Environmental Reconnaissance of the Salton Sea: Sediment Contaminants Riverside and Imperial Counties, California

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Prepared For
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NOTICE

This report was submitted in fulfillment of a contract with the Salton Sea Authority under the (partial) sponsorship of the U.S. Environmental Protection Agency. This report covers the period from November 1998 to May 1999, and work was completed as of May 1999.

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PREFACE

Extensive research has been performed in and around Salton Sea to characterize water quality and evaluate biological impacts, namely, migratory and resident birds and their habitats, from agricultural drainage contaminants. Even more geotechnical research has been conducted on the tectonics and geologic setting of the Salton Trough. However, information on the bottom sediment characteristics and contaminants of Salton Sea is limited.

Previous studies on Salton Sea bottom sediments have identified a variety of inorganic and organic chemicals, including organochlorine pesticide residues of banned DDT (1,1,1-trichloro-2,2-bis [p-chlorophenyl]-ethane) and its derivatives, DDD (1,1-dichloro-2,2-bis [p-chlorophenyl]-ethane) and DDE (1,1-dichloro-2,2-bis [p-chlorophenyl] ethylene). Many of these same chemicals, plus some additional ones, have been identified in the riverbeds feeding into the Sea, including DDT, DDD, DDE, dichloromethane, polychlorinated biphenyls, polynuclear aromatic hydrocarbons, pesticides, selenium, and boron. Prior to our study, little was known about the current concentrations and distribution of these contaminants in sediments in Salton Sea.

LFR reviewed the records contained in the archives of the University of Redlands Salton Sea Database Program pertaining to the bottom sediments of Salton Sea. This information was incorporated into the design of our field study.

ABSTRACT

An investigation of the physical and chemical characterization of sediments in and around Salton Sea, Imperial and Riverside Counties, California, was undertaken in the winter of 1998–1999. This field investigation was one of the first comprehensive studies completed at Salton Sea to evaluate the distribution of sediment types and chemical contaminants throughout the entire Sea and its main tributaries. The study was implemented in two phases. The first phase sampled sediments on December 15 through 22, 1998, and analyzed contaminant concentrations and particle size distribution in the bottom sediment of the Sea plus approximately 1 mile up each of three of its main tributaries: the Whitewater, the Alamo, and the New rivers. Phase I sediment samples were collected from 42 grab sampling sites and six core sampling sites.

Based on results of the first phase of investigation, a second phase of sediment sampling was conducted from January 19 through 22, 1999, to further assess and measure contaminant concentrations and evaluate particle size distribution in the bottom sediment. This second sampling phase focused on the significant areas of interest identified during Phase I and included sediment sampling at 15 grab sites and 10 core sites.

Sediments sampled on the bottom of the Sea consisted of a range of silt, clay, and finer grained sands. The shallow sediment near the shoreline also included abundant barnacle shells and occasional fish bones. The surface sediment composition included a high percentage of sand outside Salton City on the western bank of the Sea and extending into the central, deeper parts of the Sea. Sand percentages near the mouths of the New and Alamo rivers were also high, likely from deposition of the heavier particles from the high-velocity flows into the Sea. The lower velocity Whitewater River delta, on the other hand, was found to be predominantly silt. Silt was also abundant along the southwest near-shore area and along the shallow water bays near the New and Alamo rivers. A shallow layer of clay blankets the southwestern corner of the Sea and extends toward the center near the deepest part of the Sea. Clay is also abundant near shore and offshore just north of Desert Shores. The majority of the deeper sediment sampled in the central and southern parts of the Sea consisted predominantly of varied amounts of silt and clay with lesser amounts of fine sand.

The sediment samples were analyzed for 17 inorganic chemicals, including metals and metalloids, and organic chemicals, including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and agricultural pesticides, herbicides, and their major breakdown products.

In general, concentrations of inorganic chemicals in the sediments were found to be higher in the northern part of the Sea. Concentrations were generally in the upper 30 centimeters (1 foot) of the sediment than at depth. The chemical concentrations were compared against background and available sediment quality screening criteria commonly used in sediment assessment studies of saline environments: NOAA effects range low (ERL) and effects range medium (ERM). For selenium, California Regional

Water Quality Control Board, San Francisco Region criteria for wetlands creation were used because no ERLs or ERMs exist. Based on these screening criteria, the following chemicals were determined to be of potential ecological concern: cadmium, copper, molybdenum, nickel, zinc, and selenium, with the most elevated inorganic constituent being selenium.

Concentrations of cadmium ranged from 0.67 to 5.8 milligrams per kilogram (mg/kg). The highest reported concentrations of cadmium were found in the north-central part of the Sea. Concentrations of copper ranged from 8.1 to 53 mg/kg. The highest concentrations were found near the mouth of the Whitewater River. Concentrations of molybdenum detected in the north and central part of the Sea ranged from approximately 11 to 194 mg/kg. The range of reported concentrations for nickel was from 3.3 to 33 mg/kg. The highest concentrations of nickel were detected at the mouth of the Whitewater River and in the deeper portion of the Sea. The range of concentrations for zinc was from 5.4 to 190 mg/kg. The highest concentrations of zinc were found at the mouths of the Whitewater River and Salt Creek. Concentrations of selenium detected at the Sea ranged from 0.086 to 8.5 mg/kg. The highest concentrations of selenium were found just offshore of Desert Shores. In general, inorganic and organic chemical concentrations were elevated over much of the northern half of the Sea.

Elevated concentrations of organic chemicals were detected in sediment predominately in the northern part of the Sea and were limited to predominately VOCs. Of the 118 sediment samples analyzed for VOCs, 114 samples contained detectable concentrations of acetone, carbon disulfide, and/or 2-butanone. These three detected chemicals could possibly be present as a result of natural biological processes occurring within Salton Sea sediment. Acetone concentrations ranged from 32 to 840 micrograms per kilogram (µg/kg). The highest concentrations of acetone were located near the mouth of the New River. Carbon disulfide concentrations ranged from 15 to 1,800 µg/kg. The highest concentrations of carbon disulfide were near the mouth of the Whitewater River. Concentrations of 2-butanone ranged from 11 to 150 µg/kg. The highest concentration of 2-butanone was located in the northern portion of the Sea, offshore from Salton Sea State Park. Only a few other sediment samples contained detectable concentrations of other VOCs, including o-xylenes, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, naphthalene, and n-propylbenzene.

Organic chemicals not detected in any sediment samples include SVOCs, chlorinated pesticides, PCBs, organophosphate and nitrogen pesticides, and chlorinated herbicides.

This preliminary study indicates that some inorganic chemicals, notably selenium, are present at elevated concentrations in Salton Sea. However, more detailed sediment assessments are required to determine if these chemicals pose a potentially significant human and/or ecological risk. A determination of the forms of the contaminants, especially selenium, would be valuable in evaluating its potential mobility and bioavailability. Additionally, near-shore sediment sampling and a higher sampling density would be required to determine baseline chemical concentrations for Salton Sea.

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ACRONYMS AND ABBREVIATIONS

Authority	Salton Sea Authority
bgs	below ground surface
CCR	California Code of Regulations
cfs	cubic feet per second
cm	centimeters
COC	chain-of-custody
DDT	1,1,1-trichloro-2,2-bis (p-chlorophenyl)-ethane
DDD	1,1-dichloro-2,2-bis (p-chlorophenyl)-ethane
DDE	1,1-dichloro-2,2-bis (p-chlorophenyl) ethylene
DGPS	Differential Global Positioning System
DMG	Data Management Group (LFR)
DQO	Data Quality Objective
GIS	Geographic Information System
GPS	Global Positioning System
GLP	Good Laboratory Practices
kg	kilograms
km/km^2	kilometers per kilometer squared
LFR	LFR Levine·Fricke Inc.
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilograms
ppt	parts per thousand

PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
Sea	Salton Sea
SCUBA	self-contained underwater breathing apparatus
SFRWQCB	California Regional Water Quality Control Board, San Francisco Region
SVOCs	semivolatile organics compounds
U.S. EPA	U.S. Environmental Protection Agency
SSDP	University of Redlands Salton Sea Database Program
VOCs	volatile organic compounds

1.0 INTRODUCTION

On behalf of the Salton Sea Authority ("Authority"), LFR Levine·Fricke (LFR) has prepared this reconnaissance investigation report for sediment contaminants at the Salton Sea in Riverside and Imperial Counties, California ("the Sea"; Figure 1). This report discusses and presents the results obtained during Phase I and Phase II sampling activities conducted under contract with the Salton Sea Authority and in accordance with LFR's "Proposal for Environmental Reconnaissance of the Salton Sea: Sediment Contaminants," dated November 12, 1998; the "Quality Assurance Project Plan for Environmental Reconnaissance of the Salton Sea: Sediment Contaminants," dated December 11, 1998; and "Health and Safety Plan for Sediment Contaminants Investigation Activities at the Salton Sea, Riverside and Imperial Counties, California," dated December 11, 1998.

The following documents were reviewed and elements incorporated, as appropriate, during preparation of this report:

- LFR Levine·Fricke. 1998a. Proposal for Environmental Reconnaissance of the Salton Sea: Sediment Contaminants. November 12.

- LFR Levine·Fricke. 1998b. Quality Assurance Project Plan for Environmental Reconnaissance of the Salton Sea: Sediment Contaminants. December 11.

- LFR Levine·Fricke. 1998c. Health and Safety Plan for Sediment Contaminants Investigation Activities at the Salton Sea, Riverside and Imperial Counties, California. December 11.

- U.S. Environmental Protection Agency. 1998. EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations. External Review Draft Final Document.

- U.S. Environmental Protection Agency. 1995. Handbook for Preparing Office of Research and Development Reports.

1.1 Purpose of the Report

This study was conducted to strengthen the limited current information on the Salton Sea's bottom sediment. Specifically, LFR evaluated the physical and chemical characteristics of the sediments present at the Sea, including metals, metalloids, nonmetals, and organic compounds (and their residues) over a range of depths and distances from Sea inflows. The present study represents a reconnaissance-level characterization of bottom sediment throughout the Salton Sea without interpretation of potential ecological risk associated with the contaminants. The results, analyses, and interpretation of data contained within this reconnaissance investigation will provide a

scientific foundation for the final restoration project on the Salton Sea ecosystem. Salton Sea's long-term, natural resource management concerns include high salinity (now at about 25 percent greater than seawater), bird disease epidemics, fish kills, and contaminants.

1.2 Objectives of the Sediment Contaminants Investigation

Based upon a review of information regarding Salton Sea, there are numerous areas where environmental data are lacking. The information currently available is limited in its applicability and outdated due to the significant changes in the environment affecting the Sea's ecology and biota. LFR's specific goals for the sediment contaminant study were as follows:

- Provide physical characterization data of Salton Sea sediment.
- Collect significant and defensible data on the concentrations of contaminants in the bottom sediment of Salton Sea.
- Specifically evaluate inorganic chemicals (metals and metalloids to include selenium) and anthropogenic organic compounds and their residues at a range of depths and distances from the Sea inflows.

1.3 Background

Salton Sea is the largest lake in California, with current measurements of 56.35 kilometers (km; 35 miles) long and 24.15 km (15 miles) wide and a maximum depth of approximately 15 meters (m; 50 feet). It is approximately 278 feet below mean sea level and its salinity is 44 parts per thousand (ppt), compared to ocean water at 34.9 ppt, according to the Salton Sea National Wildlife Refuge. The Sea has a surface coverage of 240,000 acres and a watershed of 8,360 square miles. It has no outlets and lies in an area that receives only 5.84 centimeters (cm; 2.3 inches) of rain a year with temperatures reaching 120 degrees Fahrenheit. However, drainage from the 500,000 acres of heavily watered and fertilized growing fields of Imperial Valley has kept it alive. Agricultural wastewater carries nitrates, pesticides, selenium, and other metals, as well as salt leached from agricultural fields.

Sources of pollution into the Sea are from the maquiladoras in Mexicali, Mexico, agricultural runoff in Mexicali Valley, and runoff in Imperial Valley. Pollution in the New River consists of industrial, municipal, and agricultural runoff and raw sewage, making it a serious, acute health risk to humans and animals. Furthermore, the pollution collects in Salton Sea and threatens the wildlife that depends on this ecosystem.

Some of the chemicals known and expected to exist in the rivers feeding into the Salton Sea are selenium, boron, DDT (1,1,1-trichloro-2,2-bis [p-chlorophenyl]-ethane), DDE

(1,1-dichloro-2,2-bis [p-chlorophenyl] ethylene), dichloromethane, Dieldrin, hexachlorobenzene, polychlorinated biphenyls (PCBs), Toxaphene, and other pesticides.

1.4 History of the Site and Geologic Setting

Salton Sea is located in an area known as the Salton Trough. Some of the major contributors to the understanding of the tectonic systems present within the Salton Trough include Moran (1977), Babcock (1974), Thornton and Seyfried (1975), and Johnson et al. (1994). Babcock (1974) noted that prior to deposition of the Borrego Formation, beds of the Shavers Well Formation were tilted and eroded, creating an unconformity upon which the Borrego lacustrine sediments were deposited and resulting in the current formation of the Salton Trough. It underwent repeated periods of desiccation interspersed with influxes of clayey/silty sediments, largely derived from the Colorado River. Thornton and Seyfried (1975) noted that the sediments of the Salton Trough and the Gulf Coast region contain detritus and organic matter.

2.0 PREVIOUS INVESTIGATIONS

LFR reviewed records contained within the archives of the University of Redlands Salton Sea Database Program (SSDP) for previous investigations of the Salton Sea's sediment characteristics. All of the information presented in this section and its subsections was obtained from the references listed.

Previous studies on Salton Sea bottom sediments identified a variety of inorganic and organic chemicals, including organochlorine pesticide residues of banned DDT and its derivatives, DDD (1,1-dichloro-2,2-bis [p-chlorophenyl]-ethane) and DDE. Many of these same chemicals, plus some additional ones, have been identified in the riverbeds feeding into the Sea, including DDT, DDD, DDE, dichloromethane, PCBs, polynuclear aromatic hydrocarbons (PAHs), pesticides, selenium, and boron. Limited chemical data were collected by Bechtel (1997) at the Salton Sea Test Base, which comprises 13,462 acres of water located along Highway 86 at the southwest corner of the Sea and approximately 6 miles south of Salton City, and from Setmire and Stroud's (1990) irrigation study of the deltas and tributaries of the New and Alamo rivers. Other documents that provide the best available information on bottom sediment contaminants include Bechtel (1997), Eccles (1979), Hogg (1963), and Setmire [et al.] (1993). Summaries of historic concentrations of inorganic and organic chemicals of concern in sediment from the Salton Sea and surrounding tributaries are presented in Tables 1 and 2, respectively.

The report prepared by Bechtel National, Inc., for the U.S. Navy's removal site evaluation at the Salton Sea Test Base provided information regarding historic use of the Salton Sea Test Base property. The aeroballistic marine target area was reportedly used for testing inert atomic weapons. Approximately 3,750 test units were dropped into the Sea. These inert (nonexplosive, nonradioactive) test units were usually stainless steel

casings filled with arming, fusing, and firing components (containing nickel/cadmium [until the 1950s] or lead/acid batteries batteries, minor amounts of aluminum, copper, brass, and rubber), as well as concrete, lead, and/or stainless steel ballast. Most units weighed between 5,000 and 40,000 pounds. Nickel/cadmium and lead/acid batteries were used for firing/fusing tests. The test units reportedly broke apart upon impact, scattering debris across the Sea floor. Approximately 10,000 pounds of material was recovered from one area investigated, but the majority of the debris still lies buried in the sediment of the Sea. An MK-6 "fly-around" radioactive test unit that contained 120 pounds of uranium was also reportedly lost in the Sea.

Ferrari and Weghorst (1997) completed a detailed survey to develop underwater topography, compute area-capacity relationships, and develop detailed bathymetry for design analysis. The bathymetric survey was run using sonic depth recording equipment interface with Differential Global Positioning System (DGPS; accuracy of 1 to 2 meters), creating an above-average quality map of the Sea.

Sufficient data have been collected over the past 26 years to show that Salton Sea and surrounding tributary bottom sediments include a variety of metals, metalloids, radioactive elements, pesticides, and organic compounds. Little was known about the sediment types in the Sea below depths of approximately 91 cm. Data regarding current concentrations of sediment contaminants in the Sea were also quite limited.

2.1 Sediment Characteristics and Sedimentation

In 1997, Bechtel obtained extensive sediment core data from approximately 107 sediment samples collected offshore from the Navy's Salton Sea Test Base property (Bechtel, 1997). This study revealed that sediments consist of predominantly sands to depths greater than 91 cm (3 feet) within 152 m (166 yards) offshore, predominantly clay to depths greater than 91 cm (3 feet) between 152 m (166 yards) and 3,658 m (2.27 miles) offshore, and predominantly clay to a depth of 84 cm underlain by sand beyond 3,658 m offshore. Core depths varied from 30 to 91 cm (1 foot to 3 feet). The three offshore areas sampled included a shoreline disposal area (25 sediment samples), an offshore aeroballistic marine target area (68 sediment samples), and an Imhoff Tank area (14 sediment samples).

In 1996, James Walker conducted sediment sampling at 59 sites using a Wildco coring device that measured 5 cm (1.95 inches) in diameter and 51 cm (19.89 inches) long (Walker, 1996). One sampling transect was conducted along a north-south baseline, and five sampling transects were conducted along an east-west baseline. Although the cores were shallow and no chemical analyses were run, these cores provide a representation of the grain sizes found in the bottom sediment. A summary of the grain size distribution for bottom sediments from this study is presented on Figure 1.

In 1968, Van de Kamp (1973) investigated all the major facies within outcrops of the entire basin, including lacustrine deposits, meandering channel deposits, alluvial fans and braided-stream deposits, and Aeolian sand deposits. Although none of the 18 core borings

were collected from the Salton Sea bottom sediment, these cores provide information about the distribution and sources of sand and sediments within the Salton Sea watershed. The two major sources of sediments identified include the Colorado River and the basin margins. The Colorado River carried eroded debris from the Colorado Plateau to the southern part of the basin, depositing sand and mud in deltaic and lacustrine facies. The sediment deposits from sources at the basin margins were deposited in alluvial fans, braided streams, barrier beaches, and lacustrine beds.

Stephen (1972) investigated the New River delta and found it to have an extent greater than 15 square kilometers ($km^{2)}$, draining 6,500 km^2 over its 150-km length. The suspended sediment load carried within the New River was estimated to be approximately 5.0 by 108 kg per year. This document provides descriptions of sediment mineralogy and grain size, and elaborates on the correlation of sediment size distribution with distributary patterns. Three years later, Stephen and Gorsline (1975) revisited the New River and reported on subaerial deposits comprising distributary channel, levee, and interdistributary subaerial flat and crevasse deposits. The investigators identified subaqueous deposits as largely prodelta clay and delta-front fine silt.

General conditions that affect sediments and distribution were best presented in Arnal (1961). Historically, the Sea's lowest elevation has been 276.7 feet below sea level, with an annual temperature range from 10 to 34.5 degrees Celsius (ºC). The Sea's currents move in a counterclockwise, gyral motion around the lake due to the influence of prevailing winds. Sand, silts, and clays are deposited in that order from the shore toward the center of the lake, where more fine sediments accumulate. The water content, amount of calcium carbonate, and natural characteristics indicate that most of the sediments (75 percent) were derived from the suspended load of the Colorado River, whereas the mineralogy suggests that some of the sediments have a local origin. The water content of the sediments varies in inverse ratio to the grain size, high (>50 percent) in clay depositions (the deepest lake sediment; grain size less than 4 microns) and low (approximately 20 percent) where sand is deposited. The water content decreases with depth. The pH of the sediments is regulated by a variety of physical and chemical properties and reactions including carbonates, organic matter, carbon dioxide, and organic acids from the decomposition of plant and animal matter. The distribution of the organic content of the sediments is influenced by phytoplankton, the texture of the sediments, and currents. The distribution shows a low organic content (<1 percent) along the shore, with higher values (4 to 6 percent) found in the central part, and a maximum content (>6 percent) found 3 miles offshore, near Fish Spring. In all sediments, quartz and plagioclases are the dominant primary minerals.

Inflow rates to the Sea were calculated using limited suspended sampling data and historical suspended sediment sampling data observed from other major reservoirs in the southwestern United States (U.S. Department of the Interior, 1970). The Salton Sea watershed is approximately 8,360 square miles. The long-term average sediment inflow volume calculated was 4,000 acre-feet of sediment per year. Over a 50-year period, this would amount to less than 4 percent of the gross water storage volume of the Salton Sea. A quarterly sediment sampling program carried out by the Imperial Irrigation District since 1952 reported a flow rate ranging from 1,508 to 385 cubic feet per second (cfs) for

the Alamo River, and 964 to 315 cfs for the New River. The total average annual sediment contribution from the Alamo River and New River is estimated to be 340 acre-feet and 370 acre-feet, respectively. (Both estimates include an average flow rate and a 10 percent bedload pickup.) Sedimentation rates from 1928 through 1958 estimated at least 5 feet of sediments being deposited within the deltas of the Alamo and New rivers. The sedimentation rate at the deltas was estimated to be 2 inches per year, as opposed to a rate of 0.02 inch per year for the central part of the lake (Arnal, 1961).

2.2 Previous Chemical Data

Setmire and Stroud's (1990) document, which focused on agricultural runoff and drainage, measured sediment concentrations of "trace elements" (i.e., inorganic compounds) and organochlorine compounds in and around Salton Sea. Seventeen sediment samples were collected from the upper 5 to 10 cm (1.95 to 3.9 inches) of sediments in 1986 and were analyzed for "trace elements," organochlorine pesticides, and (to a limited extent) organophosphorous pesticides. These data are summarized in Tables 1 and 2. The laboratory procedures document that samples were air dried, pulverized with a mortar and pestle, then split and sieved separately to eliminate sand particles that did not pass a 100-mesh and 230-mesh sieve (Stephen, 1972). Data were reported in dry weight. Chemicals detected above the maximum "baseline value" for soils of the western United States (Shacklette and Boerngen, 1984) were identified as being of concern. Setmire and Stroud concluded that the following chemicals were of concern: chromium, nickel, selenium, thorium, uranium, and zinc. Silver and cadmium were not detected in the bottom sediment samples. Median concentrations of Setmire and Stroud's "trace elements" were reported as 5.6 mg/kg arsenic, 0.7 mg/kg selenium, <2 mg/kg silver, 550 mg/kg barium, <2 mg/kg cadmium, 58 mg/kg chromium, 28 mg/kg copper, 21 mg/kg lead, <2 mg/kg molybdenum, 25 mg/kg nickel, 77 mg/kg vanadium, 78 mg/kg zinc, 10.6 mg/kg thorium, and 4.9 mg/kg uranium.

In this same 1990 Setmire and Stroud study, DDT, DDD, DDE, and PCBs were detected in bottom sediments. Other chemicals found included Chlordane in the New River at the international boundary, Toxaphene at Trifolium Drain 4, and Methoxychlor at Vail Drain 4. Table 2 summarizes these findings.

Three years later, Setmire [et al.] (1993) published another study that focused more on surface and subsurface water quality and on biotic tissue concentrations of "trace elements," heavy metals, and organochlorine pesticides (Setmire [et al.], 1993). Of particular interest to the sedimentology of the Sea, this study investigated a naturally occurring "selenium removal process" at the mouth of the Alamo River. In August 1988 and February 1989, 16 samples of the bottom sediment were collected at the Alamo River delta and analyzed for selenium content. Selenium concentrations were between 0.2 and 0.3 mg/kg in the river sediment samples, and varied from 0.2 to 2.5 mg/kg at sites throughout the Alamo River delta. Relatively high levels of selenium (1.3 to 2.5 mg/kg) were found in the embayments, without any discernable pattern of distribution. This area of investigation is depicted in Figure 1. Analytical results are summarized in Table 2.

The Bechtel report (1997) stated that organochlorine pesticides, PAHs, and VOCs (acetone, carbon disulfide, ethylbenzene, toluene, and xylenes) were detected in sediment samples collected from the shoreline disposal area. Elevated concentrations of copper (68.7 mg/kg), barium, and thallium were also detected.

Elevated concentrations of cadmium (maximum concentration of 1.6 mg/kg), arsenic (maximum concentration of 27.4 mg/kg), antimony (maximum concentration of 9.9 mg/kg), molybdenum (maximum concentration of 14.5 mg/kg), selenium (maximum concentration of 8.4 mg/kg), and vanadium (maximum concentration of 52.5 mg/kg) were detected in the offshore aeroballistic marine target area sediment. A localized area of elevated uranium (maximum concentration of 14.2 mg/kg) was also identified. The report concluded that: (1) these contaminants were naturally occurring, with the exception of cadmium; and (2) based on the limited source and nature of the cadmium release (nickel/cadmium battery), no further action was warranted.

Organochlorine pesticides (DDE, Dieldrin, gamma-Chlordane, and/or Heptachlor) were detected in 3 of the 14 sediment samples collected from the Imhoff Tank area. Phenol was also detected in one of the samples, and thallium (maximum concentration of 0.26 mg/kg) was detected in two samples. Bechtel concluded that except for the organochlorine pesticides (attributed to irrigation drainage), the presence of these contaminants in sediment did not present a significant risk. It is unclear if the data presented in Bechtel (1997) were reported in dry or wet weights. Table 2 summarizes these findings.

Hogg (1973) performed some of the earliest pesticide work on the bottom sediments. Hogg collected six substratum samples using SCUBA gear and 16 mm (inner diameter) by 23-cm-long (8.97 inches) coring tubes. Mean values (reported in micrograms per kilogram, or μg/kg) for pesticide residues of Dieldrin, DDT, DDD, DDE, and combined samples for the upper and lower layers of the core samples are summarized in Table 2. Based on his small data set for sediment contaminants, Hogg calculated the presence of 10,400 pounds of total DDT and its metabolites in the upper 12 cm (4.68 inches) for the entire Sea.

Eccles (1979) provided values for DDE concentrations in bottom sediment samples collected in tributaries to the Salton Sea. Eccles collected samples in 1977 and found concentrations of DDE at Avenue 64 Evacuation Channel (67 μg/kg) and at Trifolium Drain 1 (110 μg/kg).

3.0 METHODOLOGIES AND PROCEDURES

3.1 Field Sampling Plan and Sampling Rationale

The work tasks, which include project planning, field activities, sample analyses, sample and data handling, and data evaluation and interpretation, were outlined in the Quality

Assurance Project Plan (QAPP) to be of such quality as to allow complete fulfillment of the project's objectives. To achieve valid, reliable, appropriate, and complete data during all phases of work, quality control measures were developed for both field and laboratory procedures within a data quality objective (DQO) process. The strategic planning approach of the DQO process defined pertinent criteria for the sampling program including:

- where to collect samples
- how to collect samples
- tolerable levels of decision errors
- how many samples to collect

According to U.S. EPA documents, DQOs are developed using a seven-step process: (a) state the problem; (b) identify decisions that address the problem; (c) identify inputs to the decision; (d) identify the boundaries; (e) develop decision rules; (f) specify limits on decision error tolerances; and (g) optimize the design of the data collection program. The following letters present the seven-step DQO development process that was implemented during this project's sampling activities.

(a) Problem statement: As stated in the Objectives section, the data collected will be used to quantify sediment contaminant levels in the Sea and assist in preparation of the Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

(b) Decisions to address problem: Decisions that will address the problem include identifying representative lake bottom sediment sampling sites and incorporating sediment analytical data with historic contaminant levels.

(c) Inputs to decision: Inputs for decision making include field observations and sediment analytical results.

(d) Boundaries: Boundaries for data collection are based on the surface water borders of Salton Sea and up to 183 cm (6 feet) below the water-sediment interface. Additionally, the boundary extends up to 1.61 km (1 mile) within the three main tributaries of the Salton Sea.

(e) Decision rule: If refusal occurs during sediment core sampling, a different location will be selected within a 152-cm (5-foot) radius of the original location. If refusal occurs at the second sampling site, a third location will be selected within a 152-cm (5-foot) radius. If refusal occurs again, the deepest of the three cores will be selected for laboratory analysis.

(f) Decision error limits: Decision error limits are based on the use of general observations of site conditions during the time of sampling.

(g) Data collection program: The sediment sampling component of data to be collected during this investigation consists of field and laboratory data. The field investigation includes the depth to bottom sediment from surface water at each sampling location and the latitude and longitude of each sampling site recorded on a hand-held global positioning system (GPS). Laboratory analysis for each method generated the desired sediment quality data.

As outlined in the QAPP, LFR collected duplicate samples at various sites and processed equipment blanks as quality assurance/quality control (QA/QC) measures. During Phase I, LFR collected four duplicate samples and processed five equipment blanks. During Phase II, two duplicate samples were collected and four equipment blanks were processed. Duplicates were not collected from cores since the entire length of each core was required for laboratory analysis, with each sample number representing approximately 30 cm (1-foot interval).

3.2 Sediment Sampling Methodology

The proposed study revolved around a phased, nonseasonal sampling work schedule that was accomplished during the winter. The phased approach allowed for the refinement and subsequent additional investigation of areas of concern identified during Phase I. The objective of the first phase of sediment sampling was to assess and measure contaminant concentrations and evaluate particle size distribution in the bottom sediment of Salton Sea. After this preliminary investigation, the objective of the second phase of sediment sampling was to further assess and measure contaminant concentrations and evaluate particle size distribution in the bottom sediment of Salton Sea, focusing on the significant areas of interest identified during Phase I.

LFR's initial Phase I sampling was conducted on December 15 through December 22, 1998. The first phase of the sampling effort encompassed the entire Sea plus approximately 1 mile up each of three of its main tributaries: the Whitewater, the Alamo, and the New rivers. Phase I sediment samples were collected from 42 grab sampling sites (GB#) and six core sampling sites (CR#). Sites that showed elevated concentrations of contaminants became the focus of Phase II sampling activities.

Phase II sediment sampling began on January 19, 1999, and continued through January 22, 1999. Phase II sediment samples were collected from 15 grab sampling sites and 10 core sampling sites. The locations of both Phase I and Phase II sampling sites are shown in Figure 2.

Sample stations in the Sea can be categorized as either near-shore or deeper water. The near-shore site samples reflect information on a relatively short time scale, with influences associated with inflow velocities of heavier particles and runoff contaminants. Deep stations located over the deepest points of the Sea provide seasonal, longer time-frame information about the water column, such as conditions associated with silt/clay suspension.

3.2.1 Sampling Documentation

Daily morning briefings were held to cover safety procedures and contingency plans in the event of an emergency along with a discussion of the day's activities. These daily meetings were recorded on LFR's Daily Tailgate Safety Meeting Forms. A debriefing to cover the activities was held upon completion of the work. Copies of the Daily Tailgate Safety Meeting Forms are included in Appendix A.

The field documentation included the use of field activities logbook entry forms, lithologic logs, sample labels, and chain-of-custody (COC) analyses request forms. These documents were completed using indelible ink and corrections followed Good Laboratory Practices (GLP) procedures. Copies of LFR's Field Activities Logbook Entry Forms, Field Boring Logs of Sediment Lithology, Chain-of-Custody Forms, Core Photographs, and Sediment Laboratory Analysis Data are included in Appendices B through F, respectively.

3.2.2 Field Custody Procedures

Strict chain-of-custody protocol was followed throughout all sample transfers. COC forms were filled out by the sampler on a daily basis as samples were collected. The COC documents were completed in triplicate. One copy accompanied the samples to the laboratory, one was retained by the LFR sampler, and the third was forwarded to the LFR data management system. The COC form was signed over to the laboratory or courier relinquishing custody of the samples. If a courier was used, possession was relinquished by the courier to the laboratory. Copies of the COC forms are included in Appendix D.

3.2.3 Sample Identification

All samples were identified and labeled at the time of collection. Sample identification followed a specific format to ensure that all sample numbers were unique. Grab samples were given the prefix GB, followed by the site number, followed by the depth in feet, followed by the six-digit date (example: GB4-2-111098). Core samples were given the prefix CR, followed by the site number, followed by the depth in feet, followed by the six-digit date (example: CR4-2-111098). Duplicate samples were given the same name as above, followed by "-0" (example: GB4-2-111098-0). Equipment blank samples were given the prefix EB, followed by a consecutive number, followed by the six-digit date (example: EB4-111098).

3.2.4 Laboratory Custody Procedures

The laboratory custody procedures designated a sample custodian who accepted custody of the shipped samples and checked that the information on the sample labels matched that on the COC form(s). The custodian then entered the appropriate data into the laboratory's sample tracking system. The custodian used the sample number on the

sample label and assigned a unique laboratory number to each sample. As a record of sample receipt, the analytical laboratory mailed a copy of the COC form, with the assigned laboratory numbers, to LFR. The custodian then transferred the samples to the proper analysts or stored the samples under refrigeration until they were extracted and analyzed. Material remaining after completion of the requested analyses was stored until the end of the investigation. Disposal of unused samples complied with all applicable federal, state, and local environmental regulations. Data sheets and laboratory records will be retained as permanent documentation.

3.3 Field Procedures

Bottom sediment studies were conducted from a 6.4-m (21-foot) motorized boat furnished by LFR. Bottom sediment samples were collected using a modified Birge-Ekman-style box sediment sampler and the AMS soft sediment corer. The only exceptions to these sampling techniques were the use of a hand trowel for collecting a sample at site GB42, approximately 1 mile up the New River, and the use of a stainless-steel hand-auger with a flapper-valve during the second sampling event at location 24.

The bottom sediment consisted of predictable soil compositions (Quaternary deposits of lacustrine silts and clays) based on previous reports by Setmire and Stroud (1990). The proposed sampling sites were selected to provide representative coverage of Salton Sea. Water depth measurements were taken to ensure adequate cable length for operation of the samplers and proper execution. This important consideration controlled the speed of entry of the sampler into the sediment, increasing its recovery and decreasing any shock waves.

3.3.1 Field Method for Grab Sediment Samples

A stainless-steel modified Birge-Ekman-style box sediment sampler, 15.24 cm by 15.24 cm by 15.24 cm in size (6 inches by 6 inches by 6 inches), was used to collect samples at 57 of the 73 sampling sites. This stainless-steel apparatus was chosen because it is less likely to corrode or affect metal concentrations in sediment samples. The apparatus was tied to a nylon rope and lowered from the side of the boat. The flaps on the top of the sampler open during descent, allowing water to flow through until impact with the bottom sediment. A stainless-steel weighted messenger was sent down the nylon rope to activate the shovel-like jaws to close. The sampler was then pulled up by the rope, forcing the top flaps to close during ascent and maintaining the sample during retrieval. Grab sediment samples were collected each day with varied recoveries within the top 15 cm (6 inches) throughout the Sea. The sediment was accessed through the top flaps to identify acceptable recovery of sediment and then subsampled. The percent recovery for each sample is represented in Table 3.

For each grab sample, up to 24 ounces of material was retained for inorganic and organic chemical analyses, depending on sample recovery. Sediment samples were transferred directly from the sampling equipment into clean, laboratory-grade glass jars using a

stainless-steel trowel. Wearing a clean pair of nitrile gloves, the sampler cleaned the threads of each jar and then capped and sealed the jar. The filled jars were subsequently labeled and stored in a chilled cooler on board pending delivery to the analytical laboratory. Strict COC protocol was followed throughout all phases of the sample handling process.

3.3.2 Field Method for Core Sediment Samples

The core samples were collected using an AMS stainless-steel soft sediment sampler that can produce a 5-cm (6-inch) diameter by 182-cm (6-foot) long square core. The corer can take up to 182 cm of undisturbed samples from soft sediment, provided that rocks or dense materials are not encountered. The AMS soft sediment sampler consists of:

- Two stainless steel, 182-cm (6-foot) long, right-angle-shaped sampler halves, each with a pointed lower end, that create a 5.08-cm (6-inch) square when locked together. One half contains a riveted sediment trap that engages when the sampler is pulled from the sediment.

- Ten hollow aluminum extension guiding rods with hollow steel connections (each approximately 152.4 cm (5 feet) long).

- One 24-pound stainless-steel drop weight with chain and 100-foot rope.

After sediment depth measurements were obtained, the sampler half with the primary head was lower into the water and extension rods were added as the sampler was lowered. The corer was lowered until it rested on the undisturbed sediment. The drop weight was then lowered down the extension rods by rope, and the sampler was driven into the sediment by repeated hammering until the desired depth was reached. The weight was then retrieved and the second cutting blade was gently lowered down the guiding rods with a safety wire line securely fastened to the sampler and boat. Once contact was made with the sampler, the weight was gently lowered once again until contact was made. The weight was lifted 15 to 25 cm (6 to 10 inches) and allowed to drop, shearing a Teflon fastener and allowing the blade to advance. The hammering was then repeated until the desired depth was reached. The drop weight was retrieved and the sampler pulled straight up. Once out of the water, the cutting blades were slid apart to expose the sediment sample contained inside.

Sediment samples obtained using the stainless steel corer were collected from a boring advanced down to a maximum of 182 cm (6 feet) below ground surface (bgs), with samples for laboratory analyses taken at 30-cm (1-foot) intervals. The cores were carefully measured for total length and different layers of sediment without disturbing the sediment-water interface. Cored samples were lithologically described and classified using the Unified Soil Classification System. A lithologic log was prepared for each boring, with photographs documenting most of the collection (Appendix C and E, respectively). Boring and logging were performed under the direction of Richard Vogl, a GLP-trained, LFR California Registered Geologist. As with the grab samples, these

samples were transferred to clean, laboratory-grade glass jars using a stainless steel trowel that was cleaned between samples. The labeled jars were then stored in a chilled cooler on board pending delivery to the analytical laboratory with a COC form.

3.4 Quality Assurance / Quality Control

The Quality Assurance (QA) and Quality Control (QC) procedures are detailed in LFR's QAPP (1998b) and were designed so that the technical data generated during investigative activities at Salton Sea were precise, unbiased, accurate, complete, and representative of actual field conditions. QA is defined as an integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client. QC is defined as the overall system of technical activities that measure the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer. QC includes the operational techniques and activities that are used to fulfill requirements for quality.

3.4.1 Equipment Cleaning

To reduce the potential for cross contamination between borings, soil sampling equipment was scrubbed with a laboratory-grade, nonphosphate detergent and double-rinsed with distilled water between sampling intervals.

3.4.2 Instrument / Equipment Calibration and Frequency

During the investigation, calibration of field sampling, measuring, and test equipment for sediment sampling included checks on the modified Birge-Ekman-style box sediment sampler, the AMS soft sediment corer, and the boat-mounted depth finder.

Preventative maintenance and cleaning was performed on the modified Birge-Ekman-style box sediment sampler and the AMS soft sediment corer after each day. The sediment sampler and corer were used to collect sediment only and had no other calibration requirements.

The water depth measurements were taken by a boat-mounted depth finder and verified by a calibrated plumb line. Calibration of the boat-mounted depth finder was performed by using the calibrated plumb line to verify its accuracy. The average difference in depths recorded by the on-board depth finder and the manual plumb line was 0.78 meters (2.5 feet), with the larger depths found using the manual plumb line. This difference is attributed to the angled measurement of the plumb line under the influence of underwater currents and boat movement. The Field Activities Logbook Entry forms contain the information recorded and can be found in Appendix B.

According to the manufacturer, calibration of the GPS instrument is not required for instrument use. Calibration of the GPS instrument was not necessary for this reconnaissance.

3.4.3 Instrument and Equipment Testing, Inspection, and Maintenance Requirements

Equipment operation was routinely checked to minimize breakdowns in the field. Due to the calibration of equipment to ensure proper functioning of field instrumentation, sampling equipment remained fully functional and required only minor repairs without the need to remove equipment from service. The soft sediment corer's headpiece was bent slightly during coring activities through dense clay. Repairs consisted of minor straightening of the sampler blade with a hammer, which occurred on shore later that day.

3.4.4 Duplicate and Equipment Blank Samples

Duplicate sediment samples were collected from approximately 10 percent of the total sample number. These samples were used for assessing the reproducibility of analytical procedures. In addition, approximately one equipment blank was also collected per day to verify sampling equipment decontamination procedures. The equipment blank sample was labeled with the prefix EB, followed by the six-digit date. Section B5 of the QAPP (LFR, 1998b) describes the duplicate and blank samples in more detail.

3.4.5 GPS Data to Locate Sampling Sites

To ensure consistent sample location identification, all sampling sites were identified using standard GPS equipment. The model used for this project was a hand-held Garmin 112XL, which uses up to 12 satellites to simultaneously locate position. This allowed all data to be submitted in a GIS-compatible format according to the metadata standards set forth by the Federal Geographic Data Committee. GPS coordinates for each sample location are summarized in Table 3 and documented in the Field Activities Logbook Entry Forms located in Appendix B.

3.4.6 Office Documentation Procedures

Samples and data were tracked and archived at LFR's office in Irvine, California. LFR's Data Management Group (DMG) was responsible for ensuring that correct management practices were followed for proper documentation and for linking all samples with data. The project file was used in data tracking and documentation, as discussed below.

The field log, COC forms, and sampling information forms are all stored in the project file, in addition to several other documents (e.g., work orders, proposals, sampling plans, assessment reports, and correspondence). This system provides a common location for all

information that was required for data evaluation and interpretation and report preparation. The file is organized for easy retrieval and long-term storage of information.

3.4.7 Laboratory QC Checks

The types of laboratory QC samples that were analyzed by the three laboratories include reagent and method blanks, calibration blanks, split duplicates, laboratory control standards and laboratory control standard duplicates, matrix spikes, and matrix spike duplicates.

Reagent or method blanks are samples prepared from distilled, deionized water that has been treated with all of the reagents and manipulations (i.e., digestions or extractions) to which samples are subjected. Positive results in the reagent or method blank may indicate either contamination of the chemical reagents or the glassware and other implements used to store or prepare the sample and resulting solutions.

Calibration blanks are samples prepared from distilled, deionized water that are directly introduced into an instrument without having been treated with reagents appropriate to the analytical method used to analyze samples. Positive results in the calibration blank may indicate contamination of an instrument or of the water used in the laboratory.

Matrix spikes and matrix spike duplicates are samples prepared using the batch sample matrix (i.e., sediment) and adding a predetermined quantity of target compounds. Following analysis, percent recovery of the "spikes" and the relative percent difference of the two spikes are calculated.

Control samples are samples of a well-characterized matrix (such as blank water or sand) that are spiked with certain target parameters and analyzed at approximately 10 percent of the sample load to establish method-specific control limits.

Laboratory quality control checks were conducted as follows:

- Duplicates, spikes (matrix or similar type), and blanks (reagent and method) were analyzed on at least 10 percent of the total samples submitted for analysis.

- A method blank was performed for every batch of samples analyzed.

- Surrogates and internal standards were added to each individual sample when applicable.

- Spikes were conducted on the matrix in the case of water samples and on the method blank in the case of sediment samples.

3.4.8 Laboratory Calibration Procedures

Calibration of laboratory instruments is necessary to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established detection limits. Each instrument was calibrated with standard solutions appropriate for the type of instrument and the linear range established for the analytical method. Daily calibration checks and standards for relevant constituents fell within the laboratory control limits.

