm

Location 21°15.18' N 157°56.04' W

Description

0-4 DREDGED MATERIAL, COMPOSED OF CORAL AND SHELL DEBRIS IN A MUDDY SAND MATRIX.

SUBSAMPLES:
COLLECTED NO BIOLOGY SAMPLES.
COLLECTED NO CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL.

K1–95-HW
Box Core Visual Description Form

Core ID: 95-B9 (B-80) Observer: TORRESAN

Site Description SOUTH OAHU SITE 2 (REOCCUPY 94-B7): 4TH OF 5 TRIES.

Water Depth 443 m (uncorrected) Core Length 4 cm

Location 21°15.19' N 157°56.03' W

Description

LIMESTONE COBBLE

0-4 DREDGED MATERIAL, VERY COARSE, COBBLE-RICH, INCLUDING LIMESTONE COBBLE, IN MUDDY SAND MATRIX. SOME SHELL AND CORAL DEBRIS.

SUBSAMPLES:
COLLECTED NO BIOLOGY SAMPLES.
COLLECTED NO CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL.

K1–95-HW
Box Core Visual Description Form

Core ID: 95-B10 (B-81) Observer: TORRESAN

Site Description SOUTH OAHU SITE 2 (REOCCUPY 94-B7): 5TH OF 5 TRIES.

Water Depth 442 m (uncorrected) Core Length 5 cm

Location 21°15.19' N 157°56.01' W

Description

0-5 DREDGED MATERIAL - MUDDY SAND MATRIX, WITH BASALT AND LIMESTONE COBBLES, CORAL, SHELL AND GLASS DEBRIS.

SUBSAMPLES:
COLLECTED 1 BIOLOGY SAMPLE.
COLLECTED 1 CHEMISTRY SAMPLE.
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL.

K1–95-HW
Box Core Visual Description Form

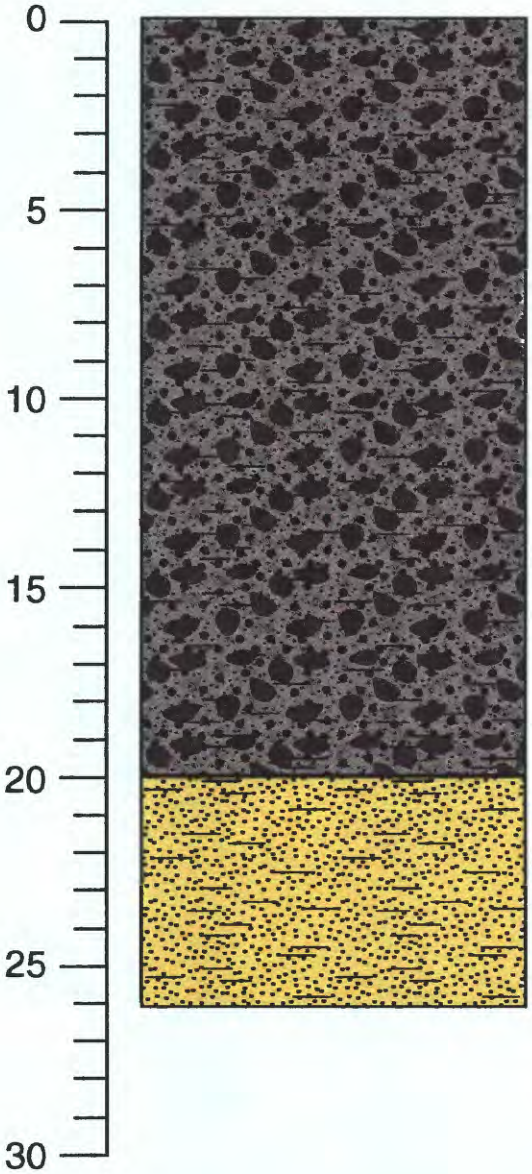
Core ID: 95-B11 (B-82) Observer: TORRESAN

Site Description OLD HONOLULU HARBOR SITE 1 (REOCCUPY 94-B64): 1ST OF 2 TRIES.

Water Depth 491 m (uncorrected) Core Length 26 cm

Location 21°14.50' N 157°54.50' W

Description



0-20 DREDGED MATERIAL - HETEROGENEOUS MIXTURE OF GRAY MUD AND MUDDY SAND WITH COARSE CORAL, SHELL, WOOD, GLASS, LIMESTONE, AND BASALT FRAGMENTS.

20-26 NATIVE MEDIUM SAND WITH MUD.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 3 CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL.

K1–95-HW
Box Core Visual Description Form

Core ID: 95-B12 (B-83) Observer: TORRESAN

Site Description OLD HONOLULU HARBOR SITE 1 (REOCCUPY 94-B64): 2ND OF 2 TRIES.

Water Depth 493 m (uncorrected) Core Length 28 cm

Location 21°14.49' N 157°54.51' W

Description

NEARLY IDENTICAL TO 95-11. VERY HETEROGENEOUS DREDGED MATERIAL.

0-28 DREDGED MATERIAL - MUDDY SAND/SANDY MUD WITH CORAL, SHELL, WOOD, GLASS, AND OXIDIZED TERRIGENOUS SOIL CLUMPS. POCKETS OF CLEAN SAND IMPLY BURROWING.

24-28 LAST 4 CM HAVE CLEANER SAND WITH A LAYER OF CORAL FRAGMENTS.

LAYER OF CORAL FRAGMENTS.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 1 CHEMISTRY SAMPLE.
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL.

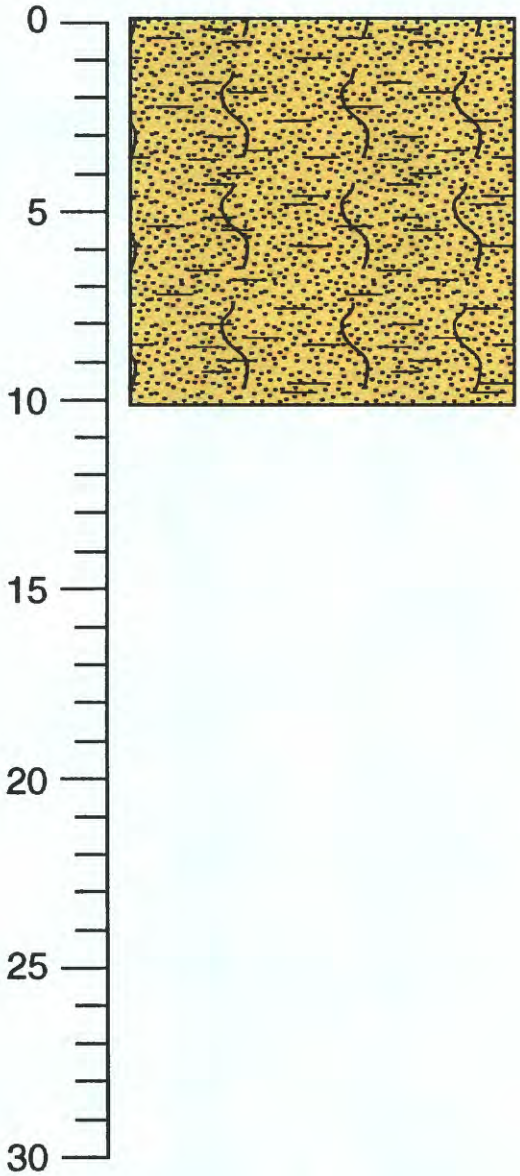
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B13 (B-84) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 1- EAST OF OLD HONOLULU HARBOR SITE (REOCCUPY 94-B67) - 1ST OF 5 TRIES.

Water Depth 522 m (uncorrected) Core Length 10 cm

Location 21°14.00' N 157°51.98' W



Description

0-10 NATIVE SEDIMENT - MEDIUM TO FINE GRAINED, SLIGHTLY MUDDY CARBONATE SAND. BURROWS, WORMS, AND OCCASIONAL POCKETS OF COARSER SAND INDICATE BURROWING.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER.

K1–95-HW
Box Core Visual Description Form

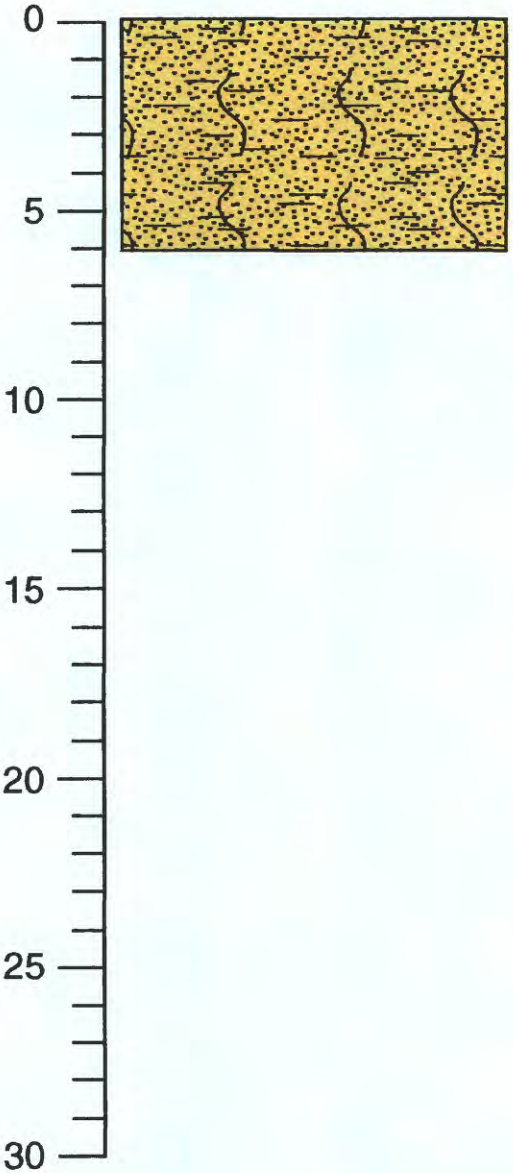
Core ID: 95-B14 (B-85) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 1- EAST OF OLD HONOLULU HARBOR SITE (REOCCUPY 94-B67) - 2ND OF 5 TRIES.

Water Depth 518 m (uncorrected) Core Length 6 cm

Location 21°14.00' N 157°51.98' W

Description



0-6 NATIVE SEDIMENT - BURROWED, MEDIUM GRAINED SLIGHTLY MUDDY CARBONATE SAND. POCKETS OF COARSER SAND IN SOME BURROWS. WORM TUBES AND SPICULES ARE VISIBLE.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED NO CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER.

K1–95-HW
Box Core Visual Description Form

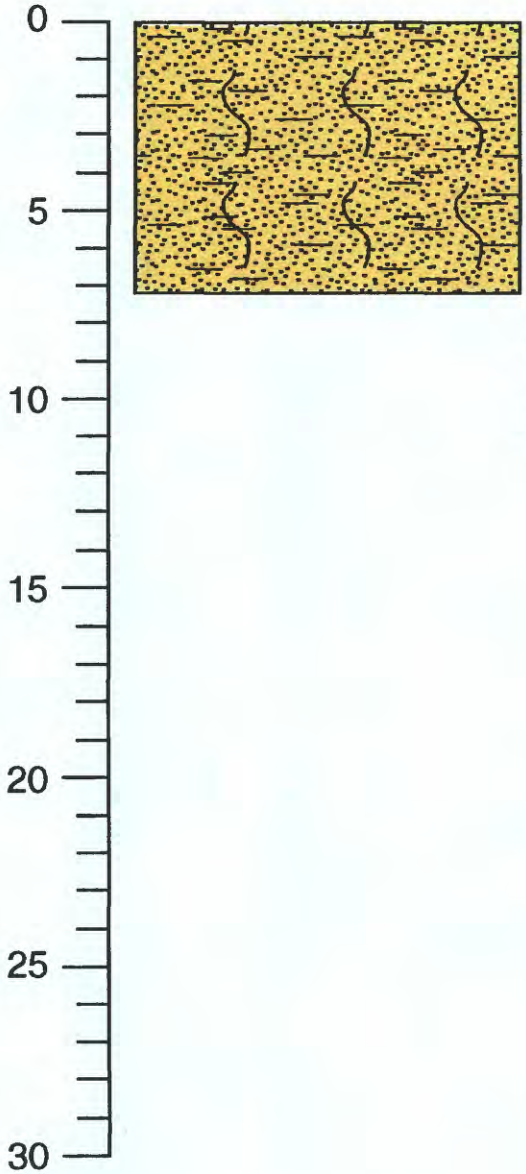
Core ID: 95-B15 (B-86) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 1- EAST OF OLD HONOLULU HARBOR SITE (REOCCUPY 94-B67) - 3RD OF 5 TRIES.

Water Depth 520 m (uncorrected) Core Length 7 cm

Location 21°14.00' N 157°51.98' W

Description



0-7 BURROWED NATIVE SEDIMENT - LIKE 95-B13 AND 95-B14.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED NO CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER.

K1–95-HW
Box Core Visual Description Form

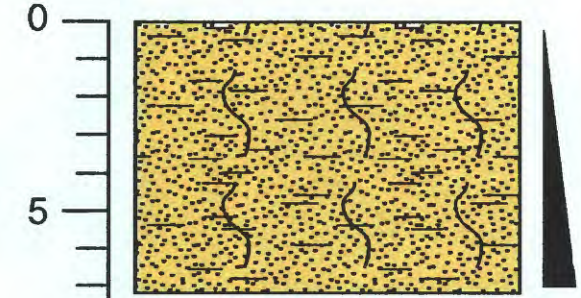
Core ID: 95-B16 (B-87) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 1- EAST OF OLD HONOLULU HARBOR SITE (REOCCUPY 94-B67) - 4TH OF 5 TRIES.

Water Depth 520 m (uncorrected) Core Length 7 cm

Location 21°14.00' N 157°51.99' W

Description



0-7 NATIVE SEDIMENT - LIKE 95-B13, 95-B14, 95-B15. COARSER SAND AT BASE.

SUBSAMPLES:
COLLECTED 1 BIOLOGY SAMPLE.
COLLECTED 1 CHEMISTRY SAMPLE.
COLLECTED 1 BIOASSAY FROM REMAINDER.

K1–95-HW
Box Core Visual Description Form

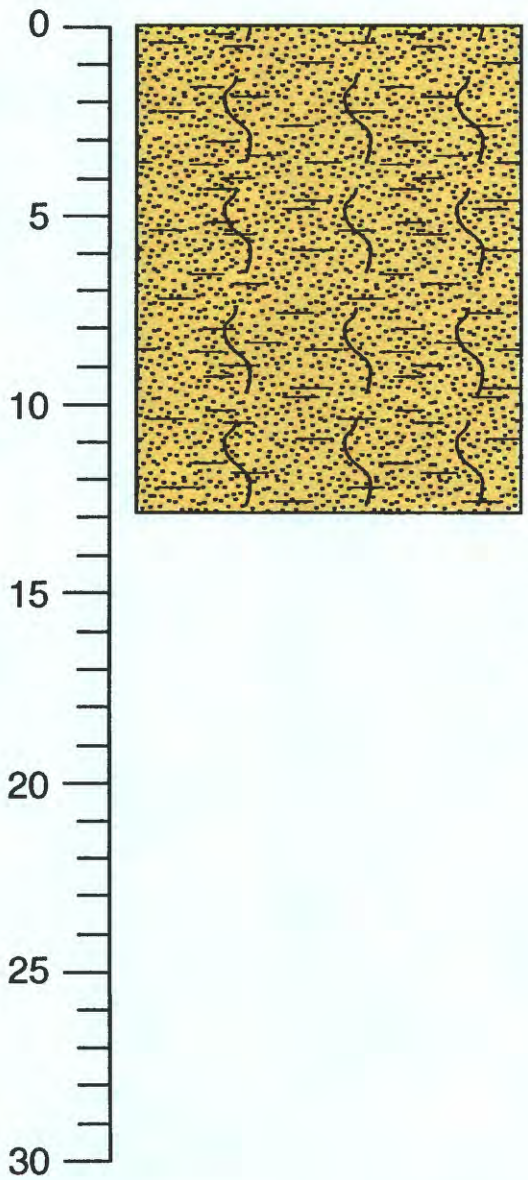
Core ID: 95-B17 (B-88) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 1- EAST OF OLD HONOLULU HARBOR SITE (REOCCUPY 94-B67) - 5TH OF 5 TRIES.

Water Depth 518 m (uncorrected) Core Length 13 cm

DEPTH AND LOCATION ARE APPROXIMATE: 'ON BOTTOM' WAS NOT DETECTED.

Location 21°13.97' N 157°51.94' W



Description

0-13 NATIVE SEDIMENT - LIKE 95-B13, 95-B14, 95-B15, 95-B16.

SUBSAMPLES:
COLLECTED NO BIOLOGY SAMPLES.
COLLECTED NO CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER.

K1–95-HW
Box Core Visual Description Form

Core ID: 95-B18 (B-89) Observer: TORRESAN

Site Description OLD PEARL HARBOR SITE (REOCCUPY 94-B25) : 1ST OF 2 TRIES.

Water Depth 408 m (uncorrected) Core Length 38 cm

Location 21°16.01' N 157°56.48' W

Description

0-32 DREDGED MATERIAL-HETEROGENEOUS MUCK: SAND, SHELL, CORAL.

32-34 MEDIUM GRAINED LAYER OF BROWN SAND. POSSIBLE REWORKED DREDGED MATERIAL.

34-38 GRAY, COARSE, HETEROGENEOUS DREDGED MATERIAL.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 4 CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL.

K1–95-HW
Box Core Visual Description Form

Core ID: 95-B19 (B90) Observer: TORRESAN

Site Description OLD PEARL HARBOR SITE (REOCCUPY 94-B25) 2ND OF 2 TRIES.

Water Depth 407 m (uncorrected) Core Length 35 cm

Location 21°15.99' N 157°56.50' W

Description

0-30 GRAY DREDGED MATERIAL-HETEROGENEOUS MUCK: SAND, SHELL, CORAL. CONTAINS SHELL FRAGMENTS THROUGHOUT. MUDBALLS, CORAL, AND POCKETS OF SANDIER MATERIAL.

30-32 BROWN COARSE SAND. OXIDIZED?

32-35 HETEROGENEOUS DREDGED MATERIAL. ANOXIC. LAYER OF COARSE CORAL FRAGMENTS.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED NO CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER OF DREDGED MATERIAL.

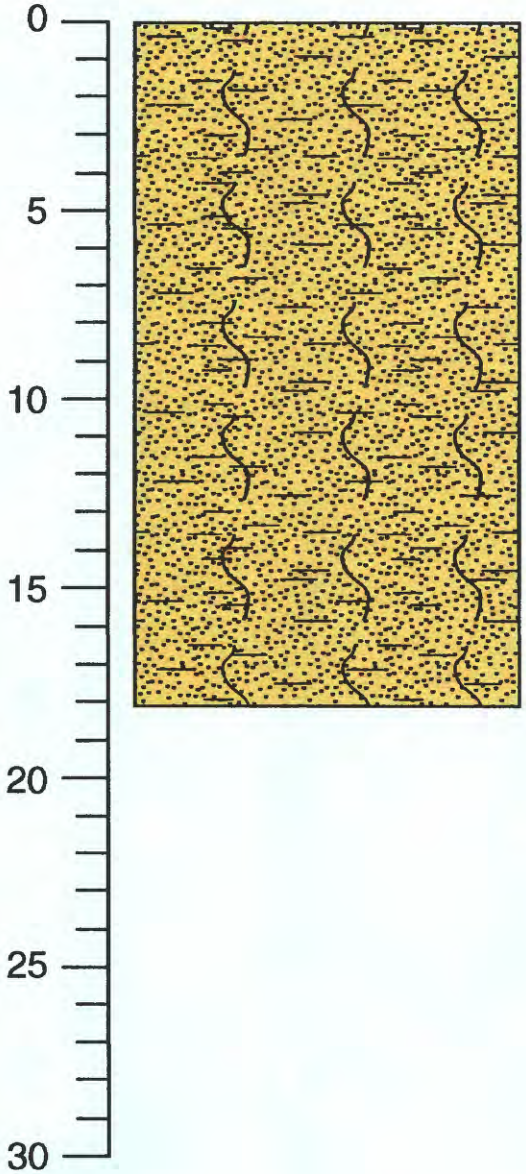
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B20 (B-91) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 2- SOUTH OF SOUTH OAHU SITE (REOCCUPY 94-B60): 1ST OF 3 TRIES.

Water Depth 492 m (uncorrected) Core Length 18 cm

Location 21°13.51' N 157°57.00' W



Description

0-18 NATIVE SEDIMENT -BEIGE, SLIGHTLY MUDDY SAND, BURROWED WITH POCKETS OF COARSER AND FINER SAND.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER.

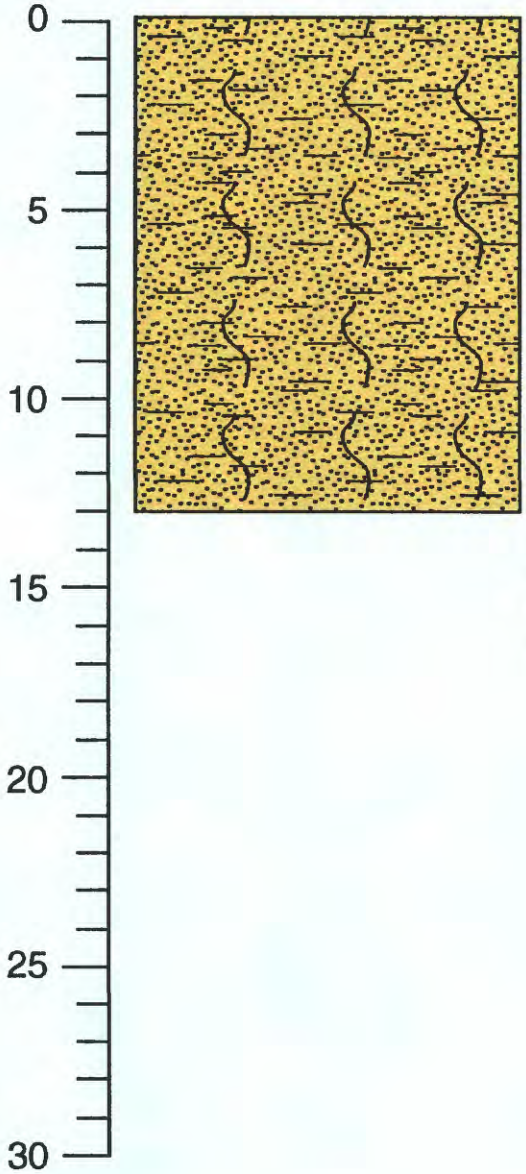
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B21 (B-92) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 2- SOUTH OF SOUTH OAHU SITE (REOCCUPY 94-B60): 2ND OF 3 TRIES.

Water Depth 493 m (uncorrected) Core Length 13 cm

Location 21°13.52' N 157°57.01' W



Description

0-13 NATIVE SEDIMENT - BEIGE, BIOTURBATED CARBONATE SAND WITH SOME MUD.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLE.
COLLECTED 1 BIOASSAY FROM REMAINDER.