For EPA Methods 8240/8260 and 8270 analyses using a combined gas chromatograph/ mass spectrometer (GC/MS) method, the mass calibration standard was analyzed daily to demonstrate that the instrument met the standard mass spectra abundance criteria. Whenever any action was taken that may have affected the tuning parameter of the instrument (e.g., source cleaning or other maintenance), the mass calibration was immediately checked. Mass calibration criteria using U.S. EPA protocols were met before any analysis was run (standards, blanks, or samples).

For metals analysis (EPA Method Series 7000S) using atomic absorption and inductively coupled plasma, spectrophotometers were calibrated daily or at least once per batch of samples.

3.4.9 Inspection and Acceptance for Supplies and Consumables

Sample containers vary with each type of analytical parameter. Container types and materials were selected to be nonreactive with the particular analytical parameter being tested. All sampling jars were provided by Apollo Analytics in a sealed container and had already passed batch quality control inspection. Final inspection of such containers was the responsibility of the on-site quality assurance officer.

4.0 FIELD CONDITIONS

Throughout the sampling events which began on December 15, 1998, and ended on January 22, 1999, weather conditions at Salton Sea ranged from gusty (winds of 30 to 40 mph) to calm, and from cloudy to sunny. Gusty winds on January 21 limited the number of samples collected due to the 3- to 4-foot waves produced throughout the day. Unexpected setbacks during Phase I and Phase II activities included severe weather conditions, poor recovery from both samplers as a result of dense, compacted sediments, and a collision with an unmarked underwater rock jetty.

The only boat ramp identified as being able to accommodate LFR's 6.4-meter (21-foot) Bayliner Trophy with walk-around cuddy cabin and 120-hp outboard motor was at Desert Shores Marina. This marina was used for the majority of Phase I sampling and all the Phase II sampling.

Sample recovery for both the modified Birge-Ekman-style box sediment sampler and the AMS corer was typically less than 100 percent. Generally, core samples gave the greatest percent recovery, except for sites 39 and 73 (located near the mouth of the New River) and site 63 (located in the central-northern part of the Sea). This uncharacteristically low recovery for sites 39 and 73 was due to the compacted nature of the fine-grained sediment, which resulted in the core apparatus splitting apart within the sediment and releasing the sample upon retrieval. The low recovery for site 63 was due to similar equipment difficulties compounded by depths of 14.7 m (48 feet). The greatest recovery for a core sample during this phase of work was at site 60. Grab sample recoveries were lowest for sites located in the southern end of the Sea near the mouth of the Alamo River, and greatest for sites at the northwestern end (sites 1 and 3), at the middle (sites 17, 18, 64), and near the mouth of San Felipe Creek (site 46) in the southwestern part of the Sea.

The difference in recoveries was due to the sediment composition observed in the field. These included fine-grained sand to silty sand in the southern part of the Sea and more of a silty, dark greenish gray (1 Gley), soft, gelatinous, organic material found in the northern part and middle of the Sea. Percent recoveries for each sample site and the type of sampler used to collect the sample are documented in the Field Activities Logbook Entry Forms located in Appendix B. The percent recoveries for each sample are also included in summary form as Table 3.

5.0 RESULTS AND DISCUSSION

5.1 Laboratory Analysis of Sediment Samples

Sediment samples were submitted to the following laboratories for chemical analysis: Apollo Analytics Laboratory (Apollo) in Irvine, California; Truesdail Laboratories, Inc., in Tustin, California; and PTS Laboratories, Inc., in Santa Fe Springs, California. All are certified by Cal-EPA for the relevant test methods. Apollo received all samples and analyzed them for VOCs and SVOCs by GC/MS and California Code of Regulations (CCR) metals. Samples were subcontracted to PTS Laboratories, Inc., for particle size using ASTM D4464M methodology. Samples were subcontracted to Truesdail Laboratories, Inc., for mercury, pesticides/PCBs, chlorinated herbicides, and organophosphate and nitrogen pesticides.

Samples collected in the field were stored on ice and delivered to the laboratory regularly and remained at a constant temperature of at least 4°C. Each sample with a sufficient amount of sediment was analyzed for:

- total inorganic metals consisting of the CCR 17 metals series (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc) using EPA Method 7000S

- VOCs using EPA Method 8260

- SVOCs using EPA Method 8270
- chlorinated pesticides and PCBs using EPA Method 8081; confirmation of selected chlorinated pesticides using EPA Method 8270
- organophosphate and nitrogen pesticides using EPA Method 8141
- chlorinated herbicides using EPA Method 8151

EPA methods 8080, 8140, and 8150B, proposed in LFR's QAPP (1998b), were substituted by the laboratories analyzing the samples for newer EPA methods 8081, 8141, and 8151. The associated analyte list and detection limits are included in Appendix F.

Samples which did not contain enough sediment for analysis by all of these methods were subject to the analyses starting with total inorganic metals. Additionally, the samples having enough sediment (except for the duplicates and blanks) were evaluated in the laboratory for particle size using sieves for the coarse-grained materials and a hydrometer for the fine-grained materials, along with evaluation for moisture content.

For most of the sediment samples, as noted in the field notes, a strong sulfur odor was present. Sulfur is a commonly found constituent known to be present in large concentrations in Salton Sea sediments and can mask the presence of low concentrations of many of the target analytes in pesticide and PCB analyses unless a sulfur cleanup is successfully implemented in the laboratory. To reduce the potential interferences from sulfur compounds, both laboratories performing chemical analyses on the sediment samples (Apollo Analytics and Truesdail Laboratories) took every step necessary to clean up and prepare these samples. For pesticide analysis, the samples were extracted by sonication using EPA Method 3550. For organochlorine pesticides, the extracts were cleaned up by Florisil using EPA Method 3620B. For organophos-phorous pesticides and herbicides, cleanup was not performed on the extracts because it was determined to have minimal effect on changing the detection limits (established in SW 846) with the available sample size and matrix interference.

5.2 Results of Sediment Contaminants Investigations

Analytical results for the sediment samples were reported in both wet and dry weights. The samples were run for wet weight concentrations first. The dry weight concentrations were calculated by correcting for the moisture content of each sample. This method, as opposed to drying, was necessary for analyses involving volatile and semivolatile organic compounds. Concentrations were reported on a dry and wet weight basis for inorganic chemicals in units of mg/kg and for organic chemicals in units of µg/kg. Percentages of particle size and moisture content for each sediment sample are presented in Table 3, along with percent sand, silt, and clay. Tables 4 and 5 represent the detected concentrations of inorganic and organic chemicals, respectively. Chronologically arranged laboratory reports for the sediment samples are contained in Appendix F.

5.2.1 Sediment Composition

PTS Laboratories, Inc., was subcontracted by Apollo to perform analysis of particle size (ASTM D4464M). Percent moisture was determined by Apollo. Sediment samples were analyzed for these physical characteristics only if sample recovery was high enough to permit conducting the inorganic and organic chemical analyses.

5.2.1.1 Particle Size

Sediments sampled on the bottom of the Sea consisted of silt, clay, and relatively fine-grained sands. The shallow sediment also included abundant barnacle shells and occasional fish bones. The surface sediment composition included a high percentage of sand outside Salton City and extending into the central, deeper parts of the Sea. Sand percentages near the mouths of the New River and Alamo River were also high, as expected from deposition of these heavier particles from higher velocity inflows into the Sea. The lower velocity Whitewater River delta, on the other hand, was predominantly silt. Silt was also abundant along the southwest near shore area and along the shallow water bays near the New and Alamo rivers. A shallow layer of clay blankets the southwestern corner of the Sea and extends toward the center near the deepest part of the Sea. Clay is also abundant near shore and offshore just north of Desert Shores. The majority of the deeper sediment sampled consisted predominantly of varied amounts of silt and clay with lesser amounts of fine sand.

Sand, silt, and clay distribution as determined from the results of this study are represented in Figures 3, 4, and 5, respectively. These data, along with the remaining sediment composition of core data, are summarized in Table 3.

5.2.1.2 Percent Moisture

All sediment samples were analyzed for moisture content. The percent moisture for sediment samples ranged from 17 to 87 percent. Analytical results for percent moisture are presented in Table 3.

5.2.2 Inorganic Chemicals

In general, concentrations of inorganic chemicals were relatively high in the northern part of the Sea. Elevated concentrations were usually limited to the upper 30 cm (1 foot) of sediment. Table 4 summarizes the inorganic chemicals detected in Phase I and Phase II sediment samples. Concentrations are reported in dry weight.

Twelve of the 17 inorganic chemical analytes were detected during this investigation. These included arsenic, barium, cadmium, chromium, cobalt, copper, lead, molybdenum, nickel, selenium, vanadium, and zinc. Antimony, beryllium, mercury, silver, and thallium were not detected above the laboratory detection limit during this study. The following is

a discussion of the inorganic chemicals that were detected in the sediment of the Sea at elevated concentrations. It should be noted that lead was also detected at an elevated concentration of 50 mg/kg at only one location (GB1) near Desert Shores.

5.2.2.1 Cadmium

Reported concentrations for cadmium ranged from 0.67 to 5.8 mg/kg. The highest reported concentrations of cadmium were 5.8 mg/kg (grab site 10) and 5.6 mg/kg (grab site 9). These elevated levels of cadmium were detected near the center, deeper portion of the Sea at the northern end. Analytical results are summarized in Table 4, graphically depicted in Figure 6, and spatially depicted in Figure 15.

5.2.2.2 Copper

Reported concentrations of copper ranged from 3.3 to 53 mg/kg. The highest reported concentrations of copper were 53 mg/kg (core site 6), 46 mg/kg (grab site 4), and 41 mg/kg (grab site 7). These elevated levels of copper were found near the mouth of the Whitewater River. Analytical results are summarized in Table 4, graphically depicted in Figure 7, and spatially depicted in Figure 16.

5.2.2.3 Molybdenum

Concentrations of molybdenum detected in the northern part of Salton Sea above the laboratory detection limit ranged from 11 to 194 mg/kg. The highest reported concentrations of molybdenum were 194 mg/kg (grab site 10), 138 mg/kg (grab site 11), and 120 mg/kg (grab site 1). Analytical results are summarized in Table 4, graphically depicted in Figure 8, and spatially depicted in Figure 17.

5.2.2.4 Nickel

Reported concentrations of nickel ranged from 3.3 to 33 mg/kg. The highest reported concentrations were 33 mg/kg (core site 6), 31 mg/kg (grab sites 34, 11, and 4), 29 mg/kg (grab site 16), and 29 mg/kg (grab site 17). These locations are along the north-south transect. Analytical results are summarized in Table 4, graphically depicted in Figure 9, and spatially depicted in Figure 18.

5.2.2.5 Zinc

Reported concentrations of zinc ranged from 5.4 to 190 mg/kg. The highest reported concentrations were 190 mg/kg (grab site 4), 176 mg/kg (core site 13), and 130 mg/kg (core site 6). These elevated levels were found at the mouths of the Whitewater River and Salt Creek. Analytical results are summarized in Table 4, graphically depicted in Figure 10, and spatially depicted in Figure 19.

5.2.2.6 Selenium

Concentrations of selenium detected at the Sea above the laboratory detection limit generally ranged from approximately 0.086 to 8.5 mg/kg. This latter concentration was found at site 1 outside the Desert Shores marina. Other high concentrations of selenium were 6.7 mg/kg (core site 66), 5.8 mg/kg (grab site 59), and 5.0 mg/kg (grab sites 3 and 65). Core site 13 was the only core sample to have a selenium concentration above 1 mg/kg for sediment below the first 30 cm (1 foot). This core had selenium concentrations of 4.3 mg/kg for the first 30 cm (1 foot) of sediment sampled, decreasing to 1.2 mg/kg for the next 30 cm (1 foot) sampled, and further decreasing to 0.66 mg/kg at a depth of 90 cm (3 feet) below the sea floor and 0.34 mg/kg at 120 cm (4 feet) below the sea floor. These elevated selenium concentrations were detected in the northern and central parts of the Sea. Analytical results are summarized in Table 4, graphically depicted in Figure 11, and spatially depicted in Figure 20.

5.2.3 Organic Chemicals

Elevated concentrations of organic chemicals were detected predominately in the northern part of the Sea and were limited to VOCs. Of the 118 sediment samples analyzed for VOCs using EPA method 8260, 114 samples contained one or more of the following compounds at concentrations above laboratory detection limits: acetone, o-xylenes, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, carbon disulfide, naphthalene, n-propylbenzene, and 2-butanone. Chemicals not detected in sediment samples include SVOCs, chlorinated pesticides, PCBs, organophosphate and nitrogen pesticides, and chlorinated herbicides. LFR reanalyzed a number of samples for chlorinated hydrocarbon pesticides using a lower detection limit with mass spectrometer positive confirmation (EPA Method 8270). This additional analysis was conducted at no additional charge to verify that these compounds were not present, and confirmed the absence of the selected pesticides in the sediment samples at a much lower detection limit. The laboratory reports for these additional confirmatory analyses, along with the other sample analytical results, are included in Appendix F. Table 5 summarizes the organic chemical concentrations detected in Phase I and Phase II sediment samples (wet and dry weight). Concentrations reported in this section are in dry weight.

Although organochlorine pesticides may not have been detected in this study because of elevated reporting detection limits, a number of previously detected concentrations for these pesticides (see Section 2.2; Table 2) were above the laboratory detection limits for this study, yet nothing was detected even from our much larger data set. Adding to the detection limit problem are the unique characteristics of Salton Sea sediments, which have a high organic carbon and sulfur content. For each analysis, the laboratory attempted to achieve the lowest detection limit possible based on the available sample size and matrix interference present.

Included below is a discussion of the VOCs detected during this investigation. Acetone, carbon disulfide, and 2-butanone are believed to be present as a result of naturally occurring biological processes within the organic rich sediment on the bottom of the Sea.

The other VOCs were only detected at two locations and were not pervasive throughout the sediments sampled.

5.2.3.1 Acetone

The highest reported concentrations of acetone (1,526 and 1,300 µg/kg) were at grab sites 64 and 65, respectively, in the middle of the Sea. The lowest reported concentration of acetone above the laboratory detection limit was 37 µg/kg, found below depths of 60 cm at core site 73, near the mouth of the New River. Analytical results are summarized in Table 5, graphically depicted in Figure 12, and spatially depicted in Figure 21.

5.2.3.2 Carbon Disulfide

The highest reported concentrations of carbon disulfide (5,000 and 3,400 µg/kg) were at grab sites 3 and 8, respectively, near the mouth of the Whitewater River. The lowest reported concentration of carbon disulfide above the laboratory detection limit was 18 µg/kg, found within the top 30 cm (1 foot) at core site 73, near the mouth of the New River. Analytical results are summarized in Table 5, graphically depicted in Figure 13, and spatially depicted in Figure 22.

5.2.3.3 2-Butanone

Reported concentrations of 2-butanone ranged from 14 to 536 µg/kg. The highest reported concentration of 2-butanone was 536 µg/kg at grab site 61, located in the northern portion of the Sea, offshore from Salton Sea State Recreation Area. The lowest reported concentration of 2-butanone above detection limits was 14 µg/kg, found below depths of 30 cm (1 foot) at core site 73. Analytical results are summarized in Table 4, graphically depicted in Figure 14, and spatially depicted in Figure 23.

5.2.3.4 Other VOCs

The remaining VOCs were detected only at grab site 8 (located 5 miles from the mouth of the Whitewater River), except for benzene, which was detected at grab site 56 (also located at the mouth of the Whitewater River). Dry weight concentrations for benzene, o-xylenes, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, naphthalene, and n-propylbenzene were reported as 43, 45, 230, 700, 110, and 77 µg/kg, respectively. The concentrations of these compounds detected at grab site 8 appear to be very localized, since none of the compounds were detected at grab site 54, which was placed adjacent to grab site 8 during Phase II sampling.

5.3 Quality Assurance / Quality Control Results

The LFR project team and management structure provide for direct and constant operational responsibility and the integration of QA activities. Project management, field operations, quality assurance, and analytical laboratory responsibilities are outlined in Section A3 of the QAPP (LFR, 1998b).

The field QA program is a systematic process that, together with the laboratory and data storage QA programs, ensured a high degree of reliability and confidence in the data collected for this survey. An example of the applicability of this process included reanalyzing a number of samples for chlorinated hydrocarbon pesticides using a lower detection limit with mass spectrometer positive confirmation (EPA Method 8270). This additional analysis was conducted at no additional charge to verify that these compounds were not present, and confirmed the absence of the selected pesticides in the sediment samples at a much lower detection limit.

5.3.1 Equipment Blanks

LFR collected five equipment blank samples during Phase I sampling activities and four equipment blank samples during Phase II. Equipment blank sample EB7, collected during Phase II sampling activities, was submitted to the laboratory but not analyzed as a result of the low number of samples collected for that day.

5.3.2 Duplicate Samples

Four duplicate samples were collected during Phase I sampling activities and two duplicate samples were collected during Phase II. Analytical results for duplicate samples were in general agreement with the primary samples collected. The duplicate samples analyzed were within acceptable ranges of the primary samples, especially when considering the heterogeneity of sediment samples collected at the Sea and the variability of detection limits for dry weight as a result of variation in moisture content between samples.

5.3.3 Laboratory Quality Control Measures

No analytes were detected above the laboratory detection limit in the laboratory method blank samples analyzed by the laboratory for any analysis performed during this study. In addition, the other laboratory quality control checks such as matrix spikes, matrix spike duplicates, relative percent difference, and laboratory control samples were all checked by LFR data management personnel for each laboratory report and were within the acceptable range of tolerance as specified in the laboratory reports.

In order to maintain the integrity of analytical results, strict custody procedures and adherence to sample holding times were carried out. Following collection in the field,

samples were packed upright in the cooler with at least two times as much ice pack weight as the total volume of the samples. The cooler was sealed with heavy-duty packing tape to reduce the possibility of it accidentally opening and to prevent tampering with the samples. Samples were shipped in such a manner that no more than 24 hours elapsed from the time of shipment to the time of receipt by the analytical laboratory. The method of shipment included hand-delivery by the field personnel, laboratory courier, and a commercial shipping service. Laboratory personnel were responsible for the care and custody of samples from the time they were received until the sample was exhausted or until disposal was determined. In the event of disposal, all disposal activities complied with all applicable federal, state, and local environmental regulations. Material remaining after completion of the requested analyses was stored. All data sheets and laboratory records will be retained as permanent documentation.

Holding times for the various laboratory analyses (EPA Methods) are as follows:

- 8260 14 days for liquid (with preservative) and sediment
- 8270 7 days for liquid extraction / 14 days for sediment, 40 days thereafter
- 8081 7 days for liquid extraction / 14 days for sediment, 40 days thereafter
- 8141 7 days for liquid extraction / 14 days for sediment, 40 days thereafter
- 8151 7 days for liquid extraction / 14 days for sediment, 40 days thereafter
- 7000S 6 months for liquid and sediment, except for the 28 days for mercury (liquid)

All of the samples analyzed during this investigation were within their respective holding times. The exception to this was when some of the samples were reanalyzed for chlorinated hydrocarbon pesticides using a lower detection limit with mass spectrometer positive confirmation (EPA Method 8270). These additional analyses confirmed the absence of the selected pesticides in the sediment samples listed below at a much lower detection limit. LFR believes that these data are still valid as a result of the extremely low half-life of the specific compounds being analyzed for. Although most of these samples were analyzed within their holding times, the following samples exceeded their prospective recommended holding times for EPA Method 8270:

- 76 days for sample GB1-34.5-121598
- 75 days for samples GB7-25.4-121698, GB5-1-121698, and GB12-40-121698
- 73 days for samples GB45-32.8-121798 and GB44-16.8-121798
- 72 days for samples GB21-31-121898, GB29-17.2-121898, and GB32-36.5-121898
- 69 days for samples GB30-4.9-122198 and GB42-1-122198
- 68 days for samples CR13-38-122298 and CR20-25-122298

Those samples which confirmed the absence of EPA Method 8270 analytes and were within their holding times included:

- 43 days for samples CR50-39-11999, GB53-33-11999, GB54-28.2-11999, GB56-17.4-11999, GB57-25.8-11999, and GB58-45-11999
- 44 days for sample CR63-49-12199
- 45 days for samples GB68-47.2-12199, GB69-42.7-12199, CR73-9-12199, and GB71-34.2-12199

5.4 Discussion

The inorganic and organic chemicals of concern were identified using available comparative values (e.g., maximum "baseline value" for soils of the western United States (Severson et al., 1987; modified from Shacklette and Boerngen, 1984). The NOAA biological effects range low (ERL) and effects range medium (ERM) values (Long et al., 1995) were also used as comparative values on Phase I sample results to identify which contaminants should be the focus of additional sampling efforts in Phase II and any follow-up studies. The ERL and ERM values are guidelines used to evaluate whether sediment chemical concentrations were within ranges that have been reported to be associated with biological effects. These guidelines were generated from a large national sediment database and are currently the most widely used and accepted sediment effects guidelines available. ERMs are the concentrations at which 50 percent of the studies for a particular chemical showed biological effects, and ERLs are the concentrations at which 10 percent of the studies showed biological effects. Since sediment chemical concentrations below ERLs are interpreted as being "rarely" associated with adverse effects, exceedances of ERM values and maximum baseline values were used to identify chemicals of potential concern. However, use of these criteria for evaluating ecological risk was beyond the scope of this assessment. Also, as a result of the Sea's unique ecosystem, whose characteristics (high salinity) put it well outside the database used to determine the ERLs and ERMs, these values may not be applicable for evaluating ecological risk at the Sea. A number of the chemicals of concern (including selenium and molybdenum) do not currently have ERM or ERL values for comparison. For selenium, SFRWQCB guidelines for sediment suitable for cover (0.7 mg/kg) and noncover (1.4 mg/kg) sediment in wetlands creation projects were used for comparisons purposes. For molybdenum, a baseline value of 4.0 mg/kg (Severson et al., 1987; modified from Shacklette and Boerngen, 1984) was used as a comparative value.

Cadmium, copper, lead, nickel, and zinc were present at concentrations exceeding their respective ERL values. The ERL value of lead was only slightly exceeded at one sampling location (50 mg/kg). None of these chemicals were detected at concentrations above their respective ERM values.

Selenium and molybdenum did not have established ERL or ERM values, but did regularly exceed their corresponding screening values (0.7 mg/kg and 1.4 mg/kg, and 4.0 mg/kg, respectively). Selenium, a naturally occurring element in the region's soils and waters, is also known to be leached into Salton Sea as a result of current irrigated agricultural practices. The selenium concentrations found during this investigation appear to be elevated with respect to previously reported background concentrations and Salton

Sea data. For example, Shacklette and Boerngen (1984) analyzed 733 samples of undisturbed soil collected throughout the western United States. A comparison of their selenium data with the 118 selenium concentrations measured in this study reveals a 78 percent increase in this element's geometric mean. The Shacklette and Boerngen (1984) data can be used to calculate a "maximum baseline level" of 1.4 mg/kg (based on the geometric mean times the geometric deviation squared). Assuming a log normal distribution of only approximately 5 percent of natural background, selenium values should exceed this level. However, this value was equaled or exceeded by 18 of the 118 (or 15%) collected in this study. The maximum concentration of selenium reported by Shacklette and Boerngen (1984) was 4.3 mg/kg. This value was equaled or exceeded by seven of the 118 samples collected during this study. The highest measured concentration in this study (8.5 mg/kg) is nearly twice the maximum concentration reported by Shacklette and Boerngen and slightly higher than the previous maximum value measured in the Salton Sea of 8.4 mg/kg reported in Bechtel (1984).

The other chemicals were detected at low and generally narrow ranges of concentrations in the sediment samples collected during this investigation and are therefore not discussed further. Graphs 6 through 14 represent the detected concentrations of potentially elevated concentrations of inorganic and organic chemicals detected during this study.

The potential for the observed contaminant concentrations to adversely affect benthic organisms can be assessed preliminarily by comparison with available sediment guidelines (ERLs and ERMs) developed by Long et al. (1995). However, as a result of the Sea's unique ecosystem, whose characteristics (especially high salinity) put it well outside the database used to develop the ERLs and ERMs, these comparative values may not be applicable for evaluating ecological risks at the Sea. The biota of the Salton Sea's high salinity waters also differ from the organisms found in estuarine areas for which the ERLs and ERMs were developed. However, evaluating ecological risk at the Salton Sea was beyond the scope of our contaminants study.

Statistical Evaluation

A statistical analysis of the laboratory results was conducted to evaluate possible correlations between the various sediment characteristics and chemicals. A statistical analysis was conducted on all surface grab samples and the uppermost samples from each core, for a statistical sample population representing 74 samples; it did not include duplicate samples or the deeper core samples. The following parameters were considered in the statistical analysis:

- **Sediment type:** The analysis considered percent clay, percent silt, percent total fines (silt plus clay), and percent sand.

- **VOCs:** The analysis considered the reported concentrations of acetone, 2-butanone, and carbon disulfide, which were the only commonly detected VOCs.

- **Inorganic chemicals:** The analysis considered the concentrations of 12 metals and metalloids detected during this study (arsenic, barium, cadmium, chromium, cobalt, copper, lead, molybdenum, nickel, selenium, vanadium, and zinc).

In a substantial number of cases, metals and VOCs were present at concentrations below the applicable laboratory detection limits. These nondetected, or "ND," values included the results for five metals: antimony, beryllium, mercury, silver, and thallium. Furthermore, the laboratory detection limits for each analyte were subject to wide variation. Since the use of ND values can introduce uncertainties and possible spurious correlations, the statistical analysis considered only those results that were above laboratory detection limits.

The Pearson correlation coefficient (r) was calculated for each pair of analytes. The statistical significance of each r value was then computed based on the number of valid data pairs. Positive and negative correlations that were significant at the 95 percent and 99 percent confidence levels are shown in Table 6, along with the applicable r^2 values.

Interpretation of the observed correlations is largely speculative. Further work would be required to definitively establish the significance and cause of these correlations.

The correlation between certain volatile organic compounds in sediments is probably related to the biodegradation and decomposition of the sediment organic matter. Acetone (C_3H_6O) and 2-butanone (C_4H_8O) are chemically similar, and therefore they may have similar environmental origins and fates. The distribution maps (Figures 21 and 23) suggest that these two compounds tend to be associated with deeper water, and it may be that these compounds are being produced as byproducts of organic matter decomposition.

Many of the metallic elements, such as chromium and copper, are positively correlated with each other. These elements also tend to be positively correlated with fine-grained sediments (i.e., percent clay, percent silt or percent total fines). Fine-grained sediments and sedimentary rocks are commonly enriched in metallic elements relative to coarse-grained sediments and sedimentary rocks (American Geological Institute, 1982).

Certain other elements such as selenium, molybdenum, and cadmium are positively correlated with coarse-grained, sandy sediments (and with each other). The reason for this phenomenon is not obvious. However, G.R. Bradford et al. (1996) also found significant selenium/cadmium and molybdenum/cadmium relationships in a survey of 50 representative California soils.

6.0 SUMMARY

Prior to this investigation, there was limited information about the current concentrations of contaminants in sediments in the Salton Sea and surrounding tributaries. This investigation was one of the first comprehensive studies completed to evaluate the distribution of sediment types and contaminants throughout the Sea. Phase I sediment

samples were collected from 42 grab sampling sites and 6 core sampling sites. The second phase of sampling focused on the significant areas of interest identified during Phase I and included sediment sampling at 15 grab sites and 10 core sites.

Sediments sampled on the bottom of the Sea consisted of silt, clay, and finer grained sands. The shallow sediment also included abundant barnacle shells and occasional fish bones. The surface sediment composition included a high percentage of sand outside Salton City and extending into the central, deeper parts of the Sea. Sand percentages near the mouths of the New and Alamo rivers were also high, as expected, from deposition of these heavier particles from higher velocity inflows into the Sea. The lower velocity Whitewater River delta, on the other hand, was predominantly silt. Silt was also abundant along the southwest near-shore area and along the shallow water bays near the New and Alamo rivers. A shallow layer of clay blankets the southwestern corner of the Sea and extends toward the center, near the deepest part of the Sea. Clay is also abundant near shore and offshore just north of Desert Shores. The majority of the deeper sediment sampled consisted predominantly of varied amounts of silt and clay, with lesser amounts of fine sand.

Concentrations of inorganic chemicals in the sediments were found to be higher in the northern part of the Sea. Concentrations were generally higher in the upper 30 cm (1 foot) of sediment. The chemical concentrations were compared against background and available sediment quality screening criteria commonly used in sediment assessment studies of saline environments: maximum “baseline value” for soils of the western United States (Severson and others, 1987; modified from Shacklette and Boerngen, 1984) and NOAA effects range low (ERL) and effects range medium (ERM). For selenium, SFRWQCB criteria for wetlands creation were used because no ERLs or ERMs exist. NOAA ERL and ERM levels were used as a preliminary screening tool to define apparent elevated concentrations within the Sea. These values were not used for the purpose of determining ecological risk, and such an evaluation was beyond the scope of this reconnaissance level assessment. Based on these screening criteria, the following chemicals were determined to be elevated and of potential ecological concern: cadmium, copper, molybdenum, nickel, zinc, and selenium, with the most elevated inorganic constituent being selenium.

Concentrations of cadmium ranged from 0.67 to 5.8 mg/kg. The highest reported concentrations of cadmium were found in the north-central part of the Sea. Concentrations of copper ranged from 8.1 to 53 mg/kg. The highest concentrations were found near the mouth of the Whitewater River. Concentrations of molybdenum detected in the north and central part of the Sea ranged from approximately 11 to 194 mg/kg. The range of reported concentrations for nickel was from 3.3 to 33 mg/kg. The highest concentrations of nickel were detected at the mouth of the Whitewater River and in the deeper portion of the Sea. The range of concentrations for zinc was from 5.4 to 190 mg/kg. The highest concentrations of zinc were found at the mouths of the Whitewater River and Salt Creek. Concentrations of selenium detected at the Sea ranged from 0.086 to 8.5 mg/kg. The highest concentrations of selenium were found just offshore of Desert Shores. In general, inorganic and organic chemical concentrations were elevated over much of the northern half of the Sea.

A cursory comparison of historic data with those obtained during this investigation show a broad decrease in maximum levels detected in sediment concentrations for many of the inorganic and organic chemicals, particularly pesticides, copper, and zinc. It should be noted that the majority of the previous studies focused on specific areas (including areas known to be "hot spots") and are not as comprehensive as this study, thus potentially skewing the range of concentrations detected. For example, the concentration ranges for copper (23–68.7 mg/kg), nickel (2–170 mg/kg), and zinc (8.6–510 mg/kg) in the historical data are higher than the concentration ranges observed in this study for copper (3.3–53 mg/kg), nickel (<5.1–31 mg/kg), and zinc (5.4–190 mg/kg). Chemicals showing increased concentration ranges in this current study were cadmium (<0.96–5.8 mg/kg) and selenium (<0.046–8.5mg/kg) compared to their historical range of <2–1.6 mg/kg and 0.1–8.4 mg/kg, respectively. The concentration ranges for DDE (0.6–110 µg/kg) and Dieldrin (0.6–880 µg/kg) in the historical data are higher than the concentration ranges observed in this study for DDE (<47–<90 µg/kg) and Dieldrin (<47–<90 µg/kg). Although low concentrations of organochlorine pesticides may not have been detected in this study because of elevated reporting detection limits, a number of previously detected concentrations for these pesticides were above the laboratory detection limits for this study, yet nothing was detected even from our much larger data set. The detection limit problem likely resulted from the characteristics of Salton Sea sediments, which contain very high levels of organic carbon and sulfur. For each analysis, the laboratory attempted to achieve the lowest detection limit possible based on the available sample size and matrix sampled.

Elevated concentrations of organic chemicals were detected in sediment predominately in the northern part of the Sea and were limited to predominately VOCs. Of the 118 sediment samples analyzed for VOCs, 114 samples contained detectable concentration of acetone, carbon disulfide, and/or 2-butanone. These three detected chemicals could possibly be present as a result of natural biological processes occurring within Salton Sea sediment. Acetone concentrations ranged from 32 to 840 µg/kg. The highest concentrations of acetone were located near the mouth of the New River. Carbon disulfide concentrations ranged from 15 to 1,800 µg/kg. The highest concentrations of carbon disulfide were near the mouth of the Whitewater River. Concentrations of 2-butanone ranged from 11 to 150 µg/kg. The highest concentration of 2-butanone was located in the northern portion of the Sea, offshore from Salton Sea State Park.

Only two other sediment samples contained other detectable concentrations of VOCs, including o-xylenes, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, naphthalene, and n-propylbenzene. These chemicals appeared to be very localized and nonpervasive.

One of the most significant findings of this study was that SVOCs, chlorinated pesticides, PCBs, organophosphate and nitrogen pesticides, and chlorinated herbicides were not detected in the sediment samples analyzed.

This preliminary study indicates that some inorganic chemicals, notably selenium, are present at elevated concentrations in Salton Sea. However, more detailed sediment assessments are required to determine if these chemicals pose a potentially significant human and/or ecological risk. A determination of the forms of the contaminants,

especially selenium, would be valuable in evaluating its potential mobility and bioavailability. Additionally, near-shore sediment sampling and sampling at a greater density, especially for identified chemicals of potential concern, would be required to determine baseline chemical concentrations for Salton Sea.

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TABLES

Table 1:

Historic Concentrations of Inorganic Chemicals in Sediment
From Salton Sea and Surrounding Tributaries Determined to be of Concern

LFR 6824.00

Results reported in milligrams per kilogram (mg/kg), dry weight

Location	**Chemical** (metals)													
	Antimony	**Arsenic**	**Barium**	**Cadmium**	**Chromium**	**Copper**	**Molybdenum**	**Nickel**	**Selenium**	**Thallium**	**Thorium**	**Uranium**	**Vanadium**	**Zinc**
Max. Baseline Value mg/kg *(a)*		**22**	1,700		**200**	**90**	4	**66**	**1.4**		20	5.3	270	**180**
Salton Sea median conc. (mg/kg) *(b)*		5.6	550		58	28		**25**	**0.7**		10.6	4.9	77	78
Whitewater River upstream from HWY 111 *(b)*		2.4	690	<2	**81**	**34**	<2	**30**	0.1		56	14.6	140	110
Whitewater River at outlet *(b)*		5	710	<2	**210**	**64**	3	**170**	0.5		18.9	5.5	130	**510**
Alamo River at international boundary *(b)*		6.3	510	<2	58	26	<2	**26**	**1.6**		12.2	4.8	77	97
Trifolium Drain 1 *(b)*		5.8	550	<2	53	28	<2	**24**	**1.9**		9	4.4	72	78
Ave 64 Evacuation Channel at HWY 195 *(b)*		4.4	620	<2	75	**61**	2	2	0.4		21.3	5.1	120	130
New River at midpoint (08/11/86, 08/14/86) *(b)*		5.4, **11.0**	580, 780	<2, <2	63, 73	30, 27	<2, 2	**25, 35**	0.6, **1.3**		10.6, 12.0	6.1, 7.5	77, 96	75, 120
New River at outlet *(b)*		4.7	720	<2	70	23	<2	**22**	0.6		19.2	7.7	82	71
East Highline Canal *(b)*		4.5	690	<2	50	23	<2	**22**	**0.9**		12.7	5.9	60	70
Alamo River delta *(c)*									0.2 - **2.5**					
Shoreline Disposal Area *(d)*		0.9	315		33.9	**68.7**				0.31			2.6	8.6
Offshore aeroballistic marine target SSTB *(d)*	**9.9**	**27.4**		**1.6**			14.5		**8.4**			14.2	52.5	
Imhoff Tank *(d)*										0.26				
Maximum Baseline Values [1]	-	22	1,700	-	200	90	4.0	66	1.4	-			270	180
Effects Range - Low [2]	2 [3]	8.2	-	1.2	81	34	-	20.9	0.7 [3]	-			-	150
Effects Range - Medium [2]	25 [3]	70	-	9.6	370	270	-	51.6	1.4 [3]	-			-	410

NOTES:

[1] = from Severson & others, 1987: modified by Shacklette & Boerngen, 1984 — **Bold** = Values exceeding ERL

[2] = from Long & others, 1995 — **Bold** = Values exceeding ERM

[3] = Wolfenden & Carlin (SFRWQCB), 1992 ("surrogate" ERL & ERM values for comparison purposes)

(a) Shacklette & Boerngen, 1984

(b) Setmire & Stroud, 1990

(c) Setmire [et al.], 1993

(d) Bechtel, 1997 (maximum concentrations reported)

Table 2:

Historic Concentrations of Organic Chemicals in Sediment
From Salton Sea and Surrounding Tributaries Determined to be of Concern

LFR 6824.00

Results reported in micrograms per kilogram (µg/kg), dry weight

Location		Chemicals															
		Acetone	*Carbon disulfide*	*Chlordane*	*DDT*	*DDD*	*DDE*	*Dieldrin*	*Ethylbenzene*	*gamma-Chlordane*	*Heptachlor*	*Methoxychlor*	*PAHs **	*PCBs*	*Toluene*	*Toxaphene*	*Xylenes*
Whitewater River upstream from HWY 111 *(b)*				<1.0		<0.1	0.6					<0.1		<1		10	
Alamo River outlet *(b)*				<1.0		20	64					<0.1		<1		<10	
Alamo River at international boundary *(b)*				<1.0		2.3	18					<0.1		9		<10	
Trifolium Drain 1 *(b)*				<1.0		3.7	41					<0.1		<1		<10	
Trifolium Drain 1 *(e)*							110										
Trifolium Drain 4 *(b)*				<1.0		12	56					<0.1		<1		40	
Vail Drain 4 *(b)*				<1.0		7.8	57					45		<1		<10	
Ave 64 Evacuation Channel at HWY 195 *(b)*				1		5.8	56					<0.1		<1		<10	
Ave 64 Evacuation Channel at HWY 195 *(e)*							67										
New River at midpoint (08/14/86) *(b)*				5		3.5	7.4					<0.1		4		<10	
New River at international boundary *(b)*				20		24	7.6					<0.1		24		<10	
East Highline Canal *(b)*				<1.0		2.3	18					<0.1		9		<10	
Shoreline Disposal Area *(d)*		23	2		3.1	4.9	6.6	3	2	3.4	3.5	14	85		15		11
Imhoff Tank *(d)*							3.2	0.6		190	290						
1 mile from Whitewater River outlet *(f)*	0-11.5 cm				<25	5	5	<5									
	11.5-23 cm				<25	<5	<5	<5									

Table 2:

Historic Concentrations of Organic Chemicals in Sediment
From Salton Sea and Surrounding Tributaries Determined to be of Concern

LFR 6824.00

Results reported in micrograms per kilogram (µg/kg), dry weight

Location		Chemicals															
		Acetone	*Carbon disulfide*	*Chlordane*	*DDT*	*DDD*	*DDE*	*Dieldrin*	*Ethylbenzene*	*gamma-Chlordane*	*Heptachlor*	*Methoxychlor*	*PAHs **	*PCBs*	*Toluene*	*Toxaphene*	*Xylenes*
2.5 miles from Whitewater River outlet *(f)*	0-11.5 cm				<25	5	5	<5									
	11.5-23 cm				**25**	**20**	23	<5									
5 miles from Whitewater River *(f)*	0-11.5 cm				<25	12	14	<5									
	11.5-23 cm				**25**	5	5	5									
1 mile from Alamo River outlet *(f)*	0-11.5 cm				**25**	5	5	**92**									
	11.5-23 cm				**25**	5	5	**100**									
2.5 miles from Alamo River outlet *(f)*	0-11.5 cm				**25**	5	16	**49**									
	11.5-23 cm				**82**	5	18	**880**									
5 miles from Alamo River outlet *(f)*	0-11.5 cm				**25**	5	5	**60**									
	11.5-23 cm				**25**	5	5	**43**									
Effects Range - Low [1]		-	-	-	1 [2]	2 [2]	2.2	0.02 [2]	-	-	-	-	261	22.7	-	-	-
Effects Range - Medium [1]		-	-	-	7 [2]	20 [2]	27	8 [2]	-	-	-	-	1,600	180	-	-	-

Notes:

***** Polycyclic Aromatic Hydrocarbon (PAHs) values are for Benzo(a)anthracene and Chrysene

[1] from Long and others, 1995

[2] from Long and Morgan, 1990

Bold = Values exceeding ERL

Bold = Values exceeding ERM

(a) Shacklette & Boerngen, 1984
(b) Setmire & Stroud, 1990
(c) Setmire [et al.], 1993
(d) Bechtel, 1997 (maximum data reported)
(e) Eccles, 1979
(f) Hogg, 1973

Table 3:
Physical Composition of Phase I & II Sediment Samples
From Salton Sea and Surrounding Tributaries Determined to be of Concern
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LFR	Sample ID	Depth	Date	Sand%	Silt%	Clay%	Percent Moisture	Sampler Percent Recovery	Longitude	Latitude
1	GB1-34.5-121598	34.5	12/15/98	52	35	13	80	50	-116.0220	33.412
2	GB2-12.4-121598	12.4	12/15/98	36	55	9	59	30	-116.0430	33.453
3	GB3-19.5-121598	19.5	12/15/98	44	43	13	76	50	-116.0550	33.479
4	GB4-7.2-121698	7.2	12/16/98	18	67	15	52	30	-116.0560	33.501
4D	GB4-7.2-121698-0	7.2	12/16/98	---	---	---	57	30	-116.0560	33.501
5	GB5-1-121698	1.0	12/16/98	98	2	0	27	10	-116.0790	33.525
6	CR6-18-122198	18	12/16/98	21	60	19	64	85*	-116.0460	33.492
6	CR6-19-122198	19	12/16/98	28	61	11	46	85*	-116.0460	33.492
6	CR6-20-122198	20	12/16/98	11	64	25	39	85*	-116.0460	33.492
6	CR6-21-122198	21	12/16/98	9	64	27	45	85*	-116.0460	33.492
6	CR6-22-122198	22	12/16/98	2	61	37	43	85*	-116.0460	33.492
7	GB7-25.4-121698	25.4	12/16/98	22	62	16	71	30	-116.0300	33.495
8	GB8-27.3-121698	27.3	12/16/98	37	49	14	78	30	-116.0290	33.481
9	GB9-39.3-121798	39.3	12/17/98	55	33	12	84	2	-115.9920	33.486
10	GB10-47.4-121798	47.4	12/17/98	61	35	4	84	40	-115.9480	33.429
11	GB11-45.9-121798	45.9	12/17/98	65	26	9	87	25	-115.8870	33.418
12	GB12-40-121698	40	12/16/98	53	33	14	79	30	-115.8810	33.447
13	CR13-33-122298	33	12/22/98	27	44	29	51	100*	-115.8690	33.436
13	CR13-34-122298	34	12/22/98	27	44	29	38	100*	-115.8690	33.436
13	CR13-35-122298	35	12/22/98	4	40	56	27	100*	-115.8690	33.436
13	CR13-36-122298	36	12/22/98	33	45	22	25	100*	-115.8690	33.436
13	CR13-37-122298	37	12/22/98	47	37	16	20	100*	-115.8690	33.436
13	CR13-38-122298	38	12/22/98	4	40	56	27	100*	-115.8690	33.436
14	GB14-11-121698	11	12/16/98	30	54	16	50	-	-115.8520	33.445
15	GB15-38.2-121698	38.2	12/16/98	48	39	13	64	20	-115.8530	33.423
16	GB16-45.3-121898	45.3	12/18/98	66	25	9	84	-	-115.8530	33.361
17	GB17-40.8-121898	40.8	12/18/98	69	21	10	79	50	-115.8020	33.314