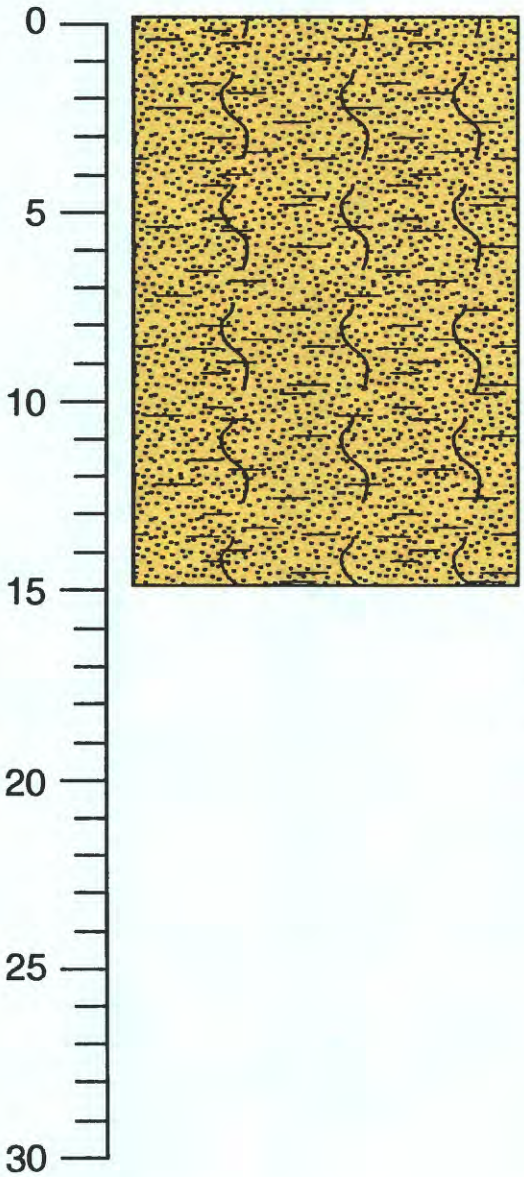
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B22 (B-93) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 2- SOUTH OF SOUTH OAHU SITE (REOCCUPY 94-B60): 3RD OF 3 TRIES.

Water Depth 493 m (uncorrected) Core Length 15 cm

Location 21°13.51' N 157°57.00' W



Description

0-15 NATIVE SEDIMENT - SLIGHTLY MUDDY BEIGE CARBONATE SAND WITH SOME BURROWS.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED NO CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER.

K1–95-HW
Box Core Visual Description Form

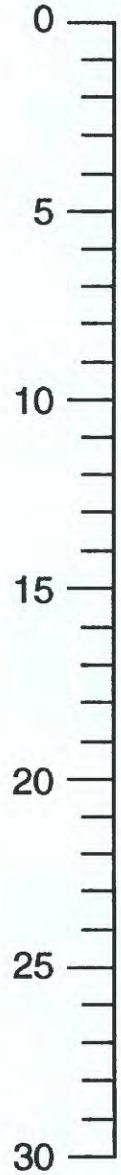
Core ID: 95-B23 (B-94) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 3- SOUTHWEST OF SOUTH OAHU SITE (REOCCUPY 94-B46): 1ST OF 4 TRIES.

Water Depth 493 m (uncorrected) Core Length 0 cm

Location 21°13.99' N 158°00.01' W

WESTERN NATIVE SEDIMENT SITE - NEAR SUBMERGED REEF PLATFORM .



Description

NO RECOVERY - DID NOT TRIGGER.

K1–95-HW
Box Core Visual Description Form

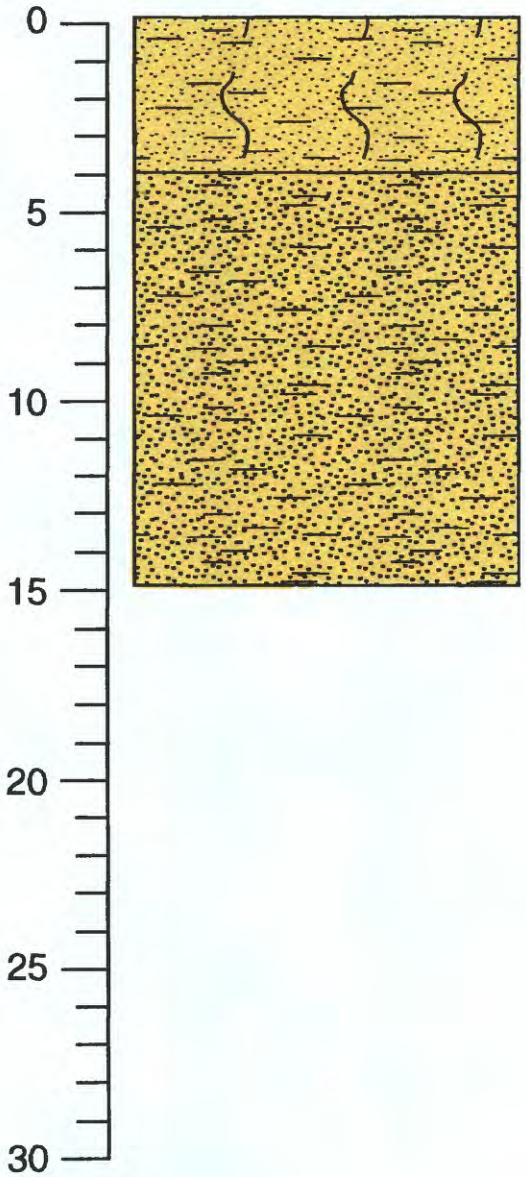
Core ID: 95-B24 (B-95) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 3- SOUTHWEST OF SOUTH OAHU SITE (REOCCUPY 94-B46) - 2ND OF 4 TRIES.

Water Depth 416 m (uncorrected) Core Length 15 cm

Location 21°14.01' N 158°00.00' W

WESTERN NATIVE SEDIMENT SITE - NEAR SUBMERGED REEF PLATFORM .



Description

0-4 FINE-GRAINED BEIGE CARBONATE SAND, SOME BURROWS AND CRUSTACEANS.

4-15 ORANGE, COARSER GRAINED, IRON-OXIDIZED 'REEF' DEBRIS SAND, WITH SPICULES, SOME SHELL DEBRIS.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER.

K1–95-HW
Box Core Visual Description Form

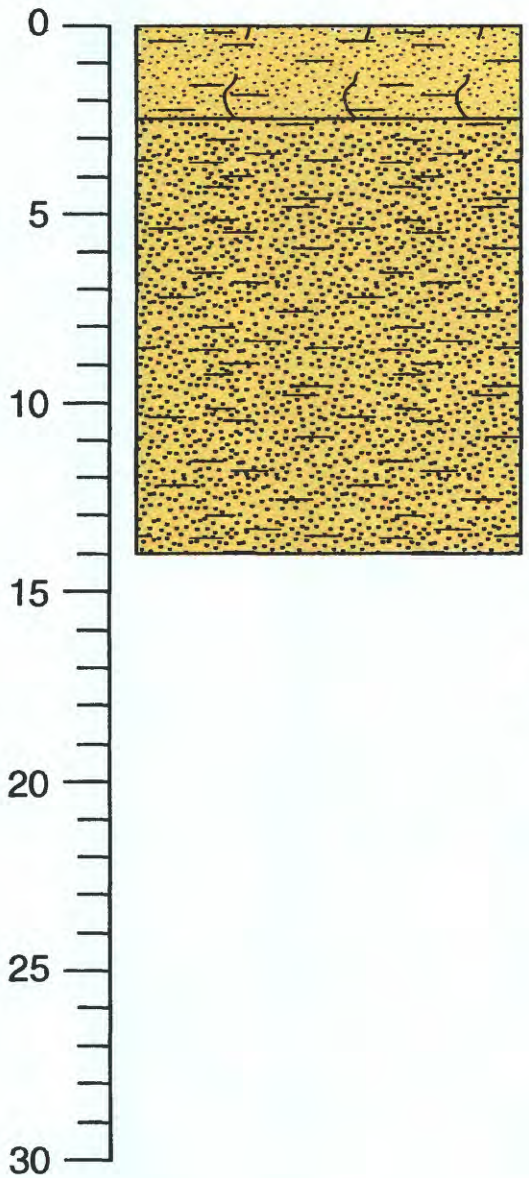
Core ID: 95-B25 (B-96) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 3- SOUTHWEST OF SOUTH OAHU SITE (REOCCUPY 94-B46) - 3RD OF 4 TRIES.

Water Depth 411 m (uncorrected) Core Length 14 cm

Location 21°14.00' N 158°00.01' W

WESTERN NATIVE SEDIMENT SITE - NEAR SUBMERGED REEF PLATFORM .



Description

0-2.5 FINE, WHITE NATIVE SAND.

2.5-14 COARSER, IRON OXIDE, MORE REEF DEBRIS SAND, ORANGE COLOR.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER.

K1–95-HW
Box Core Visual Description Form

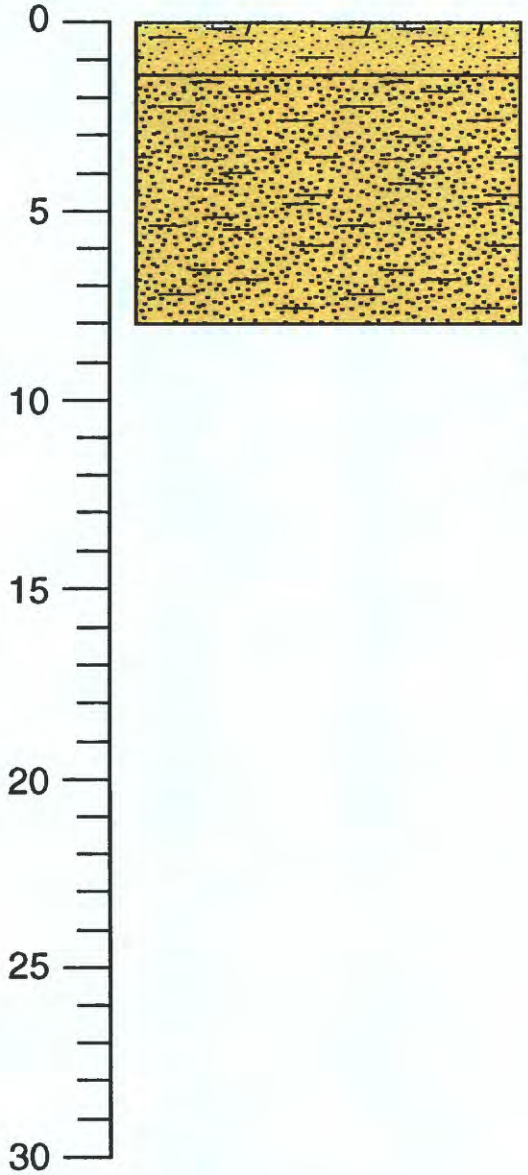
Core ID: 95-B26 (B-97) Observer: TORRESAN

Site Description NATIVE SEDIMENT SITE 3- SOUTHWEST OF SOUTH OAHU SITE (REOCCUPY 94-B46) - 4TH OF 4 TRIES.

Water Depth 418 m (uncorrected) Core Length 8 cm

Location 21°14.02' N 157°59.98' W

WESTERN NATIVE SEDIMENT SITE - NEAR SUBMERGED REEF PLATFORM .



Description

0-1.5 FINE, WHITE CARBONATE SAND.

1.5-8 COARSER, IRON OXIDE, MORE REEF DEBRIS SAND, ORANGE COLOR.

SUBSAMPLES:
COLLECTED 3 BIOLOGY SAMPLES.
COLLECTED NO CHEMISTRY SAMPLES.
COLLECTED 1 BIOASSAY FROM REMAINDER.

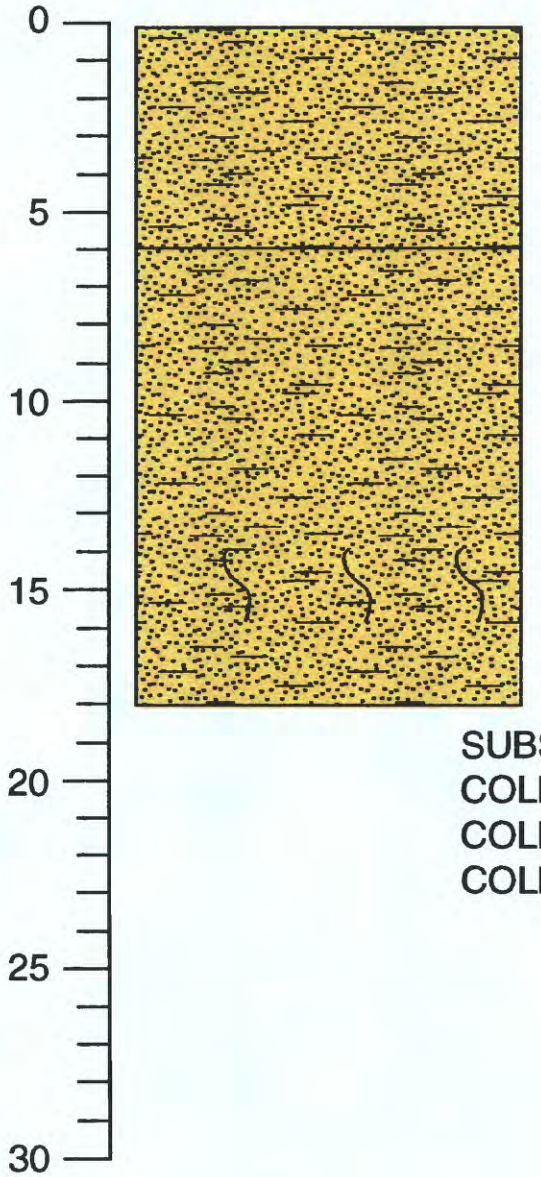
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B27 (B-98) Observer: TORRESAN

Site Description WEST OF SOUTH OAHU SITE , NEW STATION.