Table 3:
Physical Composition of Phase I & II Sediment Samples
From Salton Sea and Surrounding Tributaries Determined to be of Concern
LFR 6824.00

LFR	Sample ID	Depth	Date	Sand%	Silt%	Clay%	Percent Moisture	Sampler Percent Recovery	Longitude	Latitude
18	GB18-46.8-121898	46.8	12/18/98	61	28	11	82	50	-115.7660	33.258
19	CR19-46-122298	46	12/22/98	9	36	55	41	60*	-115.7290	33.248
19	CR19-47-122298	47	12/22/98	9	36	55	48	60*	-115.7290	33.248
19	CR19-48-122298	48	12/22/98	1	55	44	43	60*	-115.7290	33.248
20	CR20-21-122298	21	12/22/98	25	51	24	54	90*	-115.6580	33.314
20	CR20-22-122298	22	12/22/98	25	51	24	49	90*	-115.6580	33.314
20	CR20-23-122298	23	12/22/98	26	52	22	52	90*	-115.6580	33.314
20	CR20-24-122298	24	12/22/98	13	63	24	40	90*	-115.6580	33.314
20	CR20-25-122298	25	12/22/98	0	35	65	43	90*	-115.6580	33.314
20	CR20-26-122298	26	12/22/98	1	50	49	39	90*	-115.6580	33.314
21	GB21-31-121898	31	12/18/98	39	44	17	61	35	-115.6490	33.276
22	GB22-23.4-121898	23.4	12/18/98	40	45	15	66	10	-115.6320	33.253
23	GB23-34.8-121898	34.8	12/18/98	55	33	12	65	25	-115.6630	33.244
24	GB24-20.4-121898	20.4	12/18/98	98	1	1	17	<1	-115.6530	33.241
24-20.5	GB24-20.5-122298	20.5	12/22/98	86	11	3	26	5	-115.6520	33.240
25	GB25-16.2-121898	16.2	12/18/98	56	33	11	35	2	-115.6410	33.235
26	CR26-17-122298	17	12/22/98	33	48	19	35	50*	-115.6340	33.228
26	CR26-18-122298	18	12/22/98	13	61	27	30	50*	-115.6340	33.228
26	CR26-19-122298	19	12/22/98	33	47	20	29	50*	-115.6340	33.228
27	GB27-12-121898	12	12/18/98	86	10	4	26	<2	-115.6250	33.232
28	GB28-14.2-121898	14.2	12/18/98	48	38	14	41	2	-115.6270	33.220
29	GB29-17.2-121898	17.2	12/18/98	62	29	9	29	<2	-115.6390	33.222
30	GB30-4.9-122198	4.9	12/21/98	64	30	6	30	30	-115.5970	33.199
31	GB31-25.2-121898	25.2	12/18/98	59	33	8	45	5	-115.6630	33.216
32	GB32-36.5-121898	36.5	12/18/98	58	31	11	72	20	-115.6870	33.221
32D	GB32-36.5-121898-0	36.5	12/18/98	---	---	---	66	20	-115.6870	33.221
33	GB33-33-121898	33	12/18/98	51	36	13	68	15	-115.6980	33.204

Table 3:
Physical Composition of Phase I & II Sediment Samples
From Salton Sea and Surrounding Tributaries Determined to be of Concern
LFR 6824.00

LFR	Sample ID	Depth	Date	Sand%	Silt%	Clay%	Percent Moisture	Sampler Percent Recovery	Longitude	Latitude
34	GB34-33-121898	33	12/18/98	56	32	12	73	20	-115.7150	33.191
35	GB35-24-121898	24	12/18/98	43	47	10	46	5	-115.6800	33.185
36	GB36-20.4-121798	20.4	12/17/98	41	37	22	37	2	-115.6850	33.163
37	GB37-23.4-121798	23.4	12/17/98	23	57	20	56	-	-115.7050	33.171
38	GB38-24-121798	24	12/17/98	15	65	20	63	30	-115.7350	33.164
39	CR39-21-122298	21	12/22/98	5	54	41	32	10	-115.7050	33.159
40	GB40-13.2-121798	13.2	12/17/98	62	29	9	40	2	-115.7180	33.149
41	GB41-12-121798	12	12/17/98	75	18	7	28	2	-115.6950	33.142
42	GB42-1-122198	1.0	12/21/98	24	64	12	35	100	-115.6840	33.110
42D	GB42-1-122198-0	1.0	12/21/98	---	---	---	32	100	-115.6840	33.110
43	GB43-11.4-121798	11.4	12/17/98	13	62	25	55	35	-115.7490	33.119
44	GB44-16.8-121798	16.8	12/17/98	14	60	26	64	25	-115.7360	33.133
45	GB45-32.8-121798	32.8	12/17/98	31	49	20	69	30	-115.7590	33.183
46	GB46-15-121798	15	12/17/98	10	63	27	51	50	-115.8060	33.179
47	GB47-24.4-121798	24.4	12/17/98	66	27	7	56	10	-115.8520	33.284
48	GB48-24.5-121798	24.5	12/17/98	73	22	5	52	25	-115.9560	33.355
48D	GB48-24.5-121798-0	24.5	12/17/98	---	---	---	57	25	-115.9560	33.355
49	CR49-39-12099	39	01/20/99	9	60	31	26	33*	-115.9760	33.377
49	CR49-40-12099	40	01/20/99	1	53	46	37	33*	-115.9760	33.377
50	CR50-39-11999	39	01/19/99	15	57	28	50	50*	-116.0100	33.402
50	CR50-40-11999	40	01/19/99	4	48	48	38	50*	-116.0100	33.402
50	CR50-41-11999	41	01/19/99	4	48	48	26	50*	-116.0100	33.402
51	CR51-29-12099	29	01/20/99	64	28	8	50	33*	-116.0280	33.413
51	CR51-30-12099	30	01/20/99	31	55	14	34	33*	-116.0280	33.413
51	CR51-31-12099	31	01/20/99	8	50	42	27	33*	-116.0280	33.413
52	CR52-41-12099	41	01/20/99	56	31	13	54	70*	-116.0140	33.421
52	CR52-42-12099	42	01/20/99	8	58	34	39	70*	-116.0140	33.421

Table 3:
Physical Composition of Phase I & II Sediment Samples
From Salton Sea and Surrounding Tributaries Determined to be of Concern
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LFR	Sample ID	Depth	Date	Sand%	Silt%	Clay%	Percent Moisture	Sampler Percent Recovery	Longitude	Latitude
52	CR52-43-12099	43	01/20/99	2	53	45	33	70*	-116.0140	33.421
52	CR52-44-12099	44	01/20/99	16	54	30	31	70*	-116.0140	33.421
53	GB53-33-11999	33	01/19/99	56	32	12	74	30	-116.0270	33.425
54	GB54-28.2-11999	28.2	01/19/99	34	51	15	75	30	-116.0310	33.477
55	CR55-14-12099	14	01/20/99	23	63	14	41	33*	-116.0680	33.484
55	CR55-15-12099	15	01/20/99	23	63	14	30	33*	-116.0680	33.484
56	GB56-17.4-11999	17.4	01/19/99	43	45	12	66	40	-116.0280	33.510
56D	GB56-17.4-11999-0	17.4	01/19/99	---	---	---	77	40	-116.0280	33.510
57	GB57-25.8-11999	25.8	01/19/99	44	42	14	39	30	-115.9930	33.507
58	GB58-45-11999	45	01/19/99	58	30	12	78	40	-115.9400	33.480
59	GB59-45-11999	45	01/19/99	64	27	9	83	30	-115.9690	33.449
60	CR60-48-12099	48	01/20/99	33	49	18	40	95*	-115.9490	33.427
60	CR60-49-12099	49	01/20/99	7	69	24	31	95*	-115.9490	33.427
60	CR60-50-12099	50	01/20/99	6	71	23	28	95*	-115.9490	33.427
60	CR60-51-12099	51	01/20/99	10	66	24	36	95*	-115.9490	33.427
60	CR60-52-12099	52	01/20/99	12	64	24	31	95*	-115.9490	33.427
61	GB61-44-11999	44	01/19/99	46	47	7	72	45	-115.8980	33.466
62	GB62-44-12099	44	01/20/99	50	37	13	74	10	-115.8970	33.429
63	CR63-49-12299	49	01/22/99	16	58	26	36	19	-115.9190	33.393
64	GB64-46.2-12099	46.2	01/20/99	70	23	7	81	75	-115.8660	33.390
65	GB65-46.2-12099	46.2	01/20/99	75	18	7	80	-	-115.8860	33.360
66	CR66-42-12299	42	01/21/99	45	42	13	52	69*	-115.8360	33.321
66	CR66-43-12299	43	01/21/99	18	32	50	27	69*	-115.8360	33.321
66	CR66-44-12299	44	01/21/99	45	42	13	35	69*	-115.8360	33.321
66	CR66-45-12299	45	01/21/99	13	41	46	36	69*	-115.8360	33.321
67	GB67-43.6-12199	44	01/21/99	60	30	10	79	25	-115.7880	33.277
68	GB68-47.2-12199	47.2	01/21/99	37	45	18	76	25	-115.7430	33.282

Table 3:
Physical Composition of Phase I & II Sediment Samples
From Salton Sea and Surrounding Tributaries Determined to be of Concern
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LFR	Sample ID	Depth	Date	Sand%	Silt%	Clay%	Percent Moisture	Sampler Percent Recovery	Longitude	Latitude
69	GB69-42.7-12199	42.7	01/21/99	16	41	43	59	20	-115.7730	33.231
70	GB70-35.4-12299	35.4	01/21/99	49	33	18	60	20	-115.7680	33.345
71	GB71-34.2-12199	34.2	01/21/99	33	47	20	60	20	-115.6760	33.295
72	CR72-11-12199	11	01/21/99	17	62	21	37	66*	-115.6280	33.193
72	CR72-12-12199	12	01/21/99	3	66	31	39	66*	-115.6280	33.193
72	CR72-13-12199	13	01/21/99	2	67	31	39	66*	-115.6280	33.193
72	CR72-14-12199	14	01/21/99	3	37	60	31	66*	-115.6280	33.193
73	CR73-8-12199	8.0	01/21/99	54	35	11	21	12*	-115.7100	33.115
73	CR73-9-12199	9.0	01/21/99	53	33	14	19	12*	-115.7100	33.115
73	CR73-10-12199	10	01/21/99	89	8	3	18	12*	-115.7100	33.115

NOTES:

Particle size analysis conducted by PTS Laboratories, Inc., Santa Fe Springs, California using ASTM D4464M/D422 methodology.
Percent moisture analysis conducted by Apollo Analytics, Inc., Costa Mesa, California.

- = Not reported.
--- = Not analyzed.
GB = Grab sediment sample.
CR = Core sediment sample.
"-0" = Duplicate sediment sample.
* Represents the percent recovery for the whole core, not for the individual intervals within the core.

Table 4:

Inorganic Chemicals Detected in Phase I & II Sediment Samples

Salton Sea

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Results reported in milligrams per kilogram (mg/kg) dry weight and wet weight

Sample Number	Sample Date	Antimony		Arsenic		Barium		Beryllium		Cadmium		Chromium		Cobalt		Copper		Lead		Mercury		Molybdenum		Nickel		Selenium		Silver		Thallium		Vanadium		Zinc	
GB1-34.5-121598	15-Dec-98	< 63	< 12.5	4.2	0.84	225	45	< 4.0	< 0.8	4.5	0.9	< 16	< 3.25	< 13	< 2.5	23	4.6	50	10	< 1.0	< 0.2	120	24	23	4.6	8.5	1.7	< 13	< 2.5	< 62	< 12.5	< 94	< 18.8	39	7.8
GB2-12.4-121598	15-Dec-98	< 30	< 12.5	6.1	2.5	240	99	< 2.0	< 0.8	2.1	0.88	10	4.3	< 6.1	< 2.5	16	6.7	20	8.1	< 0.49	< 0.2	< 30	< 12.5	14	5.9	1.5	0.61	< 6.1	< 2.5	< 30	< 12.5	< 46	< 18.8	44	18
GB3-19.5-121598	15-Dec-98	< 52	< 12.5	4.6	1.1	190	45	< 3.3	< 0.8	< 3.7	< 0.88	17	4.0	< 10	< 2.5	29	7.0	38	9.0	< 0.83	< 0.2	< 52	< 12.5	21	5.0	5.0	1.3	< 10	< 2.5	< 52	< 12.5	< 78	< 18.8	63	15
GB4-7.2-121698	16-Dec-98	< 26	< 12.5	4.4	2.1	230	110	< 1.7	< 0.8	1.9	0.91	33	16	15	7.1	46	22	29	14	< 0.42	< 0.2	< 26	< 12.5	31	15	0.58	0.28	< 5.2	< 2.5	< 26	< 12.5	108	52	190	91
GB4-7.2-121698-0	16-Dec-98	< 29	< 12.5	1.1	0.46	165	71	< 1.9	< 0.8	< 2.0	< 0.88	26	11	12	5.0	37	16	23	10	< 0.46	< 0.2	< 29	< 12.5	26	11	1.0	0.45	< 5.8	< 2.5	< 29	< 12.5	74	32	102	44
GB5-1-121698	16-Dec-98	< 17	< 12.5	0.4	0.29	25	18	< 1.1	< 0.8	< 1.2	< 0.88	5.1	3.7	< 3.4	< 2.5	< 4.4	< 3.25	< 8.6	< 6.25	< 0.27	< 0.2	< 17	< 12.5	< 5.1	< 3.75	< 0.11	< 0.08	< 3.4	< 2.5	< 17	< 12.5	< 26	< 18.8	21	15
CR6-18-122198	21-Dec-98	< 35	< 12.5	1.1	0.39	500	180	< 2.2	< 0.8	< 2.4	< 0.88	31	11	18	6.5	53	19	36	13	< 0.56	< 0.1	< 35	< 12.5	33	12	1.1	0.39	< 6.9	< 2.5	< 35	< 12.5	120	43	130	47
CR6-19-122198	21-Dec-98	< 23	< 12.5	0.74	0.4	260	140	< 1.5	< 0.8	< 1.6	< 0.88	22	12	12	6.6	24	13	15	8.0	< 0.37	< 0.1	< 23	< 12.5	24	13	0.83	0.45	< 4.6	< 2.5	< 23	< 12.5	72	39	98	53
CR6-20-122198	21-Dec-98	< 20	< 12.5	1.5	0.93	310	190	< 1.3	< 0.8	< 1.4	< 0.88	25	15	13	8.2	28	17	18	11	< 0.16	< 0.1	< 20	< 12.5	26	16	0.7	0.43	< 4.1	< 2.5	< 20	< 12.5	84	51	102	62
CR6-21-122198	21-Dec-98	< 23	< 12.5	0.6	0.33	450	250	< 1.4	< 0.8	2.0	1.1	27	15	15	8.4	40	22	29	16	< 0.36	< 0.1	< 23	< 12.5	33	18	0.75	0.41	< 4.6	< 2.5	< 23	< 12.5	107	59	115	63
CR6-22-122198	21-Dec-98	< 22	< 12.5	1.9	1.1	510	290	< 1.4	< 0.8	< 1.5	< 0.88	21	12	12	6.7	35	20	28	16	< 0.18	< 0.1	< 22	< 12.5	28	16	0.9	0.52	< 4.4	< 2.5	< 22	< 12.5	82	47	88	50
GB7-25.4-121698	16-Dec-98	< 43	< 12.5	6.6	1.9	210	61	< 2.8	< 0.8	< 3.0	< 0.88	25	7.3	11	3.3	41	12	34	10	< 0.69	< 0.2	< 43	< 12.5	28	8.1	4.1	1.2	< 8.6	< 2.5	< 43	< 12.5	83	24	86	25
GB8-27.3-121698	16-Dec-98	< 57	< 12.5	6.8	1.5	160	35	< 3.6	< 0.8	4.0	0.88	< 15	< 3.25	< 11	< 2.5	27	5.9	33	7.3	< 0.91	< 0.2	< 57	< 12.5	22	4.9	2.0	0.43	< 11	< 2.5	< 57	< 12.5	< 85	< 18.8	55	12
GB9-39.3-121798	17-Dec-98	< 78	< 12.5	3.7	0.59	200	32	< 5.0	< 0.8	5.6	0.9	< 20	< 3.25	< 16	< 2.5	< 20	< 3.25	< 39	< 6.25	< 1.2	< 0.2	< 78	< 12.5	26	4.1	1.6	0.26	< 16	< 2.5	< 78	< 12.5	< 120	< 18.8	34	5.4
GB10-47.4-121798	17-Dec-98	< 78	< 12.5	4.1	0.65	188	30	< 5.0	< 0.8	5.8	0.93	< 20	< 3.25	< 16	< 2.5	< 20	< 3.25	< 39	< 6.25	< 1.2	< 0.2	194	31	26	4.2	3.1	0.5	< 16	< 2.5	< 78	< 12.5	< 120	< 18.8	28	4.5
GB11-45.9-121798	17-Dec-98	< 96	< 12.5	5.0	0.65	238	31	< 6.2	< 0.8	< 6.8	< 0.88	< 25	< 3.25	< 19	< 2.5	< 25	< 3.25	< 48	< 6.25	< 1.5	< 0.2	138	18	31	4.0	3.4	0.44	< 19	< 2.5	< 96	< 12.5	< 140	< 18.8	35	4.5
GB12-40-121698	16-Dec-98	< 60	< 12.5	4.4	0.92	157	33	< 3.8	< 0.8	4.7	1.0	< 16	< 3.25	< 12	< 2.5	< 16	< 3.25	45	9.5	< 0.95	< 0.2	71	15	20	4.3	2.1	0.46	< 12	< 2.5	< 60	< 12.5	< 90	< 18.8	20	4.3
CR13-33-122298	22-Dec-98	< 15	< 12.5	1.7	0.81	290	140	< 0.96	< 0.8	2.0	1.0	8.6	4.2	< 3.0	< 2.5	12	6.0	31	15	< 0.24	< 0.1	< 15	< 12.5	18	9.0	4.3	2.1	< 3.0	< 2.5	< 15	< 12.5	39	19	176	86
CR13-34-122298	22-Dec-98	< 20	< 12.5	3.7	2.3	360	230	< 1.3	< 0.8	1.9	1.2	16	10	8.7	5.5	19	12	21	13	< 0.32	< 0.1	< 20	< 12.5	27	17	1.2	0.73	< 4.0	< 2.5	< 20	< 12.5	52	33	70	44
CR13-35-122298	22-Dec-98	< 17	< 12.5	2.7	2.0	310	230	< 1.1	< 0.8	< 1.2	< 0.88	13	9.3	5.8	4.2	15	11	19	14	< 0.27	< 0.1	< 17	< 12.5	19	14	0.66	0.48	< 3.4	< 2.5	< 17	< 12.5	47	34	45	33
CR13-36-122298	22-Dec-98	< 17	< 12.5	1.3	0.99	410	310	< 1.1	< 0.8	1.2	0.93	19	14	8.0	6.0	15	11	17	13	< 0.13	< 0.1	< 17	< 12.5	24	18	0.48	0.36	< 3.3	< 2.5	< 17	< 12.5	51	38	59	44
CR13-37-122298	22-Dec-98	< 16	< 12.5	3.1	2.5	270	220	< 1.0	< 0.8	< 1.1	< 0.88	9.8	7.8	5.1	4.1	10	8.3	16	13	< 0.13	< 0.1	< 16	< 12.5	16	13	0.34	0.27	< 3.1	< 2.5	< 16	< 12.5	38	30	41	33
CR13-38-122298	22-Dec-98	< 17	< 12.5	1.5	1.1	230	170	< 1.1	< 0.8	1.3	0.91	13	9.2	6.7	4.9	16	12	22	16	< 0.27	< 0.1	< 17	< 12.5	19	14	0.45	0.33	< 3.4	< 2.5	< 17	< 12.5	49	36	53	39
GB14-11-121698	16-Dec-98	< 25	< 12.5	5.8	2.9	200	100	< 1.6	< 0.8	2.8	1.4	10	5.1	< 5.0	< 2.5	15	7.5	30	15	< 0.4	< 0.2	< 25	< 12.5	19	9.7	0.46	0.23	< 5.0	< 2.5	< 25	< 12.5	< 38	< 18.8	40	20
GB15-38.2-121698	16-Dec-98	< 35	< 12.5	2.2	0.79	100	36	< 2.2	< 0.8	2.8	1.0	< 9.0	< 3.25	< 6.9	< 2.5	< 9.0	< 3.25	26	9.3	< 0.56	< 0.2	< 35	< 12.5	13	4.6	0.86	0.31	< 6.9	< 2.5	< 35	< 12.5	< 52	< 18.8	16	5.7
GB16-45.3-121898	18-Dec-98	< 78	< 12.5	4.3	0.68	375	60	< 5.0	< 0.8	< 5.5	< 0.88	63	10	< 16	< 2.5	< 20	< 3.25	44	7.0	< 1.2	< 0.2	88	14	29	4.7	0.69	0.11	< 16	< 2.5	< 78	< 12.5	< 120	< 18.8	34	5.5
GB17-40.8-121898	18-Dec-98	< 60	< 12.5	2.8	0.59	329	69	< 3.8	< 0.8	< 4.2	< 0.88	< 16	< 3.25	< 12	< 2.5	20	4.3	44	9.2	< 0.95	< 0.2	< 60	< 12.5	29	6.1	0.76	0.16	< 12	< 2.5	< 60	< 12.5	< 90	< 18.8	47	9.9
GB18-46.8-121898	18-Dec-98	< 69	< 12.5	2.7	0.49	233	42	< 4.4	< 0.8	< 4.9	< 0.88	< 18	< 3.25	< 14	< 2.5	< 18	< 3.25	36	6.4	< 1.1	< 0.2	< 69	< 12.5	25	4.5	1.4	0.26	< 14	< 2.5	< 69	< 12.5	< 100	< 18.8	37	6.7
CR19-46-122298	22-Dec-98	< 21	< 12.5	1.0	0.58	360	210	< 1.4	< 0.8	1.6	0.94	15	9.1	7.5	4.4	20	12	20	12	< 0.34	< 0.1	< 21	< 12.5	20	12	0.3	0.17	< 4.2	< 2.5	< 21	< 12.5	51	30	66	39
CR19-47-122298	22-Dec-98	< 24	< 12.5	5.0	2.6	420	220	< 1.5	< 0.8	< 1.7	< 0.88	13	6.9	6.4	3.3	16	8.2	25	13	< 0.19	< 0.1	48	25	19	10	0.7	0.36	< 4.8	< 2.5	< 24	< 12.5	63	33	54	28
CR19-48-122298	22-Dec-98	< 22	< 12.5	2.3	1.3	350	200	< 1.4	< 0.8	< 1.5	< 0.88	14	7.9	6.1	3.5	16	8.9	23	13	< 0.18	< 0.1	< 22	< 12.5	19	11	0.75	0.43	< 4.4	< 2.5	< 22	< 12.5	58	33	53	30
CR20-21-122298	22-Dec-98	< 27	< 12.5	1.5	0.67	280	130	< 1.7	< 0.8	< 1.9	< 0.88	9.6	4.4	< 5.4	< 2.5	14	6.6	30	14	< 0.22	< 0.1	< 27	< 12.5	19	8.6	0.7	0.32	< 5.4	< 2.5	< 27	< 12.5	< 41	< 18.8	46	21
CR20-22-122298	22-Dec-98	< 24	< 12.5	1.7	0.85	230	120	< 1.6	< 0.8	2.0	1.0	7.1	3.6	< 4.9	< 2.5	12	6.3	25	13	< 0.2	< 0.1	< 24	< 12.5	16	8.1	0.63	0.32	< 4.9	< 2.5	< 24	< 12.5	< 37	< 18.8	37	19
CR20-23-122298	22-Dec-98	< 26	< 12.5	1.4	0.66	290	140	< 1.7	< 0.8	2.3	1.1	8.1	3.9	< 5.2	< 2.5	14	6.8	31	15	< 0.42	< 0.1	< 26	< 12.5	18	8.8	0.92	0.44	< 5.2	< 2.5	< 26	< 12.5	< 39	< 18.8	42	20
CR20-24-122298	22-Dec-98	< 21	< 12.5	3.7	2.2	200	120	< 1.3	< 0.8	< 1.5	< 0.88	9.2	5.5	< 4.2	< 2.5	13	7.6	18	11	< 0.33	< 0.1	< 21	< 12.5	13	7.9	0.9	0.54	< 4.2	< 2.5	< 21	< 12.5	32	19	35	21
CR20-25-122298	22-Dec-98	< 22	< 12.5	3.7	2.1	250	140	< 1.4	< 0.8	< 1.5	< 0.88	11	6.4	6.1	3.5	25	14	25	14	< 0.18	< 0.1	< 22	< 12.5	19	11	0.4	0.22	< 4.4	< 2.5	< 22	< 12.5	39	22	56	32
CR20-26-122298	22-Dec-98	< 20	< 12.5	2.3	1.4	280	170	< 1.3	< 0.8	< 1.4	< 0.88	15	9.2	6.4	3.9	21	13	25	15	< 0.16	< 0.1	< 20	< 12.5	20	12	0.46	0.28	< 4.1	< 2.5	< 20	< 12.5	46	28	62	38
GB21-31-121898	18-Dec-98	< 32	< 12.5	1.4	0.54	282	110	< 2.0	< 0.8	2.8	1.1	10	3.9	< 6.4	< 2.5	15	5.7	31	12	< 0.51	< 0.2	< 32	< 12.5	21	8.0	< 0.21	< 0.08	< 6.4	< 2.5	< 32	< 12.5	< 48	< 18.8	44	17
GB22-23.4-121898	18-Dec-98	< 37	< 12.5	1.4	0.46	274	93	< 2.4	< 0.8	< 2.6	< 0.88	12	4.1	< 7.4	< 2.5	15	5.2	25	8.4	< 0.59	< 0.2	< 37	< 12.5	22	7.6	0.32	0.11	< 7.4	< 2.5	< 37	< 12.5	< 55	< 18.8	50	17
GB23-34.8-121898	18-Dec-98	< 36	< 12.5	1.8	0.62	249	87	< 2.3	< 0.8	< 2.5	< 0.88	10	3.6	< 7.1	< 2.5	15	5.3	28	9.9	< 0.57	< 0.2	< 36	< 12.5	21	7.3	0.46	0.16	< 7.1	< 2.5	< 36	< 12.5	< 54	< 18.8	49	17
GB24-20.4-121898	18-Dec-98	< 15	< 12.5	2.2	1.8	145	120	< 0.96	< 0.8	1.6	1.3	< 3.9	< 3.25	< 3.0	< 2.5	< 3.9	< 3.25	18	15	< 0.24	< 0.2	< 15	< 12.5	6.5	5.4	< 0.1	< 0.08	< 3.0	< 2.5	< 15	< 12.5	< 23	< 18.8	24	20
GB24-20.5-122298	22-Dec-98	< 17	< 12.5	1.6	1.2	42	31	< 1.1	< 0.8	< 1.2	< 0.88	< 4.4	< 3.25	< 3.4	< 2.5	< 4.4	< 3.25	14	10	< 0.27	< 0.1	< 17	< 12.5	< 5.1	< 3.75	0.3	0.22	< 3.4	< 2.5	< 17	< 12.5	< 25	< 18.8	5.4	4.0
GB25-16.2-121898	18-Dec-98	< 19	< 12.5	2.9	1.9	215	140	< 1.2	< 0.8	1.5	1.0	7.8	5.0	4.9	3.2	12	7.7	20	13	< 0.31	< 0.2	< 19	< 12.5	15	9.5	< 0.12	< 0.08	< 3.8	< 2.5	< 19	< 12.5	31	20	37	24
CR26-17-122298	22-Dec-98	< 19	< 12.5	2.5	1.6	210	140	< 1.2	< 0.8	< 1.4	< 0.88	11	6.9	5.1	3.3	17	11	22	14	< 0.31	< 0.1	< 19	< 12.5	15	10	0.42	0.27	< 3.8	< 2.5	< 19	< 12.5	35	23	51	33
CR26-18-122298	22-Dec-98	< 18	< 12.5	0.8	0.55	230	160	< 1.1	< 0.8	< 1.3	< 0.88	7.3	5.1	< 3.6	< 2.5	13	8.8	19	13	< 0.14	< 0.1	< 18	< 12.5	13	8.9	0.41	0.29	< 3.6	< 2.5	< 18	< 12.5	29	20	41	29
CR26-19-122298	22-Dec-98	< 18	< 12.5	3.0	2.1	320	230	< 1.1	< 0.8	< 1.2	< 0.88	12	8.7	5.2	3.7	20	14	24	17	< 0.28	< 0.1	< 18	< 12.5	18	13	0.27	0.19	< 3.5	< 2.5	< 18	< 12.5	38	27	56	40
GB27-12-121898	18-Dec-98	< 17	< 12.5	1.4	1.0	81	60	< 1.1	< 0.8	< 1.2	< 0.88	< 4.4	< 3.25	< 3.4	< 2.5	< 4.4	< 3.25	8.6	6.4	< 0.27	< 0.2	< 17	< 12.5	5.3	3.9	< 0.11	< 0.08	< 3.4	< 2.5	< 17	< 12.5	< 25	< 18.8	8.6	6.4
GB28-14.2-121898	18-Dec-98	< 21	< 12.5	0.71	0.42	158	93	< 1.4	< 0.8	1.6	0.96	7.1	4.2	< 4.2	< 2.5	11	6.5	20	12	< 0.34	< 0.2	< 21	< 12.5	13	7.8	< 0.14	< 0.08	< 4.2	< 2.5	< 21	< 12.5	32	19	32	19
GB29-17.2-121898	18-Dec-98	< 18	< 12.5	1.2	0.83	115	82	< 1.1	< 0.8	1.7	1.2	3.4	2.4	< 3.5	< 2.5	< 4.6	< 3.25	17	12	< 0.28	< 0.2	< 18	< 12.5	8.5	6.0	< 0.11	< 0.08	< 3.5	< 2.5	< 18	< 12.5	< 26	< 18.8	11	7.6
GB30-4.9-122198	21-Dec-98	< 18	< 12.5	0.61	0.43	170	120	< 1.1	< 0.8	1.3	0.89	< 4.6	< 3.25	< 3.6	< 2.5	7.1	5.0	10	7.0	< 0.14	< 0.1	< 18	< 12.5	9.6	6.7	0.27	0.19	< 3.6	< 2.5	< 18	< 12.5	< 27	< 18.8	26	18
GB31-25.2-121898	18-Dec-98	< 23	< 12.5	1.7	0.94	218	120	< 1.4	< 0.8	2.2	1.2	5.3	2.9	< 4.6	< 2.5	8.2	4.5	24	13	< 0.36	< 0.2	< 23	< 12.5	13	7.3	< 0.15	< 0.08	< 4.6	< 2.5	< 23	< 12.5	< 34	< 18.8	22	12
GB32-36.5-121898	18-Dec-98	< 45	< 12.5	3.9	1.1	346	97	< 2.9	< 0.8	4.3	1.2	11	3.0	< 8.9	< 2.5	20	5.6	43	12	< 0.71	< 0.2	< 45	< 12.5	28	7.9	< 0.29	< 0.08	< 8.9	< 2.5	< 45	< 12.5	< 67	< 18.8	50	14
GB32-36.5-121898-0	18-Dec-98	< 37	< 12.5	2.2	0.76	229	78	< 2.4	< 0.8	2.9	1.0	9.7	3.3	< 7.4	< 2.5	15	5.0	32	11	< 0.59	< 0.2	< 37	< 12.5	21	7.0	0.38	0.13	< 7.4	< 2.5	< 37	< 12.5	< 55	< 18.8	41	14

Table 4:

Inorganic Chemicals Detected in Phase I & II Sediment Samples

Salton Sea

LFR 6824.00

Results reported in milligrams per kilogram (mg/kg) dry weight *and wet weight*

Sample Number	Sample Date	Antimony		Arsenic		Barium		Beryllium		Cadmium		Chromium		Cobalt		Copper		Lead		Mercury		Molybdenum		Nickel		Selenium		Silver		Thallium		Vanadium		Zinc	
GB33-33-121898	18-Dec-98	< 39	< 12.5	2.5	0.79	281	90	< 2.5	< 0.8	3.0	0.96	12	3.7	< 7.8	< 2.5	18	5.6	38	12	< 0.63	< 0.2	< 39	< 12.5	25	7.9	0.5	0.16	< 7.8	< 2.5	< 39	< 12.5	< 59	< 18.8	47	15
GB34-33-121898	18-Dec-98	< 46	< 12.5	2.9	0.77	359	97	< 3.0	< 0.8	< 3.3	< 0.88	13	3.5	< 9.3	< 2.5	25	6.8	41	11	< 0.74	< 0.2	< 46	< 12.5	31	8.4	0.44	0.12	< 9.3	< 2.5	< 46	< 12.5	70	19	70	19
GB35-24-121898	18-Dec-98	< 23	< 12.5	1.3	0.71	185	100	< 1.5	< 0.8	< 1.6	< 0.88	< 6.0	< 3.25	< 4.6	< 2.5	11	5.7	18	9.9	< 0.37	< 0.2	< 23	< 12.5	16	8.4	< 0.15	< 0.08	< 4.6	< 2.5	< 23	< 12.5	< 35	< 18.8	33	18
GB36-20.4-121798	17-Dec-98	< 20	< 12.5	1.1	0.72	127	80	< 1.3	< 0.8	3.5	2.2	5.6	3.5	< 4.0	< 2.5	6.2	3.9	33	21	< 0.32	< 0.2	< 20	< 12.5	13	8.0	< 0.13	< 0.08	< 4.0	< 2.5	< 20	< 12.5	< 30	< 18.8	13	7.9
GB37-23.4-121798	17-Dec-98	< 28	< 12.5	5.5	2.4	173	76	< 1.8	< 0.8	2.7	1.2	8.4	3.7	6.4	2.8	14	6.3	27	12	< 0.45	< 0.2	< 28	< 12.5	19	8.3	0.43	0.19	< 5.7	< 2.5	< 28	< 12.5	< 43	< 18.8	43	19
GB38-24-121798	17-Dec-98	< 34	< 12.5	6.0	2.2	195	72	< 2.2	< 0.8	2.6	0.96	10	3.7	7.8	2.9	17	6.4	24	8.7	< 0.54	< 0.2	< 34	< 12.5	19	7.0	0.59	0.22	< 6.8	< 2.5	< 34	< 12.5	< 51	< 18.8	51	19
CR39-21-122298	22-Dec-98	< 18	< 12.5	1.8	1.2	220	150	< 1.2	< 0.8	< 1.3	< 0.88	13	9.0	5.6	3.8	16	11	24	16	< 0.15	< 0.1	< 18	< 12.5	16	11	0.35	0.24	< 3.7	< 2.5	< 18	< 12.5	38	26	54	37
GB40-13.2-121798	17-Dec-98	< 21	< 12.5	1.7	0.72	72	43	< 1.3	< 0.8	2.5	1.5	< 5.4	< 3.25	< 4.2	< 2.5	< 5.4	< 3.25	23	14	< 0.33	< 0.2	< 21	< 12.5	9.7	5.8	< 0.13	< 0.08	< 4.2	< 2.5	< 21	< 12.5	< 31	< 18.8	12	7.1
GB41-12-121798	17-Dec-98	< 17	< 12.5	0.69	0.5	49	35	< 1.1	< 0.8	1.5	1.1	< 4.5	< 3.25	< 3.5	< 2.5	< 4.5	< 3.25	11	8.0	< 0.28	< 0.2	< 17	< 12.5	6.9	5.0	< 0.11	< 0.08	< 3.5	< 2.5	< 17	< 12.5	< 26	< 18.8	9.7	7.0
GB42-1-122198	21-Dec-98	< 19	< 12.5	0.94	0.61	180	120	< 1.2	< 0.8	1.5	1.0	8.2	5.3	45	2.9	9.8	6.4	15	10	< 0.31	< 0.1	< 19	< 12.5	14	8.9	0.28	0.18	< 3.8	< 2.5	< 19	< 12.5	< 29	< 18.8	38	25
GB42-1-122198-0	21-Dec-98	< 18	< 12.5	0.5	0.34	250	170	< 1.2	< 0.8	1.3	0.9	8.5	5.8	4.1	2.8	9.6	6.5	14	9.3	< 0.15	< 0.1	< 18	< 12.5	18	8.6	0.12	0.084	< 3.7	< 2.5	< 18	< 12.5	< 28	< 18.8	37	25
GB43-11.4-121798	17-Dec-98	< 28	< 12.5	3.1	1.4	156	70	< 1.8	< 0.8	2.1	0.93	11	5.1	6.7	3.0	15	6.9	21	9.6	< 0.44	< 0.2	< 28	< 12.5	18	8.0	0.47	0.21	< 5.6	< 2.5	< 28	< 12.5	< 42	< 18.8	49	22
GB44-16.8-121798	17-Dec-98	< 35	< 12.5	3.9	1.4	150	54	< 2.2	< 0.8	2.5	0.91	9.2	3.3	7.5	2.7	16	5.6	22	7.8	< 0.56	< 0.2	< 35	< 12.5	18	6.6	0.67	0.24	< 6.94	< 2.5	< 35	< 12.5	< 52	< 18.8	44	16
GB45-32.8-121798	17-Dec-98	< 40	< 12.5	7.1	2.2	187	58	< 2.6	< 0.8	3.2	1.0	< 10	< 3.25	8.1	2.5	17	5.4	25	7.7	< 0.65	< 0.2	< 40	< 12.5	20	6.3	0.9	0.28	< 8.1	< 2.5	< 40	< 12.5	< 61	< 18.8	45	14
GB46-15-121798	17-Dec-98	< 26	< 12.5	1.7	0.82	169	83	< 1.6	< 0.8	2.4	1.2	13	6.4	7.3	3.6	17	8.2	20	10	< 0.41	< 0.2	< 26	< 12.5	19	9.3	< 0.16	< 0.08	< 5.1	< 2.5	< 26	< 12.5	39	19	61	30
GB47-24.4-121798	17-Dec-98	< 28	< 12.5	1.3	0.55	116	51	< 1.8	< 0.8	2.7	1.2	< 7.4	< 3.25	< 5.7	< 2.5	< 7.4	< 3.25	16	7.1	< 0.45	< 0.2	< 28	< 12.5	11	4.7	< 0.18	< 0.08	< 5.7	< 2.5	< 28	< 12.5	< 43	< 18.8	19	8.3
GB48-24.5-121798	17-Dec-98	< 26	< 12.5	0.4	0.19	154	74	< 1.7	< 0.8	2.5	1.2	7.7	3.7	< 5.2	< 2.5	8.3	4.0	19	9.1	< 0.42	< 0.2	< 26	< 12.5	11	5.2	< 0.17	< 0.08	< 5.2	< 2.5	< 26	< 12.5	< 39	< 18.8	27	13
GB48-24.5-121798-0	17-Dec-98	< 29	< 12.5	1.1	0.47	142	61	< 1.9	< 0.8	2.1	0.9	< 7.6	< 3.25	< 5.8	< 2.5	7.9	3.4	15	6.3	< 0.46	< 0.2	< 29	< 12.5	9.1	3.9	0.7	0.3	< 5.8	< 2.5	< 29	< 12.5	< 44	< 18.8	28	12
CR49-39-12099	20-Jan-99	< 9	< 6.3	2.4	1.8	162	120	< 1	< 0.38	1.3	0.94	11	8.3	3.9	2.9	10	7.7	12	9.1	< 0.27	< 0.2	< 9	< 6.3	11	8.5	0.1	0.077	< 2	< 1.3	< 9	< 6.3	42	31	42	31
CR49-40-12099	20-Jan-99	< 10	< 6.3	3.3	2.1	222	140	< 1	< 0.38	1.9	1.2	11	6.8	4.3	2.7	13	8.3	19	12	< 0.32	< 0.2	< 10	< 6.3	15	9.4	0.14	0.087	< 2	< 1.3	< 10	< 6.3	43	27	38	24
CR50-39-11999	19-Jan-99	< 13	< 6.3	3.6	1.8	400	200	< 1	< 0.38	2.0	1.0	10	5.2	6.6	3.3	19	9.7	22	11	< 0.4	< 0.2	20	10	17	8.4	0.4	0.2	< 3	< 1.3	< 13	< 6.3	48	24	50	25
CR50-40-11999	19-Jan-99	< 10	< 6.3	3.2	2.0	194	120	< 1	< 0.38	1.9	1.2	7.9	4.9	4.0	2.5	13	8.3	21	13	< 0.32	< 0.2	< 10	< 6.3	13	8.2	0.088	0.055	< 2	< 1.3	< 10	< 6.3	27	17	32	20
CR50-41-11999	19-Jan-99	< 9	< 6.3	1.0	0.72	324	240	< 1	< 0.38	1.4	1.0	15	11	7.3	5.4	19	14	14	10	< 0.27	< 0.2	< 9	< 6.3	15	11	0.2	0.15	< 2	< 1.3	< 9	< 6.3	51	38	73	54
CR51-29-12099	20-Jan-99	< 13	< 6.3	3.4	1.7	340	170	< 1	< 0.38	2.4	1.2	11	5.3	4.4	2.2	16	7.8	24	12	< 0.4	< 0.2	< 13	< 6.3	17	8.5	2.6	1.3	< 3	< 1.3	< 13	< 6.3	42	21	40	20
CR51-30-12099	20-Jan-99	< 10	< 6.3	6.4	4.2	379	250	< 1	< 0.38	1.7	1.1	14	9.3	5.5	3.6	17	11	20	13	< 0.3	< 0.2	< 10	< 6.3	17	11	0.21	0.14	< 2	< 1.3	< 10	< 6.3	62	41	52	34
CR51-31-12099	20-Jan-99	< 9	< 6.3	2.9	2.1	315	230	< 1	< 0.38	1.4	1.0	11	7.8	4.8	3.5	23	17	18	13	< 0.27	< 0.2	< 9	< 6.3	16	12	0.16	0.12	< 2	< 1.3	< 9	< 6.3	53	39	47	34
CR52-41-12099	20-Jan-99	< 14	< 6.3	3.9	1.8	370	170	< 1	< 0.38	1.8	0.84	12	5.5	6.3	2.9	21	9.7	22	10	< 0.43	< 0.2	43	20	20	9.1	2.6	1.2	< 3	< 1.3	< 14	< 6.3	57	26	48	22
CR52-42-12099	20-Jan-99	< 10	< 6.3	6.4	3.9	311	190	< 1	< 0.38	1.5	0.89	9.5	5.8	3.4	2.1	13	8.0	20	12	< 0.33	< 0.2	< 10	< 6.3	14	8.6	0.34	0.21	< 2	< 1.3	< 10	< 6.3	33	20	33	20
CR52-43-12099	20-Jan-99	< 9	< 6.3	1.1	0.76	269	180	< 1	< 0.38	1.1	0.76	6.7	4.5	3.4	2.3	11	7.2	15	10	< 0.3	< 0.2	< 9	< 6.3	13	8.3	0.37	0.25	< 2	< 1.3	< 9	< 6.3	24	16	33	22
CR52-44-12099	20-Jan-99	< 9	< 6.3	2.8	1.9	217	150	< 1	< 0.38	1.3	0.91	11	7.5	4.5	3.1	14	10	19	13	< 0.29	< 0.2	< 9	< 6.3	16	11	0.26	0.18	< 2	< 1.3	< 9	< 6.3	41	28	41	28
GB53-33-11999	19-Jan-99	< 24	< 6.3	1.6	0.42	200	52	< 1	< 0.38	3.2	0.83	8.1	2.1	5.4	1.4	16	4.1	28	7.3	< 1	< 0.2	28	7.2	15	4.0	0.85	0.22	< 5	< 1.3	< 24	< 6.3	< 36	< 9.4	30	7.9
GB54-28.2-11999	19-Jan-99	< 25	< 6.3	3.4	0.86	164	41	< 2	< 0.38	3.0	0.74	15	3.7	11	2.7	28	7.0	26	6.5	< 1	< 0.2	< 25	< 6.3	20	4.9	0.8	0.2	< 5	< 1.3	< 25	< 6.3	56	14	60	15
CR55-14-12099	20-Jan-99	< 11	< 6.3	2.5	1.5	3.05	180	< 1	< 0.38	1.6	0.94	3.6	2.1	5.3	3.1	17	10	20	12	< 0.34	< 0.2	< 11	< 6.3	16	9.6	0.68	0.4	< 2	< 1.3	< 11	< 6.3	49	29	54	32
CR55-15-12099	20-Jan-99	< 9	< 6.3	2.3	1.6	443	310	< 1	< 0.38	1.6	1.1	9.7	6.8	4.3	3.0	16	11	20	14	< 0.29	< 0.2	< 9	< 6.3	16	11	0.17	0.12	< 2	< 1.3	< 9	< 6.3	41	29	30	21
GB56-17.4-11999	19-Jan-99	< 19	< 6.3	3.2	1.1	159	54	< 1	< 0.38	2.5	0.85	9.4	3.2	6.8	2.3	17	5.8	21	7.2	< 1	< 0.2	< 19	< 6.3	16	5.3	0.71	0.24	< 4	< 1.3	< 19	< 6.3	32	11	47	16
GB56-17.4-11999-0	19-Jan-99	< 27	< 6.3	3.6	0.83	200	46	< 2	< 0.38	3.8	0.88	11	2.5	9.6	2.2	21	4.9	25	5.8	< 1	< 0.2	< 27	< 6.3	18	4.2	1.2	0.28	< 6	< 1.3	< 27	< 6.3	< 41	< 9.4	48	11
GB57-25.8-11999	19-Jan-99	< 10	< 6.3	2.3	1.4	180	110	< 1	< 0.38	2.0	1.2	6.9	4.2	3.3	2.0	8.4	5.1	20	12	< 0.33	< 0.2	11	6.6	11	6.8	0.19	0.12	< 2	< 1.3	< 10	< 6.3	21	13	23	14
GB58-45-11999	19-Jan-99	< 29	< 6.3	2.7	0.6	145	32	< 2	< 0.38	4.0	0.89	1.6	< 1.6	< 6	< 1.3	11	2.4	29	6.4	< 1	< 0.2	64	14	14	3.0	0.73	0.16	< 6	< 1.3	< 29	< 6.3	< 43	< 9.4	16	3.5
GB59-45-11999	19-Jan-99	< 37	< 6.3	3.1	0.53	224	38	< 2	< 0.38	5.1	0.87	< 9	< 1.6	< 8	< 1.3	18	3.0	31	5.2	< 1	< 0.2	76	13	17	2.9	5.8	0.98	< 8	< 1.3	< 37	< 6.3	< 55	< 9.4	26	4.5
CR60-48-12099	20-Jan-99	< 11	< 6.3	5.3	3.2	450	270	< 1	< 0.38	1.2	0.72	12	7.0	4.0	2.4	12	7.2	14	8.6	< 0.33	< 0.2	22	13	14	8.1	0.3	0.18	< 2	< 1.3	< 11	< 6.3	47	28	33	20
CR60-49-12099	20-Jan-99	< 9	< 6.3	1.6	1.1	449	310	< 1	< 0.38	1.2	0.82	11	7.7	3.3	2.3	10	7.0	12	8.4	< 0.29	< 0.2	< 9	< 6.3	12	8.1	0.17	0.12	< 2	< 1.3	< 9	< 6.3	29	20	30	21
CR60-50-12099	20-Jan-99	< 9	< 6.3	2.4	1.7	129	93	< 1	< 0.38	1.0	0.73	10	7.5	3.3	2.4	11	8.2	11	7.8	< 0.27	< 0.2	< 9	< 6.3	12	8.3	0.26	0.19	< 2	< 1.3	< 9	< 6.3	31	22	29	21
CR60-51-12099	20-Jan-99	< 10	< 6.3	6.7	4.3	102	65	< 1	< 0.38	1.7	1.1	10	6.7	3.8	2.4	13	8.0	16	10	< 0.31	< 0.2	69	44	14	9.0	0.2	0.13	< 2	< 1.3	< 10	< 6.3	44	28	30	19
CR60-52-12099	20-Jan-99	< 9	< 6.3	2.2	1.5	203	140	< 1	< 0.38	1.6	1.1	8.3	5.7	3.5	2.4	12	8.2	16	11	< 0.29	< 0.2	< 9	< 6.3	14	9.5	0.42	0.29	< 2	< 1.3	< 9	< 6.3	32	22	32	22
GB61-44-11999	19-Jan-99	< 23	< 6.3	1.5	0.43	154	43	< 1	< 0.38	3.6	1.0	5.7	1.6	< 5	< 1.3	10	2.8	29	8.0	< 1	< 0.2	43	12	14	3.9	0.23	0.064	< 5	< 1.3	< 23	< 6.3	36	10	19	5.4
GB62-44-12099	20-Jan-99	< 24	< 6.3	3.8	1.0	158	41	< 1	< 0.38	2.9	0.76	5.4	1.4	2.8	0.72	12	3.1	20	5.2	< 1	< 0.2	88	23	15	3.8	3.8	0.98	< 5	< 1.3	< 24	< 6.3	42	11	18	4.7
CR63-49-12299	22-Jan-99	< 10	< 6.3	3.6	2.3	105	67	< 1	< 0.38	1.7	1.1	8.8	5.6	3.9	2.5	13	8.2	17	11	< 0.31	< 0.2	27	17	12	7.6	0.086	0.055	< 2	< 1.3	< 10	< 6.3	31	20	31	20
GB64-46.2-12099	20-Jan-99	< 33	< 6.3	5.1	0.97	174	33	< 2	< 0.38	3.1	0.58	7.4	1.4	3.4	0.64	13	2.5	21	3.9	< 1	< 0.2	89	17	17	3.2	4.3	0.82	< 7	< 1.3	< 33	< 6.3	< 49	< 9.4	27	5.1
GB65-46.2-12099	20-Jan-99	< 32	< 6.3	7.0	1.4	180	36	< 2	< 0.38	3.0	0.6	6.0	1.2	2.6	0.52	15	2.9	21	4.2	< 1	< 0.2	90	18	16	3.1	5	1.0	< 7	< 1.3	< 32	< 6.3	< 47	< 9.4	27	5.3
CR66-42-12299	22-Jan-99	< 13	< 6.3	6.5	3.1	250	120	< 1	< 0.38	1.7	0.8	11	5.5	6.0	2.9	19	9.0	20	9.5	< 0.42	< 0.2	< 13	< 6.3	16	7.8	6.7	3.2	< 3	< 1.3	< 13	< 6.3	44	21	46	22
CR66-43-12299	22-Jan-99	< 9	< 6.3	4.4	3.2	19	14	< 1	< 0.38	1.1	0.79	5.2	3.8	2.5	1.8	6.6	4.8	11	7.9	< 0.27	< 0.2	< 9	< 6.3	7.3	5.3	< 0.052	< 0.038	< 2	< 1.3	< 9	< 6.3	18	13	21	15
CR66-44-12299	22-Jan-99	< 10	< 6.3	2.6	1.7	292	190	< 1	< 0.38	1.4	0.93	7.8	5.1	4.8	3.1	18	12	15	9.8	< 0.31	< 0.2	< 10	< 6.3	14	8.9	0.62	0.4	< 2	< 1.3	< 10	< 6.3	38	25	35	23
CR66-45-12299	22-Jan-99	< 10	< 6.3	3.3	2.1	102	65	< 1	< 0.38	2.3	1.5	11	7.3	4.8	3.1	13	8.0	19	12	< 0.31	< 0.2	< 10	< 6.3	15	9.4	0.1	0.066	< 2	< 1.3	< 10	< 6.3	47	30	45	29

Table 4:

Inorganic Chemicals Detected in Phase I & II Sediment Samples

Salton Sea

LFR 6824.00

Results reported in milligrams per kilogram (mg/kg) dry weight *and wet weight*

Sample Number	Sample Date	Antimony		Arsenic		Barium		Beryllium		Cadmium		Chromium		Cobalt		Copper		Lead		Mercury		Molybdenum		Nickel		Selenium		Silver		Thallium		Vanadium		Zinc	
GB67-43.6-12199	21-Jan-99	< 30	< 6.3	**4.2**	**0.88**	**233**	**49**	< 2	< 0.38	**3.2**	**0.68**	< 8	< 1.6	< 6	< 1.3	**11**	**2.4**	**25**	**5.3**	< 1	< 0.2	**67**	**14**	**12**	**2.5**	**1.3**	**0.27**	< 6	< 1.3	< 30	< 6.3	< 45	< 9.4	**23**	**4.8**
GB68-47.2-12199	21-Jan-99	< 26	< 6.3	**3.8**	**0.92**	**208**	**50**	< 2	< 0.38	**2.6**	**0.63**	< 7	< 1.6	< 5	< 1.3	**11**	**2.6**	**20**	**4.8**	< 1	< 0.2	**63**	**15**	**13**	**3.0**	**1.3**	**0.31**	< 5	< 1.3	< 26	< 6.3	**46**	**11**	**27**	**6.4**
GB69-42.7-12199	21-Jan-99	< 15	< 6.3	**6.6**	**2.7**	**229**	**94**	< 1	< 0.38	**1.8**	**0.75**	**11**	**4.5**	**5.9**	**2.4**	**17**	**6.8**	**22**	**8.9**	< 0.49	< 0.2	< 15	< 6.3	**16**	**6.7**	**0.36**	**0.15**	< 3	< 1.3	< 15	< 6.3	**39**	**16**	**51**	**21**
GB70-35.4-12299	22-Jan-99	< 16	< 6.3	**2.8**	**1.1**	**115**	**46**	< 1	< 0.38	**2.3**	**0.93**	**8.8**	**3.5**	< 3	< 1.3	**8.3**	**3.3**	**23**	**9.0**	< 1	< 0.2	< 16	< 6.3	**12**	**4.6**	**0.78**	**0.31**	< 3	< 1.3	< 16	< 6.3	**35**	**14**	**25**	**9.8**
GB71-34.2-12199	21-Jan-99	< 16	< 6.3	**4.0**	**1.6**	**275**	**110**	< 1	< 0.38	**2.1**	**0.84**	**12**	**4.7**	**5.3**	**2.1**	**14**	**5.4**	**22**	**8.6**	< 1	< 0.2	< 16	< 6.3	**16**	**6.4**	**0.17**	**0.067**	< 3	< 1.3	< 16	< 6.3	**43**	**17**	**43**	**17**
CR72-11-12199	21-Jan-99	< 10	< 6.3	**3.2**	**2.0**	**154**	**97**	< 1	< 0.38	**1.7**	**1.1**	**6.8**	**4.3**	**3.7**	**2.3**	**8.1**	**5.1**	**19**	**12**	< 0.32	< 0.2	< 10	< 6.3	**11**	**7.1**	**0.38**	**0.24**	< 2	< 1.3	< 10	< 6.3	**21**	**13**	**30**	**19**
CR72-12-12199	21-Jan-99	< 10	< 6.3	**4.1**	**2.5**	**246**	**150**	< 1	< 0.38	**1.5**	**0.94**	**15**	**9.1**	**6.9**	**4.2**	**18**	**11**	**25**	**15**	< 0.33	< 0.2	< 10	< 6.3	**18**	**11**	**0.093**	**0.057**	< 2	< 1.3	< 10	< 6.3	**46**	**28**	**59**	**36**
CR72-13-12199	21-Jan-99	< 10	< 6.3	**3.8**	**2.3**	**262**	**160**	< 1	< 0.38	**1.5**	**0.93**	**11**	**6.9**	**6.2**	**3.8**	**18**	**11**	**25**	**15**	< 0.33	< 0.2	< 10	< 6.3	**16**	**10**	**0.11**	**0.066**	< 2	< 1.3	< 10	< 6.3	**41**	**25**	**52**	**32**
CR72-14-12199	21-Jan-99	< 9	< 6.3	**1.6**	**1.1**	**246**	**170**	< 1	< 0.38	**1.2**	**0.85**	**10**	**7.1**	**5.9**	**4.1**	**14**	**10**	**22**	**15**	< 0.29	< 0.2	< 9	< 6.3	**14**	**10**	**0.28**	**0.19**	< 2	< 1.3	< 9	< 6.3	**32**	**22**	**49**	**34**
CR73-8-12199	21-Jan-99	< 8	< 6.3	**1.4**	**1.1**	**190**	**150**	< 0.48	< 0.38	**1.0**	**0.8**	**5.3**	**4.2**	**3.4**	**2.7**	**8.6**	**6.8**	**12**	**9.5**	< 0.25	< 0.2	< 8	< 6.3	**9**	**7.1**	**0.095**	**0.075**	< 2	< 1.3	< 8	< 6.3	**18**	**14**	**29**	**23**
CR73-9-12199	21-Jan-99	< 8	< 6.3	**0.8**	**0.65**	**116**	**94**	< 0.47	< 0.38	**0.81**	**0.66**	**3.6**	**2.9**	**2.2**	**1.8**	**3.3**	**2.7**	**6.4**	**5.2**	< 0.25	< 0.2	< 8	< 6.3	**4.8**	**3.9**	< 0.047	< 0.038	< 2	< 1.3	< 8	< 6.3	**12**	**9.7**	**15**	**12**
CR73-10-12199	21-Jan-99	< 8	< 6.3	**0.6**	**0.5**	**85**	**70**	< 0.46	< 0.38	**0.67**	**0.55**	**2.7**	**2.2**	< 2	< 1.3	< 2	< 1.6	**4.9**	**4.0**	< 0.24	< 0.2	< 8	< 6.3	**3.3**	**2.7**	< 0.046	< 0.038	< 2	< 1.3	< 8	< 6.3	< 11	< 9.4	**9**	**7.4**
Maximum Baseline Values [1]		-		22		1700		-		-		200		-		90		55		-		4.0		66		1.4		-		-		270		180	
Effects Range - Low [2]		2 [3]		8.2		-		-		1.2		81		-		34		46.7		0.15		-		20.9		0.7 [3]		1.0		-		-		150	
Effects Range - Medium [2]		25 [3]		70		-		-		9.6		370		-		270		218		0.71		-		51.6		1.4 [3]		3.7		-		-		410	

NOTES:

Analysis conducted by Apollo Analytics, Inc., Costa Mesa, CA using EPA Method 7000S. (Mercury analysis conducted by Truesdale)

[1] = from Severson & others, 1987: modified by Shacklette & Boerngen, 1984

[2] = from Long & others, 1995

[3] = Wolfenden & Carlin (SFRWQCB), 1992 ("surrogate" ERL & ERM values for comparison purposes)

- = not reported

GB = grab sediment sample

CR = core sediment sample

" - 0 " = duplicate sediment sample

Bold = Detected values

Bold = Values exceeding ERL

Bold = Values exceeding ERM

QA/QC: _____

Table 5:

Organic Chemicals Detected in Phase I & II Sediment Samples

Salton Sea
LFR 6824.00

Results reported in micrograms per kilogram (µg/kg) dry weight and wet weight

Sample Number	Sample Date	1,2,4-Trimethylbenzene		1,3,5-Trimethylbenzene		2-Butanone		Acetone		Benzene		Carbon Disulfide		n-Propylbenzene		Naphthalene		o-Xylene	
GB1-34.5-121598	15-Dec-98	< 50	< 10	< 50	< 10	**185**	**37**	**455**	**91**	< 50	< 10	**1,600**	**320**	< 50	< 10	< 50	< 10	< 50	< 10
GB2-12.4-121598	15-Dec-98	< 24	< 10	< 24	< 10	< 24	< 10	< 49	< 20	< 24	< 10	**32**	**54**	< 24	< 10	< 24	< 10	< 24	< 10
GB3-19.5-121598	15-Dec-98	< 42	< 10	< 42	< 10	**190**	**45**	**530**	**127**	< 42	< 10	**5,000**	**1,200**	< 42	< 10	< 42	< 10	< 42	< 10
GB4-7.2-121698	16-Dec-98	< 21	< 10	< 21	< 10	< 21	< 10	< 42	< 20	< 21	< 10	**2,300**	**1,100**	< 21	< 10	< 21	< 10	< 21	< 10
GB4-7.2-121698-0	16-Dec-98	< 23	< 10	< 23	< 10	< 23	< 10	< 47	< 20	< 23	< 10	**1,700**	**720**	< 23	< 10	< 23	< 10	< 23	< 10
GB5-1-121698	16-Dec-98	< 14	< 10	< 14	< 10	< 14	< 10	< 27	< 20	< 14	< 10	< 14	< 10	< 14	< 10	< 14	< 10	< 14	< 10
CR6-18-122198	21-Dec-98	< 28	< 10	< 28	< 10	**110**	**41**	**350**	**125**	< 28	< 10	**2,300**	**840**	< 28	< 10	< 28	< 10	< 28	< 10
CR6-19-122198	21-Dec-98	< 18	< 10	< 18	< 10	**50**	**25**	**170**	**91**	< 18	< 10	**930**	**500**	< 18	< 10	< 18	< 10	< 18	< 10
CR6-20-122198	21-Dec-98	< 16	< 10	< 16	< 10	**50**	**28**	**150**	**92**	< 16	< 10	**720**	**440**	< 16	< 10	< 16	< 10	< 16	< 10
CR6-21-122198	21-Dec-98	< 18	< 10	< 18	< 10	**70**	**40**	**230**	**125**	< 18	< 10	**840**	**460**	< 18	< 10	< 18	< 10	< 18	< 10
CR6-22-122198	21-Dec-98	< 18	< 10	< 18	< 10	**60**	**32**	**180**	**105**	< 18	< 10	**250**	**140**	< 18	< 10	< 18	< 10	< 18	< 10
GB7-25.4-121698	16-Dec-98	< 34	< 10	< 34	< 10	**130**	**38**	**520**	**150**	< 34	< 10	**2,700**	**790**	< 34	< 10	< 34	< 10	< 34	< 10
GB8-27.3-121698	16-Dec-98	**700**	**154**	**230**	**51**	**160**	**36**	**480**	**105**	< 45	< 10	**3,400**	**750**	**77**	**17**	**110**	**25**	**45**	**10**
GB9-39.3-121798	17-Dec-98	< 62	< 10	< 62	< 10	< 62	< 10	**220**	**35**	< 62	< 10	**690**	**110**	< 62	< 10	< 62	< 10	< 62	< 10
GB10-47.4-121798	17-Dec-98	< 62	< 10	< 62	< 10	**110**	**17**	**220**	**35**	< 62	< 10	**1,400**	**230**	< 62	< 10	< 62	< 10	< 62	< 10
GB11-45.9-121798	17-Dec-98	< 77	< 10	< 77	< 10	< 77	< 10	**150**	< 20	< 77	< 10	**420**	**55**	< 77	< 10	< 77	< 10	< 77	< 10
GB12-40-121698	16-Dec-98	< 48	< 10	< 48	< 10	< 48	< 10	< 95	< 20	< 48	< 10	**490**	**102**	< 48	< 10	< 48	< 10	< 48	< 10
CR13-33-122298	22-Dec-98	< 20	< 10	< 20	< 10	**55**	**27**	**160**	**78**	< 20	< 10	**1,200**	**570**	< 20	< 10	< 20	< 10	< 20	< 10
CR13-34-122298	22-Dec-98	< 16	< 10	< 16	< 10	**40**	**25**	**130**	**80**	< 16	< 10	**490**	**310**	< 16	< 10	< 16	< 10	< 16	< 10
CR13-35-122298	22-Dec-98	< 14	< 10	< 14	< 10	**20**	**17**	**60**	**44**	< 14	< 10	**70**	**48**	< 14	< 10	< 14	< 10	< 14	< 10
CR13-36-122298	22-Dec-98	< 13	< 10	< 13	< 10	**20**	**17**	**60**	**47**	< 13	< 10	**40**	**30**	< 13	< 10	< 13	< 10	< 13	< 10
CR13-37-122298	22-Dec-98	< 12	< 10	< 12	< 10	**15**	**12**	**60**	**49**	< 12	< 10	**20**	**19**	< 12	< 10	< 12	< 10	< 12	< 10
CR13-38-122298	22-Dec-98	< 14	< 10	< 14	< 10	**30**	**23**	**110**	**82**	< 14	< 10	< 14	< 10	< 14	< 10	< 14	< 10	< 14	< 10
GB14-11-121698	16-Dec-98	< 20	< 10	< 20	< 10	< 20	< 10	< 40	< 20	< 20	< 10	**650**	**326**	< 20	< 10	< 20	< 10	< 20	< 10
GB15-38.2-121698	16-Dec-98	< 28	< 10	< 28	< 10	**110**	**39**	**360**	**130**	< 28	< 10	**860**	**310**	< 28	< 10	< 28	< 10	< 28	< 10
GB16-45.3-121898	18-Dec-98	< 62	< 10	< 62	< 10	**210**	**33**	**510**	**81**	< 62	< 10	**1,300**	**200**	< 62	< 10	< 62	< 10	< 62	< 10
GB17-40.8-121898	18-Dec-98	< 48	< 10	< 48	< 10	**130**	**27**	**460**	**96**	< 48	< 10	**1,200**	**260**	< 48	< 10	< 48	< 10	< 48	< 10
GB18-46.8-121898	18-Dec-98	< 56	< 10	< 56	< 10	**190**	**35**	**500**	**91**	< 56	< 10	**1,200**	**213**	< 56	< 10	< 56	< 10	< 56	< 10
CR19-46-122298	22-Dec-98	< 17	< 10	< 17	< 10	**50**	**29**	**220**	**130**	< 17	< 10	**60**	**34**	< 17	< 10	< 17	< 10	< 17	< 10
CR19-47-122298	22-Dec-98	< 19	< 10	< 19	< 10	**50**	**25**	**330**	**170**	< 19	< 10	**580**	**300**	< 19	< 10	< 19	< 10	< 19	< 10
CR19-48-122298	22-Dec-98	< 18	< 10	< 18	< 10	**50**	**27**	**210**	**120**	< 18	< 10	**160**	**91**	< 18	< 10	< 18	< 10	< 18	< 10
CR20-21-122298	22-Dec-98	< 22	< 10	< 22	< 10	**70**	**31**	**190**	**89**	< 22	< 10	**1,200**	**560**	< 22	< 10	< 22	< 10	< 22	< 10
CR20-22-122298	22-Dec-98	< 20	< 10	< 20	< 10	**40**	**23**	**120**	**59**	< 20	< 10	**1,600**	**840**	< 20	< 10	< 20	< 10	< 20	< 10
CR20-23-122298	22-Dec-98	< 21	< 10	< 21	< 10	**60**	**29**	**170**	**84**	< 21	< 10	**2,900**	**1,410**	< 21	< 10	< 21	< 10	< 21	< 10
CR20-24-122298	22-Dec-98	< 17	< 10	< 17	< 10	**30**	**21**	**110**	**67**	< 17	< 10	**920**	**548**	< 17	< 10	< 17	< 10	< 17	< 10
CR20-25-122298	22-Dec-98	< 18	< 10	< 18	< 10	**60**	**33**	**210**	**120**	< 18	< 10	**390**	**220**	< 18	< 10	< 18	< 10	< 18	< 10
CR20-26-122298	22-Dec-98	< 16	< 10	< 16	< 10	**60**	**36**	**220**	**135**	< 16	< 10	**200**	**120**	< 16	< 10	< 16	< 10	< 16	< 10
GB21-31-121898	18-Dec-98	< 26	< 10	< 26	< 10	< 26	< 10	**360**	**140**	< 26	< 10	**1,000**	**390**	< 26	< 10	< 26	< 10	< 26	< 10
GB22-23.4-121898	18-Dec-98	< 29	< 10	< 29	< 10	< 29	< 10	**230**	**79**	< 29	< 10	**560**	**190**	< 29	< 10	< 29	< 10	< 29	< 10
GB23-34.8-121898	18-Dec-98	< 29	< 10	< 29	< 10	< 29	< 10	**220**	**76**	< 29	< 10	**570**	**200**	< 29	< 10	< 29	< 10	< 29	< 10
GB24-20.4-121898	18-Dec-98	< 12	< 10	< 12	< 10	< 12	< 10	**110**	**91**	< 12	< 10	< 12	< 10	< 12	< 10	< 12	< 10	< 12	< 10
GB24-20.5-122298	22-Dec-98	< 14	< 10	< 14	< 10	**20**	**15**	**40**	**32**	< 14	< 10	**150**	**110**	< 14	< 10	< 14	< 10	< 14	< 10
GB25-16.2-121898	18-Dec-98	< 15	< 10	< 15	< 10	< 15	< 10	< 30	< 20	< 15	< 10	**110**	**70**	< 15	< 10	< 15	< 10	< 15	< 10

Table 5:

Organic Chemicals Detected in Phase I & II Sediment Samples

Salton Sea
LFR 6824.00

Results reported in micrograms per kilogram (µg/kg) dry weight and wet weight

Sample Number	Sample Date	1,2,4-Trimethylbenzene		1,3,5-Trimethylbenzene		2-Butanone		Acetone		Benzene		Carbon Disulfide		n-Propylbenzene		Naphthalene		o-Xylene	
CR26-17-122298	22-Dec-98	< 15	< 10	< 15	< 10	**40**	**24**	**100**	**66**	< 15	< 10	**460**	**300**	< 15	< 10	< 15	< 10	< 15	< 10
CR26-18-122298	22-Dec-98	< 14	< 10	< 14	< 10	**40**	**27**	**120**	**85**	< 14	< 10	**430**	**300**	< 14	< 10	< 14	< 10	< 14	< 10
CR26-19-122298	22-Dec-98	< 14	< 10	< 14	< 10	**30**	**20**	**80**	**55**	< 14	< 10	**50**	**39**	< 14	< 10	< 14	< 10	< 14	< 10
GB27-12-121898	18-Dec-98	< 14	< 10	< 14	< 10	< 14	< 10	< 28	< 20	< 14	< 10	< 14	< 10	< 14	< 10	< 14	< 10	< 14	< 10
GB28-14.2-121898	18-Dec-98	< 17	< 10	< 17	< 10	< 17	< 10	**70**	**42**	< 17	< 10	**270**	**160**	< 17	< 10	< 17	< 10	< 17	< 10
GB29-17.2-121898	18-Dec-98	< 14	< 10	< 14	< 10	< 14	< 10	< 28	< 20	< 14	< 10	< 14	< 10	< 14	< 10	< 14	< 10	< 14	< 10
GB30-4.9-122198	21-Dec-98	< 14	< 10	< 14	< 10	< 14	< 10	< 28	< 10	< 14	< 10	< 14	< 10	< 14	< 10	< 14	< 10	< 14	< 10
GB31-25.2-121898	18-Dec-98	< 18	< 10	< 18	< 10	< 18	< 10	**85**	**47**	< 18	< 10	**130**	**74**	< 18	< 10	< 18	< 10	< 18	< 10
GB32-36.5-121898	18-Dec-98	< 36	< 10	< 36	< 10	< 36	< 10	**140**	**40**	< 36	< 10	**240**	**67**	< 36	< 10	< 36	< 10	< 36	< 10
GB32-36.5-121898-0	18-Dec-98	< 29	< 10	< 29	< 10	< 29	< 10	**180**	**61**	< 29	< 10	**340**	**117**	< 29	< 10	< 29	< 10	< 29	< 10
GB33-33-121898	18-Dec-98	< 31	< 10	< 31	< 10	< 31	< 10	**200**	**64**	< 31	< 10	**500**	**160**	< 31	< 10	< 31	< 10	< 31	< 10
GB34-33-121898	18-Dec-98	< 37	< 10	< 37	< 10	**110**	**29**	**280**	**75**	< 37	< 10	**520**	**140**	< 37	< 10	< 37	< 10	< 37	< 10
GB35-24-121898	18-Dec-98	< 18	< 10	< 18	< 10	< 18	< 10	**120**	**63**	< 18	< 10	**220**	**120**	< 18	< 10	< 18	< 10	< 18	< 10
GB36-20.4-121798	17-Dec-98	< 16	< 10	**17**	**11**	< 16	< 10	< 32	< 20	< 16	< 10	**35**	**22**	< 16	< 10	< 16	< 10	< 16	< 10
GB37-23.4-121798	17-Dec-98	< 23	< 10	< 23	< 10	< 23	< 10	**80**	**36**	< 23	< 10	**180**	**79**	< 23	< 10	< 23	< 10	< 23	< 10
GB38-24-121798	17-Dec-98	< 27	< 10	< 27	< 10	**80**	**30**	**140**	**53**	< 27	< 10	**570**	**210**	< 27	< 10	< 27	< 10	< 27	< 10
CR39-21-122298	22-Dec-98	< 15	< 10	< 15	< 10	**30**	**24**	**140**	**95**	< 15	< 10	**160**	**110**	< 15	< 10	< 15	< 10	< 15	< 10
GB40-13.2-121798	17-Dec-98	< 17	< 10	< 17	< 10	**28**	**17**	< 33	< 20	< 17	< 10	**90**	**56**	< 17	< 10	< 17	< 10	< 17	< 10
GB41-12-121798	17-Dec-98	< 14	< 10	< 14	< 10	**25**	**18**	**47**	**34**	< 14	< 10	**140**	**99**	< 14	< 10	< 14	< 10	< 14	< 10
GB42-1-122198	21-Dec-98	< 15	< 10	< 15	< 10	< 15	< 10	**70**	**43**	< 15	< 10	**40**	**26**	< 15	< 10	< 15	< 10	< 15	< 10
GB42-1-122198-0	21-Dec-98	< 15	< 10	< 15	< 10	< 15	< 10	**80**	**56**	< 15	< 10	**60**	**40**	< 15	< 10	< 15	< 10	< 15	< 10
GB43-11.4-121798	17-Dec-98	< 22	< 10	< 22	< 10	**50**	**24**	**120**	**56**	< 22	< 10	**1,000**	**460**	< 22	< 10	< 22	< 10	< 22	< 10
GB44-16.8-121798	17-Dec-98	< 28	< 10	< 28	< 10	**60**	**21**	**190**	**70**	< 28	< 10	**1,000**	**360**	< 28	< 10	< 28	< 10	< 28	< 10
GB45-32.8-121798	17-Dec-98	< 32	< 10	< 32	< 10	**100**	**32**	**230**	**73**	< 32	< 10	**840**	**260**	< 32	< 10	< 32	< 10	< 32	< 10
GB46-15-121798	17-Dec-98	< 20	< 10	< 20	< 10	**60**	**31**	**160**	**77**	< 20	< 10	**1,200**	**590**	< 20	< 10	< 20	< 10	< 20	< 10
GB47-24.4-121798	17-Dec-98	< 23	< 10	< 23	< 10	**60**	**25**	**130**	**57**	< 23	< 10	**290**	**126**	< 23	< 10	< 23	< 10	< 23	< 10
GB48-24.5-121798	17-Dec-98	< 21	< 10	< 21	< 10	**50**	**25**	**120**	**57**	< 21	< 10	**420**	**200**	< 21	< 10	< 21	< 10	< 21	< 10
GB48-24.5-121798-0	17-Dec-98	< 23	< 10	< 23	< 10	**40**	**17**	**90**	**39**	< 23	< 10	**370**	**160**	< 23	< 10	< 23	< 10	< 23	< 10
CR49-39-12099	20-Jan-99	< 14	< 10	< 14	< 10	**23**	**17**	**130**	**96**	< 14	< 10	**103**	**76**	< 14	< 10	< 14	< 10	< 14	< 10
CR49-40-12099	20-Jan-99	< 16	< 10	< 16	< 10	**76**	**48**	**889**	**560**	< 16	< 10	< 16	< 10	< 16	< 10	< 16	< 10	< 16	< 10
CR50-39-11999	19-Jan-99	< 20	< 10	< 20	< 10	**32**	**16**	**158**	**79**	< 20	< 10	**1280**	**640**	< 20	< 10	< 20	< 10	< 20	< 10
CR50-40-11999	19-Jan-99	< 16	< 10	< 16	< 10	**27**	**17**	**115**	**71**	< 16	< 10	**323**	**200**	< 16	< 10	< 16	< 10	< 16	< 10
CR50-41-11999	19-Jan-99	< 14	< 10	< 14	< 10	**19**	**14**	**61**	**45**	< 14	< 10	**23**	**17**	< 14	< 10	< 14	< 10	< 14	< 10
CR51-29-12099	20-Jan-99	< 20	< 10	< 20	< 10	**92**	**46**	**1100**	**550**	< 20	< 10	**680**	**340**	< 20	< 10	< 20	< 10	< 20	< 10
CR51-30-12099	20-Jan-99	< 15	< 10	< 15	< 10	**48**	**32**	**439**	**290**	< 15	< 10	**818**	**540**	< 15	< 10	< 15	< 10	< 15	< 10
CR51-31-12099	20-Jan-99	< 14	< 10	< 14	< 10	**56**	**41**	**205**	**150**	< 14	< 10	**33**	**24**	< 14	< 10	< 14	< 10	< 14	< 10
CR52-41-12099	20-Jan-99	< 22	< 10	< 22	< 10	**152**	**70**	**565**	**260**	< 22	< 10	**1174**	**540**	< 22	< 10	< 22	< 10	< 22	< 10
CR52-42-12099	20-Jan-99	< 16	< 10	< 16	< 10	**93**	**57**	**541**	**330**	< 16	< 10	**344**	**210**	< 16	< 10	< 16	< 10	< 16	< 10
CR52-43-12099	20-Jan-99	< 15	< 10	< 15	< 10	**91**	**61**	**328**	**220**	< 15	< 10	**57**	**38**	< 15	< 10	< 15	< 10	< 15	< 10
CR52-44-12099	20-Jan-99	< 14	< 10	< 14	< 10	**94**	**65**	**304**	**210**	< 14	< 10	**28**	**19**	< 14	< 10	< 14	< 10	< 14	< 10
GB53-33-11999	19-Jan-99	< 38	< 10	< 38	< 10	**100**	**26**	**538**	**140**	< 38	< 10	**577**	**150**	< 38	< 10	< 38	< 10	< 38	< 10
GB54-28.2-11999	19-Jan-99	< 40	< 10	< 40	< 10	**56**	**14**	**352**	**88**	< 40	< 10	**840**	**210**	< 40	< 10	< 40	< 10	< 40	< 10
CR55-14-12099	20-Jan-99	< 17	< 10	< 17	< 10	**93**	**55**	**475**	**280**	< 17	< 10	**898**	**530**	< 17	< 10	< 17	< 10	< 17	< 10

Table 5:

Organic Chemicals Detected in Phase I & II Sediment Samples

Salton Sea
LFR 6824.00

Results reported in micrograms per kilogram (µg/kg) dry weight and wet weight

Sample Number	Sample Date	1,2,4-Trimethylbenzene		1,3,5-Trimethylbenzene		2-Butanone		Acetone		Benzene		Carbon Disulfide		n-Propylbenzene		Naphthalene		o-Xylene	
CR55-15-12099	20-Jan-99	< 14	< 10	< 14	< 10	**86**	**60**	**257**	**180**	< 14	< 10	**200**	**140**	< 14	< 10	< 14	< 10	< 14	< 10
GB56-17.4-11999	19-Jan-99	< 29	< 10	< 29	< 10	< 29	< 10	**218**	**74**	< 29	< 10	**1059**	**360**	< 29	< 10	< 29	< 10	< 29	< 10
GB56-17.4-11999-0	19-Jan-99	< 43	< 10	< 43	< 10	**309**	**71**	**1130**	**260**	**43**	**10**	**4957**	**1140**	< 43	< 10	< 43	< 10	< 43	< 10
GB57-25.8-11999	19-Jan-99	< 16	< 10	< 16	< 10	< 16	< 10	< 16	< 20	< 16	< 10	**162**	**99**	< 16	< 10	< 16	< 10	< 16	< 10
GB58-45-11999	19-Jan-99	< 45	< 10	< 45	< 10	**273**	**60**	**1000**	**220**	< 45	< 10	**1636**	**360**	< 45	< 10	< 45	< 10	< 45	< 10
GB59-45-11999	19-Jan-99	< 59	< 10	< 59	< 10	**294**	**50**	**1235**	**210**	< 59	< 10	**2706**	**460**	< 59	< 10	< 59	< 10	< 59	< 10
CR60-48-12099	20-Jan-99	< 17	< 10	< 17	< 10	**233**	**140**	**983**	**590**	< 17	< 10	**2217**	**1330**	< 17	< 10	< 17	< 10	< 17	< 10
CR60-49-12099	20-Jan-99	< 14	< 10	< 14	< 10	**100**	**69**	**420**	**290**	< 14	< 10	**449**	**310**	< 14	< 10	< 14	< 10	< 14	< 10
CR60-50-12099	20-Jan-99	< 14	< 10	< 14	< 10	**117**	**84**	**889**	**640**	< 14	< 10	**944**	**680**	< 14	< 10	< 14	< 10	< 14	< 10
CR60-51-12099	20-Jan-99	< 16	< 10	< 16	< 10	**89**	**57**	**688**	**440**	< 16	< 10	**281**	**180**	< 16	< 10	< 16	< 10	< 16	< 10
CR60-52-12099	20-Jan-99	< 14	< 10	< 14	< 10	**57**	**39**	**1217**	**840**	< 14	< 10	**783**	**540**	< 14	< 10	< 14	< 10	< 14	< 10
GB61-44-11999	19-Jan-99	< 36	< 10	< 36	< 10	**536**	**150**	**929**	**260**	< 36	< 10	**43**	**12**	< 36	< 10	< 36	< 10	< 36	< 10
GB62-44-12099	20-Jan-99	< 38	< 10	< 38	< 10	**208**	**54**	**962**	**250**	< 38	< 10	**423**	**110**	< 38	< 10	< 38	< 10	< 38	< 10
CR63-49-12299	22-Jan-99	< 16	< 10	< 16	< 10	**84**	**54**	**641**	**410**	< 16	< 10	**2813**	**1800**	< 16	< 10	< 16	< 10	< 16	< 10
GB64-46.2-12099	20-Jan-99	< 53	< 10	< 53	< 10	**395**	**75**	**1526**	**290**	< 53	< 10	**658**	**125**	< 53	< 10	< 53	< 10	< 53	< 10
GB65-46.2-12099	20-Jan-99	< 50	< 10	< 50	< 10	**310**	**62**	**1300**	**260**	< 50	< 10	**500**	**100**	< 50	< 10	< 50	< 10	< 50	< 10
CR66-42-12299	22-Jan-99	< 21	< 10	< 21	< 10	**67**	**32**	**417**	**200**	< 21	< 10	**2000**	**960**	< 21	< 10	< 21	< 10	< 21	< 10
CR66-43-12299	22-Jan-99	< 14	< 10	< 14	< 10	**22**	**16**	**103**	**75**	< 14	< 10	**21**	**15**	< 14	< 10	< 14	< 10	< 14	< 10
CR66-44-12299	22-Jan-99	< 15	< 10	< 15	< 10	**46**	**30**	**277**	**180**	< 15	< 10	**231**	**150**	< 15	< 10	< 15	< 10	< 15	< 10
CR66-45-12299	22-Jan-99	< 16	< 10	< 16	< 10	**19**	**12**	**72**	**46**	< 16	< 10	**64**	**41**	< 16	< 10	< 16	< 10	< 16	< 10
GB67-43.6-12199	21-Jan-99	< 48	< 10	< 48	< 10	**100**	**21**	**424**	**89**	< 48	< 10	**157**	**33**	< 48	< 10	< 48	< 10	< 48	< 10
GB68-47.2-12199	21-Jan-99	< 42	< 10	< 42	< 10	**179**	**43**	**583**	**140**	< 42	< 10	**383**	**92**	< 42	< 10	< 42	< 10	< 42	< 10
GB69-42.7-12199	21-Jan-99	< 24	< 10	< 24	< 10	**44**	**18**	**163**	**67**	< 24	< 10	**805**	**330**	< 24	< 10	< 24	< 10	< 24	< 10
GB70-35.4-12299	22-Jan-99	< 25	< 10	< 25	< 10	**120**	**48**	**400**	**160**	< 25	< 10	**350**	**140**	< 25	< 10	< 25	< 10	< 25	< 10
GB71-34.2-12199	21-Jan-99	< 25	< 10	< 25	< 10	**118**	**47**	**525**	**210**	< 25	< 10	**675**	**270**	< 25	< 10	< 25	< 10	< 25	< 10
CR72-11-12199	21-Jan-99	< 16	< 10	< 16	< 10	**27**	**17**	**92**	**58**	< 16	< 10	**365**	**230**	< 16	< 10	< 16	< 10	< 16	< 10
CR72-12-12199	21-Jan-99	< 16	< 10	< 16	< 10	**52**	**32**	**180**	**110**	< 16	< 10	**508**	**310**	< 16	< 10	< 16	< 10	< 16	< 10
CR72-13-12199	21-Jan-99	< 16	< 10	< 16	< 10	**51**	**31**	**180**	**110**	< 16	< 10	**492**	**300**	< 16	< 10	< 16	< 10	< 16	< 10
CR72-14-12199	21-Jan-99	< 14	< 10	< 14	< 10	**36**	**25**	**87**	**60**	< 14	< 10	**58**	**40**	< 14	< 10	< 14	< 10	< 14	< 10
CR73-8-12199	21-Jan-99	< 13	< 10	< 13	< 10	**22**	**17**	**49**	**39**	< 13	< 10	**18**	**14**	< 13	< 10	< 13	< 10	< 13	< 10
CR73-9-12199	21-Jan-99	< 12	< 10	< 12	< 10	**14**	**11**	**37**	**30**	< 12	< 10	< 12	< 10	< 12	< 10	< 12	< 10	< 12	< 10
CR73-10-12199	21-Jan-99	< 12	< 10	< 12	< 10	**23**	**19**	**38**	**31**	< 12	< 10	< 12	< 10	< 12	< 10	< 12	< 10	< 12	< 10
Effects Range - Low [1]		-		-		-		-		-		-		-		160		-	
Effects Range - Medium [1]		-		-		-		-		-		-		-		2,100		-	

Analysis conducted by Apollo Analytics, Inc., Costa Mesa, CA using EPA Method 8260

[1] = from Long and others, 1995.
- = not reported
GB = grab sediment sample
CR = core sediment sample
" - 0 " = duplicate sediment sample

QA/QC: _____

Table 6:
Summary of Statistical Analyses on Phase I & Phase II Sediment Samples

Salton Sea

LFR 6824.00

	Percent Clay	Percent Silt	Percent Total Fines	Percent Sand	Acetone	2-Butanone	Carbon Disulfide	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Vanadium	Zinc
Percent Clay						- 0.10			++ 0.10	- 0.08					- 0.27		- 0.07		++ 0.12
Percent Silt								+ 0.07		- 0.08		+ 0.15	+ 0.08		- 0.24		- 0.09		++ 0.22
Percent Total Fines						- 0.10			+ 0.06	- 0.11					- 0.32		- 0.12		++ 0.23
Percent Sand						+ 0.10			- 0.06	+ 0.11					+ 0.32		+ 0.12		-- 0.23
Acetone						++ 0.86	+ 0.08	++ 0.21									+ 0.13		
2-Butanone	- 0.10		- 0.10	+ 0.10	++ 0.86			++ 0.26		+ 0.13				+ 0.11		+ 0.09	++ 0.20		
Carbon Disulfide					+ 0.08			++ 0.12			+ 0.15		++ 0.35	+ 0.11		++ 0.13	+ 0.13	++ 0.27	++ 0.15
Arsenic		+ 0.07			++ 0.21	++ 0.26	++ 0.12							+ 0.06		++ 0.12	++ 0.14		
Barium	++ 0.10		+ 0.06	- 0.06							++ 0.23		++ 0.16	++ 0.18		++ 0.35		++ 0.22	++ 0.20
Cadmium	- 0.08	- 0.08	- 0.11	+ 0.11		+ 0.13								++ 0.66	++ 0.58	++ 0.30	++ 0.16		
Chromium							+ 0.15		++ 0.23				++ 0.84	++ 0.26		++ 0.45		++ 0.82	++ 0.18
Cobalt		+ 0.15																++ 0.84	
Copper		+ 0.08					++ 0.35		++ 0.16		++ 0.84			++ 0.23		++ 0.66		++ 0.90	++ 0.48
Lead						+ 0.11	+ 0.11	+ 0.06	++ 0.18	++ 0.66	++ 0.26		++ 0.23		+ 0.32	++ 0.61	+ 0.10	++ 0.40	++ 0.10
Molybdenum	- 0.27	- 0.24	- 0.32	+ 0.32						++ 0.58				+ 0.32		++ 0.51	++ 0.36		
Nickel						+ 0.09	++ 0.13	++ 0.12	++ 0.35	++ 0.30	++ 0.45		++ 0.66	++ 0.61	++ 0.51			++ 0.83	++ 0.31
Selenium	- 0.07	- 0.09	- 0.12	+ 0.12	+ 0.13	++ 0.20	+ 0.13	++ 0.14		++ 0.16				+ 0.10	++ 0.36				
Vanadium							++ 0.27		++ 0.22		++ 0.82	++ 0.84	++ 0.90	++ 0.40		++ 0.83			
Zinc	++ 0.12	++ 0.22	++ 0.23	-- 0.23			++ 0.15		++ 0.20		++ 0.18		++ 0.48	++ 0.10		++ 0.31			

NOTES:

0.22 = Posted results are the r^2 values for the analyte pairs. See text for explanation of sample and analyte selection.