Water Depth 420 m (uncorrected) Core Length 18 cm

Location 21°14.51' N 157°59.01' W



Description

SURFACE DISTURBANCE.
COLOR CHANGES DOWNCORE ARE GRADATIONAL.

0-18 ORANGE CARBONATE SAND WITH THIN GRAY MUD AT THE SURFACE. SLIGHTLY MUDDY. COARSER THAN WHITE SAND.

0-6 MORE ORANGE/IRON OXIDE.
6-18 GRAYER.

14-16 BURROWS WITH DARK GRAY TO BLACK COLORED SEDIMENT. FINE-GRAINED, ANOXIC COLORED BURROWS.

SUBSAMPLES:
COLLECTED 5 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLES (0-4 CM).
COLLECTED 1 BAG OF SURFACE SEDIMENT (0-2 CM).

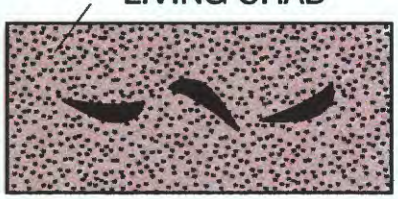
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B28 (B-99) Observer: TORRESAN

Site Description 'BLACK CORAL' REEF LINE, ON THE SHELF.

Water Depth 18 m (uncorrected) Core Length 5 cm

Location 21°17.09' N 157°59.05' W



0
5
10
15
20
25
30

Description

0-5 (APPROXIMATE LENGTH). VERY COARSE CARBONATE SAND, WITH CORAL, SHELL, AND LIMESTONE DEBRIS.

SUBSAMPLES:
COLLECTED 1 BIOLOGY SAMPLE.
COLLECTED 1 SMALL CRAB.
COLLECTED NO CHEMISTRY SAMPLES.
COLLECTED 2 BAGS OF BULK SEDIMENT.

THIS AREA IS THE SOURCE OF THE BLACK CARBONATE DEBRIS.

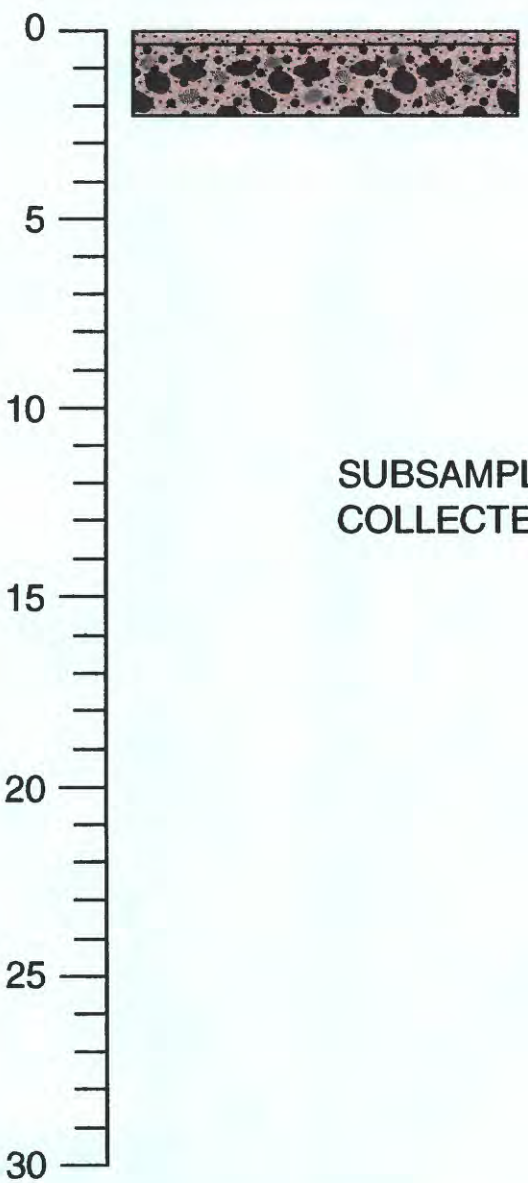
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B29 (B-100) Observer: TORRESAN

Site Description SUBMERGED REEF IN WESTERNMOST PORTION OF MOSAIC AT END OF 1993 LINE 4; TO DETERMINE NATURE OF HIGH BACKSCATTER MATERIAL MANTLING THE REEF.

Water Depth 333 m (uncorrected) Core Length ~2 cm

Location 21°14.51' N 158°01.52' W



Description

THIN VENEER OF WHITE/BEIGE, FINE GRAINED CARBONATE SAND.

0-2 LUMPS OF BOTRYOIDAL LIMESTONE OR ALGAL MATERIALWITH IRON OXIDE STAIN, SOME CORAL.

SUBSAMPLES:
COLLECTED 1 BAG OF BULK SAMPLE.

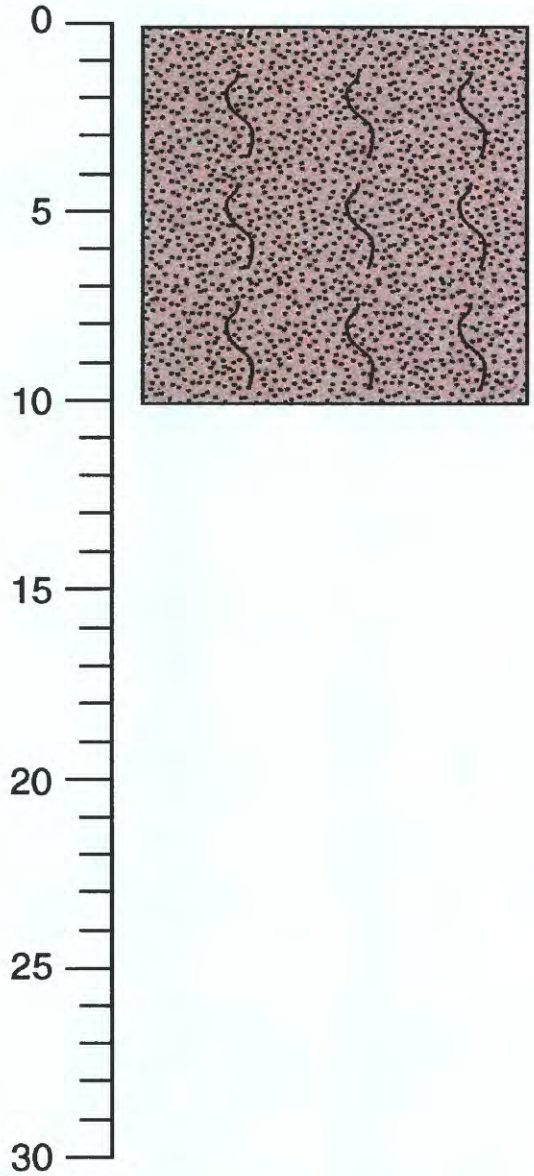
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B30 (B-101) Observer: TORRESAN

Site Description SUBMERGED REEF IN WESTERNMOST PORTION OF MOSAIC AT END OF 1993 LINE 14; TO DETERMINE NATURE OF HIGH BACKSCATTER MATERIAL MANTLING THE REEF.

Water Depth 388 m (uncorrected) Core Length 10 cm

Location 21°13.19' N 158°01.20' W



Description

0-10 IRON OXIDE ORANGE CARBONATE SAND WITH ANIMAL CARAPACE TESTS, CORAL FRAGMENTS, LIMESTONE SAND, FORAMS. BURROWS AND WORM TUBES CLOSE TO THE SURFACE. BURROWS THROUGHOUT.

SUBSAMPLES:
COLLECTED 4 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLES.
COLLECTED 1 BAG OF BULK SAMPLE.

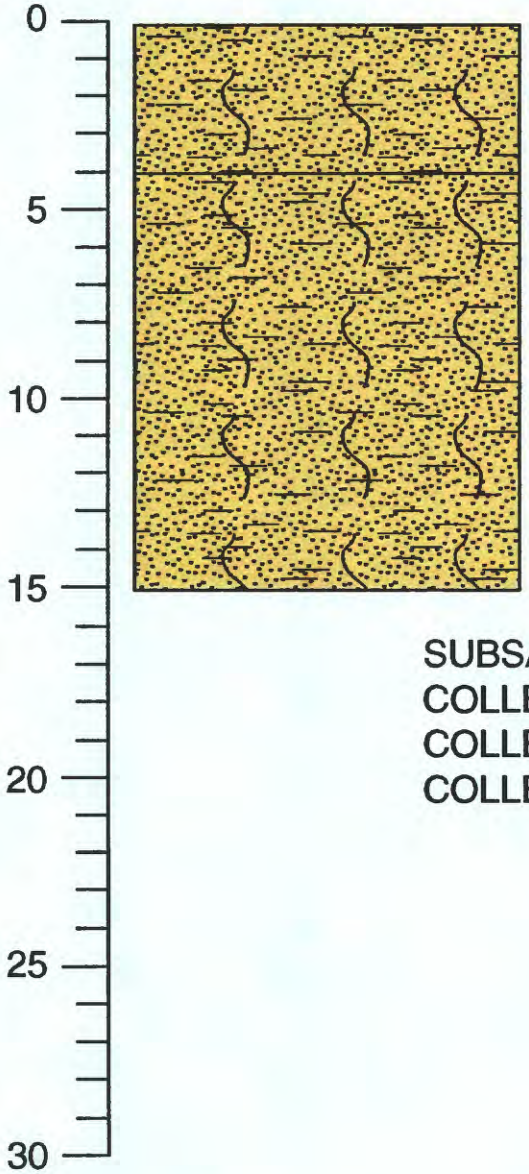
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B31 (B-102) Observer: TORRESAN

Site Description 1.8 KM SOUTH OF 94-B60, ALONG SOUTH-TO-NORTH TRANSECT TO IDENTIFY EXTENT/TRANSPORT OF DREDGED MATERIAL FROM SOUTH OAHU SITE.

Water Depth 523 m (uncorrected) Core Length 15 cm

Location 21°12.51' N 157°56.99' W



Description

0-15 CARBONATE SAND WITH WORM TUBES AT SURFACE AND BURROWS. FAIRLY FINE GRAINED WITH SOME MUD. SLIGHT COLOR CHANGE AT 4 CM.
0-4 REDDER.
4-15 WHITER.

SUBSAMPLES:
COLLECTED 4 BIOLOGY SAMPLES.
COLLECTED 4 CHEMISTRY SAMPLES (0-4 CM).
COLLECTED 1 BAG OF SURFACE SEDIMENT (0-2 CM).