++ = Positive correlation, significant at the 99% confidence level

\+ = Positive correlation, significant at the 95% confidence level

-- = Negative correlation, significant at the 99% confidence level

\- = Negative correlation, significant at the 95% confidence level

QA/QC: _____

Table 7:

Summary of Equipment Blank Samples Collected During
Phase I & Phase II Activities
LFR 6824.00

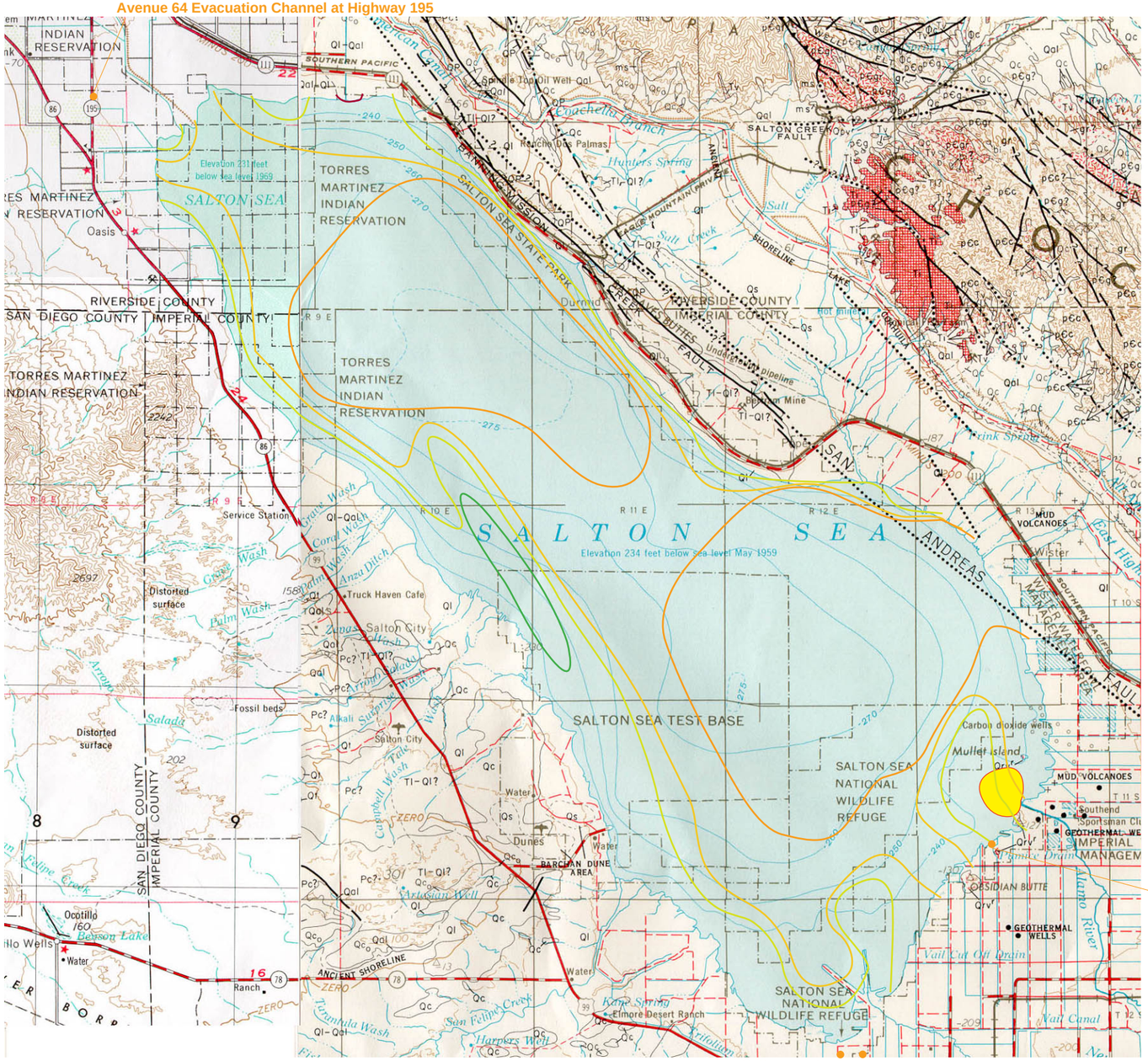
Sample ID	Sample Date	Number of Containers	Sampler Used	Performed EPA Methods	Analyte Detected	Result (mg/l)
EB1-121698	12/16/98	2 ambers	Grab sampler	8260	None	ND
EB2-121798	12/17/98	3 ambers	Grab sampler	8260	None	ND
EB3-121898	12/18/98	5 ambers 2 plastic 3 VOAs	Stainless-steel trowel	8081, 8141, 8151, 8260, 8270, CAM17	None	ND
EB4-122198	12/21/98	5 ambers 2 plastic 3 VOAs	Stainless-steel trowel	8081, 8141, 8151, 8260, 8270, CAM17	None	ND
EB5-122298	12/22/98	5 ambers 2 plastic 3 VOAs	Stainless-steel trowel	8081, 8141, 8151, 8260, 8270, CAM17	None	ND
EB6-011999	1/19/99	3 ambers 1 plastic 3 VOAs	Corer	8081, 8141, 8151, 8260, 8270, CAM17	None	ND
EB7-012099	1/20/99	3 ambers 1 plastic 3 VOAs	Grab sampler	---	---	---
EB8-12199	1/21/99	4 ambers 1 plastic 3 VOAs	Stainless-steel trowel	8081, 8141, 8151, 8260, 8270, CAM17	None	ND
EB9-12299	1/22/99	4 ambers 1 plastic 3 VOAs	Stainless-steel trowel	8081, 8141, 8151, 8260, 8270, CAM17	None	ND

Notes:

ND = Not Detected
--- = Sample not analyzed by laboratory

QA/QC: _____

FIGURES



EXPLANATION

Selenium Assessment Area
Setmire [et al], 1993.

Sediment Investigation,
Setmire and Stroud, 1990.

Sediment Grain Size

- Sand 256-1,000 µm
- Fine Sand 64-256 µm
- Fine Sand 16-64 µm
- Silt 4-16 µm
- Clay ≤ 4 µm

NOTE: Grain Size of lake bottom sediments (after Arnal, 1961)

N

0 6 Miles

MAP SOURCES:

- State of California - *Division of Mines and Geology*, Geologic Map of California (Jenkins), Salton Sea Sheet, 1977.
- U.S.G.S Topographic Map, 1:250,000', Santa Ana, California, 1981.

Salton Sea

Historic Sediment Sampling at the Salton Sea

Figure 1
Project No. 6824

6824-11 123098RNH/meg

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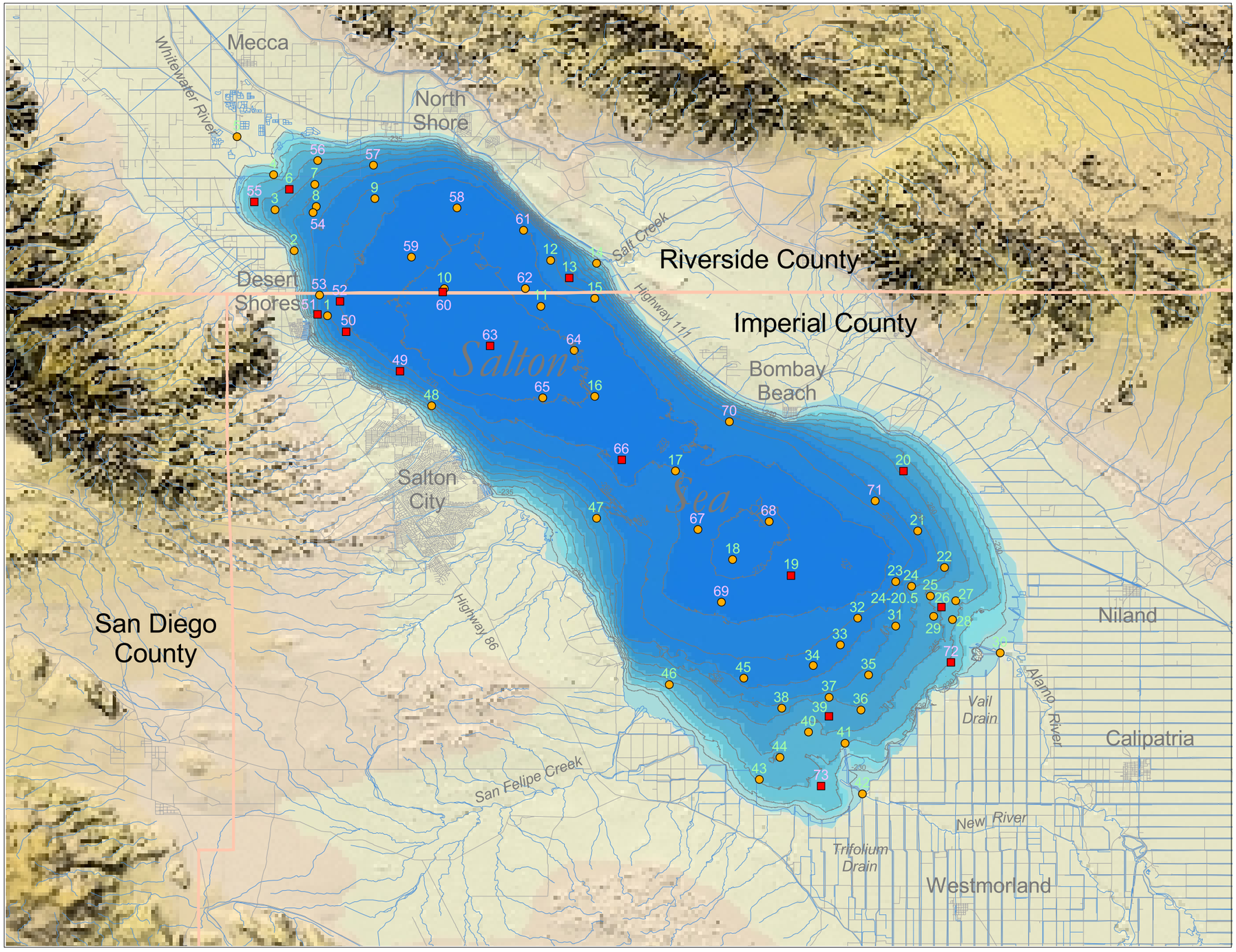

Salton Sea

LFR Phase I and Phase II Sediment Sampling Locations

Figure 2

Project No. 6824.00

LFR LEVINE•FRICKE

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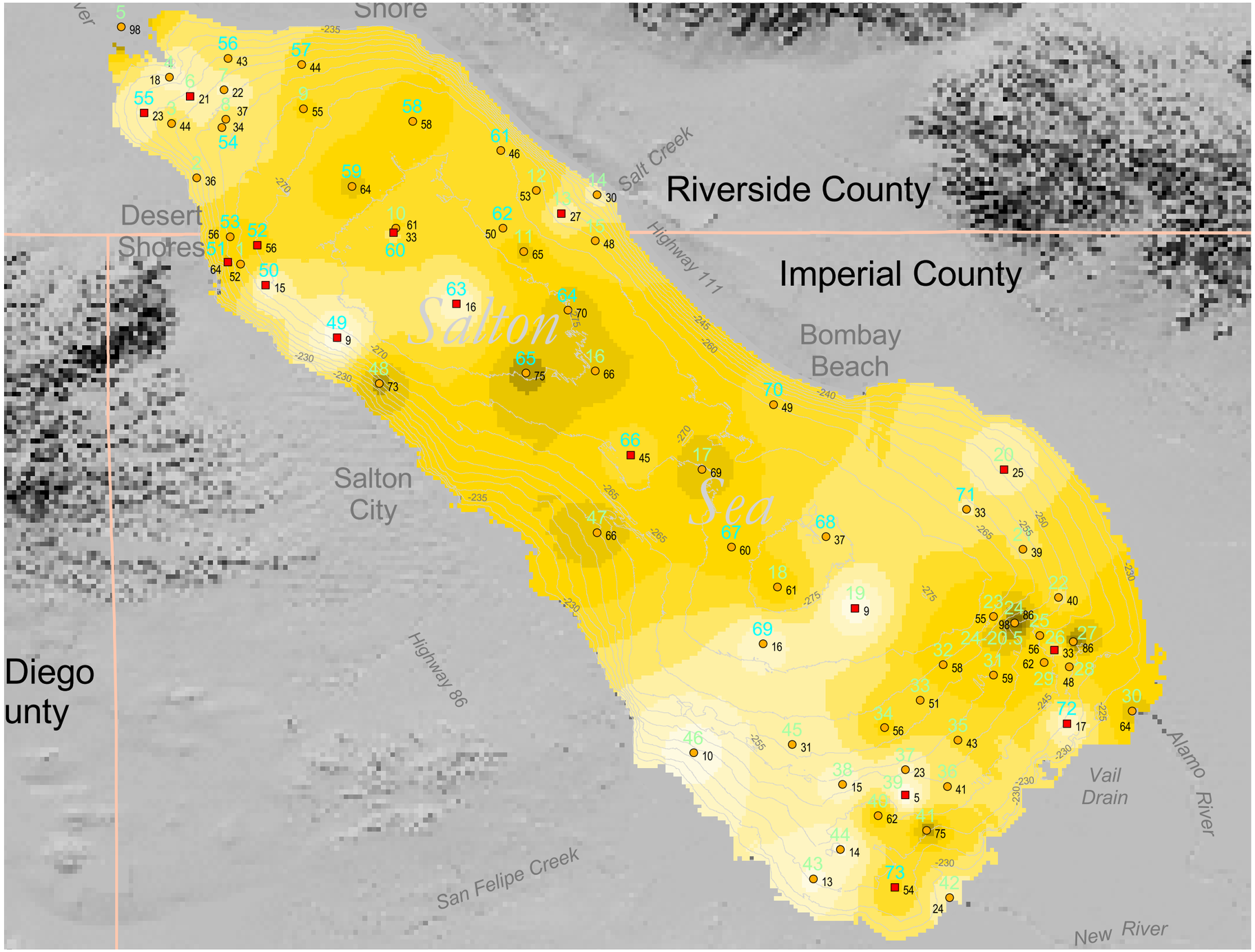

1-48 Phase I Sediment Sample Locations (December, 1998)

49-73 Phase II Sediment Sample Locations (January, 1999)

Sediment Sample Type

- Core 0 - 30 cm
- Grab 0 - 15 cm

SANDS

Bathymetric Contours (5 ft. interval)

Sand Percentage per Sediment Sample

- 5 - 15
- 15 - 24
- 24 - 33
- 33 - 42
- 42 - 52
- 52 - 61
- 61 - 70
- 70 - 79
- 79 - 89
- 89 - 98

Riverside County Line

San Diego County Line

Shoreline

N

1 0 1 2 3 4 Miles

Salton Sea

LFR Phase I and Phase II Distribution of Surface Sediments SANDS

Figure 3

Project No. 6824.01

LFR LEVINE•FRICKE

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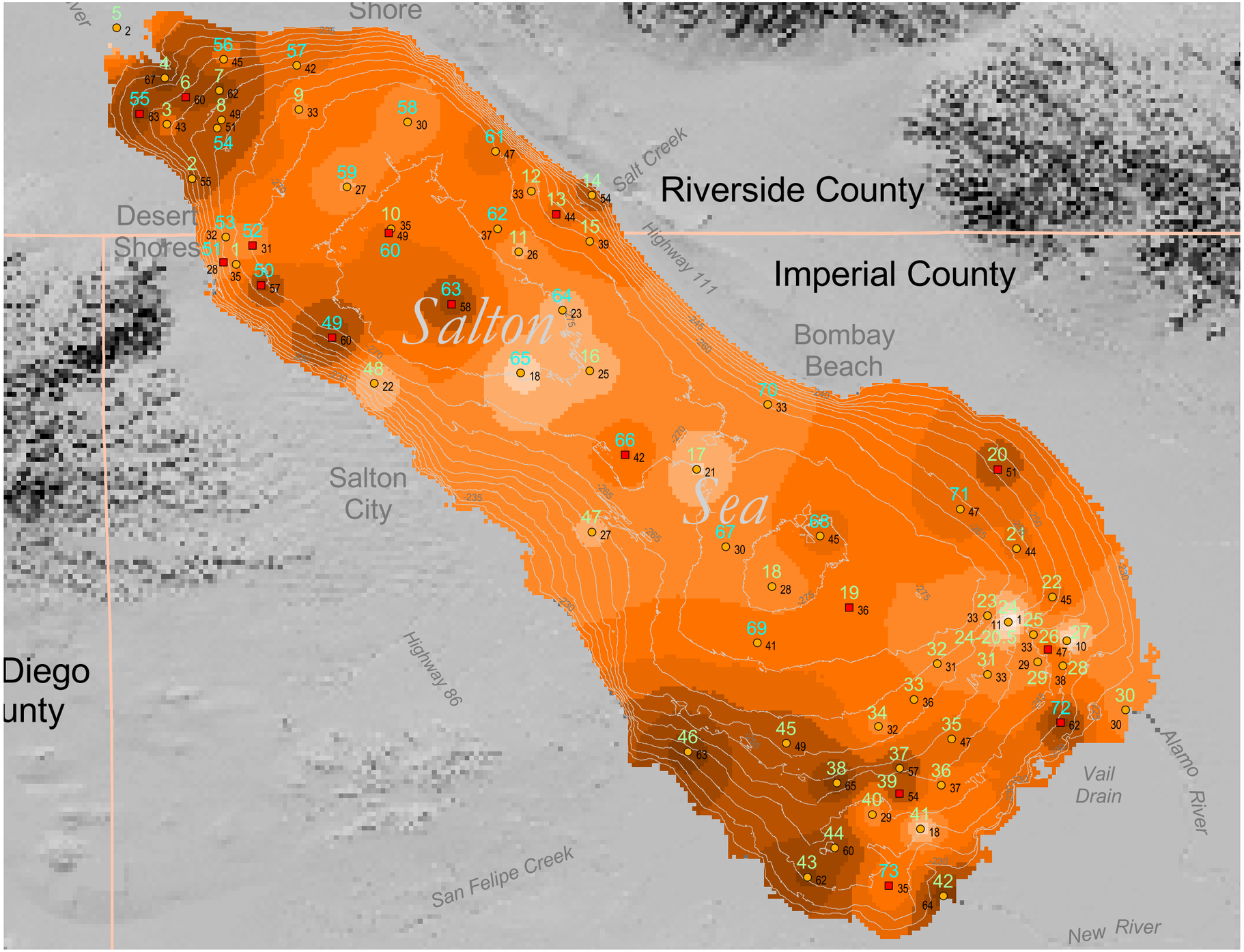

1-48 Phase I Sediment Sample Locations (December, 1998)

49-73 Phase II Sediment Sample Locations (January, 1999)

Sediment Sample Type

- Core 0 - 30 cm
- Grab 0 - 15 cm
- SILTS

Bathymetric Contours (5 ft. interval)

Silt Percentage per Sediment Sample

- 1 - 8
- 8 - 14
- 14 - 21
- 21 - 27
- 27 - 34
- 34 - 41
- 41 - 47
- 47 - 54
- 54 - 60
- 60 - 67

- Riverside County Line
- San Diego County Line
- Shoreline

N

1 0 1 2 3 4 Miles

Salton Sea

LFR Phase I and Phase II Distribution of Surface Sediments SILTS

Figure 4

Project No. 6824.01

LFR LEVINE•FRICKE

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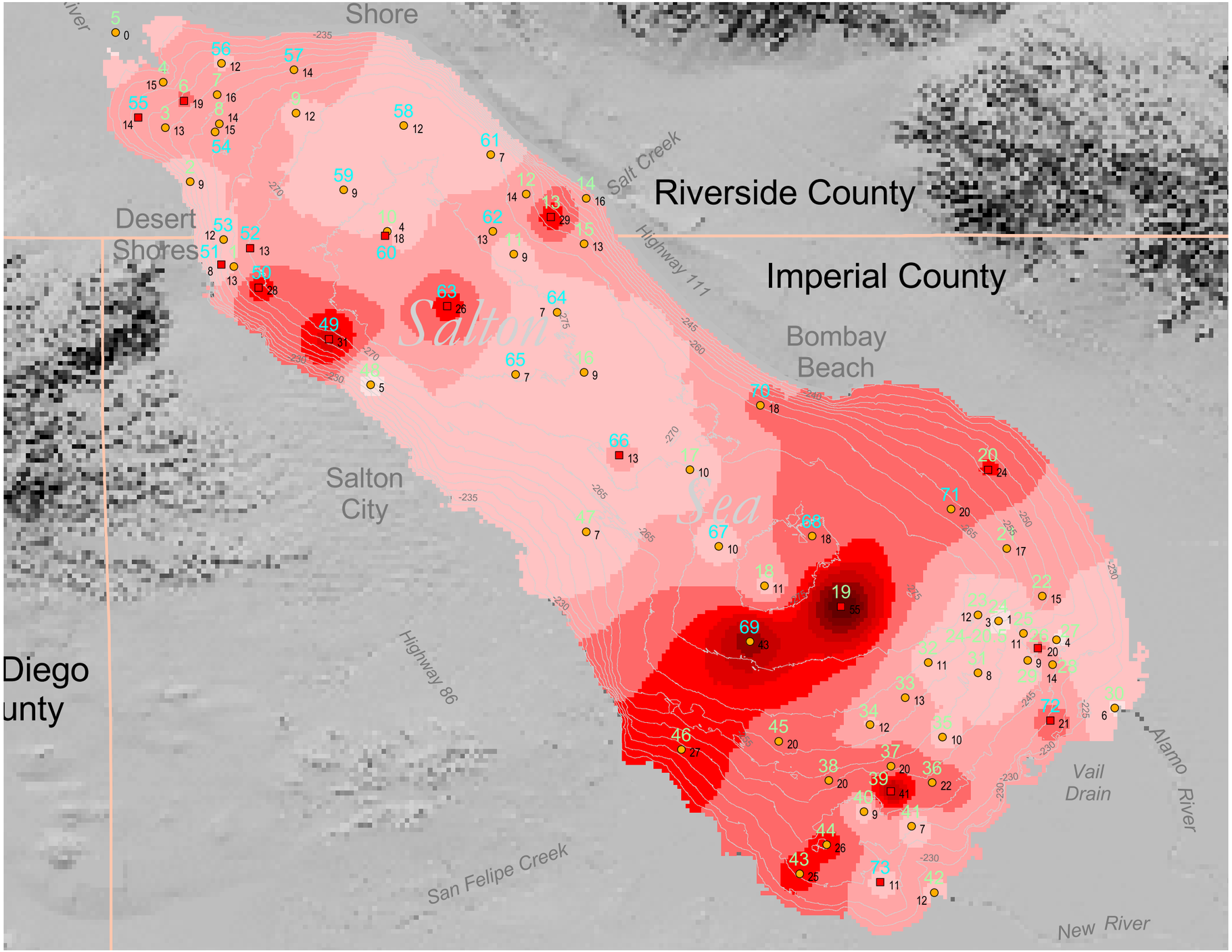

1-48 Phase I Sediment Sample Locations (December, 1998)

49-73 Phase II Sediment Sample Locations (January, 1999)

Sediment Sample Type

- Core 0 - 30 cm
- Grab 0 - 15 cm

CLAYS

Bathymetric Contours (5 ft. interval)

Clay Percentage per Sediment Sample

- 1 - 6
- 6 - 12
- 12 - 17
- 17 - 23
- 23 - 28
- 28 - 33
- 33 - 39
- 39 - 44
- 44 - 49
- 49 - 55

- Riverside County Line
- San Diego County Line
- Shoreline

N

1 0 1 2 3 4 Miles

Salton Sea

LFR Phase I and Phase II
Distribution of Surface Sediments
CLAYS

Figure 5

Project No. 6824.01

LFR LEVINE•FRICKE

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Figure 6: Graph of Cadmium Concentrations Detected in Sediment Samples