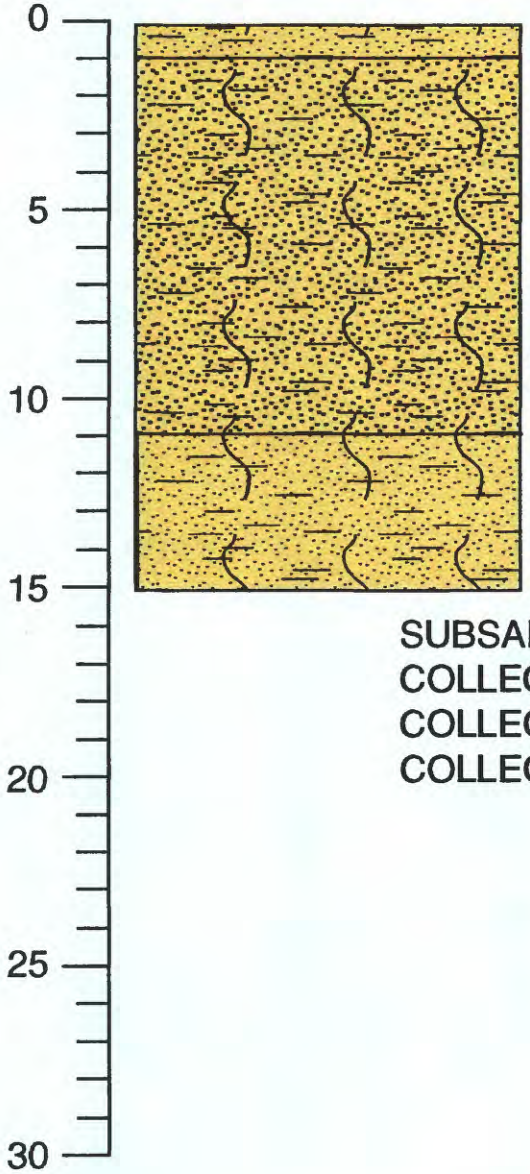
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B32 (B-103) Observer: TORRESAN

Site Description 0.9 KM SOUTH OF 94-B60, ALONG SOUTH-TO-NORTH TRANSECT TO IDENTIFY EXTENT/TRANSPORT OF DREDGED MATERIAL FROM SOUTH OAHU SITE.

Water Depth 506 m (uncorrected) Core Length 15 cm

Location 21°13.01' N 157°56.99' W



Description

0-1 THIN, LIGHT-COLORED LAYER, CONTAINING FINE ORGANIC DEBRIS, SMALL ANIMAL TESTS, BURROWS, AND WORM TUBES.

1-11 MEDIUM-GRAINED, BEIGE, CARBONATE, NATIVE SAND, WORM TUBES AND BURROWS VISIBLE, AND SOME FINE ORGANIC DEBRIS.

11-15 FINER, MUDDIER CARBONATE SAND. LIGHTER COLORED THAN ABOVE.

SUBSAMPLES:
COLLECTED 4 BIOLOGY SAMPLES.
COLLECTED 3 CHEMISTRY SAMPLES (0-4 CM).
COLLECTED 1 BAG OF SURFACE SEDIMENT (0-2 CM).

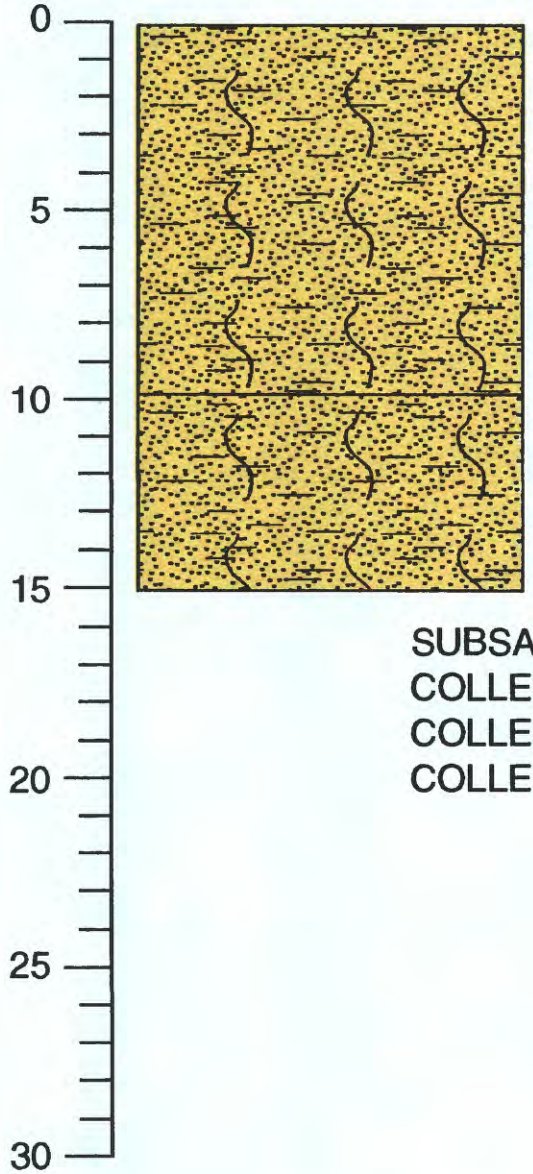
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B33 (B-104) Observer: TORRESAN

Site Description 0.9 KM NORTH OF 94-B60, ALONG SOUTH-TO-NORTH TRANSECT TO IDENTIFY EXTENT/TRANSPORT OF DREDGED MATERIAL FROM SOUTH OAHU SITE.

Water Depth 483 m (uncorrected) Core Length 15 cm

Location 21°13.84' N 157°57.00' W



Description

SURFACE ORGANIC DEBRIS, WORMS, WORMTUBES, WOOD AND BURROWS VISIBLE.

0-15 BEIGE NATIVE CARBONATE SAND WITH APRECIABLE AMOUNTS OF BLACK FLECKS AND GRAINS THAT APPEAR TO BE BASALT.

0-10 LESS MUD?
10-15 APPEARS MUDDIER.

NO DREDGED MATERIAL PRESENT.

SUBSAMPLES:
COLLECTED 4 BIOLOGY SAMPLES.
COLLECTED 3 CHEMISTRY SAMPLES (0-4 CM).
COLLECTED 1 BAG OF SURFACE SEDIMENT (0-2 CM).

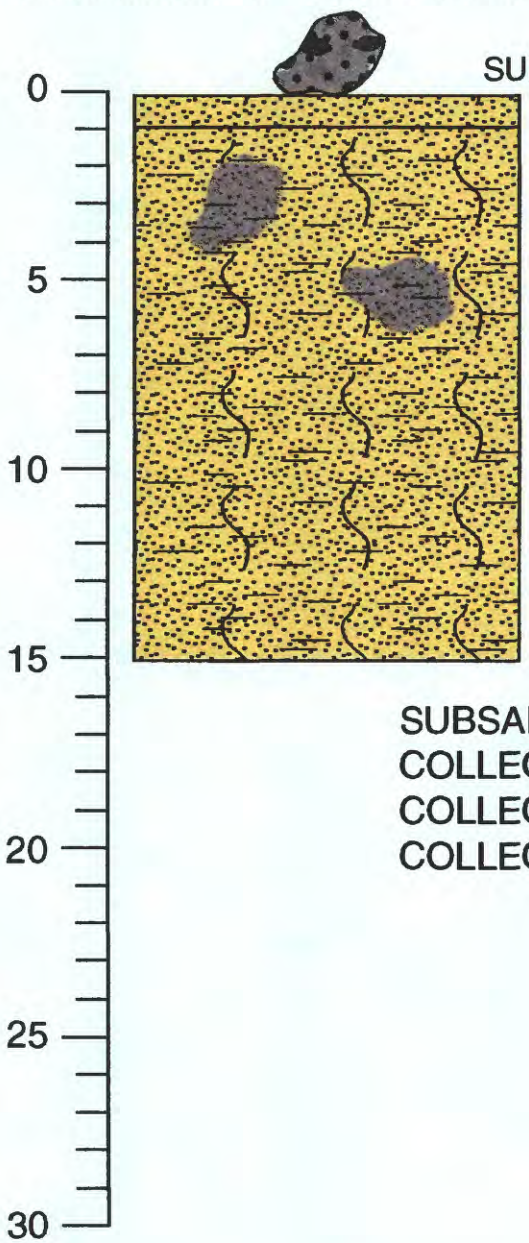
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B34 (B-105) Observer: TORRESAN

Site Description 0.45 KM WEST OF 94-B21, ALONG EAST-WEST TRANSECT TO IDENTIFY EXTENT/TRANSPORT OF DREDGED MATERIA FROM SOUTH OAHU SITE.

Water Depth 427 m (uncorrected) Core Length 15 cm

Location 21°14.93' N 157°57.76' W



Description

SURFACE CONTAINS MUDLUMP SAMPLED BY BIOLOGIST.

0-1 RELATIVELY CLEAN CARBONATE SAND.

2-15 MUDDY CARBONATE SAND, WITH APPRECIABLE DARK (BASALT?). GRAINS, BURROWS, WORMTUBES THROUGHOUT.

MUDBALLS AND MOTTLED (BROWN-GRAY-BLACK) MUDDY AREAS IN THIS CORE INDICATE PRESENCE OF DREDGED MATERIAL.

SUBSAMPLES:
COLLECTED 4 BIOLOGY SAMPLES.
COLLECTED 3 CHEMISTRY SAMPLES (0-4 CM).
COLLECTED 1 BAG OF SURFACE SEDIMENT (0-2 CM).

K1–95-HW
Box Core Visual Description Form

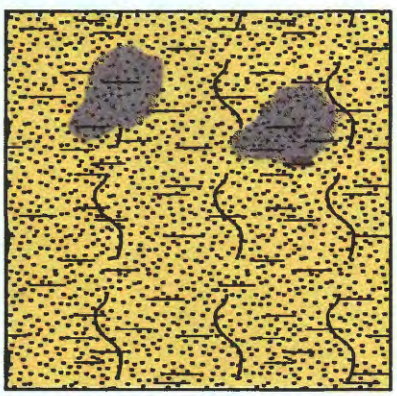
Core ID: 95-B35 (B-106) Observer: TORRESAN

Site Description 1.3 KM WEST OF 94-B21, ALONG EAST-WEST TRANSECT TO IDENTIFY EXTENT/TRANSPORT OF DREDGED MATERIAL FROM SOUTH OAHU SITE.

Water Depth 426 m (uncorrected) Core Length 10 cm

Location 21°14.92' N 157°58.23' W

Description



0-10 CARBONATE SAND WITH BLACK (BASALT?) FRAGMENTS, WORMS, AND BURROWS VISIBLE. GRAYISH MUD IN BURROWS AND LENSES IMPLIES DREDGED MATERIAL.

SUBSAMPLES:
COLLECTED 5 BIOLOGY SAMPLES.
COLLECTED 3 CHEMISTRY SAMPLES.
COLLECTED 1 BAG OF SURFACE SEDIMENT.

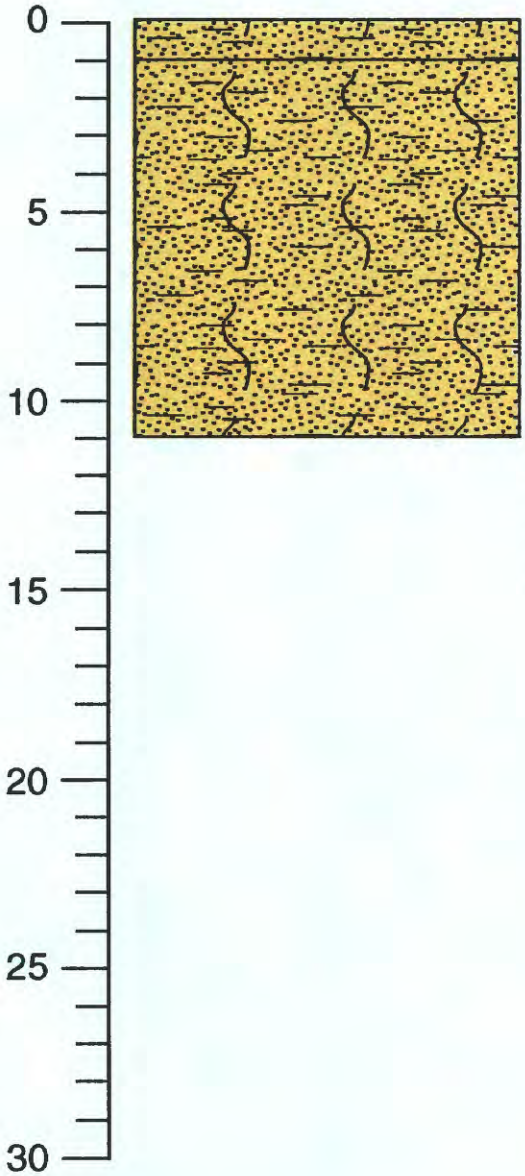
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B36 (B-107) Observer: TORRESAN

Site Description 2.2 KM WEST OF 94-B21, ALONG EAST-WEST TRANSECT TO IDENTIFY EXTENT/TRANSPORT OF DREDGED MATERIAL FROM SOUTH OAHU SITE.

Water Depth 418 m (uncorrected) Core Length 11 cm

Location 21°14.90' N 157°58.75' W



Description

0-1 FINE, BEIGE MUDDY LAYER WITH SAND. LIGHTER, LESS ORANGE THAN BELOW.

1-11 CARBONATE SAND WITH IRON OXIDE, SHELLS, MORE ORANGE THAN IN 0-1, WITH COARSER NATURE. SOME BURROWS VISIBLE.

NOT MANY BLACK GRAINS (BASALT?) VISIBLE.

SUBSAMPLES:
COLLECTED 5 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLES.
COLLECTED 1 BAG OF SURFACE SEDIMENT.

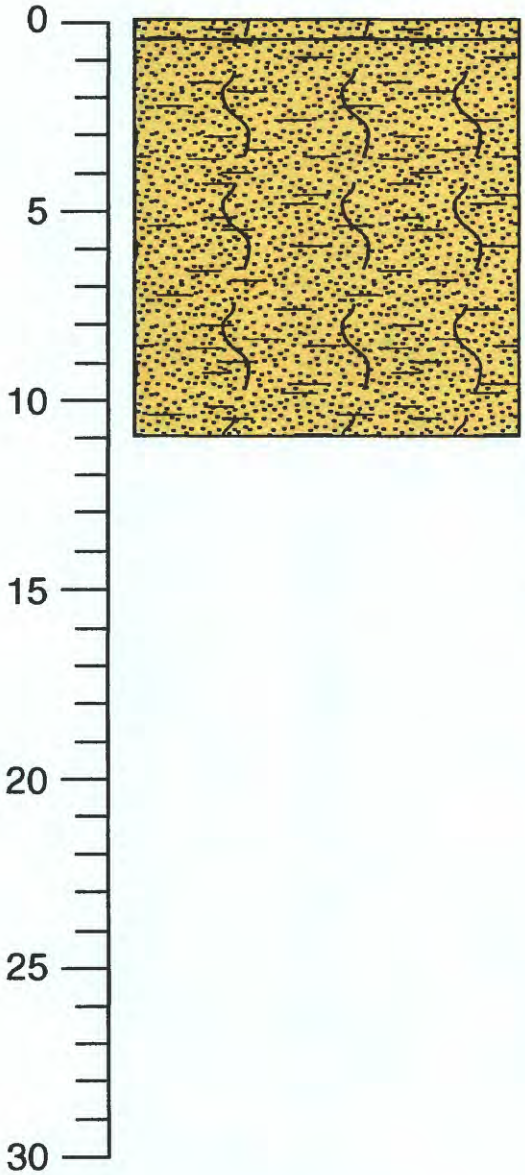
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B37 (B-108) Observer: TORRESAN

Site Description 3.4 KM WEST OF 94-B21, ALONG EAST-WEST TRANSECT TO IDENTIFY EXTENT/TRANSPORT OF DREDGED MATERIAL FROM SOUTH OAHU SITE.

Water Depth 397 m (uncorrected) Core Length 11 cm

Location 21°14.90' N 157°59.53' W



Description

0-0.5 VENEER OF MUDDY CARBONATE SAND. WORM TUBE AT SURFACE.

0.5-10 IRON OXIDE STAINED TO BEIGE, SLIGHTLY MUDDY CARBONATE SAND. NOTE BLACK (BASALT?) GRAINS AS WELL. SMALL SHELL FRAGMENTS THROUGHOUT.

SUBSAMPLES:
COLLECTED 4 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLES.
COLLECTED 1 BAG OF SURFACE SEDIMENT.

K1–95-HW
Box Core Visual Description Form

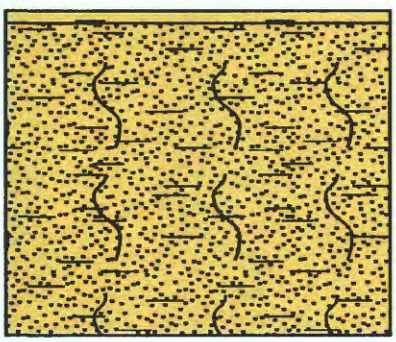
Core ID: 95-B38 (B-109) Observer: TORRESAN

Site Description 1.6 KM EAST OF 94-B65, ALONG EAST-WEST TRANSECT TO IDENTIFY EXTENT/TRANSPORT OF DREDGED MATERIAL FROM THE OLD HONOLULU HARBOR SITE.

Water Depth 503 m (uncorrected) Core Length 8 cm

Location 21°14.40' N 157°53.00' W

Description



SURFACE: THIN MUD VENEER VISIBLE

0-8 NATIVE CARBONATE SAND (BLACK GRAINS - BASALT?). SMALL SHELL FRAGMENTS.

.

SUBSAMPLES:
COLLECTED 4 BIOLOGY SAMPLES.
COLLECTED 2 CHEMISTRY SAMPLES.
COLLECTED 1 BAG OF SURFACE SEDIMENT.

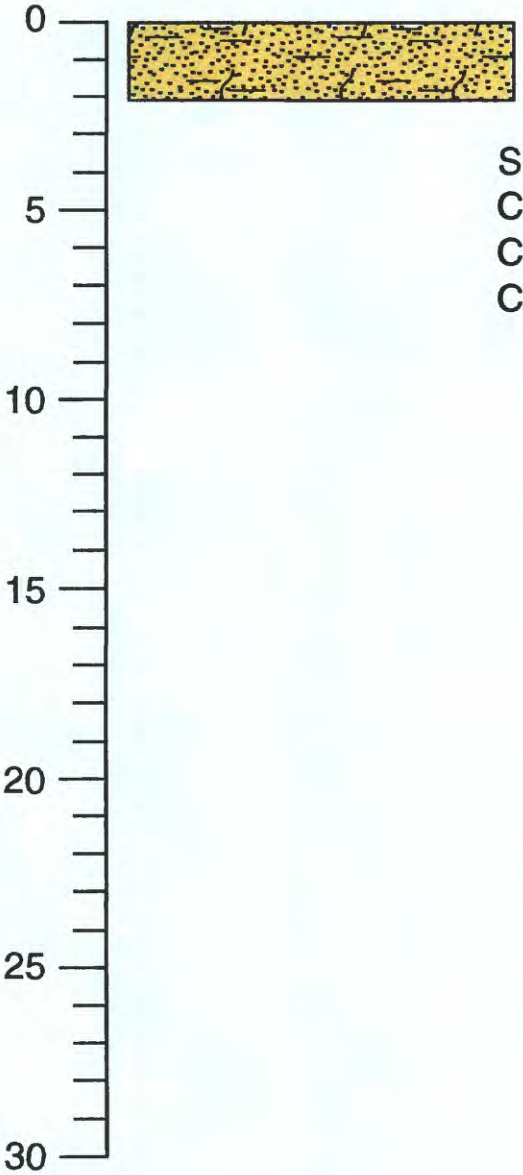
K1–95-HW
Box Core Visual Description Form

Core ID: 95-B39 (B-110) Observer: TORRESAN

Site Description 2.3 KM EAST OF 94-B65, ALONG EAST-WEST TRANSECT TO IDENTIFY EXTENT/TRANSPORT OF DREDGED MATERIAL FROM THE OLD HONOLULU HARBOR SITE.

Water Depth 500 m (uncorrected) Core Length 2 cm

Location 21°14.37' N 157°52.52 W



APPENDIX 2

SEDIMENT CHEMISTRY

Chain of Custody forms for samples sent to Quanterra Laboratories

CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT

PROJECT: U.S.G.S. M. TORRESAN

SAMPLING COMPANY: SOUTH OAHU DISPOSAL SITE

SAMPLING SITE

TEAM LEADER

SAMPLE SAFE™ CONDITIONS

PACKED BY: TORRESAN

SEAL NUMBER

SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY

CONDITION OF CONTENTS

SEALED FOR SHIPPING BY

INITIAL CONTENTS TEMP. °C

SEAL NUMBER

SAMPLING STATUS: [X] Done [ ] Continuing Until

SEAL INTACT UPON RECEIPT BY LAB: [X] Yes [ ] No

CONTENTS TEMPERATURE UPON RECEIPT BY LAB: 3.6 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
		COMPOSITE JARS:				
		B2 0-4CM (2 JARS)		-1B	- See LINDSAY BREYER	
		B4 0-4CM (1 JAR)	-10	-1 10	"Detailed ANALYSES"	
		as 1 SAMPLE				

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
Mike Lauer 4/20/95			1:30p

SHIPPING DETAILS

DELIVERED TO SHIPPER BY: TORRESAN

METHOD OF SHIPMENT: FEDEX

AIRBILL NUMBER

RECEIVED FOR LAB: CS

SIGNED: DCC

DATE/TIME: 4/20/95

QUANTERRA PROJECT NUMBER: 4291

QUA-4119

White – CLIENT Pink – LAB

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CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT: U.S.G.S	SAMPLE SAFE™ CONDITIONS
PROJECT: SOUTH OAHU DISPOSAL SITE	PACKED BY / SEAL NUMBER
SAMPLING COMPANY: U.S.G.S	SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY / CONDITION OF CONTENTS
SAMPLING SITE: S. OAHU SITE	SEALED FOR SHIPPING BY / INITIAL CONTENTS TEMP. °C
TEAM LEADER: TORRESAN	SEAL NUMBER / SAMPLING STATUS ☐ Done ☐ Continuing Until
	SEAL INTACT UPON RECEIPT BY LAB. ☒ Yes ☐ No / CONTENTS TEMPERATURE UPON RECEIPT BY LAB. 3.6 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/19/95	1:30p	Composite DREDGED MATERIAL IN THREE JARS	B6-0-6cm	1	See Lindsay "Detailed Analysis" - 11	
			B7 (0-4.5cm)	1		
			B10 (Bulk)	1		

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
Mike Torresan			

SHIPPING DETAILS

DELIVERED TO SHIPPER BY: FEDEX

METHOD OF SHIPMENT: FEDEX — AIRBILL NUMBER:

RECEIVED FOR LAB: DES — SIGNED: [signature] — DATE/TIME: 6/20/95 3

QUANTERRA PROJECT NUMBER: 42911

QUA-4119

White – CLIENT Pink – LAB

CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT: U.S.G.S.

PROJECT: OLD HONOLULU HARBOR DISPOSAL SITE

SAMPLING COMPANY: U.S.G.S.

SAMPLING SITE: OLD HONOLULU DISPOSAL SITE - DREDGE MATERIAL

TEAM LEADER:

SAMPLE SAFE™ CONDITIONS

PACKED BY:

SEAL NUMBER:

SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY:

CONDITION OF CONTENTS:

SEALED FOR SHIPPING BY:

INITIAL CONTENTS TEMP. °C

SEAL NUMBER:

SAMPLING STATUS: ☐ Done ☐ Continuing Until

SEAL INTACT UPON RECEIPT BY LAB: ☑ Yes ☐ No

CONTENTS TEMPERATURE UPON RECEIPT BY LAB: 3.6 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/19/95	1:30	Composite JARS	B11 (0-5)	3 JARS	-12	
			B12 (0-5 cm)	1 JAR		

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
[signature]		6/19/95	1:30

SHIPPING DETAILS

DELIVERED TO SHIPPER BY: FEDEX

METHOD OF SHIPMENT: FEDEX

AIRBILL NUMBER:

RECEIVED FOR LAB: QES

SIGNED: [signature]

DATE/TIME: 6/20/95 8?