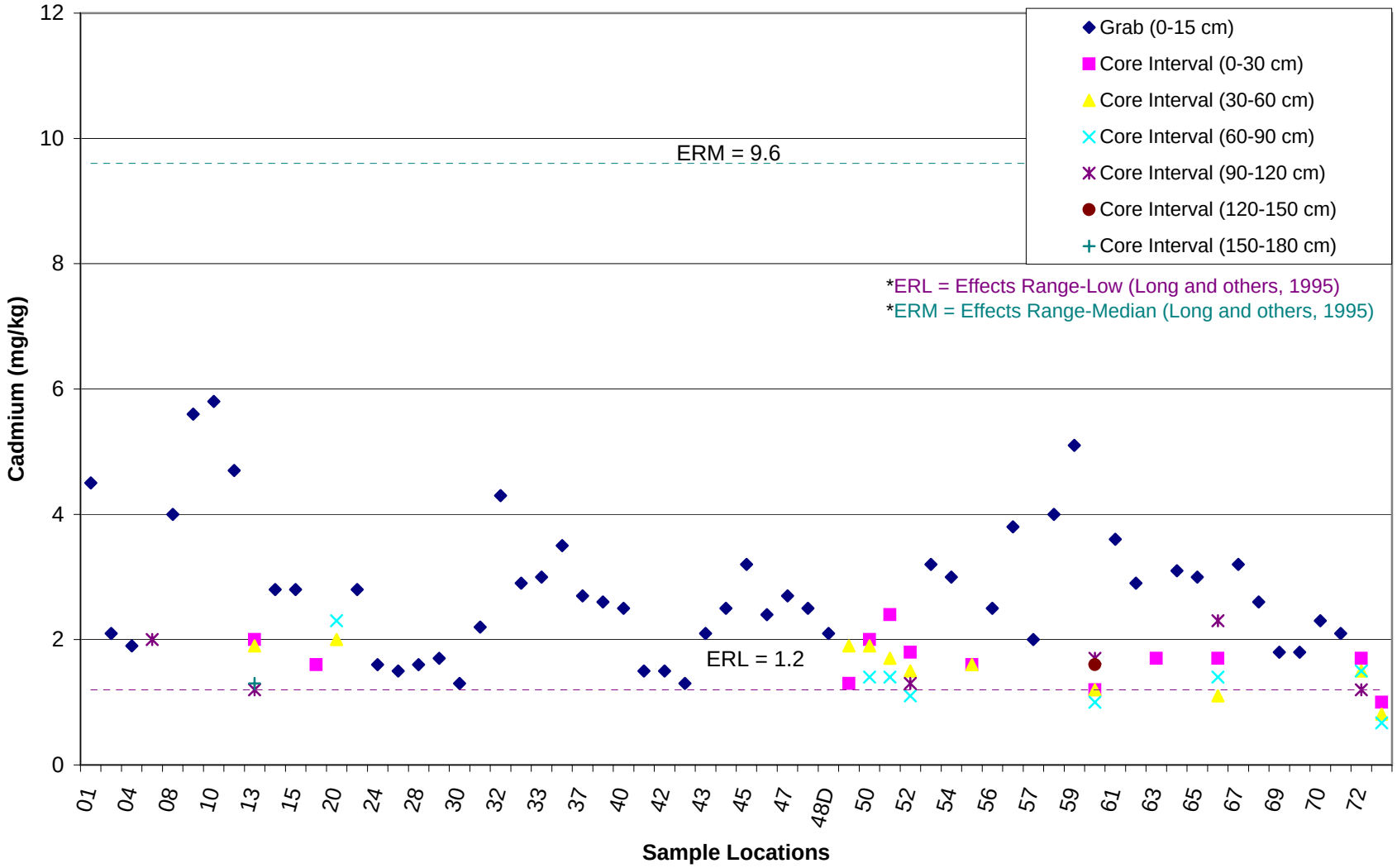


Figure 7: Graph of Copper Concentrations Detected in Sediment Samples

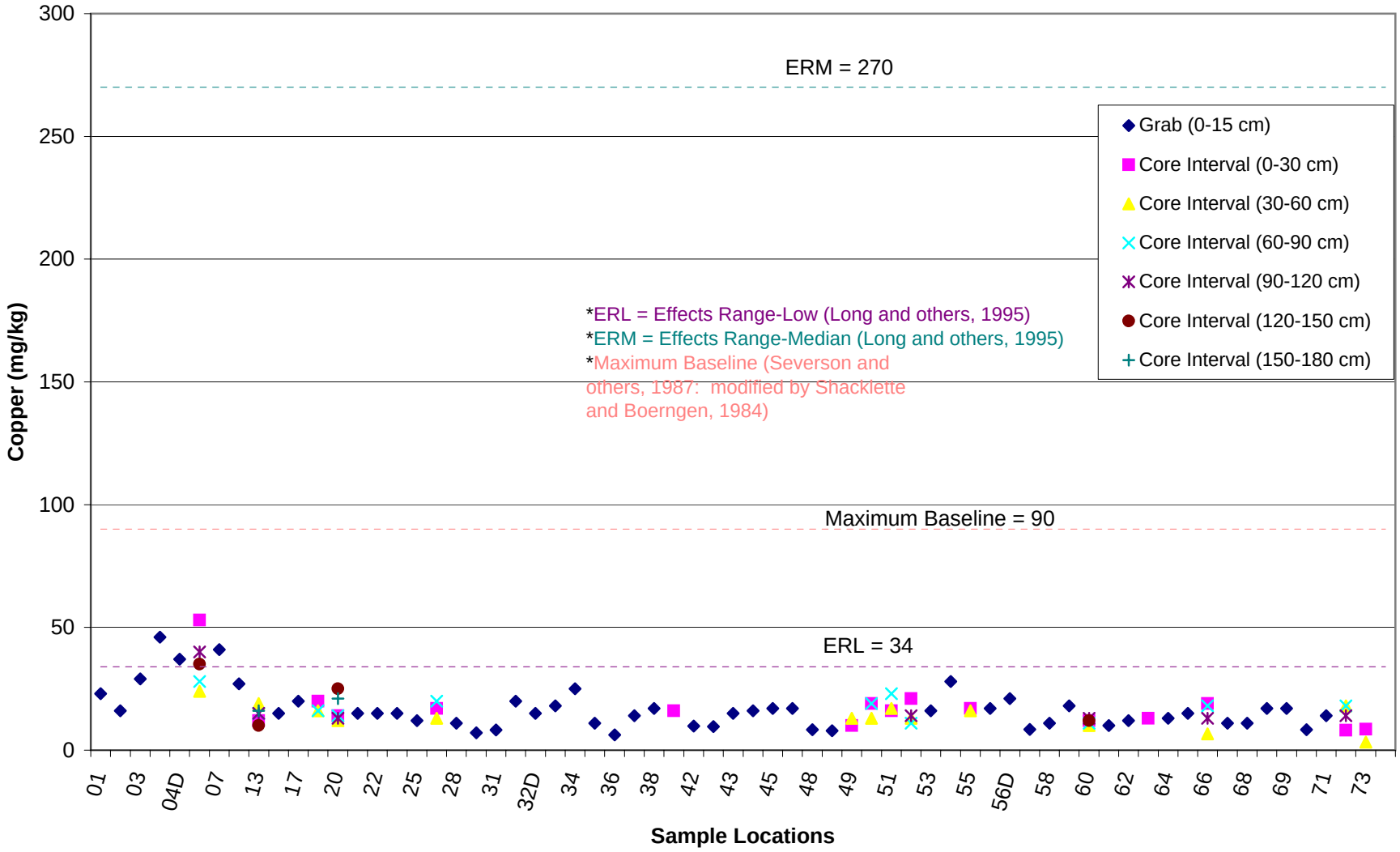


Figure 8: Graph of Molybdenum Concentratons Detected in Sediment Samples

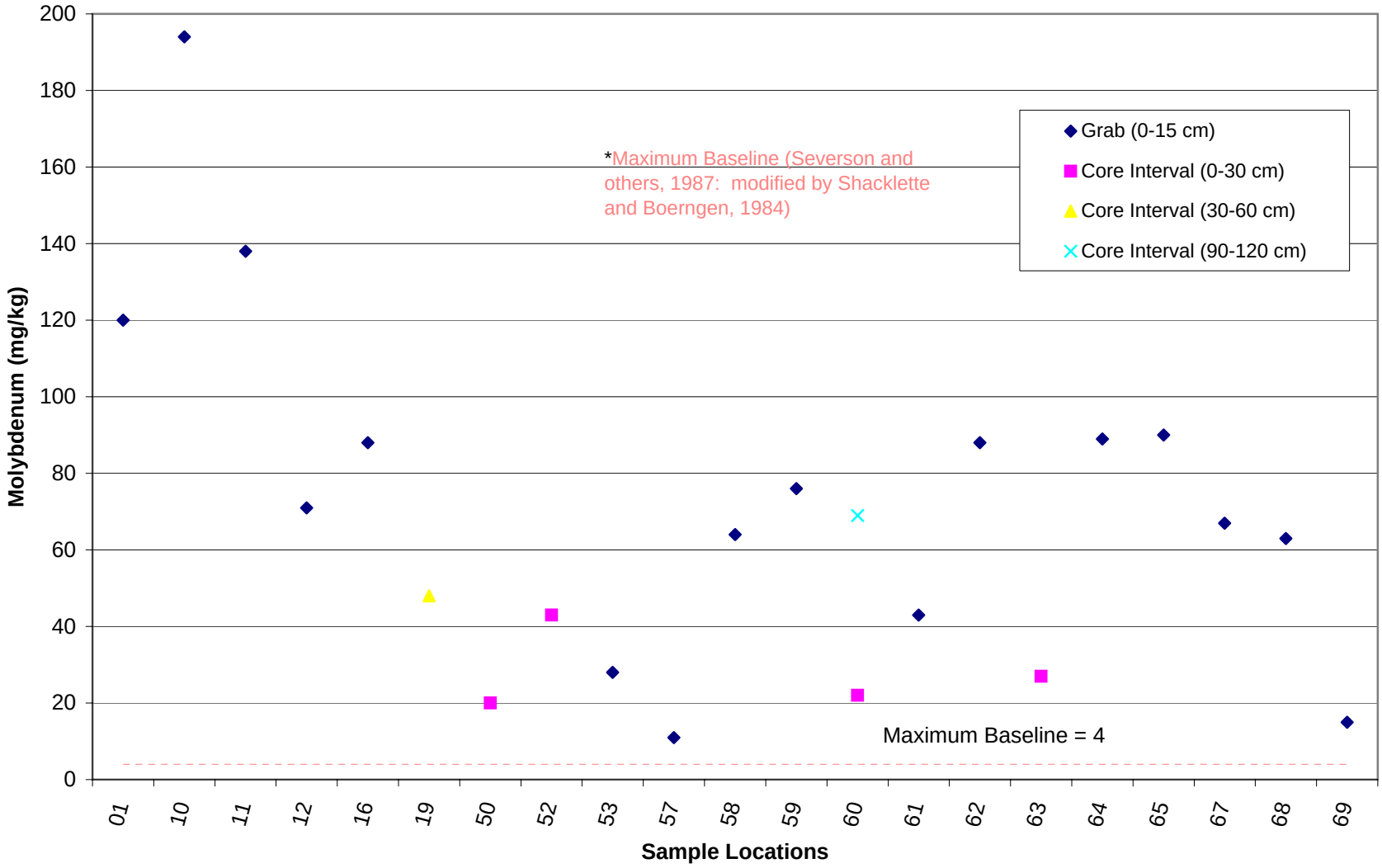


Figure 9: Graph of Nickel Concentrations Detected in Sediment Samples

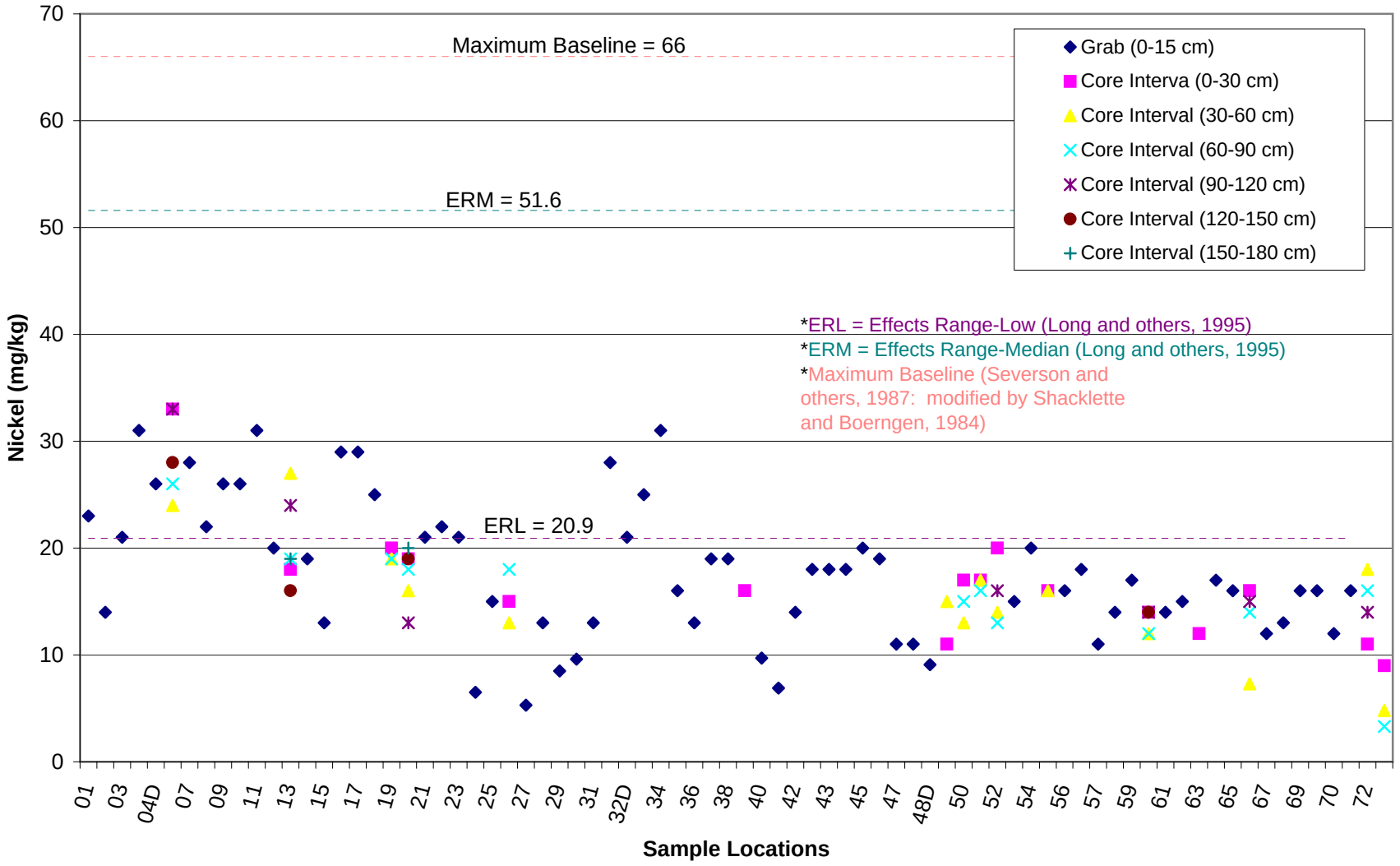


Figure 10: Graph of Zinc Concentrations Detected in Sediment Samples

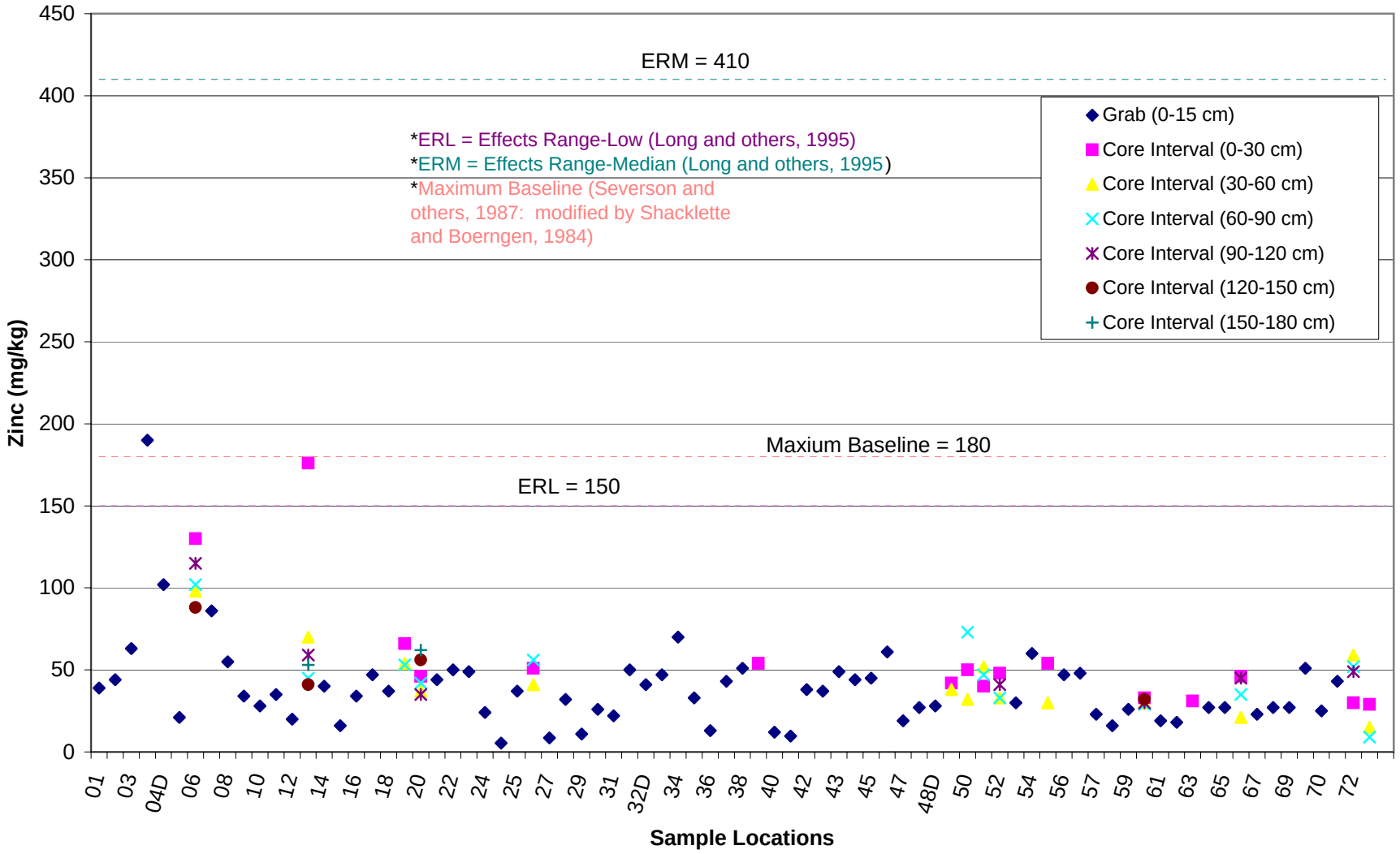


Figure 11: Graph of Selenium Concentrations Detected in Sediment Samples

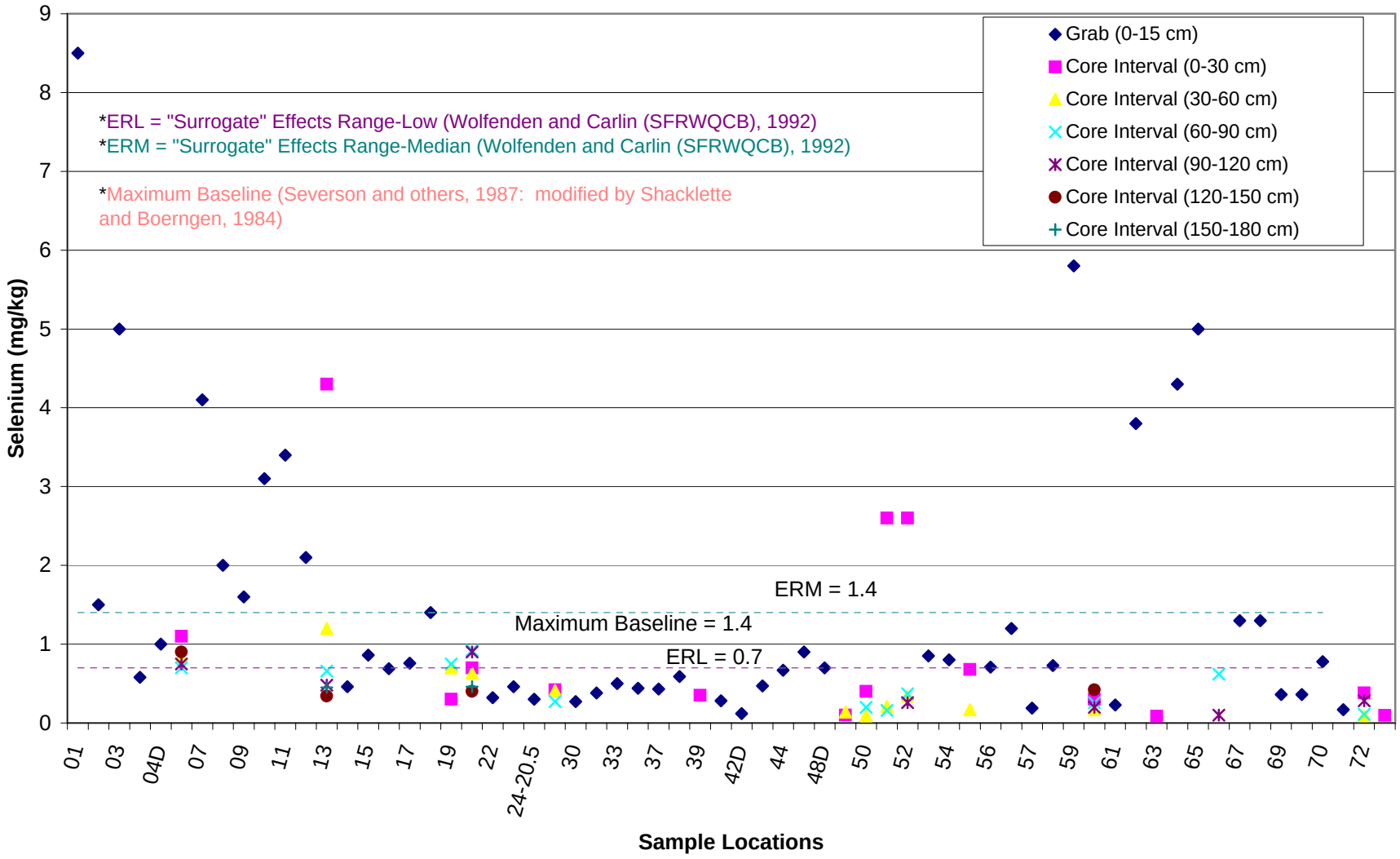


Figure 12: Graph of Acetone Concentrations Detected in Sediment Samples

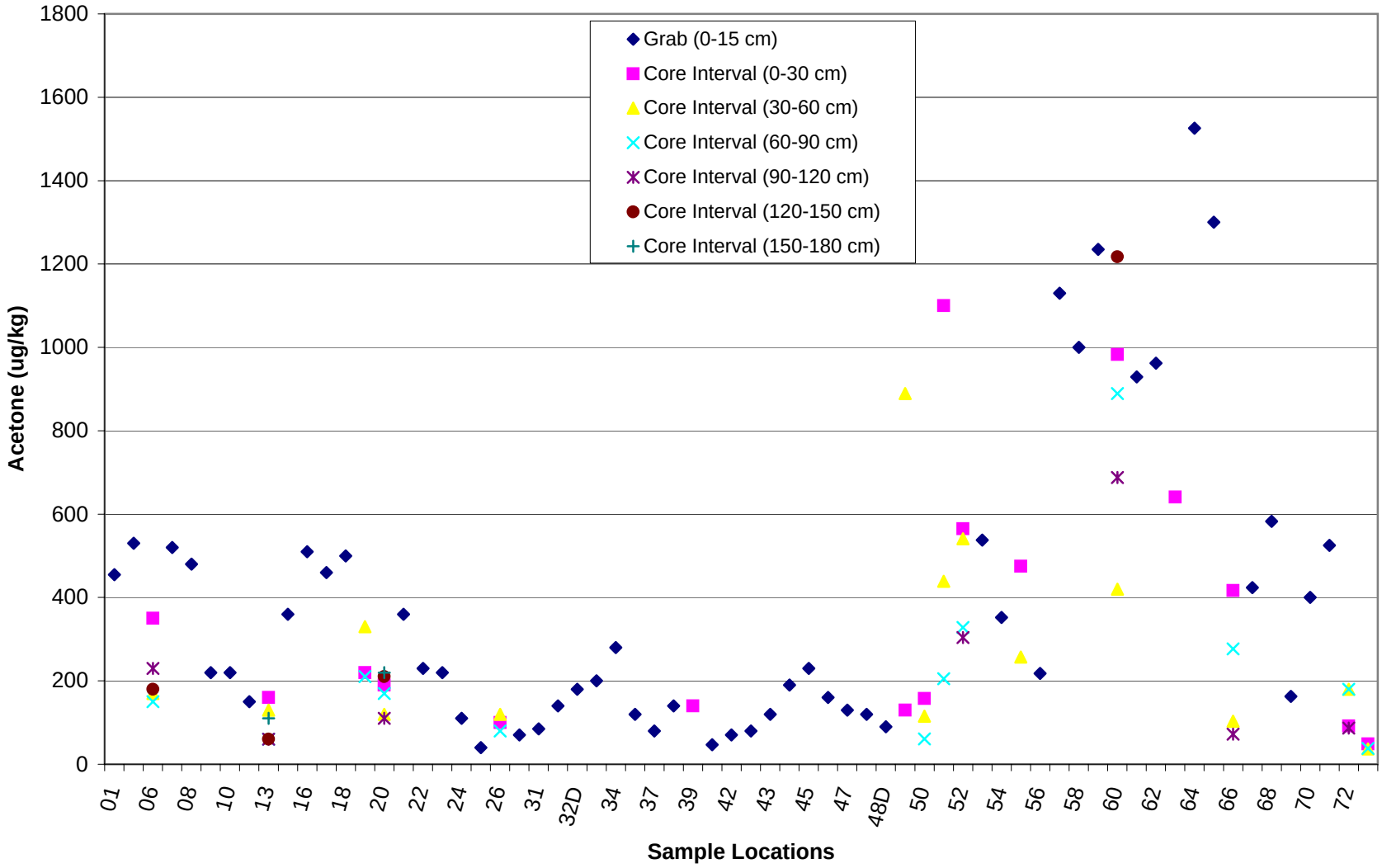


Figure 13: Graph of Carbon Disulfide Concentrations Detected in Sediment Samples

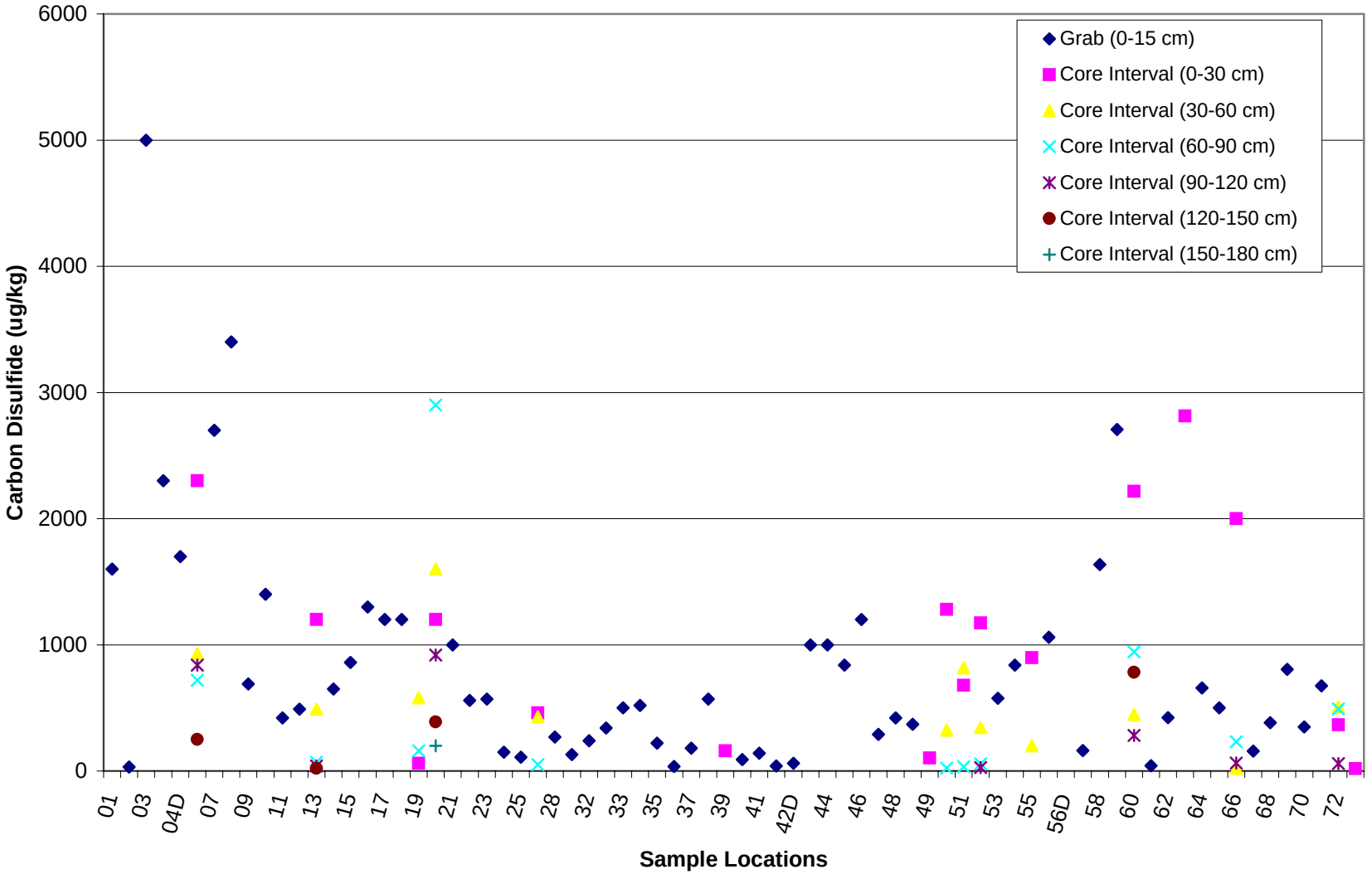
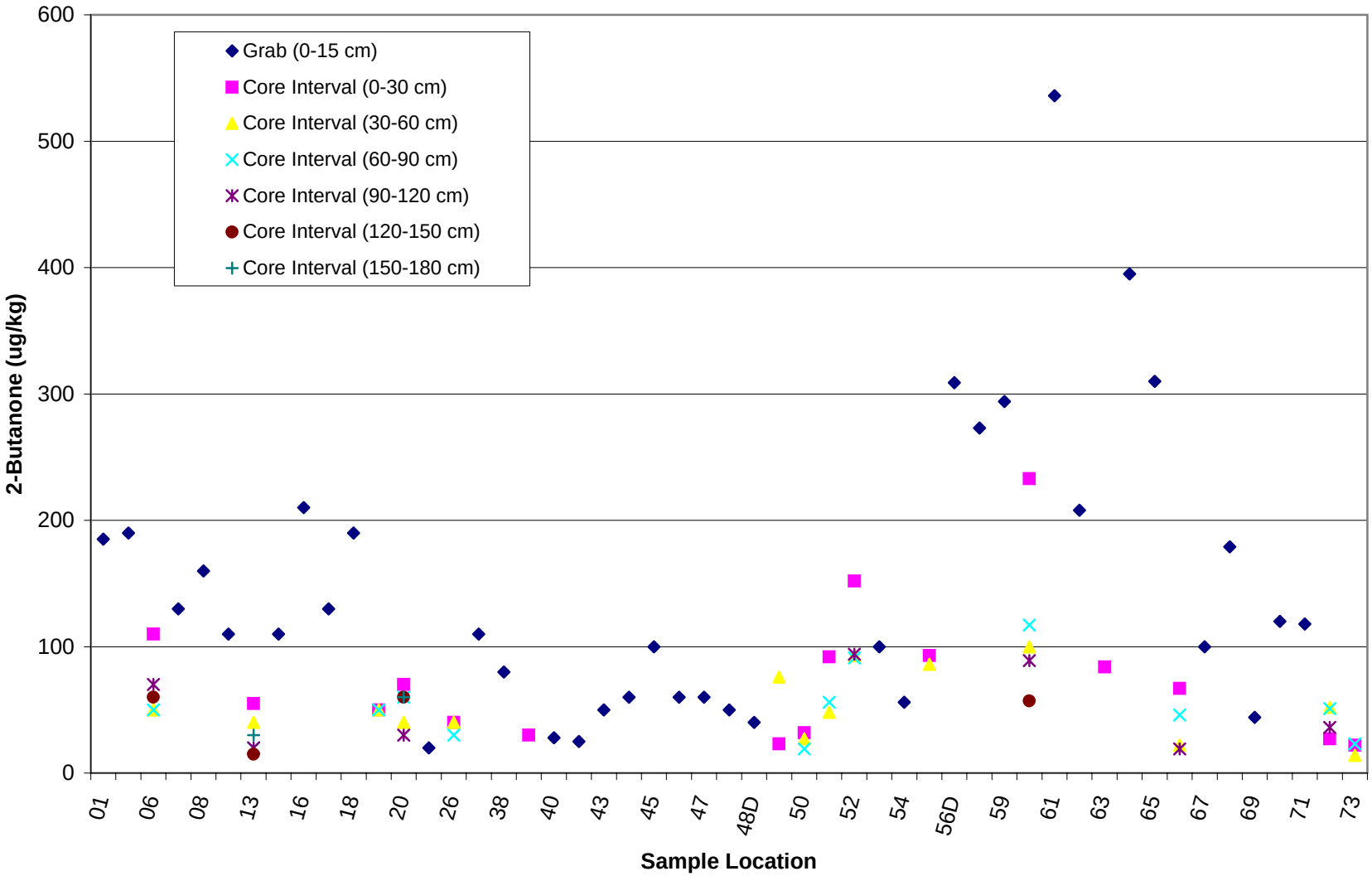
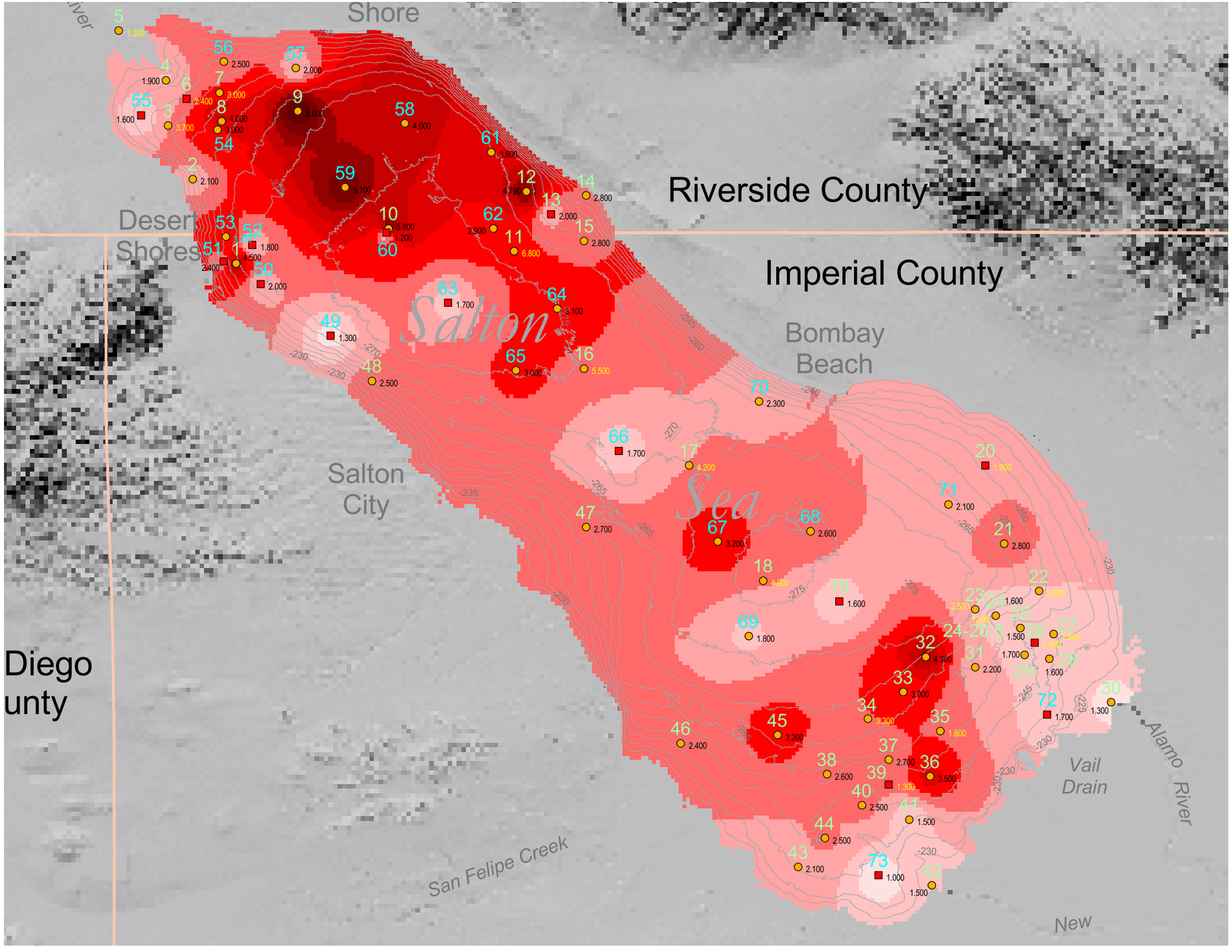


Figure 14: Graph of 2-Butanone Concentrations Detected in Sediment Samples





1-48 Phase I Sediment Sample Locations (December, 1998)
49-73 Phase II Sediment Sample Locations (January, 1999)

Sediment Sample Type
- Core 0 - 30 cm
- Grab 0 - 15 cm

2.300 Cadmium Concentrations (mg/kg, dry weight)

Bathymetric Contours (5 ft. interval)

Cadmium Concentrations (mg/kg, dry weight)
- 1.007 - 1.466
- 1.466 - 1.925
- 1.925 - 2.384
- 2.384 - 2.843
- 2.843 - 3.302
- 3.302 - 3.761
- 3.761 - 4.22
- 4.22 - 4.679
- 4.679 - 5.139
- 5.139 - 5.700

Riverside County Line

San Diego County Line

Shoreline

4.200 Analyte not detected above laboratory detection limit posted. These concentrations were not considered for the purposes of preparing this map.

N

1 0 1 2 3 4 Miles

Salton Sea

LFR Phase I and Phase II
Distribution of Cadmium Concentrations

Figure 15

Project No. 6824.01

LFR LEVINE•FRICKE

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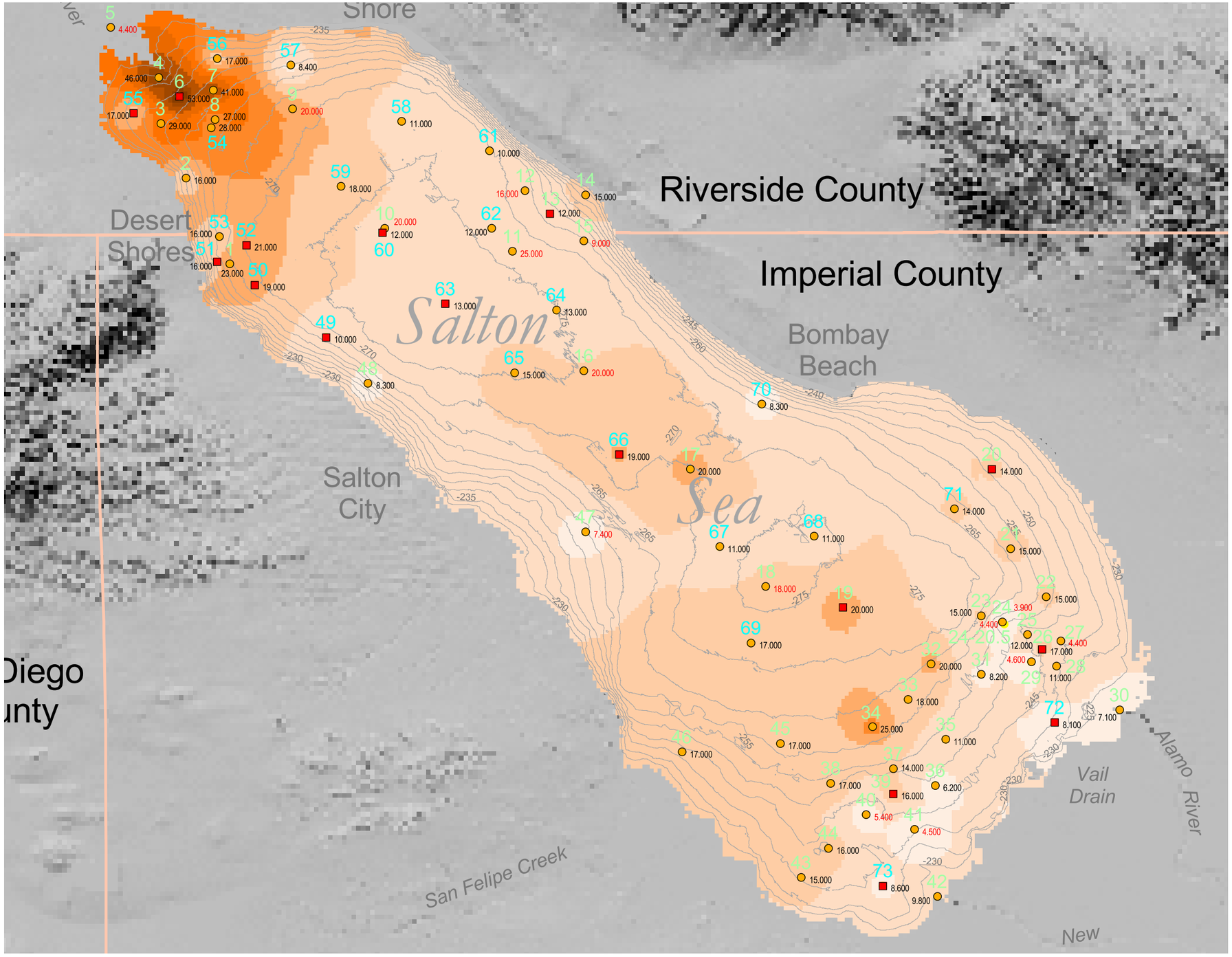

1-48 Phase I Sediment Sample Locations (December, 1998)

49-73 Phase II Sediment Sample Locations (January, 1999)

Sediment Sample Type

- Core 0 - 30 cm
- Grab 0 - 15 cm

12 Copper Concentrations (mg/kg, dry weight)

Bathymetric Contours (5 ft. interval)

Copper Concentrations (mg/kg, dry weight)

- 4.162 - 9.02
- 9.02 - 13.878
- 13.878 - 18.737
- 18.737 - 23.595
- 23.595 - 28.453
- 28.453 - 33.311
- 33.311 - 38.17
- 38.17 - 43.028
- 43.028 - 47.886
- 47.886 - 52.744

Riverside County Line

San Diego County Line

Shoreline

7.400 Analyte not detected above laboratory detection limit posted. Laboratory detection limit concentrations below 7.401 mg/kg were not considered for the purposes of preparing this map.

N

1 0 1 2 3 4 Miles

Salton Sea

LFR Phase I and Phase II Distribution of Copper Concentrations

Figure 16

Project No. 6824.01

LFR LEVINE•FRICKE

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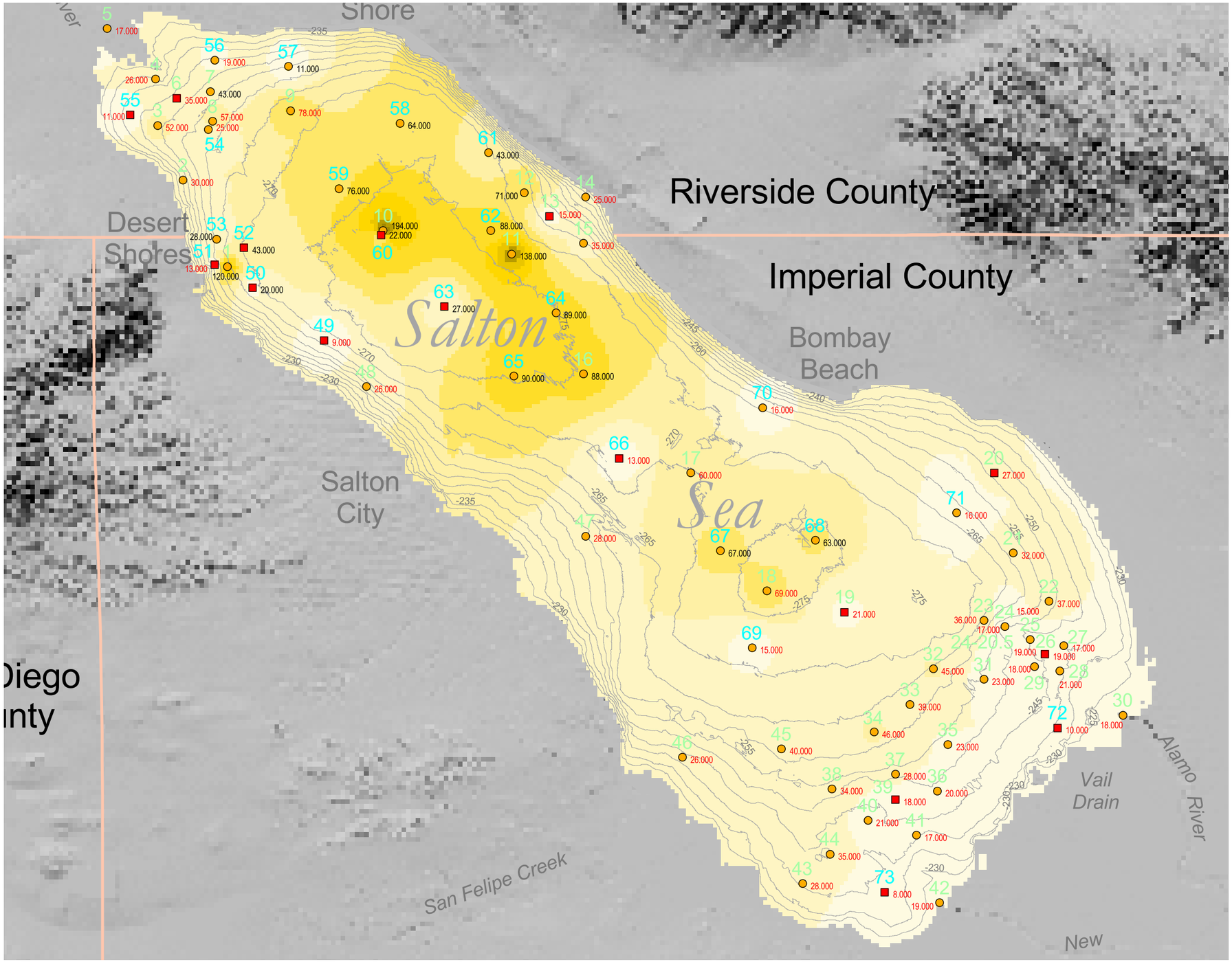

1-48 Phase I Sediment Sample Locations (December, 1998)

49-73 Phase II Sediment Sample Locations (January, 1999)

Sediment Sample Type

- Core 0 - 30 cm
- Grab 0 - 15 cm

19.000 Molybdenum Concentrations (mg/kg, dry weight)

Bathymetric Contours (5 ft. interval)

Molybdenum Concentrations (mg/kg, dry weight)

- 8.06 - 25.29
- 25.29 - 42.51
- 42.51 - 59.74
- 59.74 - 76.97
- 76.97 - 94.19
- 94.19 - 111.42
- 111.42 - 128.65
- 128.65 - 145.87
- 145.87 - 163.1
- 163.1 - 194.00

- Riverside County Line
- San Diego County Line
- Shoreline

17.000 Analyte not detected above laboratory detection limit posted. These concentrations were assumed to be the detected concentrations for the purposes of preparing this map.

N

1 0 1 2 3 4 Miles

Salton Sea

LFR Phase I and Phase II
Distribution of Molybdenum Concentrations

Figure 17

Project No. 6824.01

LFR LEVINE•FRICKE

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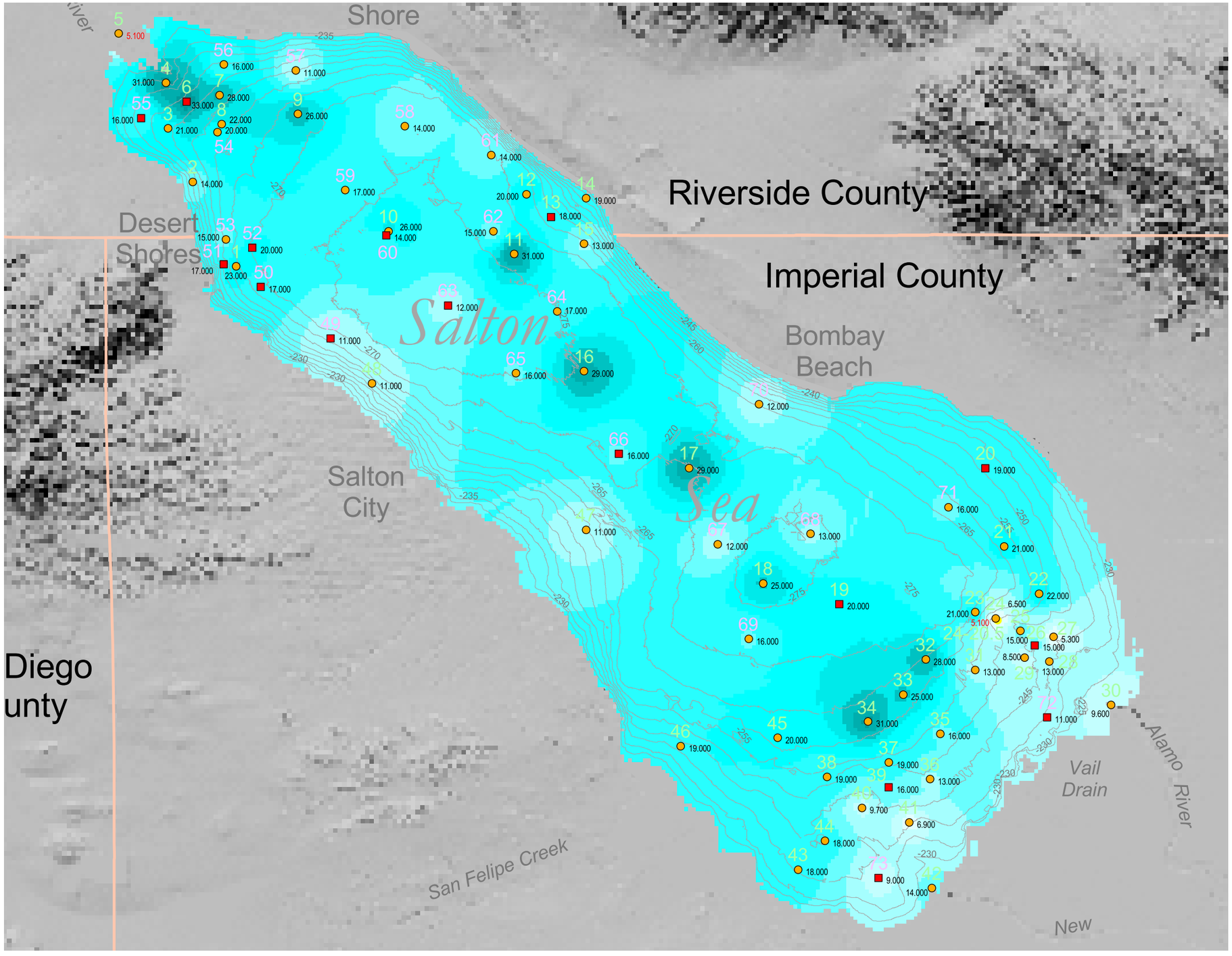

1-48 Phase I Sediment Sample Locations (December, 1998)
49-73 Phase II Sediment Sample Locations (January, 1999)

Sediment Sample Type
- Core 0 - 30 cm
- Grab 0 - 15 cm

13.000 Nickel Concentrations (mg/kg, dry weight)

Bathymetric Contours (5 ft. interval)

Nickel Concentrations (mg/kg, dry weight)
- 5.1 - 7.94
- 7.94 - 10.723
- 10.723 - 13.507
- 13.507 - 16.29
- 16.29 - 19.074
- 19.074 - 21.857
- 21.857 - 24.64
- 24.64 - 27.424
- 27.424 - 30.207
- 30.21 - 33

Riverside County Line

San Diego County Line

Shoreline

5.100 Analyte not detected above laboratory detection limit posted. These concentrations were assumed to be the detected concentrations for the purposes of preparing this map.