QUANTERRA PROJECT NUMBER: 42911

QUA-4119

White - CLIENT Pink - LAB

CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT: TOMSAW / USGS	
PROJECT: ACE Disposal Sites - Hawaii	
SAMPLING COMPANY: U.S.G.S.	
SAMPLING SITE: SITE: EAST REFERENCE NATIVE SEDIME	
TEAM LEADER: Tomsaw	

SAMPLE SAFE™ CONDITIONS

PACKED BY	SEAL NUMBER
SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY	CONDITION OF CONTENTS
SEALED FOR SHIPPING BY	INITIAL CONTENTS TEMP. 0 °C
SEAL NUMBER	SAMPLING STATUS ☐ Done ☐ Continuing Until
SEAL INTACT UPON RECEIPT BY LAB. ☒ Yes ☐ No	CONTENTS TEMPERATURE UPON RECEIPT BY LAB. 4.7 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/19/95	1:30	NATIVE SEDIMENT REFERENCE				
		SITE EAST OF OLD HONOLULU H				
		Composite THIS GROUP —	B-13 (0-4)	2 JARS		-05
		—	B-16 (0-4")	1 JAR		~~-06~~ JV

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
Mike Thomas		6/19/95	1:30

SHIPPING DETAILS

DELIVERED TO SHIPPER BY	
METHOD OF SHIPMENT	AIRBILL NUMBER
RECEIVED FOR LAB: QES	SIGNED: [signature] DATE/TIME: 6/20/95 [illegible]
QUANTERRA PROJECT NUMBER: 42911	

QUA-4119

White - CLIENT Pink - LAB

CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT: U.S.G.S./TORRESAN

PROJECT: ACE Disposal Sites : HAWAIC

SAMPLING COMPANY: U.S.G.S.

SAMPLING SITE: OLD PEARL HARBOR Disposal site

TEAM LEADER: Torres

SAMPLE SAFE™ CONDITIONS

PACKED BY

SEAL NUMBER

SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY

CONDITION OF CONTENTS

SEALED FOR SHIPPING BY

INITIAL CONTENTS TEMP. 0 °C

SEAL NUMBER

SAMPLING STATUS ☐ Done ☐ Continuing Until

SEAL INTACT UPON RECEIPT BY LAB. ☒ Yes ☐ No

CONTENTS TEMPERATURE UPON RECEIPT BY LAB. 4.7 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/19/95	1:30p	OLD PEARL HARBOR DREDGED Material Composite All 4 JARS	B18(0-5ft)	4 JARS		-07-06

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
[signature] 6/18/95			

SHIPPING DETAILS

DELIVERED TO SHIPPER BY

METHOD OF SHIPMENT

AIRBILL NUMBER

RECEIVED FOR LAB: QNS

SIGNED: [signature]

DATE/TIME: 6/20/95

QUANTERRA PROJECT NUMBER: 42911

QUA-4119

White - CLIENT Pink - LAB

CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT: U.S.G.S	SAMPLE SAFE™ CONDITIONS
PROJECT: ACE HAWAII DISPOSAL SITES	PACKED BY / SEAL NUMBER
SAMPLING COMPANY: U.S.G.S	SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY / CONDITION OF CONTENTS
SAMPLING SITE: NATIVE SED. SOUTH OF SOUTH OAHU SITE	SEALED FOR SHIPPING BY / INITIAL CONTENTS TEMP. C °C
TEAM LEADER: TORRESAN	SEAL NUMBER / SAMPLING STATUS ☐ Done ☐ Continuing Until
	SEAL INTACT UPON RECEIPT BY LAB. ☒ Yes ☐ No / CONTENTS TEMPERATURE UPON RECEIPT BY LAB. 4.7 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/19/95	1:30p	NATIVE SEDIMENT REFERENCE SITE SOUTH OF S. OAHU S.S.				
		Composite THESE	B20 (0-5)	2 JARS	-07	~~07~~ 10 ~~07~~
			B21 0-5	2 JARS		

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CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
[signature] 6/19/95			

SHIPPING DETAILS

DELIVERED TO SHIPPER BY

METHOD OF SHIPMENT / AIRBILL NUMBER

RECEIVED FOR LAB [signature] / SIGNED [signature] / DATE/TIME 6/20/95 815

QUANTERRA PROJECT NUMBER 4211

QUA 4119

White – CLIENT Pink – LAB

CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra
Environmental Services

QUANTERRA CLIENT: TORRESAN / U.S.G.S.	SAMPLE SAFE™ CONDITIONS
PROJECT: ACE HAWAIIAN Disposal Sites	PACKED BY / SEAL NUMBER
SAMPLING COMPANY: U.S.G.S.	SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY / CONDITION OF CONTENTS
SAMPLING SITE: SOUTH OAHU Disposal Sites	SEALED FOR SHIPPING BY / INITIAL CONTENTS TEMP. 0 °C
TEAM LEADER: Mike TORRESAN	SEAL NUMBER / SAMPLING STATUS ☐ Done ☐ Continuing Until
	SEAL INTACT UPON RECEIPT BY LAB. ☒ Yes ☐ No / CONTENTS TEMPERATURE UPON RECEIPT BY LAB. 4.7 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/19/95		NATIVE SEDIMENT REFERENCE SITE WEST OF SOUTH OAHU DISPOSAL SITE Composite all sample	B24 (0-5cm)	2 JARS	-08	TCL -N ATD
		—	B25 (0-5cm)	2 JARS		

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CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
Mike Torresan 6/19/95			

SHIPPING DETAILS

DELIVERED TO SHIPPER BY

METHOD OF SHIPMENT / AIRBILL NUMBER

RECEIVED FOR LAB: QMS / SIGNED / DATE/TIME: 6/20/95 8A

QUANTERRA PROJECT NUMBER: 4291

QUA-4119

White – CLIENT Pink – LAB

CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT: USGS / TORTSBW	SAMPLE SAFE™ CONDITIONS
PROJECT: ACE HAWAIIAN DISPOSAL SITE	PACKED BY / SEAL NUMBER
SAMPLING COMPANY: U.S.G.S.	SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY / CONDITION OF CONTENTS
SAMPLING SITE: SOUTH OF SOUTH OAHU	SEALED FOR SHIPPING BY / INITIAL CONTENTS TEMP.: 0 °C
TEAM LEADER	SEAL NUMBER / SAMPLING STATUS: ☐ Done ☐ Continuing Until
	SEAL INTACT UPON RECEIPT BY LAB.: ☒ Yes ☐ No / CONTENTS TEMPERATURE UPON RECEIPT BY LAB.: 4.7 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
		NATIVE SEDIMENT				
		SOUTH OF SOUTH OAHU SITE				
		Composite	B31	0-4	4 JARS	-09 -12

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CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
Christina 6/8/95			

SHIPPING DETAILS

DELIVERED TO SHIPPER BY

METHOD OF SHIPMENT / AIRBILL NUMBER

RECEIVED FOR LAB: DES / SIGNED: [signature] / DATE/TIME: 6/20/95 14

QUANTERRA PROJECT NUMBER: 4291

QUA-4119

White – CLIENT Pink – LAB

CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT: USGS / Tonaya	SAMPLE SAFE™ CONDITIONS
PROJECT: ACE Hawaiian Disposal Sites	PACKED BY / SEAL NUMBER
SAMPLING COMPANY: U.S.G.S.	SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY / CONDITION OF CONTENTS
SAMPLING SITE: Both Samples - South of South OAHU Site	SEALED FOR SHIPPING BY / INITIAL CONTENTS TEMP. 0 °C
TEAM LEADER: Tonaya	SEAL NUMBER / SAMPLING STATUS ☐ Done ☐ Continuing Until
	SEAL INTACT UPON RECEIPT BY LAB. ☒ Yes ☐ No / CONTENTS TEMPERATURE UPON RECEIPT BY LAB. 3.5 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
		RUN as 1 sample →	B32(04)	3 JARS	-13	
		Run as 1 sample →	B33(04)	3 JARS	-19	
		Both Samples South of South OAHU Site				

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME

SHIPPING DETAILS

DELIVERED TO SHIPPER BY

METHOD OF SHIPMENT / AIRBILL NUMBER

RECEIVED FOR LAB: Q ES / SIGNED: [signature] / DATE/TIME: 6/20/95 8?

QUANTERRA PROJECT NUMBER: 42911

QUA-4119

White - CLIENT Pink - LAB

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CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra
Environmental Services

QUANTERRA CLIENT: USGS

PROJECT: ACE HAWAIIAN Disposal Sites

SAMPLING COMPANY: USGS

SAMPLING SITE: WEST OF South OAHU Disposal Site

TEAM LEADER: Torrano

SAMPLE SAFE™ CONDITIONS

PACKED BY	SEAL NUMBER
SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY	CONDITION OF CONTENTS
SEALED FOR SHIPPING BY	INITIAL CONTENTS TEMP: 0 °C
SEAL NUMBER	SAMPLING STATUS: ☐ Done ☐ Continuing Until
SEAL INTACT UPON RECEIPT BY LAB: ☒ Yes ☐ No	CONTENTS TEMPERATURE UPON RECEIPT BY LAB: 3.0 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/19/95		WEST OF South OAHU Site				
		NATIVE SEDIMENT	B 34(04)	3 JARS		-01
		Composite				

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CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
[signature]			
6/19/95			

SHIPPING DETAILS

DELIVERED TO SHIPPER BY	
METHOD OF SHIPMENT	AIRBILL NUMBER
RECEIVED FOR LAB: [signature]	SIGNED: [signature] DATE/TIME: 6/20/95 8:45
QUANTERRA PROJECT NUMBER: 42911	

OUA-4119

White - CLIENT Pink - LAB

CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT: U.S.G.S.

PROJECT: ACE, HAWAIIAN Disposal site

SAMPLING COMPANY: USGS.

SAMPLING SITE: JUST WEST OF South OAHU Site.

TEAM LEADER: Terrace

SAMPLE SAFE™ CONDITIONS

PACKED BY:

SEAL NUMBER:

SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY:

CONDITION OF CONTENTS:

SEALED FOR SHIPPING BY:

INITIAL CONTENTS TEMP: C °C

SEAL NUMBER:

SAMPLING STATUS: ☐ Done ☐ Continuing Until

SEAL INTACT UPON RECEIPT BY LAB: ☒ Yes ☐ No

CONTENTS TEMPERATURE UPON RECEIPT BY LAB: 3.0 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/14/95	1:30p	Site JUST WEST OF South OAHU Disposal Site Composite 3 JARS	B35(04)	3		-02

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
[signature] 6/19/95			

SHIPPING DETAILS

DELIVERED TO SHIPPER BY:

METHOD OF SHIPMENT: FEDEX

AIRBILL NUMBER:

RECEIVED FOR LAB: QFS

SIGNED: [signature]

DATE/TIME: 6/20/95 845

QUANTERRA PROJECT NUMBER: 42911

QUA-4119

White - CLIENT Pink - LAB

CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT: Tetra / USGS

PROJECT: Army Corps of Engineers Hawaiian Disposal Site

SAMPLING COMPANY: West of South Oahu Disposal Site

SAMPLING SITE: USGS

TEAM LEADER: M. Torresan

SAMPLE SAFE™ CONDITIONS

PACKED BY:

SEAL NUMBER:

SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY:

CONDITION OF CONTENTS:

SEALED FOR SHIPPING BY:

INITIAL CONTENTS TEMP.: 0 °C

SEAL NUMBER:

SAMPLING STATUS: ☐ Done ☐ Continuing Until

SEAL INTACT UPON RECEIPT BY LAB: ☒ Yes ☐ No

CONTENTS TEMPERATURE UPON RECEIPT BY LAB.: 3.5 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/19/9	1:30	Separate Sample →	B36(0-4)	2 JARS		-15
		Separate Sample →	B 30 0-4cm	2 JARS		-16
		Separate Sample	B 27 0-4cm	2 JARS		-17
		DO GRAIN SIZE CAST!				

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
M. Torresan 6/19/9-			

SHIPPING DETAILS

DELIVERED TO SHIPPER BY:

METHOD OF SHIPMENT:

AIRBILL NUMBER:

RECEIVED FOR LAB: QES

SIGNED:

DATE/TIME: 6/24/9 8

QUANTERRA PROJECT NUMBER: 4291

QUA 4119

White – CLIENT Pink – LAB

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CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT: USGS/Toxic
PROJECT: ACE Disposal Sites
SAMPLING COMPANY: USGS
SAMPLING SITE: EAST OF OLD HONOLULU HARBOR Disposal Site
TEAM LEADER:

SAMPLE SAFE™ CONDITIONS

PACKED BY	SEAL NUMBER
SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY	CONDITION OF CONTENTS
SEALED FOR SHIPPING BY	INITIAL CONTENTS TEMP. 0 °C
SEAL NUMBER	SAMPLING STATUS ☐ Done ☐ Continuing Until
SEAL INTACT UPON RECEIPT BY LAB. ☒ Yes ☐ No	CONTENTS TEMPERATURE UPON RECEIPT BY LAB. 3.0 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/19/95	1:30p	NATIVE SEDIMENT EAST				
		OF OLD HONOLULU HARBOR	B37(0-4)	2 JARS — 1 Sample		-03
		Disposal Site.	B38(0-4)	2 JARS — 1 Sample		-04
		Run seperately if Possible				
		OTHERWISE Composite.				
		DO GRAINSIZE LAST				

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
[signature] 6/19/95			

SHIPPING DETAILS

DELIVERED TO SHIPPER BY:
METHOD OF SHIPMENT:
AIRBILL NUMBER:
RECEIVED FOR LAB: QES
SIGNED: [signature]
DATE/TIME: 6/20/95 7:4
QUANTERRA PROJECT NUMBER: 4291

QUA-4119

White - CLIENT Pink - LAB

CHAIN OF CUSTODY

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

Quanterra Environmental Services

QUANTERRA CLIENT: USGS	SAMPLE SAFE™ CONDITIONS
PROJECT: Hawaii Ocean Sediments	PACKED BY / SEAL NUMBER
SAMPLING COMPANY	SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY / CONDITION OF CONTENTS
SAMPLING SITE	SEALED FOR SHIPPING BY / INITIAL CONTENTS TEMP. °C
TEAM LEADER: CONTACT LINDSAY BREYER @ 303-421-6611 WITH	SEAL NUMBER / SAMPLING STATUS ☐ Done ☐ Continuing Until
	SEAL INTACT UPON RECEIPT BY LAB. ☐ Yes ☐ No / CONTENTS TEMPERATURE UPON RECEIPT BY LAB. °C

gives steps

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
June 19		#3681-01	Sed	1	Grain Size	
		43681 -17				

RECEIVED JUL 27 1995 INC. ING MILLER ENG. CHEYENNE, WYO.

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
[signature]	B Bourgie	7/27/95	1600
		7/28/95	1230

SHIPPING DETAILS

DELIVERED TO SHIPPER BY

METHOD OF SHIPMENT / AIRBILL NUMBER

RECEIVED FOR LAB / SIGNED / DATE/TIME

QUANTERRA PROJECT NUMBER

QUA-4119

White – CLIENT Pink – LAB

APPENDIX 3

BIOASSAY AND BIOACCUMULATION

Chain of Custody forms for Battelle Marine Sciences Laboratory

SITE 1.

Battelle
Marine Sciences Laboratory
1529 W. Sequim Bay Road
Sequim, Washington 98382

FIELD SAMPLE CHAIN OF CUSTODY

Shipped To: SEQUIM WA. Telephone: _____

Company: BATTELLE

Address: _____

Method of Shipment: FEDEX

Shipped From (Location): HONOLULU HI By (Person): M. E. GRESSAM

Container No.: 1 SOUTH OAHU DISPOSAL SITE

Sampling Location: MAMALA BAY 21° 15.15'N 157° 56.86'W

Samples Collected By: U.S.G.S. Date (s): 6/14/95

Remarks: Composite STATION 1; Box B2, B3, B4, B5

6/14/95 7:45 PM

Sample Identification

DREDGED MATERIAL — MUDDY SAND / SANDY MUD W/ CORAL, wood, CHARCOAL, SHELLS + SAND ETC. FROM PEARL & HONOLULU HARBORS. MATRIX IS A GRAY COHESIVE MUD.

Typical Dredged Material

Chain of Possession

Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time

BC-1800-193 (06/94)

Cooler #2 SITE 2.

Battelle
Marine Sciences Laboratory
1529 W. Sequim Bay Road
Sequim, Washington 98382

FIELD SAMPLE CHAIN OF CUSTODY

Shipped To: ABOVE ↑ Telephone: _____

Company: Battelle MSL

Address: Above

Method of Shipment: FEDEX

Shipped From (Location): Honolulu HI By (Person): Mike Torresan U.S.G.S.

Container No.: #2 - cooler

Sampling Location: South OAHU Disposal Site 21° 15.17N' 157° 55.99W'

Samples Collected By: M. Torresan USGS Date (s): 6/15/95

Remarks: Dredged Material - composites of cores B6, B7, B8, B9, and B10 aboard R/V Kila.

Sample Identification

Muddy carbonate sand matrix w/ mud lumps, cobbles of basalt + limestone; and coral + shell debris. Some man-made debris: rubber, glass. Very heterogeneous mixture.

Chain of Possession

Relinquished by	Date/Time	Received by	Date/Time
Mike Torresan			

Relinquished by	Date/Time	Received by	Date/Time

SITE 3.

Battelle
Marine Sciences Laboratory
1529 W. Sequim Bay Road
Sequim, Washington 98382

FIELD SAMPLE CHAIN OF CUSTODY

Shipped To: ~~Battelle~~ / SEQUIM Telephone: _____

Company: _____

Address: ABOVE SEE ABOVE

Method of Shipment: FED EX

Shipped From (Location): HONOLULU HI By (Person): M. TORRESAN

Container No.: # 3

Sampling Location: OLD HONOLULU HARBOR DISPOSAL SITE MAMALA BAY, HONOLULU

Samples Collected By: TORRESAN Date (s): 6/15/95

Remarks: ~ 21° 14.5' N 157 54.51' W

DREDGED MATERIAL Composite OF B11 AND B12

Sample Identification

A HETEROGENEOUS MIXTURE OF MUD, SANDY MUD, MUDDY SAND, SAND, WOOD, CORAL, SHELL, & GLASS. SOME POCKETS OF TERRIGENOUS SOIL - CLASSIC HONOLULU DREDGED MATERIAL w/ INCLUSIONS OF BASALT, LIMESTONE & BIO PARTS

Chain of Possession

Relinquished by	Date/Time	Received by	Date/Time
Mike Torresan	6/15/95		
Relinquished by	Date/Time	Received by	Date/Time

SITE 4.

Battelle
Marine Sciences Laboratory
1529 W. Sequim Bay Road
Sequim, Washington 98382

FIELD SAMPLE CHAIN OF CUSTODY

Shipped To: BATTELLE Marine Sciences LAB Telephone: _____

Company: See ABOVE

Address: _____

Method of Shipment: FEDEX

Shipped From (Location): Honolulu, HAWAII By (Person): M. TORRESAN

Container No.: # 4 COMPOSITE OF CORES: B13, B14, B15, B16 AND [redacted] B17

Sampling Location: MAMALA BAY, Honolulu HI, [redacted] EAST OF Honolulu HARBOR DISPOSAL SITE

Samples Collected By: Mike Torresan / U.S.G.S. Date (s): 6/15/95

Remarks: EAST OF OLD Honolulu HARBOR Disposal SITE IN NATIVE SEDIMENT - USE AS REFERENCE - UNAFFECTED BY DISPOSAL - REOCCUPY 1994 SITE # B67 21° 14.00N 157 51.98W

Sample Identification

THIS STATION - MASSIVE NATIVE CARBONATE SAND W/ SOME MUD [redacted] BURROWS VISIBLE IN WHOLE 10CM RANGE. NO DREDGED MATERIAL PRESENT.

Chain of Possession

Relinquished by	Date/Time	Received by	Date/Time
Mike Torresan	6/16/95		
Relinquished by	Date/Time	Received by	Date/Time

BC-1800-193 (06/94)

Site 5

Battelle
Marine Sciences Laboratory
1529 W. Sequim Bay Road
Sequim, Washington 98382

FIELD SAMPLE CHAIN OF CUSTODY

Shipped To: Battelle see above Telephone: _____

Company: _____

Address: _____

Method of Shipment: FEDEX

Shipped From (Location): Honolulu HI By (Person): M. Torresan

Container No.: # 5

Sampling Location: OLD PEARL HARBOR Site ~ 21° 16.00N' 157° 56.50' W

Samples Collected By: M. Torresan Date (s): 6/16/95

Remarks: IN OLD PEARL HARBOR DISPOSAL Site - REOccupy 1994 Site B25 - IN DREDGED Material.

Sample Identification

DREDGED Material Composite OF CORES B18, B19

DREDGED Material is Heterogeneous Mixture OF MUD, SAND Coral Shell Debris - CLASSIC GRAY MUD MATRIX BINDING MATERIAL TOGETHER

Chain of Possession

Relinquished by	Date/Time	Received by	Date/Time
[signature]	6/16/95		

Site 6

Battelle
Marine Sciences Laboratory
1529 W. Sequim Bay Road
Sequim, Washington 98382

FIELD SAMPLE CHAIN OF CUSTODY

Shipped To: Battelle Telephone: _____

Company: See ABOVE

Address: _____

Method of Shipment: FEDEX

Shipped From (Location): Honolulu, HI By (Person): M. Torresan

Container No.: #6

Sampling Location: South of South Oahu Disposal Site; 1994 Site B60 in Native Sediment 21°13.51N / 157° 57.00

Samples Collected By: Mike Torresan Date (s): 6/16/95

Remarks: Core is composite of B20, 21, & 22

Sample Identification

Native Carbonate Sand slightly Muddy. Burrowed & Medium Grained Sand

Chain of Possession

Relinquished by	Date/Time	Received by	Date/Time
[signature]	6/16/95		
Relinquished by	Date/Time	Received by	Date/Time

BC-1800-193 (06/94)

Site 7

Battelle
Marine Sciences Laboratory
1529 W. Sequim Bay Road
Sequim, Washington 98382

FIELD SAMPLE CHAIN OF CUSTODY

Shipped To: SEE ABOVE ↑ Telephone: _____

Company: Battelle

Address: _____

Method of Shipment: FEDEX

Shipped From (Location): HONOLULU, HAWAII By (Person): MIKE TORRESAN

Container No.: #7

Sampling Location: 21° 14.00 / 158° 00.0 / W MAMALA BAY, WEST OF DISPOSAL SITES

Samples Collected By: M. TORRESAN U.S.G.S. Date (s): 6/16/95

Remarks: _____

Sample Identification

NATIVE CARBONATE SAND SOUTH WEST OF SOUTH OAHU DISPOSAL SITE. REOCCUPY SITE B46 FROM 1994 SURVEY. NATIVE SEDIMENT COMPOSED OF CARBONATE SAND AND CONSISTS OF ANIMAL TESTS + REEF DEBRIS. COARSENS DOWN CORE.

Chain of Possession

Relinquished by	Date/Time	Received by	Date/Time
[signature]	6/16/95		
Relinquished by	Date/Time	Received by	Date/Time

ACKNOWLEDGMENTS

The authors would like to thank Laura L. Zink, who drafted the illustrations, and John Chin of for his thoughtful review. We would also like to thank Kathleen Dadey of the U.S. Army Corps of Engineers, Pacific Ocean Division, Fort Shafter, Hawaii and Allan Ota of the U.S. Environmental Protection Agency, Region IX, San Francisco for the funding the project and the inter-agency cooperation that made this possible. Special thanks go the captain and crew of the University Of Hawaii's research vessel R/V Kila and Marine Center for their logistical help, professional manner and ship handling skill during mobilization and data collection. Thanks are also due to Dr. Julie Bailey-Brock of the University of Hawaii, and her team of enthusiastic students who performed all the biological subsampling. Working with her team of researchers and the crew of the R/V Kila was an entirely fruitful and enjoyable endeavor. Finally, a big thanks goes to the U.S. Geological Survey's Marine Facility and the superb technical help provided by Steve Wallace, Walt Olson, Kevin O'Toole, Larry Kooker, John Gann, and Henry Chezar. Without the help of all involved this field program would not have been successful.