N

1 0 1 2 3 4 Miles

Salton Sea

LFR Phase I and Phase II Distribution of Nickel Concentrations

Figure 18

Project No. 6824.01

LFR LEVINE•FRICKE

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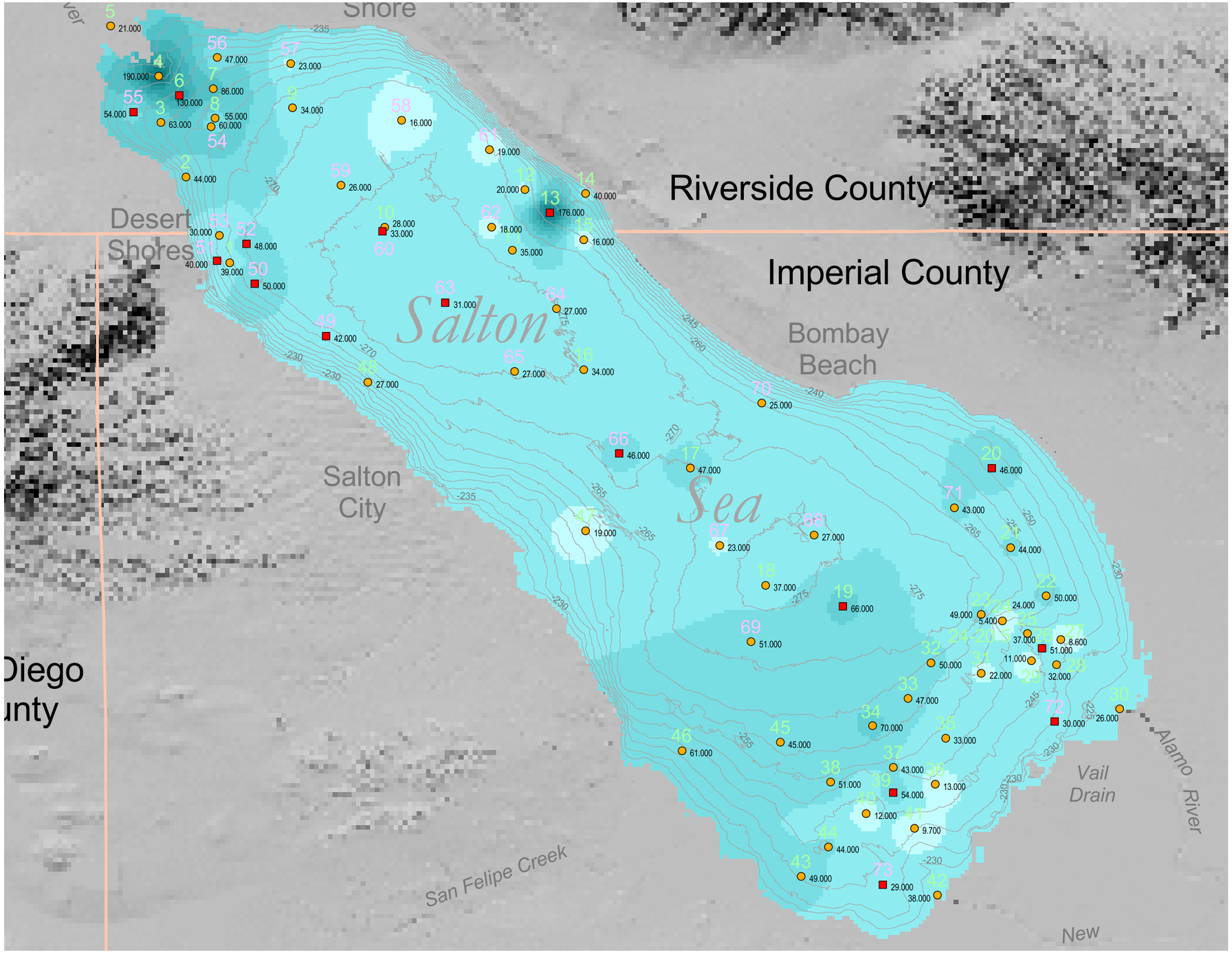


1-48 Phase I Sediment Sample Locations (December, 1998)
49-73 Phase II Sediment Sample Locations (January, 1999)

Sediment Sample Type
- Core 0 - 30 cm
- Grab 0 - 15 cm

21.000 Zinc Concentrations (mg/kg, dry weight)

Bathymetric Contours (5 ft. interval)

Zinc Concentrations (mg/kg, dry weight)
- 5.4 - 24.26
- 24.256 - 42.575
- 42.575 - 60.894
- 60.894 - 79.213
- 79.213 - 97.533
- 97.533 - 115.852
- 115.852 - 134.171
- 134.171 - 152.49
- 152.49 - 170.81
- 170.81 - 190

Riverside County Line
San Diego County Line
Shoreline

N

1 0 1 2 3 4 Miles

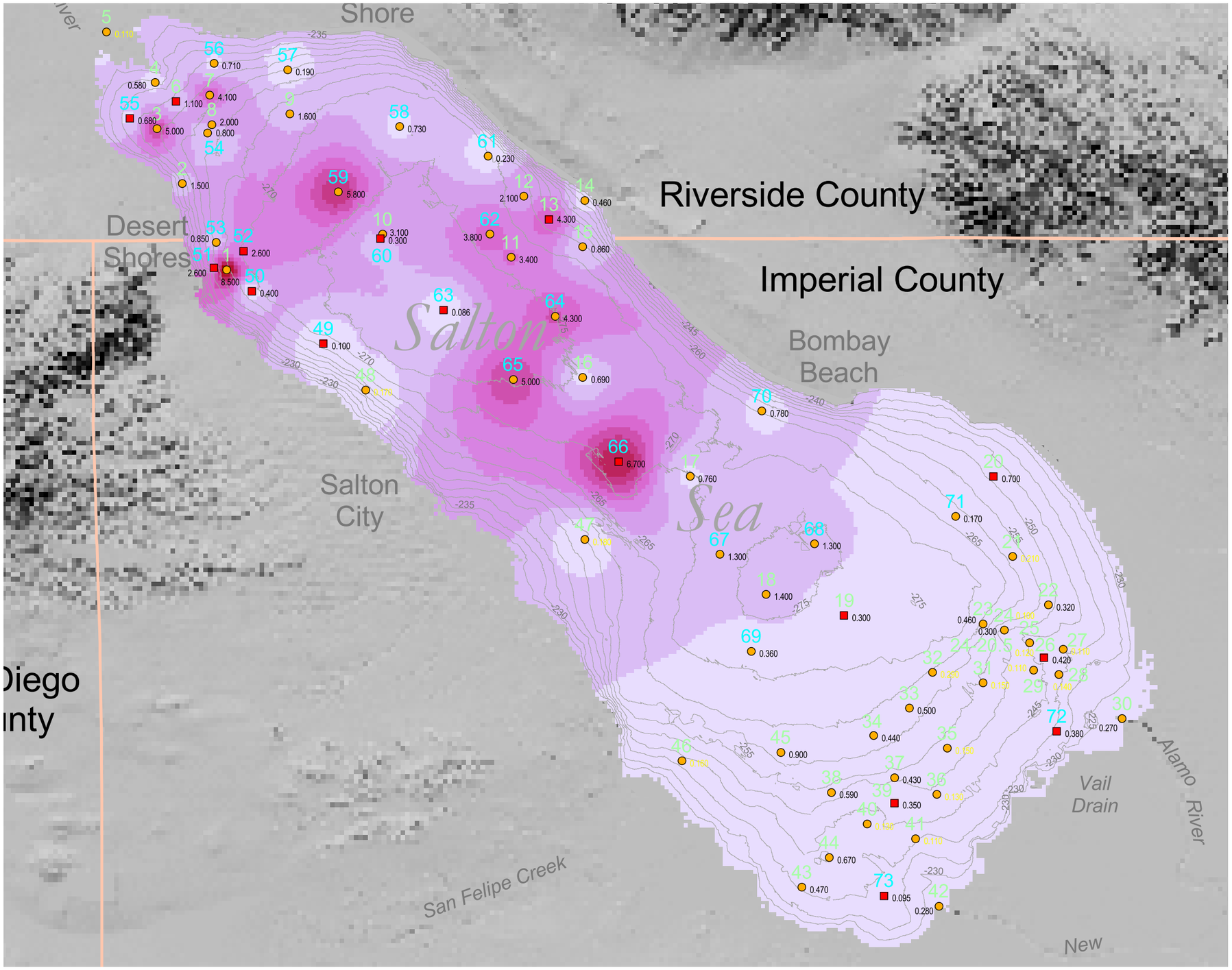
Salton Sea

LFR Phase I and Phase II
Distribution of Zinc Concentrations

Figure 19
Project No. 6824.01

LFR LEVINE•FRICKE

R:\saltonsea\saltonsea.apr



1-48 Phase I Sediment Sample Locations (December, 1998)
49-73 Phase II Sediment Sample Locations (January, 1999)
Sediment Sample Type
- Core 0 - 30 cm
- Grab 0 - 15 cm

170.000 Selenium Concentrations (mg/kg, dry weight)
Bathymetric Contours (5 ft. interval)
Selenium Concentrations (mg/kg, dry weight)
- 0.086 - 0.901
- 0.901 - 1.715
- 1.715 - 2.53
- 2.53 - 3.344
- 3.344 - 4.159
- 4.159 - 4.973
- 4.973 - 5.787
- 5.787 - 6.602
- 6.602 - 7.416
- 7.416 - 8.500

Riverside County Line
San Diego County Line
Shoreline

210.000 Analyte not detected above laboratory detection limit posted. These concentrations were assumed to be the detected concentrations for the purposes of preparing this map.

N

1 0 1 2 3 4 Miles

Salton Sea

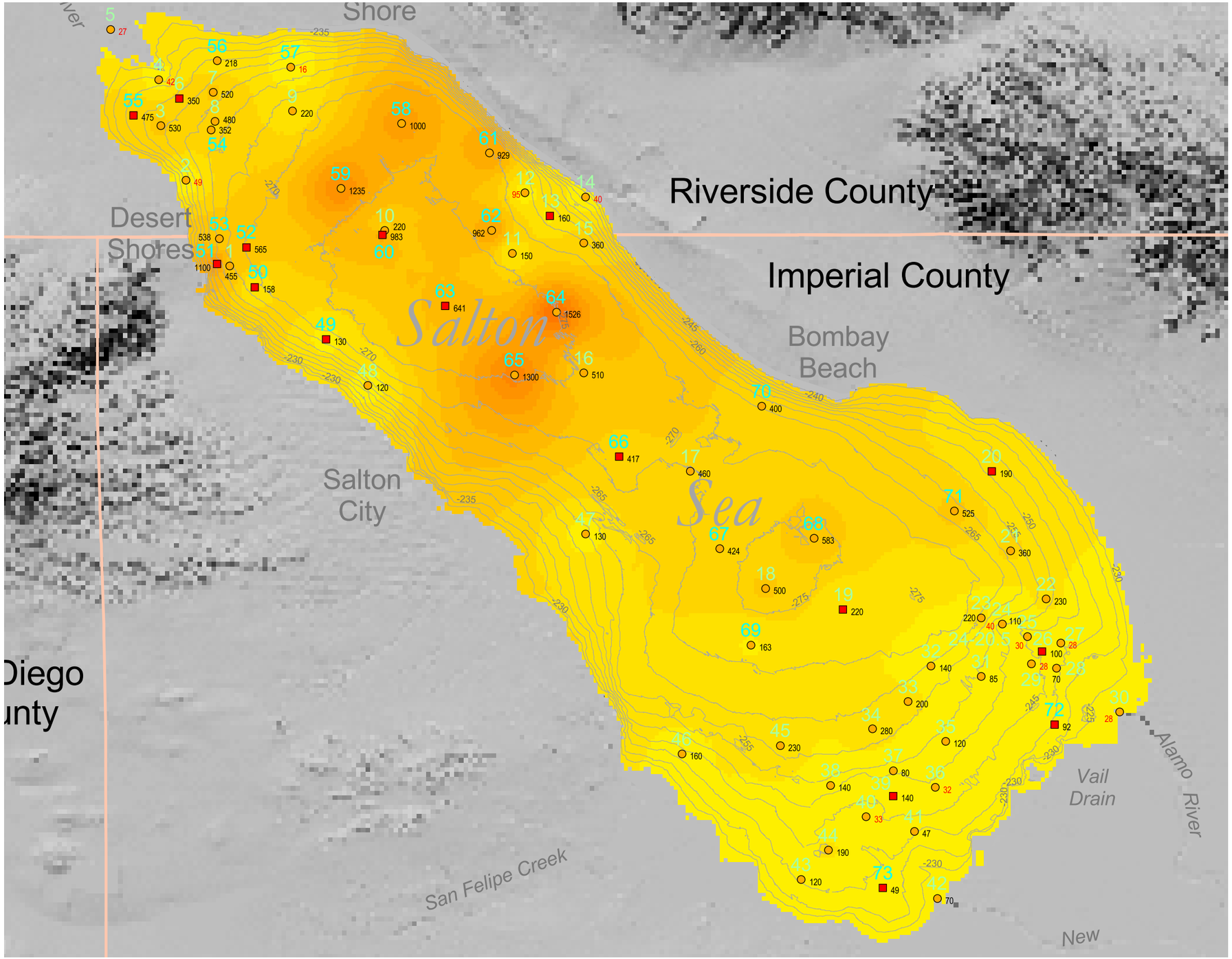
LFR Phase I and Phase II
Distribution of Selenium Concentrations

Figure 20

Project No. 6824.01

LFR LEVINE•FRICKE

R:\saltonsea\saltonsea.apr



1-48 Phase I Sediment Sample Locations (December, 1998)
49-73 Phase II Sediment Sample Locations (January, 1999)

Sediment Sample Type
- Core 0 - 30 cm
- Grab 0 - 15 cm

120 Acetone Concentrations (ug/kg, dry weight)

Bathymetric Contours (5 ft. interval)

Acetone Concentrations (ug/kg, dry weight)
- 16 - 170
- 170 - 320
- 320 - 470
- 470 - 620
- 620 - 770
- 770 - 920
- 920 - 1080
- 1080 - 1230
- 1230 - 1380
- 1380 - 1530

Riverside County Line

San Diego County Line

Shoreline

16 Analyte not detected above laboratory detection limit posted. These concentrations were assumed to be the detected concentrations for the purposes of preparing this map.

N

1 0 1 2 3 4 Miles

Salton Sea

LFR Phase I and Phase II Distribution of Acetone Concentrations

Figure 21

Project No. 6824.01

LFR LEVINE•FRICKE

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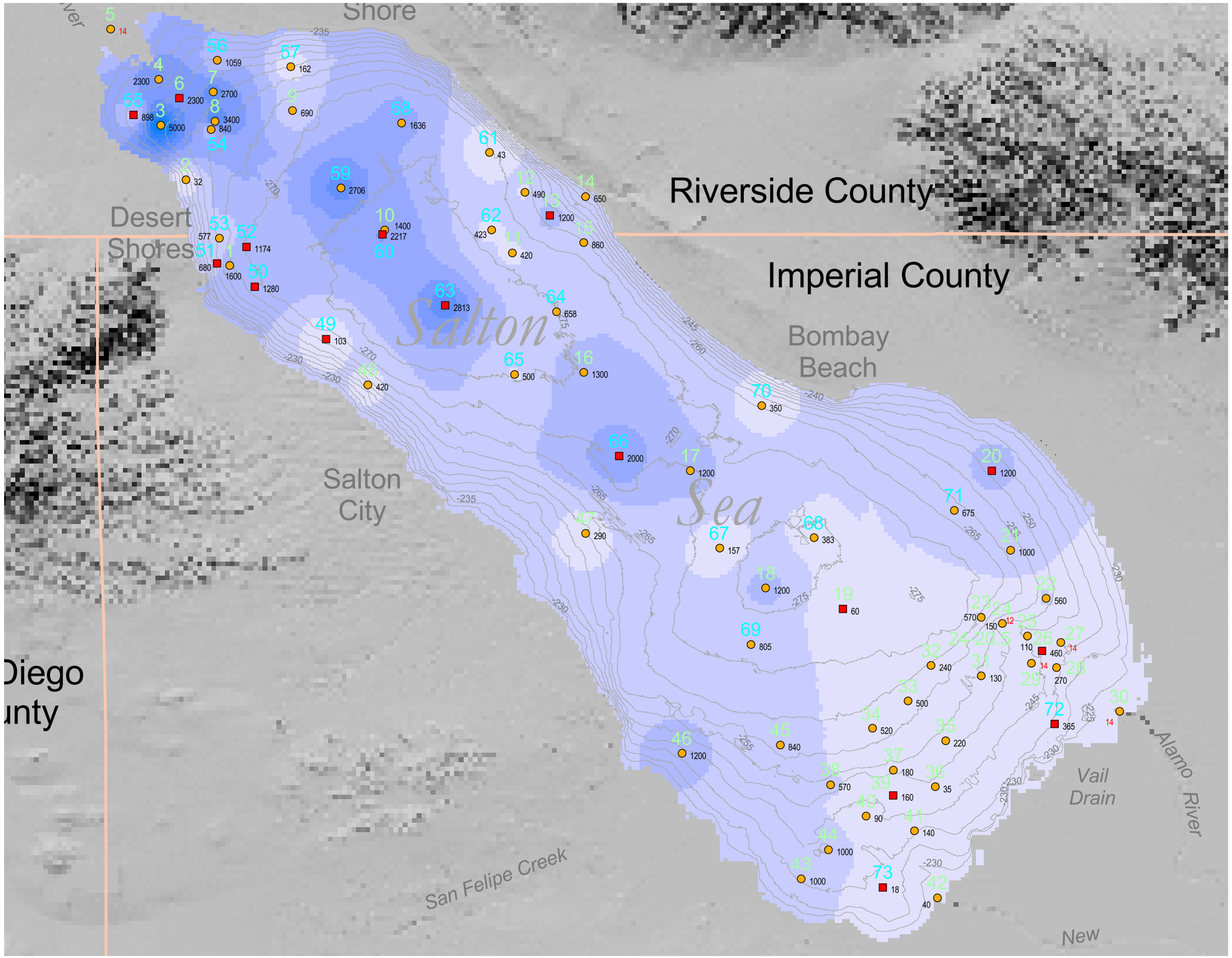


1-48 Phase I Sediment Sample Locations (December, 1998)

49-73 Phase II Sediment Sample Locations (January, 1999)

Sediment Sample Type

- Core 0 - 30 cm
- Grab 0 - 15 cm

110.000 Carbon disulfide Concentrations (ug/kg, dry weight)

Bathymetric Contours (5 ft. interval)

Carbon disulfide Concentrations (ug/kg, dry weight)

- 10 - 510
- 510 - 1010
- 1010 - 1510
- 1510 - 2000
- 2000 - 2500
- 2500 - 3000
- 3000 - 3500
- 3500 - 4000
- 4000 - 4500
- 4500 - 5000

Riverside County Line

San Diego County Line

Shoreline

12 Analyte not detected above laboratory detection limit posted. These concentrations were assumed to be the detected concentrations for the purposes of preparing this map.

N

1 0 1 2 3 4 Miles

Salton Sea

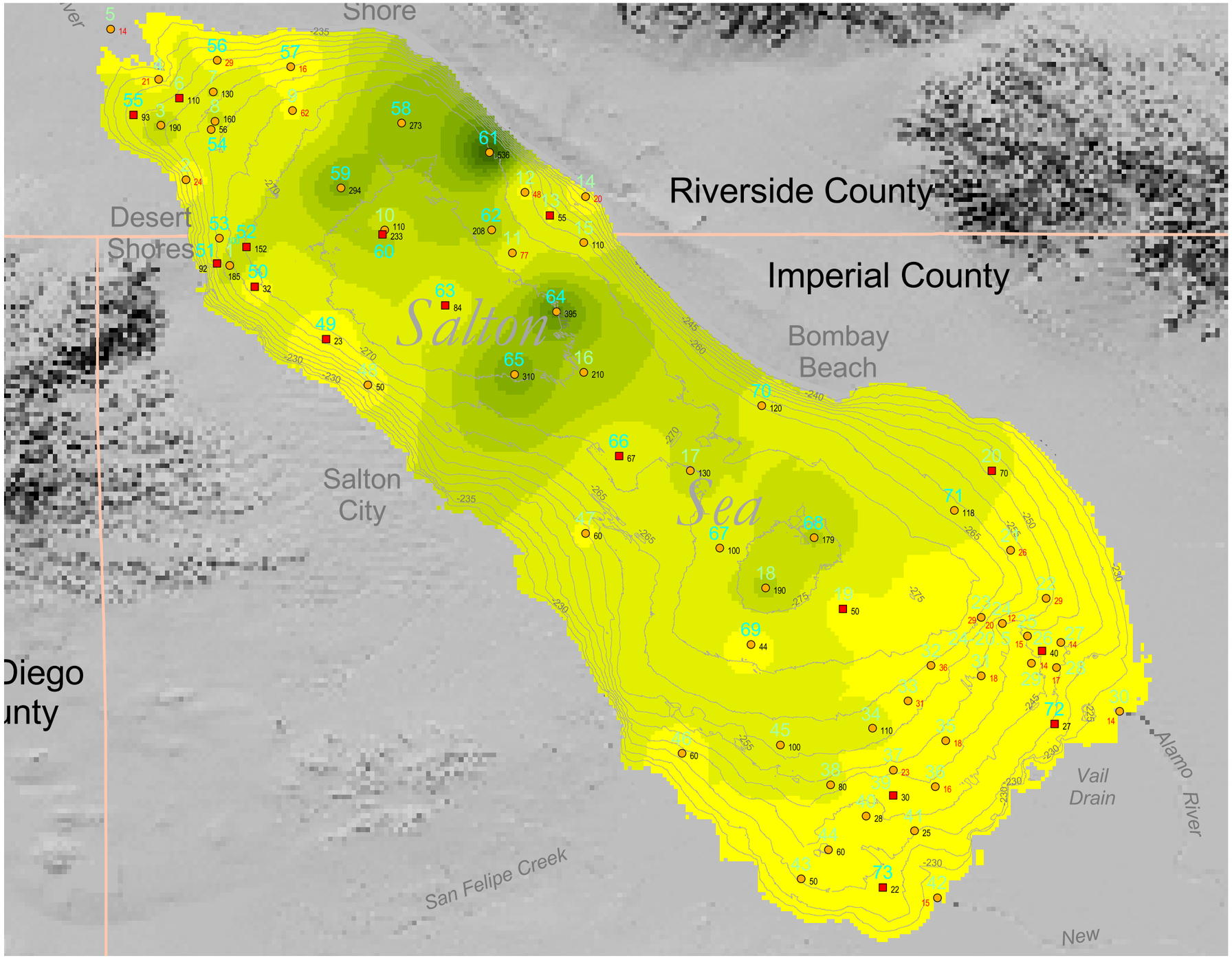
LFR Phase I and Phase II
Distribution of Carbon disulfide Concentrations

Figure 22

Project No. 6824.01

LFR LEVINE • FRICKE

R:\saltonsea\saltonsea.apr



1-48 Phase I Sediment Sample Locations (December, 1998)
49-73 Phase II Sediment Sample Locations (January, 1999)

Sediment Sample Type
- Core 0 - 30 cm
- Grab 0 - 15 cm

110 2-Butanone Concentrations (ug/kg, dry weight)

Bathymetric Contours (5 ft. interval)

2-Butanone Concentrations (ug/kg, dry weight)
- 10 - 60
- 60 - 120
- 120 - 170
- 170 - 220
- 220 - 270
- 270 - 330
- 330 - 380
- 380 - 430
- 430 - 490
- 490 - 540

Riverside County Line
San Diego County Line
Shoreline

26 Analyte not detected above laboratory detection limit posted. These concentrations were assumed to be the detected concentrations for the purposes of preparing this map.

N

1 0 1 2 3 4 Miles

Salton Sea

LFR Phase I and Phase II
Distribution of 2-Butanone Concentrations

Figure 23

Project No. 6824.01

LFR LEVINE•FRICKE

R:\saltonsea\saltonsea.apr

APPENDIX A

Daily Tailgate Safety Meeting Forms

Levine·Fricke·Recon

DAILY TAILGATE SAFETY MEETING FORM

Date: 12/15/98 Time: 12:00 Project Number: 6824.00.02

Project Name: SALTON SEA

Specific Location: RIVERSIDE & IMPERIAL COUNTIES

Type of Work: SEDIMENT SAMPLING

Chemicals Present: SELENIUM, BORON, DDT, DDE, PCBS, other pesticides

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: MODIFIED LEVEL D - polytyvek, gloves, boots

Hazards of Chemicals Present: Ingestion / inhalation of any chemical found in water or sediment. See other topics

Physical Hazards: STF, HEAT STRESS, NAUTICAL TRAFFIC

Special Hazards: BIOLOGICAL HAZARDS - pathogens, disease carrying birds

Other Topics: DDE DDT carcinogenic, teratogenic
Organochlorine pesticides - bioaccumulates. carcinogenic

ATTENDEES

Name (printed)	Signature
RYAN HENRY	Ryan Henry
RICHARD VOGL	Richard Vogl
WAYNE VOGLER	Wayne Vogler

Levine·Fricke·Recon

DAILY TAILGATE SAFETY MEETING FORM

Date: 12/16/98 Time: 0700 Project Number: 6824.00.02

Project Name: SALTON SEA

Specific Location: RIVERSIDE & IMPERIAL COUNTIES

Type of Work: SEDIMENT SAMPLING

Chemicals Present: SE, B, DDT, DDE, PCBs, OTHER PESTICIDES

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: MODIFIED LEVEL D - polytyvek, gloves, boots

Hazards of Chemicals Present: INGESTION/INHALATION OF ANY CHEMICAL FOUND IN WATER/SEDIMENT COULD BE CARCINOGENIC

Physical Hazards: STF, HEAT STRESS, NAUTICAL TRAFFIC

Special Hazards: BIOLOGICAL HAZARDS – pathogens, disease carrying birds

Other Topics: DDT, DDE - carcinogenic teratogenic
Organochlorine pesticides – bioaccumulates, carcinogenic

ATTENDEES

Name (printed)	Signature
RYAN HENRY	
RICHARD VOGL	
WAYNE VOGLER	
RAY DARLING	

Levine·Fricke·Recon

DAILY TAILGATE SAFETY MEETING FORM

Date: 12/17/98 Time: 0700 Project Number: 6824.00.02

Project Name: SALTON SEA

Specific Location: RIVERSIDE / IMPERIAL COUNTIES

Type of Work: SEDIMENT SAMPLING

Chemicals Present: Se, B, DDT, DDE, PCBs, other pesticides

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: Modified level D - polytyvek, gloves, boots mask

Hazards of Chemicals Present: Ingestion / inhalation of any chemicals found in water / sediment

Physical Hazards: S.T.F., heat stress

Special Hazards: Biological hazards - pathogens, disease carrying birds raw sewage in New River & outlet.

Other Topics: DDT, DDE - carcinogenic, teratogenic - use PPE Organochlorine pesticides - carcingenic, bioaccumulates ; Drink lots of water

ATTENDEES

Name (printed)	Signature
RYAN HENRY	Ryan Henry
RICHARD VOGL	Richard Vogl
WAYNE VOGLER	Wayne Vogler
RAY DIRLING	Raymond B. Dirling III

Levine·Fricke·Recon

DAILY TAILGATE SAFETY MEETING FORM

Date: 12/18/98 Time: 0700 Project Number: 6824.00.02

Project Name: SALTON SEA

Specific Location: RIVERSIDE / IMPERIAL COUNTIES

Type of Work: SEDIMENT SAMPLING

Chemicals Present: Se, B, DDT, DDE, PCBs, other pesticides

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: Modified Level D - polytyvek, gloves, boots mask

Hazards of Chemicals Present: Ingestion / inhalation of carcinogenic, teratogen compounds in water / sediment

Physical Hazards: S. T. F., heat stress, nautical traffic

Special Hazards: Biological hazards - pathogens, disease carrying birds raw sewage in southern end of Sea (near New River)

Other Topics: DDT, DDE, organochlorine pesticides - carcinogenic, tera[illegible] Drink lots of water

ATTENDEES

Name (printed)	Signature
RYAN HENRY	[signature]
RICHARD VOGL	[signature]
WAYNE VOGLER	[signature]
RAY DIRLING	[signature]

Levine·Fricke·Recon

DAILY TAILGATE SAFETY MEETING FORM

Date: 12/21/98 Time: 1000 Project Number: 6824.00.02

Project Name: SALTON SEA

Specific Location: RIVERSIDE/IMPERIAL COUNTIES

Type of Work: SEDIMENT SAMPLING / CORE

Chemicals Present: DDT, DDE, Se, B, PCBs, other Pesticides

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: Modified Level D - polytyvek, gloves, boots, mask

Hazards of Chemicals Present: Ingestion / inhalation of carcinogenic/teratogenic compounds in Sediment + water

Physical Hazards: S.T.F., heat stress, nautical traffic

Special Hazards: Biological hazards - pathogens, disease carrying birds raw sewage in southern end of Sea (near New River)

Other Topics: DDT, DDE, organochlorine pesticides - carcinogenic teratogenic - Drink lots of water

ATTENDEES

Name (printed)	Signature
RYAN HENRY	Ryan Henry
RICHARD VOGL	
RAY DIRLING	

Levine·Fricke·Recon

DAILY TAILGATE SAFETY MEETING FORM

Date: 12/22/98 Time: 0700 Project Number: 6824.00.02

Project Name: SALTON SEA

Specific Location: RIVERSIDE / IMPERIAL COUNTIES

Type of Work: SEDIMENT SAMPLING / CORE

Chemicals Present: Se, B, DDT, DDE, PCBs, other pesticides

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: Modified level D - polytyvek, gloves, boots, mask

Hazards of Chemicals Present: Ingestion / inhalation of carcinogenic / teratogenic compounds in water / sediment

Physical Hazards: S. T. F., heat stress, nautical traffic

Special Hazards: Biological hazards - pathogens, disease carrying birds, raw sewage

Other Topics: DDT, DDE organochlorine pesticides - carcinogenic teratogen

Drink lots of water - Dress warm

ATTENDEES

Name (printed)	Signature
RYAN HENRY	
RICHARD DOGL	
RAY DIRLING	

Levine·Fricke·Recon

DAILY TAILGATE SAFETY MEETING FORM

Date: 1/19/99 Time: 7:20 AM Project Number: 6824.00.03

Project Name: SALTON SEA

Specific Location: RIVERSIDE & IMPERIAL COUNTIES

Type of Work: SEDIMENT SAMPLING

Chemicals Present: METALS, TRACE PESTICIDES

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: LEVEL D - POLYTYVEK, GLOVES, BOOTS

Hazards of Chemicals Present: INGESTION/INHALATION OF ANY CHEMICAL FOUND IN WATER/SEDIMENT. SEE OTHER TOPICS

Physical Hazards: SLIPS, TRIPS, & FALLS HEAT STRESS, NAUTICAL TRAFFIC

Special Hazards: BIOLOGICAL HAZARDS - PATHOGENS, DISEASE CARRYING BIRDS

Other Topics: ALTHOUGH TRACE AMOUNTS OF DDE, ~~&~~ DDT, THESE ARE CARCINOGENIC, TERATOGENIC ORGANOCHLORINE PESTICIDES THAT BIOACCUMULATE

ATTENDEES

Name (printed)	Signature
RYAN HENRY	
RICHARD VOGL	
WAYNE VOGLER	
James Adams	
BARRY GUMP	

Levine-Fricke-Recon

DAILY TAILGATE SAFETY MEETING FORM

Date: Jan 20, 99 Time: 07:45 Project Number: 6824.00-003

Project Name: Salton Sea Sediment sampling

Specific Location: Riverside & Imperial Counties

Type of Work: Sediment Sampling

Chemicals Present: Metals, Trace Pesticides

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: Level D - Poly Tyvek, Gloves, Boots

Hazards of Chemicals Present: Ingestion/Inhalation of any chemical found in water/sediment. See other topics

Physical Hazards: Slips, Trips, Falls Heat stress Nautical traffic

Special Hazards: Biological hazards - Pathogens, disease carrying birds

Other Topics: Although trace amounts of DDE, PDT; these are carcinogenic, teratogenic organochloride pesticides that bio accumulate

ATTENDEES

Name (printed)	Signature
Ryan Henry	Ryan Henry
Richard Vogl	Richard Vogl
Wayne Vogler	Wayne
Steve Flint	

Levine·Fricke·Recon

DAILY TAILGATE SAFETY MEETING FORM

Date: Jan 21, 99 Time: 08:30 Project Number: 6824.00-003

Project Name: Salton Sea

Specific Location: Riverside & Imperial Counties

Type of Work: Sediment sampling

Chemicals Present: metals, trace pesticides

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: Level D - polytyvek, gloves, boots

Hazards of Chemicals Present: Ingestion/Inhalation of any chemical found in water/sediment - see other topics

Physical Hazards: Slips, trips & falls Heat stress, nautical traffic

Special Hazards: Biological hazards - Pathogens, disease carrying birds

Other Topics: Although trace amounts of DDE, DDT these are carcinogenic, teratogenic organo chloride pesticides that bioaccumulate

ATTENDEES

Name (printed)	Signature
Ryan Henry	Ryan Henry
Richard Vogl	Richard Vogl
Steve Friet	
Wayne Vogler	Wayne

Levine·Fricke·Recon

DAILY TAILGATE SAFETY MEETING FORM

Date: 1/22/99 Time: 800 Project Number: 0824.00-03

Project Name: SALTON SEA

Specific Location: RIVERSIDE / IMPERIAL COUNTIES

Type of Work: SEDIMENT SAMPLING

Chemicals Present: METALS, TRACE PESTICIDES

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: LEVEL D - POLYTUVEK, GLOVES, BOOTS

Hazards of Chemicals Present: INGESTION/INHALATION OF ANY CHEMICAL IN WATER/SEDIMENT - SEE OTHER TOPICS

Physical Hazards: SLIPS, TRIPS, FALLS - HEAT STRESS, NAUTICAL TRAFFIC

Special Hazards: BIOLOGICAL HAZARDS, PATHOGENS, DISEASES CARRIED BY BIRDS

Other Topics: ALTHOUGH TRACE AMOUNTS OF DDE, DDT, DDD, THESE ARE CARCINOGENIC, TERATOGENIC ORGANOCHLORINE PESTICIDES THAT BIOACCUMULATE

ATTENDEES

Name (printed)	Signature
RYAN HENRY	
RICHARD VOGL	
WAYNE VOGLER	
STEVE FRIET	

APPENDIX B

Field Activities Logbook Entry Forms

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB1 - 34.5 - 121598

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-15-98 Time 1:50 pm

Latitude 33° 24' 42.9" Longitude 116° 01' 17.6"

Weather/Site Conditions Windy cloudy

Project Investigators RAV, RNH, JWV

Depth to Sediment/Water Interface 34.5 depth finder / Manual 37 Feet 10.35 / 11.10 Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 50 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Just off Desert Shores Marina.

used feet for sample number

SOIL DESCRIPTION: SILT (ML) : DARK GREENISH GRAY (1GLEY 4/1)

~100% FINES, STRONG SULFUR ODOR

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB2-12.4-121598

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-15-98 Time 2:47

Latitude 33° 27' 11.5" Longitude 116° 02' 34.1"

Weather/Site Conditions Breezy, Cloudy

Project Investigators RAV, RNH, JWV

Depth to Sediment/Water Interface 12.4 depth finder RAV 1307 manual Feet 3.72 Meters (Feet x 0.30) 4.11

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 30 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: App 300 yards from shore

Non plastic Fines (silt): Dark greenish gray (10GY 4/1 RAV) (RC)

~80% fines, ~20% very fine sand

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: G03-19.5-12159B

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-15-98 Time 3:28

Latitude 33° 28' 45.5" Longitude 116° 03' 17.4"

Weather/Site Conditions Slight Breeze, Cloudy

Project Investigators RAV, RNH, JWV

Depth to Sediment/Water Interface 19.5' Depth finder 20.6' manual Feet 5.85 6.18 Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 50 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

Non Plastic Fines (ML): Dark greenish grey (10Gy 4/1), ~100% Fines, Strong Sulfur odor

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB4 - 7.2 - 121698

☐ Equipment Blank: _____ ☒ Duplicate: GB4 - 54 - 121698

Date 12-16-98 Time 4:15 ~~GB~~ RE

Latitude 33° 30' 04.1" Longitude 116° 03' NAV 20.2"

Weather/Site Conditions calm, clear

Project Investigators RAV, KWK, JWV, RBD

Depth to Sediment/Water Interface manual 7.2 depth finder 12.7 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 30 duplicate 30 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: low plastic fines (mud): Black (1 gley 2.5), ~ 100% fines, sulfur odor.

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GBS-1-121698

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-16-98 Time 9:37 am

Latitude 33° 31' 28.8" Longitude 116° 04' 44.6"

Weather/Site Conditions _____

Project Investigators RAV, RNH, JWV

Depth to Sediment/Water Interface 1' manual Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery (1st sample) 10 %

☐ Sediment Core Sediment Core Sample Percent Recovery (2nd sample) 10 %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Dredging just south on Coachella drain (Whitewater River). Both roads closed to vehicle access. Sampled at bridge where Lincoln meets main drain. Sampled along west bank just south of road bridge. Had to collect several samples to fill all 6 jars. Filled 5.5 on first bucket, filled 1.5 from second bucket.

Soil Description:

Well sorted sand (SW): Dark ~~grayish brown~~ (Re) gray (2.5Y 4/1) RAV,

well sorted, fine sand, micaceous, trace silt.

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: CR6-18-12198

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 10-21-98 Time 4:00

Latitude N 33° 29' 30.0" Longitude W 116° 02' 46.4" NAD 83

Weather/Site Conditions partly cloudy, Breeze

Project Investigators RAN, RDD, RHN

Depth to Sediment/Water Interface manual 19.2' depth file 18.0 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 85 %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: ~5' core recovered

18'-19'	CR6-18-12198	4:00	6 jars
19'-20'	CR6-19-12198	4:37	6 jars
20'-21'	CR6-20-12198	4:48	6 jars
21'-22'	CR6-21-12198	5:00	6 jars
22'-23'	CR6-22-12198	5:05	3 jars

LFR
LEVINE•FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GBJ - 25.4 - 121698

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-16-98 Time 4:45 PM

Latitude 33° 29' 40.9" Longitude 116° 01' 48.0"

Weather/Site Conditions Calm ; Clear

Project Investigators RAW, RBD, RAR, JWV

Depth to Sediment/Water Interface manual 25.4 ~~depth finder 23.4~~ Feet ~~23~~ RE RAW Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 30 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Non plastic fines (mL); Dark greenish gray (1 colors 4/1), ~ 100% fines, sulfur odor

LFR
LEVINE•FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GBB - 27.3 - 121698

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-16-98 Time 5:25 pm

Latitude N 33° 28' 50.4" Longitude W 116° 01' 43.5"

Weather/Site Conditions ~~calm~~ RE, clear, slight Breeze

Project Investigators RAV, RNH, JWV, RBD

Depth to Sediment/Water Interface ~~Mound 29.0~~ under 27ft per RE 27.3 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 30 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Non plastic fines (ML): Dark greenish gray (1 Gley 4/1), ~100% non plastic fines, strong sulfur odor.

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00

Sample Number: GBG-39.3'-121798

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12/17/98 Time 4:00

Latitude N 33° 29' 09.6" Longitude W 115° 59' 31.3"

Weather/Site Conditions Calm, sunny

Project Investigators RAV, RBD, JWV, RNH

Depth to Sediment/Water Interface measured 39.3' depth was 37.8' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 10 %

☐ Sediment Core Sediment Core Sample Percent Recovery 2nd 50 %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: 7 satellites.

Nonplastic fines (ML): dark greenish gray, (1 gley 10Y 4/1), ~ 100% fines, sulfur odor

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB10 - 47.4 -121798

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-17-98 Time 4:23 pm

Latitude N 33° 25' 43.7" Longitude W 115° 56' 52.0"

Weather/Site Conditions Calm, Clear

Project Investigators RAV, RSD, MH, GWV

Depth to Sediment/Water Interface ~~depth bid~~ nominal 49.5' depth bid 47.4 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 40 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

None to low plastic Fines (mL): Dark greenish gray (1 GBy 10Y 3/1), ~100% fines, sulfur odor

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB11 - 45.9 - 121798

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-17-98 Time 4:40

Latitude N 33° 25' 05.9" Longitude W 115° 53' 13.8"

Weather/Site Conditions slight breeze, Clear

Project Investigators RWV, RMH, RBD, JWV

Depth to Sediment/Water Interface measured 45.9' / 42.7' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 25 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: low plastic fines (ML): Dark greenish gray (1GLEY 10Y 3/1), ~100% fines, sulfur odor

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB12-40-121698

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-16-98 Time 11:50 pm

Latitude 33° 26' 49.2" Longitude 115° 52' 52.7"

Weather/Site Conditions sunny, windy

Project Investigators RAV, RNH, JWV

Depth to Sediment/Water Interface 40.0 manual Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 30 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: non plastic Fibers (mc): Dark greenish gray (GLey 4/1), ~100 fibers

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: CR13-33-122298

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-22-98 Time 9:15

Latitude N 33° 26' 10.8" Longitude W 115° 52' 07.1"

Weather/Site Conditions Sunny, Breeze

Project Investigators AW, RNH, RBD

Depth to Sediment/Water Interface manual 35.0' depth finder 33.0' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 100 %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

CR13-33-122298	9:15	6 jars
CR13-34-122298	10:58	6 jars
CR13-35-122298	11:05	6 jars
CR13-36-122298	11:10	6 jars
CR13-37-122298	10:30	6 jars
CR13-38-122298	10:00	

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB14 - 11 - 121696

☐ Equipment Blank: ☐ Duplicate:

Date 12-16-96 Time 1:00

Latitude 33° 26' 41.2" Longitude 115° 51' 7.8"

Weather/Site Conditions Sunny, Windy

Project Investigators RSV, RNH, JWV

Depth to Sediment/Water Interface 11.0 measured Feet Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery %

☐ Sediment Core Sediment Core Sample Percent Recovery %

Method of Shipment (Lab Name) ☐ Courier ☐ Hand Deliver

Field Observations/ Comments: Low plastic fines (ML): Dark greenish gray (1 Olive 4/1), ~ 100 low plastic fines, trace sand very fine

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB15 – 38.2 – 12/16/98

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-16-98 Time 12:35 pm

Latitude 33° 25' 22.6" Longitude 115° 51' 10.8"

Weather/Site Conditions Sunny, windy

Project Investigators RAV, RNH, JWV

Depth to Sediment/Water Interface 38.2 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 20 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: soil description

Low Plastic fines (ML): Dark Greenish Gray (10Gy 4/1), ~99% fines, trace <1% very fine sand, Sulfur odor

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.0002

Sample Number: GB16-45.3-121898

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-18-98 Time 4:48

Latitude N. 33° 21' 39.5" Longitude W 115° 51' 12.4" BGAK

Weather/Site Conditions Calm, partly Cloudy

Project Investigators RAV, RBD, RNH, JWV

Depth to Sediment/Water Interface depth finder 45.3' round 46.0' Feet 50 Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: low plastic flies (mc); greenish black (1 GBy 10Y 2.5/1), ~100 flies, sulfur odor

LFR LEVINE•FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6827.00.02

Sample Number: GB17 - 40.B - 121898

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-18-98 Time 4:27

Latitude N 33° 18′ 51.2″ Longitude W 115° 48′ 07.2″

Weather/Site Conditions Slight Breeze, Partly Cloudy

Project Investigators RAV, RBD, RNH, JWV

Depth to Sediment/Water Interface depth finder 40.B manual 43.0 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 50 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: ~2" plastic fines (ML): Brown greenish gray (1 Clay 10Y 3/1), ~100% fines, sulfur odor

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB18-46.8 121898

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-18-98 Time 4:02 pm

Latitude N 33° 15' 29.3" Longitude W 115° 45' 57.5" (15sec.)

Weather/Site Conditions Slight Breeze

Project Investigators RAV, RBD, RNH, JWV

Depth to Sediment/Water Interface manual 49.0 depth bdw 46.8 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 50 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: ow plastic flies (mc); greenish black (10Y 2.5/1, 1 Gley), ~ 100% fines, sulfur odor

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: CR19 – 45 – 122298

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-22-98 Time 1:27 pm

Latitude N 33° 14' 54.2" Longitude W 115° 43' 43.9"

Weather/Site Conditions sunny, breezy

Project Investigators RAV, RNH, RBD

Depth to Sediment/Water Interface ~~depth finder 44.2~~ manual 45.0 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 60 %

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments:

CR19 – 45 – 122298 Lost fell out of sampler 0 jars

CR19 – 46 – 122298 1:27 pm 6 jars

CR19 – 47 – 122298 1:36 pm 6 jars

CR19 – 48 – 122298 1:46 4.5 jars

Sampler came apart on way up?

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: CR20 - 21 - 122298

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-22-98 Time 2:52

Latitude N 33° 18' 51.0" Longitude ~~W 115° 39' 28.6"~~ ~~W 33° 18' 51.0"~~ RAV

Weather/Site Conditions clear, calm

Project Investigators RAV, RMD, RNH

Depth to Sediment/Water Interface ~~depth bdw 19.5~~ round 21.0 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 90 %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

CR20 - 21 - 122298 2:52 6 jars

CR20 - 22 - 122298 2:58

CR20 - 23 - 122298 3:00

CR20 - 24 - 122298 3:06

CR20 - 25 - 122298 3:12

CR20 - 26 - 122298 3:14

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: CSB24 - 20.4 - 12189

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-18-98 Time 10:07

Latitude N 33° 14' 28.3" Longitude W 115° 39' 09.4"

Weather/Site Conditions calm, cloudy

Project Investigators RAV, RNH, RBD, JWV

Depth to Sediment/Water Interface 22.0 manual 20.4 depth finder (w9 RV) Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery ~90 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Hard bottom. Trouble getting sample. filled half jar with ten trips. collected some sample off another only collected ½ jar total.

Silty sand (sm): greenish gray (10y 5/1, 1 Gley), ~80 v. fine to fine ~20% fines, trace barnacles.

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Carlsbad Sea LFR Project No.: 6824.00,02

Sample Number: GB23 - 34.8 - 121898

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-18-98 Time 9:55

Latitude N 33° 14' 37.2" Longitude 115° 39' 46.7"

Weather/Site Conditions cloudy, calm

Project Investigators RAN, RNH, KBD, TWV

37.5' manual

Depth to Sediment/Water Interface 34.8' depth finder Feet _____ Meters (Feet x 0.30)

Sampling Method: ☑ Benthic Grab Sample Benthic Grab Sample Percent Recovery 75 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: low plastic fines (mL). Dark greenish gray (10Y 3/1), ~95% fines, ~5% fine sand.

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824-00.02

Sample Number: GB22 - 23.4 - 121898

☐ Equipment Blank: ☐ Duplicate:

Date 12-18-98 Time 9:42

Latitude N 33° 15' 10.8" Longitude W 115° 37' 55.5"

Weather/Site Conditions calm, Cloudy

Project Investigators RAV, RNH, JWV, RBD

Depth to Sediment/Water Interface 24.6', manual 23.4' depth finder Feet Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1st 0 2nd 10 3rd 30 %

☐ Sediment Core Sediment Core Sample Percent Recovery %

Method of Shipment (Lab Name) ☐ Courier ☐ Hand Deliver

Field Observations/ Comments: low plastic fines (ML): Dark greenish gray (Gley 1 4/1), ~100 fines, sulfur odor

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB21-31-121898 RD RE RW

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-18-98 Time 9:30

Latitude N 33° 16' 33.9" Longitude W 115° 38' 57.4"

Weather/Site Conditions Cloudy, calm

Project Investigators RKV, RNH, JWV, RBD

Depth to Sediment/Water Interface manual depth 30.6' under 31.0' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 35 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: low plastic fines (ML): Dark Greenish gray (1 Gley 10 Y 3/1), ~ 100% fines, strong sulfur odor

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB24-20.5-122798

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-22-98 Time 3:55

Latitude N33° 14' 23.9" Longitude W 115° 39' 06.8"

Weather/Site Conditions Calm, sunny

Project Investigators RHV, RNH, RKD

Depth to Sediment/Water Interface 18.9' depth finder / 20.5' measured Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Crab Sample Benthic Crab Sample Percent Recovery 1st 5 %

~~☐ Sediment Core~~ RE RV Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments: Used 3" stainless core barrel 1.5' long.

Silty sand (SM): Greenish gray (10GY 5/1), ~
80% very fine to fine sand, ~
20% fines RE RV

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: CB25 - 16.2' - 121898

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-18-98 Time 10:45 am

Latitude N 33° 14' 05.1" Longitude W 115° 38' 28.3"

Weather/Site Conditions Calm, Cloudy

Project Investigators RAV, JNH, RHD, JWV

Depth to Sediment/Water Interface sepm finder 16.2' manual 17.5' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 2 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Salton Sea. Came up empty 3 times. 4th try came up with ~2%. 5th 2%. 6th 2%

Medium plasticity fines (mh): greenish gray (1 Gley 1 5Y 5/1), ~100% fines, trace worms, trace sand, barnacles & worms. got large chunk of barnacles & worms in one sample

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: CR26 - 17 - 122298

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-22-98 Time 4:40

Latitude N 33° 13' 40.7" Longitude W 115° 38' 01.9"

Weather/Site Conditions sunny / slight breeze

Project Investigators RAV, RNH, RBD

Depth to Sediment/Water Interface named 17.0' depth finder 13.6' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 50 % could only drive 3'

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

CR26 - 17 - 122298 4:40

CR26 - 18 - 122298 5:00

CR26 - 19 - 122298 5:04

Very hard bottom. Could only drive 3'

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB27-12-121898

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-18-98 Time 11:20

Latitude N 33° 13' 55.3" Longitude W 115° 37' 29.2"

Weather/Site Conditions calm, cloudy

Project Investigators RAV, RMD, RNH, JMV

Depth to Sediment/Water Interface manual 13.4' / depth finder 12.0' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Hard bottom. Required numerous samplings to collect sample.

Silty sand (SM): greenish gray (5 GY 5/1), ~80%v. fine to fine sand, ~20% silt.

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GBS9 - 17.2 - 121898

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-18-98 Time 12:53

Latitude N 33° 13' 19.1" Longitude 115° 38' 20.8"

Weather/Site Conditions calm, cloudy

Project Investigators RAV, RMH, JWV, RBD

Depth to Sediment/Water Interface 17.2' / 18.2' Feet _____ Meters (Feet x 0.30) _____

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Hard bottom - NO sample first 3 tries.
took numerous sampling to collect samples.

Sandy Silt (ML): Greenish gray (1 Gley 10Y 5/1),
≈ 85% silt, ~15% very fine sand

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB89 - 17.2 - 121898

☐ Equipment Blank: ☐ Duplicate:

Date 12-18-98 Time 12:53

Latitude N 33° 13' 19.1" Longitude 115° 38' 20.8"

Weather/Site Conditions calm, cloudy

Project Investigators RAV, RNH, JWV, RBD

Depth to Sediment/Water Interface 17.2' 18.2' Feet Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1 %

☐ Sediment Core Sediment Core Sample Percent Recovery %

Method of Shipment (Lab Name) ☐ Courier ☐ Hand Deliver

Field Observations/ Comments: Hard bottom - NO sample first 3 tries.
Took numerous sampling to collect samples.

Sandy Silt (mud): Greenish gray (10Y 5/1),
≈ 85% silt, ~15% very fine sand

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB30 - 4.9 - [illegible] (RB) (RV) 122198

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-21-98 Time 10:40 (RE) (RV) am

Latitude N 33° 11' 57.8" Longitude 115° 35' 49.8"

Weather/Site Conditions Windy, Clear

Project Investigators RAV, RBD, RNH

Depth to Sediment/Water Interface manual 4.9' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1st / 2nd 30 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

Bulk sample on southeast side of Garst Rd (RB) (RV)

Road Bridge

Silty sand (RB) (RV) (3m): Brown (10YR 5/3), ~ 80% fine to v. fine sand, ~20% fines

Alamo River

N ← Garst Rd

sample point

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 1004.00.02

Sample Number: GB31 - 25.2 - 121898

☐ Equipment Blank: ☐ Duplicate:

Date 12-18-98 Time 1148

Latitude N 33° 12' 57.5" Longitude W 115° 39' 45.3"

Weather/Site Conditions partly cloudy

Project Investigators RAV, RNH, JWV, RBD

Depth to Sediment/Water Interface ~~manual 26.0~~ depth finder 25.2 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 5 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments: low plastic pieces (rec): greenish gray (10 GY 5/1), ~ 100% fine, trace v. fine sand.

Hard bottom.

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6624.00.02

Sample Number: GB32-36.5 - 121898

☐ Equipment Blank: _____ ☒ Duplicate: GB32-36.5-121898-0

Date 12-18-98 Time 2:24 pm dup 2134

Latitude N 33° 13' 15.0" Longitude W 115° 41' 13.0"

Weather/Site Conditions partly cloudy, calm

Project Investigators RAV, RBD, RNH, JWV

Depth to Sediment/Water Interface manual depth finder 38.5 36.5' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 20 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments: no plastic Fines (mL); Dark greenish gray (10Y 4/1), ~99% fines, trace fine sand

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB33-33-121898

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-18-98 Time 2:55 pm

Latitude N 33° 12' 13.5" Longitude W 115° 41' 52.9"

10 ft.

Weather/Site Conditions calm, partly cloudy

Project Investigators RAV, RNH, RBD, JWV

Depth to Sediment/Water Interface depth finder 33.0' measured 34.0 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 15 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments: low plastic fines (nc): Dark greenish gray (10Y 3/1), ~99% fines, trace v. fine sand

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB34-33-121998

☐ Equipment Blank: ☐ Duplicate:

Date 12-18-98 Time 3:15 pm

Latitude 1) 33° 11' 27.8" Longitude W115° 42' 54.0"

Weather/Site Conditions partly Cloudy, Calm

Project Investigators RHV, RNH, RBD, JWV

Depth to Sediment/Water Interface nominal 35.7 depth finder 33.0 Feet Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1st 20 %

☐ Sediment Core Sediment Core Sample Percent Recovery 2-1 40 %

Method of Shipment (Lab Name) ☐ Courier ☐ Hand Deliver

Field Observations/ Comments: (2) plastic vials (mL): Dark greenish gray (1 (Gley 1 4Y 3/1), 95% fines, ~5% v. fine sand

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea   LFR Project No.: 6824.00.02

Sample Number: GB35 - 24 - 121898

☐ Equipment Blank: ______   ☐ Duplicate: ______

Date 12-18-98   Time 3:32 pm

9 sat. Latitude N 33° 11' 05.5"   Longitude W 115° 40' 47.3"

Weather/Site Conditions calm, partly cloudy

Project Investigators RAV, RBD, RNH, JWV

Depth to Sediment/Water Interface manual 25.5 (RE RV) depth finder 24.0 Feet ______ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample   Benthic Grab Sample Percent Recovery 1st 5 %

☐ Sediment Core   Sediment Core Sample Percent Recovery 2nd 5 %

Method of Shipment ______ (Lab Name)   ☐ Courier ______   ☐ Hand Deliver ______

Field Observations/ Comments: on plastic fines (mi...): dark greenish gray (1 Gley 10Y 3/1), ≥98% fines, ~2% v. fine sand

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: CR39-21-122296

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-22-98 Time 6:20

Latitude N 33° 09' 33.2" Longitude W 115° 42' 17.3"

Weather/Site Conditions calm, dark

Project Investigators ~~RKV~~, RNH, RSD

Depth to Sediment/Water Interface ~~measured 21.0'~~ depth finder 19.8 Feet _____ Meters (Feet x 0.30) KV

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery ~~70~~ %

☒ Sediment Core Sediment Core Sample Percent Recovery 10 % 0.5 ft recovery

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

CR 39 - 21 - 122298 6:20 3 jars

~~CR 39 - 22 - 122298~~ no recovered.
KV

Very hard bottom. First attempt dove 2' and was empty. Corer seperated. 5:50
Did try no recovery.
3rd try 2" recovery 6" recovery
KV

Levine-Fricke-Recon
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

SHEET 1 OF 1
JOB NO: 6824.00.02
DATE: 12-17-98
COMPUTED BY: RAV
CHECKED BY:

PROJECT: Salton Sea
SUBJECT: sediment phase I

Time 1:15

GB 36 - 20.4 - 121798

Lat: N 33° 09' 46.1" Long: W 115° 41' 05.5"

Swift Breeze, Sunny

RAV, RBD, JWV, RNH

manual 21.5'

depth finder 20.4'

Had to move 3 (RE) locations (RV) times to get enough sample
Hard bottom, lots of barnacles, collected
some sample off anchor in order to get sample.
Low plasticities (ML): Dark greenish gray
(10 GY 4/1), ~ 90% fines, 10% barnacles.
Initials 12-17-98

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ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

SHEET 1 OF 1
JOB NO: 6624.00.01
DATE: 12-17-98
COMPUTED BY: RAV
CHECKED BY:

PROJECT: Salton Sea
SUBJECT: Sediment phase I

Time: 12:50

GB37 – 23.4 – 121798

lat: N 33° 10' 14.9" long: W 115° 42' 17.3"

Slight Breeze, sunny
Depth finder: 23.4'
Manual depth: 25 (24) 24.3'
RAV, RBD, JWV, RNH

Low plastic fines (ML): Dark greenish gray (5 GY 3/1), ~100% fines, lots of worms

mid cyl 12/17/98

Levine·Fricke·Recon
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

SHEET 1 OF 1
JOB NO: 6824.00.02
DATE: 12-17-98
COMPUTED BY: RAV
CHECKED BY:

PROJECT: Salton Sea
SUBJECT: Sediment Phase I

Time: 11:00 am

GB 38 - 24 - 121798

Lat: N33° 09' 49.8" Long: W115° 44' 5.9"

Slight Breeze, Sunny

Depth finder: 24.0'
manual Depth: 26.0'

RAV, RBD, JWV, RNH

Benthic Grab 30% recovery.

Low plastic fines (ML): Dark greenish gray (1 Gley 10Y 4/1); ~ 100% fines

12/17/98

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ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

SHEET 1 OF 1
JOB NO: 6624.00.02
DATE: 12-17-98
COMPUTED BY: RHV
CHECKED BY:

PROJECT: Salton Sea
SUBJECT: Sediment Phase I

Time 11:15 am 9 satellites

GB40 - 13.2 - 121798

1st Lat: N 33° 08' 55.9" Long: W 115° 43' 05.0"
2nd N 33° 08' 51.1" W 115° 43' 02.5"
Slight Breeze, Sunny
1st Depth finder: 13.2'
Manual depth: 14.0'
2nd Depth finder - 15.4'
RHV, RBD, JWV, RNH

Benthic Grab 0-2 % recovery

Hard bottom. Very little sediment
Had to go down with sampler numerous times
1st 1.5 jars to get sample. Had to move to get rest of sample
2nd 4.5 jars
Well sorted sand (SW): Dark Greenish
gray (1 Gley 10Y 4/1), ~~60~~ (RE) ~99% RV fine sand,
~~40~~ (RE) RV ~1% Barnacles, trace silt.
2nd sample ≈ 40 % hard plastic lines, trace barnacles
1 inch -

12/17/98

Levine·Fricke·Recon
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

SHEET 1 OF 1
JOB NO: 6824.00.02
DATE: 12-17-98
COMPUTED BY: RAV
CHECKED BY:

PROJECT: Salton Sea
SUBJECT: Sediment phase I

Time: 2:08

GB41 - 12 - 121798

Lat: N33° 08' 31.5" Long: W115° 41' 42.7"

slight Breeze, Sunny

RAV, RBD, JWV, RNH

manual 13.5'
depth finder 12.0'

5 tries only got sed. in one. filled
on jar. pulled anchor into sediment.
Collected 5 jars off anchor.
Silty Sand (mc): Dark greenish gray (10Y 3/1), fine to med. sand, 20-30% fines, trace

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Saltonsea LFR Project No.: 6824.00.02

Sample Number: GB42-1-122198

☐ Equipment Blank: _____ ☒ Duplicate: 12:10 GB42-1-122198-0

Date 12-21-98 Time 12:00

Latitude N 33° 06' 35.5" Longitude W 115° 41' 01.8" (NAD)

Weather/Site Conditions partly cloudy, windy

Project Investigators RAN, RNH, RBD

Depth to Sediment/Water Interface Marsh 0.5-1 ft Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery used stainless trowel to fill jars. %

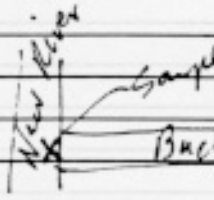
☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments:

Sampled at Buchard Rd + New River along southern bank

low plastic fines (ML): greenish black (10Y 2.5/1), ~ 100% fines.



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SHEET 1 OF 1
JOB NO: GB24.00.02
DATE: 12-17-98
COMPUTED BY: RW
CHECKED BY:

PROJECT: Salton Sea
SUBJECT: Sediment Phase I

11 subst.

Time 12:27

GB43 - 11.4 - 121798

Lat: N 33° 07' 07.8" Long: W 115° 44' 56.5"

Slight Breeze, Sunny

Depth finder: 11.4'
Manual depth: 12.5'

RAV, RBD, IWV, RNH

Benthic grab 35 % recovery.

low plastic fines (mc): very dark gray (10YR 3/1), trace fine sand

12/17/98

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SHEET 1 OF 1
JOB NO: 6824.00.02
DATE: 12-17-98
COMPUTED BY: RAV
CHECKED BY:

PROJECT: Salton Sea
SUBJECT: Sediment phase I

Time 12:06

GB44 - 16.8 - 121798

Lat: N 33° 07' 58.2" Long: W 115° 44' 08.6"

Slight Breeze, Sunny

Depth finder: 16.8'
Manual Depth: 17.2'

RAV, RBD, JWV, RNH

Benthic Grab 25% % recovery

Low plastic fines (ML): Dark greenish gray (1 Gley 10Y 3/1), ~ 100% fines,
worm present

12/17/98

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SHEET 1 OF 1
JOB NO: GB24.0.02
DATE: 12-17-98
COMPUTED BY: RAV
CHECKED BY:

PROJECT: Salton Sea
SUBJECT: Sediment Phase I

Salton Sea Thu 10:42 am

GB45 - 32.8 - 121798

Lat. N33° 10' 58.7 Long W115° 45' 31.7"

Slight Breeze, Sunny

Depth manual ~~34.5'~~ RE RAV 33.3'

Depth Reader 32.8'

RAV, RBD, JWV, RNA

Benthic Grab 30 % recovery

Low to medium Plastic fines (mL): Dark greenish gray (5Y Gley, 10Y 3/1), ~ 99 % fines, Trace very fine sand, sulfur odor, small worm 1 cm length (tan with vein) 0.5 mm dia

Richard Vogl 12/17/98

Levine·Fricke·Recon
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

SHEET 1 OF 1
JOB NO: 6B24.00.02
DATE: 12-17-98
COMPUTED BY: RAV
CHECKED BY:

PROJECT:
SUBJECT: Salton Sea

GB46-15-121798 10:18 am

Lat. 33° 10' 43.8" Long 115° 48' 22.4"

Slight Breeze, Sunny

P.I. RAV, RBD, JWV, RNH

Benthic Grab 50% recovery

depth manual 15.0
depth tube 13.2'

Soil: Low plastic fine (ml): Black (10YR 2.5/N),
~ 100% fines.

12/17/98

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB47-24.4-121796

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 12-17-96 Time 9:40

Latitude 33° 17' 09.1" Longitude 115° 51' 06.3"

Weather/Site Conditions Sunny, Slight Breeze

Project Investigators RAV, RDD, RNH, JWV

24.4 depth finder

Depth to Sediment/Water Interface 26.5 Manual Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample (1) Benthic Grab Sample Percent Recovery 10 %

☐ Sediment Core (2) Sediment Core Sample Percent Recovery 10 %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Took 2 samples to get 6 jars, low plastic fines (ML); very dark greyish brown (10YR 3/2), ~95% fines, ~5% very fine sand, abundant barnacles ~50% of total mass (live).

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: GB4B-24.5-121798 9:10 am

☐ Equipment Blank: _____ ☒ Duplicate: GB4B-24.5-121798-D

Date 12-17-98 Time 9:00 am.

Latitude 33° 21' 17.4" Longitude 115° 57' 23.2"

Weather/Site Conditions Slight Breeze, Sunny

Project Investigators RAV, RBD, JWV, RNH

Depth to Sediment/Water Interface 49.0 depth finder 24.5 manual Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 25 %

☐ Sediment Core duplicate Sediment Core Sample Percent Recovery 35 % %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Low plasticity fines (ML): Very dark greyish brown (2.5 Y 3/2), ~95% fines, ~5% very fine sand; Sulfur odor

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea phase II LFR Project No.: 6824.00.03

Sample Number: CR49-39-12099

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-20-99 Time 17:03

Grab Latitude N 33° 22' 35.6" Longitude W 115° 58' 34.5"

Weather/Site Conditions Dusk, calm

Project Investigators RMV, RNH, JWV, SAF

Depth to Sediment/Water Interface Natural 39.6' Feet _____ Meters (Feet x 0.30) Depth under 38.4'

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery ~~33~~ (RE) RV %

☒ Sediment Core Sediment Core Sample Percent Recovery 33 %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

17:25	CR49-39-12099	3 jars
17:35	CR49-40-12099	2 jars

Signature: _____ Date: 1-20-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6824.00.02 03 (RE) (RV)

Sample Number: CR50 - 39 - 11999

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-19-99 Time 3:36 or 15:36

Latitude N 33° 24' 07.3" Longitude W 116° 00' 37.0" (gps)

Weather/Site Conditions partly cloudy, slight Breeze (SE)

Project Investigators RBV, RNH, JWV

Depth to Sediment/Water Interface depth finder 39.0' moved 40.5' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 50 %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: 1st attempt sampler did not engage 6" recovery (RE) (RV)
resampled. 2nd attempt sampler did not engage. 3rd attempt —
2 jars CR50 - 39 - 11999 15:36 ~~1 Box jar~~ 1 (RE) (RV)
CR50 - 40 - 11999 15:50 RV 3 jars
CR50 - 41 - 11999 16:00 3 jars

CR50 - 42 - 11999 (collected 1/4 jar from sampler and for other studies)

Signature: _____ Date: 1-19-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea phase II LFR Project No.: 6824.00.03

Sample Number: CR51-29-12099

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-20-99 Time 8:55

Latitude N 33° 24' 46.7" Longitude W116° 01' 41.7" 9 sat.

Weather/Site Conditions partly cloudy, calm

Project Investigators RAN, RNH, JWV, SAF

Depth to Sediment/Water Interface depth finder 28.8' 29.8 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core ~25' 80 centimeters Sediment Core Sample Percent Recovery 33 %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Hand Bottom

3 jars	CR51-29-12099	8:55
3 jars	CR51-30-12099	9:13
2 jars	CR51-31-12099	9:20

Signature: _____ Date: 1-20-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6824.00.03

Sample Number: CR52 - 40 - 12099 (CR52-41-12099)
1 (RE) RV

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-20-99 Time 9:50 (NO) DV

Latitude N 33° 25' 16.3" Longitude W 116° ~~00~~ 00' 51.4"

11 sat.

Weather/Site Conditions Sunny, slight breeze

Project Investigators RAV, RNH, JWV, SMF

Depth to Sediment/Water Interface Depth finder 40.9' manual 42.3' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core ~4' or 120 cm. Sediment Core Sample Percent Recovery 70 %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

9:55 CR52 - 41 - 12099 - 3 jars
10:20 CR52 - 42 - 12099 3 jars
10:25 CR52 - 43 - 12099

Signature: [signature] Date: 1-20-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6824.00.03

Sample Number: 6B53-33-11999

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-19-1999 Time 9:45

Latitude N 33° 25' 31.1 Longitude W 116° 01' 37.0" (11 sat.)

Weather/Site Conditions Calm, partly cloudy

Project Investigators RAV, RNH, JWV

Depth to Sediment/Water Interface Manual 34.5', Depth finder 33.0' ~~34.5~~ Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample (RE/RV) Benthic Grab Sample Percent Recovery 1st 5% 2nd 30 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

1st sample filled 3/4 jar.
2nd sample filled remaining jars (3 8oz jars)
Non plastic fines (ML).
Dark greenish gray (1 Gley 10Y 3/1),
Trace barnacles, worm 5-6 cm, Sulfur odor

Signature: [signature] Date: 1-19-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6824.00.03

Sample Number: GB54 - 28.2 - 11999

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-19-99 Time 10:15

Latitude N 33° 28' 36.3" Longitude W 116° 01' 53.0"

10sat.

Weather/Site Conditions Sunny, calm

Project Investigators DAV, RWH, JWV

depth finder 28.2'

Depth to Sediment/Water Interface Manual 29.8' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1st. 30 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: 1st sampled - filled 3 BOZ cores.

Non plastic fines (ML): Dark greenish gray (1 Color 10Y 3/1), strong sulfur odor, 100% fines

Signature: [signature] Date: 1-19-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6824.00.03

Sample Number: CR55-14-12099

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-20-99 Time ~~11:55~~ RV 11:25

Latitude N 33° 29' 00.8" (SAT.) Longitude W 116° 04' 03.9"

Weather/Site Conditions Sunny, calm

Project Investigators RAW, RNH, JWV, SAF

Depth to Sediment/Water Interface ~~measured 15.1~~ depth finder 13.9' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 33 % (RV)

~~2.5'~~ 2.0' 75cm

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Hard bottom

11:25 CR55-14-12099 3 jars

11:45 CR55-15-12099 3 jars

Signature: [signature] Date: 1-20-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Flux II LFR Project No.: 6624.00.03

Sample Number: GB56-17.4-11999 10:47

☐ Equipment Blank: _____ ☒ Duplicate: GB56-17.4-11999-0

Date 1-19-99 Time 10:36

9sat.

Latitude N 33° 30' 36.7" Longitude W 116° 01' 42.3"

Weather/Site Conditions Sunny, calm

Project Investigators RAV, RNH, JWV

Depth to Sediment/Water Interface Depth finder 17.4' measured 18.7' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 40 %

Duplicate

☐ Sediment Core Sediment Core Sample Percent Recovery 20 %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: medium plastic liners (mc): Dark greenish gray (10y 4/1), ~90% silt, ~10% clay, sulfur Odor

filled all 3 8oz jars

Duplicate filled 2 8oz jars with first sample

Same description as above.

Signature: [signature] Date: 1-19-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Gulfstone Sea Plane II LFR Project No.: 6824.00.03

Sample Number: GB57 - 25.8 - 11999

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-19-99 Time ~~1-19-99~~ (RE) RV 11:14

Lat. Latitude N 33° 30' 24.7" Longitude W 115° 59' 33.6"

Weather/Site Conditions Sunny Calm

Project Investigators RAV, RWH, JWV

Depth to Sediment/Water Interface ~~Manual 27.4~~ depth finder 25.8' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1st 10% 2nd 30%

☐ Sediment Core Sediment Core Sample Percent Recovery _____%

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

1st sample - 1 jar
2nd sample - 2 jars 3 total

Low plasticity fines (mc): Dark greenish gray (1 Gley 10Y 4/1), ~ 99% fines, trace fine sand, trace to little barnacles, sulfur odor

Stopped by sheriff boat on way to GB58.

Signature: Rick Vaughn Date: 1-19-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Plant II LFR Project No.: 6824.00.03

Sample Number: GB58-45-11999

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-19-99 Time 11:39

Latitude N 33° 28' 47.9" Longitude W 115° 56' 24.5" 9 sat.

Weather/Site Conditions partly cloudy, slight breeze

Project Investigators RAV, RNH, JWV

Depth to Sediment/Water Interface 46.1 measured, depth finder 45.0' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1st 0%, 2nd 15 %, 3rd 40

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

2nd filled 2 jars
3rd filled 1 jars
low plastic fines (ML): Dark greenish gray (1 GLEY 10Y 4/1), ~100% fines, trace clay, trace fish bones

Signature: [signature] Date: 1-19-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea pleasant LFR Project No.: 6824.00.03

Sample Number: GB59-45-11999

☒ Equipment Blank: EB6-011999 13:46 ☐ Duplicate: _____

Date 1-19-99 Time 12:30

Latitude N 33° 26' 57.3" Longitude W 115° 58' 08.7"

10 sat.

Weather/Site Conditions partly cloudy, slight Breeze

Project Investigators RLV, RNH, JWV

Depth to Sediment/Water Interface depth finder 45.0' manual 46.2' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1st 30% %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: low plastic fines (ML): Dark greenish gray (1 Gly 10Y 4/1), ~ 100% fines, sulfur odor

Signature: [signature] Date: 1-19-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea phase II LFR Project No.: 6824.00.03

Sample Number: CR60 - 48 - 12099

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-20-99 Time 13:10

14X Latitude N 33° 25' 37.9" Longitude W 115° 56' 56.2

Weather/Site Conditions Sunny calm

Project Investigators RAV, RNH, JWV, SAF

depth under 47.5'

Depth to Sediment/Water Interface manual 49.2 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 95 %

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments:

3 jars CR60 - 48 - 12099 lost top silt ~ 6"
3 jars CR60 - 49 - 12099
(1 jar broken) 3 jars CR60 - 50 - 12099
3 jars CR60 - 51 - 12099
3 jars CR60 - 52 - 12099

Signature: [signature] Date: 1-20-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea phase II LFR Project No.: 6824.00.03

Sample Number: GB61-44-1999

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-19-99 Time 12:05

Latitude N 33° 27' 57.5" Longitude W 115° 53' 54.5"

grab

Weather/Site Conditions partly cloudy, slight breeze

Project Investigators RMN, RNH, JWV

Depth to Sediment/Water Interface depth finder 53.4 *manual 44.0' Feet _____ Meters (Feet x 0.30)

1st

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 45 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: con plastic frags (mm): dark greenish gray (1GGy 10Y 4/1), ~100% fines, trace clay, worm

Signature: [signature] Date: 1-19-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea phase II LFR Project No.: 6824.00.03

Sample Number: GB61-44-1999

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-19-99 Time 12:05

grab Latitude N 33° 27' 57.5" Longitude W 115° 53' 54.5"

Weather/Site Conditions partly cloudy, slight breeze

Project Investigators RMW, RNH, JWV

depth finder 53.4

Depth to Sediment/Water Interface *manual 44.0' Feet _____ Meters (Feet x 0.30)

1st

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 45 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: con plastic frags (mm): dark greenish gray (1GGy 10Y 4/1), ~100% fines, trace clay, worm

Signature: [signature] Date: 1-19-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6624.00.03

Sample Number: (NO) RV GB62 - 44 - 12099 changed to grab

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-20-99 Time 2:30 14:30

Latitude N 33° 25' 44.7" Longitude W 115° 53' 47.8 (post.)

Weather/Site Conditions Sunny calm

Project Investigators RAV, RNH, JWV, SAF

Depth to Sediment/Water Interface Depth finder 43.8 manual 45.1 Feet _____ Meters (Feet x 0.30) 1st 10%

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

(RE) ☒ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment RV (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: 3 attempts - Sampler would not engage. Last Sample 15:46

No sample collected !!!

Grab sample: on corner
low plastic fines (ML): Dark greenish gray (10GY 4/1), ~100% fines, Fish bones trace
Sulfur odor

Signature: [signature] Date: 1-20-99

Depth, feet	WELL CONSTRUCTION Type of Security:	LITHOLOGY Graphic Log	LITHOLOGY Description	SAMPLE DATA Number	SAMPLE DATA Interval	SAMPLE DATA Penetration Rate (Blows/Ft.)
15				14:35		RV (RE) CR62 44-12099
16			No sample collected on cover 3 attempts failed to engage sampler.	RE RV		CR62-45-12099
17						
18			Collected grab GB62-44-12099			

Well Permit No.: NA
Date well drilled: 1-20-99
Date water level measured: NA
Well elevation: NA

Drilling Company: LFR
Driller: RNH
Sampling Method: Auger Core
Hammer weight: 25#

LF Geologist/Engineer: RW

Sketch of Well Location:

FIELD LOG OF WELL CONSTRUCTION AND LITHOLOGY FOR CR62

Project No. 6824.00.03

LEVINE·FRICKE
CONSULTING ENGINEERS AND HYDROGEOLOGISTS

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: _____

Sample Number: CR63-49-12299

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-22-99 3 RV Time 9:00

Latitude N33° 23' 39.4" Longitude W115° 55' 08.7"

10 sats

Weather/Site Conditions Sunny, Calm

Project Investigators RAW, RNH, JWV, GDP

Depth to Sediment/Water Interface Depth finder 48.6' Feet _____ Meters (Feet x 0.30)
Manual 49.9'

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 1st 10 % ~1ft 30cm 2nd 5%

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

CR63-49-12299 3 jars

Second attempt sampler split open

retrieved 1 jar (CR63-49-12299)

Signature: [signature] Date: 1-22-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6823.00.03

Sample Number: GB64-46.2-12099

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-20-99 Time 1620

Latitude N 33° 23' 23.9" (1 sat.) Longitude W115° 51' 57.0"

Weather/Site Conditions sunny, calm

Project Investigators RAV, RNH, JWV, SAF

Depth to Sediment/Water Interface 46.2 (depth finder) 47.3 (manual) Feet 7. (RG) RV Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 75 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Low plastic fines (ML): Dark greenish gray (10Y 4/1), ~100% fines, worm ~~RG~~ RV ~5 cm long | Sulfur odor

Signature: _____ Date: 1-20-99

LFR
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FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea phase II LFR Project No.: 6824.00.03

Sample Number: GB65 - 46.2 - 12099

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-20-99 Time 16:34

Latitude N 33° 21' 34.9" Longitude W 115° 53' 10.3"

Weather/Site Conditions sunny, calm 10 gal

Project Investigators RAV, RNH, JWV, SAF

Depth to Sediment/Water Interface depth finder 46.2 manual 47.4 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☑ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: low plastic fines (mud): Dark greenish gray (10Gy (10Y 4/1)), ~100% fines, sulfur odor

Signature: [signature] Date: 1-20-99

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6824.00.03

Sample Number: CR66-42 - 12299

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-22-99 RV Time 10:50

Latitude N 33° 19' ~~44~~ 14.3" (RE) (got) Longitude W 115° 50' 07.9"

Weather/Site Conditions Sunny, calm

Project Investigators RAV, RNH, SAF, JWV

Depth to Sediment/Water Interface ~~manual 42.5'~~ depth finder 41.4' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 69 % ~35' or 110 cm

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

3 jars	CR66 - 42 - 12299	(RE) RV 11:45	11:25
3 jars	CR66 - 43 - 12299		11:30
3 jars	CR66 - 44 - 12299		11:35
1.5 jars	CR66 - 45 - 12299		11:45

Signature: _____ Date: 1-22-99

LFR
LEVINE•FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6824.0003

Sample Number: GB67-43.6-12199

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-21-99 Time 9:30

Grab Latitude N 33° 16' 37.5" Longitude W 115° 47' 17.4"

Weather/Site Conditions Dust storm, 1-2 ft swells, very rough seas

Project Investigators RAV, RMH, JWV, SAP

Depth to Sediment/Water Interface depth finder 43.6, Manual 45.0' Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1st 5% 2nd 0% 3rd 25 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments: low plastic fines (ML): Dark greenish gray (1 Gley 10Y 3/1), ~100% non plastic fines, trace worms + fish bone, sulfur odor

Signature: [signature] Date: 1-21-99

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea phase II LFR Project No.: 6824.00.03

Sample Number: GB68 - 47.2 - 12199

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-21-99 Time 10:12

10 sat

Latitude N 33°16' 54.2" Longitude W 115° 44' 34.9"

Weather/Site Conditions Hazy, Strong Breeze, 1-2 waves, very rough seas

Project Investigators [redacted], JWV, SAF

Depth to Sediment/Water Interface Depth finder 47.2' manual 48.0 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 25 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: Do low plastic tins (mL): Dark greenish gray (10Y 3/1), ~100% low plastic tins, slight odor

Signature: [signature] Date: 1-21-99

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Gulton Sea Phase II LFR Project No.: 6824.00.03

Sample Number: GB69-42.7-12199 10:42

☐ Equipment Blank: _____ ☐ Duplicate: GB69-42.7-12199-0

Date 1-21-99 Time 10:35

Latitude N 33° 13' 50.3" Longitude W 115° 46' 21.9"

Weather/Site Conditions Windy, 1-2 ft waves, Rough seas

Project Investigators RGV, RNH, JWV, SAP

Depth to Sediment/Water Interface derived tide 42.7 measured 44.0 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 1st 10% 2nd 20%

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments: Olive to med plastic tires (mL to CL);
greenish gray (1Gy 10Y 5/1) to dark
greenish gray (1Gy 10Y 4/1), ~ 10-20% plastic fines, fish bones, sulfur odor strong

Signature: [signature] Date: 1-21-99

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6824.00.03

Sample Number: GB70 - 35.4 - 12299

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-22-99 Time 12:13

Latitude N33° 20' 40.8 Longitude W115° 46' 05.7"

Weather/Site Conditions Sunny, Slight breeze

Project Investigators RAV, RNH, SAF, JWV

depth liter 35.4'

Depth to Sediment/Water Interface manual 37.0 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery 20 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments: Silt (ML): Dark greenish gray (10GY 4/1), ~100% low plastic fines, slight sulfur odor

3 jars

Signature: [signature] Date: 1-22-99

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6824.00.03

Sample Number: GB71 - 34.2

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-21-99, Time 15:55

Latitude N 33° 17' 42.5" Longitude W115° 40' 32.8

Weather/Site Conditions Very wet, 2-3' waves, stormy, Victory at Sea

Project Investigators RAV, RWH, SAF, JWV

manual 35.0'

Depth to Sediment/Water Interface ~~depth sounder~~ 34.2 Feet _____ Meters (Feet x 0.30)

Sampling Method: ☒ Benthic Grab Sample Benthic Grab Sample Percent Recovery ~~20~~ 1st 80% 2nd 20 %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments: Silt, low plastic, clay, (ML): Dark greenish gray (10BG 4/1, 10Y), ~ 5-10% plastic fines, sulfur odor

Signature: _____ Date: 1-22-99

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6824.00.03

Sample Number: ~~GB-12~~ CR72 - 11 - 12199

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-21-99 Time 11:50

Latitude N33° 11' 35.3" Longitude W115° 37' 42.1"

Weather/Site Conditions sunny, 1-2 ft waves

Project Investigators RAN, RAH, TWV, SAF

Depth to Sediment/Water Interface depth finder 11.2' Feet _____ Meters (Feet x 0.30)
measured 13.0

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 66 %
~ 4' or 110 cm

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments:

11:50	CR72-11-12199	3 jars
11:55	CR72-12-12199	3 jars
11:58	CR72-13-12199	3 jars
12:00	CR72-14-12199	2 jars

Signature: _____ Date: 1/21/99

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea Phase II LFR Project No.: 6824.00.03

Sample Number: CR73-B-12199

☐ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-21-99 Time 13:46

Latitude N 33° 06' 55.0" Longitude W 115° 42' 34.8"

Weather/Site Conditions Sunny, slight wind, 1-2 ft waves

Project Investigators RAV, RNH, JWV, SAF (RE) KV

Depth to Sediment/Water Interface ~~manual 10.0~~ ~~depth finder 9.7~~ 7.4 Feet 10.0 Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☒ Sediment Core Sediment Core Sample Percent Recovery 12 %

1st ~1ft 2nd ~2ft ~70cm 33%

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: 1st attempt 1 ft collected sample very hard!!

collected ~3 jars - Recovered 1 ft total
CR73-B-12199 13:46

2nd sample - 2' Recovery
CR73-B-12199 14:17 3 jars
CR73-9-12199 14:22 3 jars
CR73-10-12199 14:27 1 jar

Signature: _____ Date: 1-21-99

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: Salton Sea LFR Project No.: 6824.00.02

Sample Number: —

☒ Equipment Blank: EB1-121698 ☐ Duplicate: _____

Date 12-16-98 Time 6:00 PM

Latitude — Longitude —

Weather/Site Conditions Clear, slight breeze

Project Investigators RAY, RNH, JNV, RBD

Depth to Sediment/Water Interface — Feet — Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

N/A ☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: 2 Equipment blanks taken from benthic grab sampler on land after decking.

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: SALTON SEA LFR Project No.: 6824.00.02

Sample Number:

☒ Equipment Blank: EB3-121898 ☐ Duplicate:

Date 12/18/98 Time 1820 6:20 PM

Latitude — Longitude —

Weather/Site Conditions NIGHT, CLEAR

Project Investigators RAV, RNH, RBD, JWV

Depth to Sediment/Water Interface — Feet — Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery ____ %

☐ Sediment Core Sediment Core Sample Percent Recovery ____ %

Method of Shipment ____ (Lab Name) ☐ Courier ____ ☐ Hand Deliver ____

Field Observations/ Comments: 5 AMBERS
2 PLASTIC BOTTLES
3 VOAs

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: SALTON SEA LFR Project No.: 6824.00.02

Sample Number:

☒ Equipment Blank: EB4-122198 ☐ Duplicate:

Date 12/21/98 Time 6:30 PM

Latitude — Longitude —

Weather/Site Conditions Clear, cold, windy

Project Investigators RAV, RNH, RBD

Depth to Sediment/Water Interface — Feet — Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery ____%

☐ Sediment Core Sediment Core Sample Percent Recovery ____%

Method of Shipment APPLIED (Lab Name) ☐ Courier ☒ Hand Deliver

Field Observations/ Comments: 5 AMBERS
2 PLASTICS
3 VOAs

Equipment blanks taken from sampling shovel used for sub-sampling from benthic grab sampler

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: SALTON SEA LFR Project No.: 6824.00.02

Sample Number: _____

☒ Equipment Blank: EBS-122298 ☐ Duplicate: _____

Date 12/22/98 Time 8:15 PM

Latitude — Longitude —

Weather/Site Conditions Dark, slight breeze

Project Investigators KAU RNH RBD

Depth to Sediment/Water Interface — Feet — Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment Apollo (Lab Name) ☐ Courier _____ ☒ Hand Deliver _____

Field Observations/ Comments: 5 AMBERS
2 PLASTICS
3 VOAs

Equipment blanks taken from sediment shovel used to subsample from corer into glass sample jars.

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: SALTON SEA LFR Project No.: 6824.00-03

Sample Number: _____

☒ Equipment Blank: EB7-12099 ☐ Duplicate: _____

Date 1/20/99 Time 1820

Latitude — Longitude —

Weather/Site Conditions _____

Project Investigators SAF RNH

_____

Depth to Sediment/Water Interface — Feet — Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____%

☐ Sediment Core Sediment Core Sample Percent Recovery _____%

Method of Shipment _____ ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments: 3 AMBERS
1 PLASTIC
3 VOAs

Signature: [signature] Date: 1/20/99

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: SALTON SEA LFR Project No.: 6824.00-03

Sample Number: EB8-12199

☒ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-21-99 Time 1830

Latitude — Longitude —

Weather/Site Conditions —

Project Investigators RNH

Depth to Sediment/Water Interface — Feet — Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment _____ (Lab Name) ☐ Courier _____ ☐ Hand Deliver _____

Field Observations/ Comments: ~ AMBERS
1 PLASTIC
3 VOAS
Taken w/ Stainless Steel trowel

Signature: Ryan Hess Date: 1/21/99

LFR
LEVINE • FRICKE

FIELD ACTIVITIES LOGBOOK ENTRY FORM

Project Name: SALTON SEA LFR Project No.: 6824.00-03

Sample Number: EB9-12299

☒ Equipment Blank: _____ ☐ Duplicate: _____

Date 1-22-99 Time 1330

Latitude — Longitude —

Weather/Site Conditions SUNNY, CLEAR

Project Investigators RWH, JWV

Depth to Sediment/Water Interface — Feet — Meters (Feet x 0.30)

Sampling Method: ☐ Benthic Grab Sample Benthic Grab Sample Percent Recovery _____ %

☐ Sediment Core Sediment Core Sample Percent Recovery _____ %

Method of Shipment — ☐ Courier _____
(Lab Name) ☐ Hand Deliver _____

Field Observations/ Comments: 4 AMBERS
1 PLASTIC
3 VOA's

Taken using Stainless-steel hand trowel

Signature: [signature] Date: 1/22/99

APPENDIX C

Field Boring Logs of Sediment Lithology

Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		LITHOLOGY	**SAMPLING DATA**		
		Water.			
5					
10					
15					
20		**SILT (ML)**, greenish black (1 Gley, 10Y-2.5/1), 100% low plastic fines. -trace barnacles.	CR6-18-122198		
		SILTY SAND (SM), dark greenish gray (1 Gley, 10Y-3/1), 80% very fine to fine grained sand, 20% low plastic fines.	CR6-19-122198		
		SILT (ML), dark greenish gray.	CR6-20-122198		
		SILTY SAND (SM), dark greenish gray (1 Gley, 10Y-3/1), 80% fines, 20% very fine grained sand.	CR6-21-122198		
		SILT (ML), dark greenish gray (1 Gley, 10Y-3/1), low plastic fines.	CR6-22-122198		
		Bottom of boring at 7.01 meters (23 ft).			

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 12/21/98

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR6

Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		LITHOLOGY	**SAMPLING DATA**		
		Water.			
5					
10					
15					
20					
25					
30					
35		**SILT (ML)**, greenish black (1 Gley, 10Y-2.5/1), low plasticity. -dark greenish gray (1 Gley, 10Y-4/1).	CR13-33-122298 CR13-34-		

Continued

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

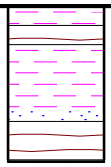
uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 12/22/98

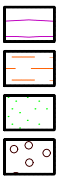
L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR13

LITHOLOGY			SAMPLING DATA		
Depth, feet	Graphic Log	Visual Description Continued	ID of Samples Collected	Penetration Rate (blows/ft.)	P I D Values (ppm)
		**LEAN CLAY (CL)**, grayish brown (10YR-5/2). **SANDY SILT (ML)**, dark greenish gray (1 Gley, 10Y-4/1), 80% fines, 20% fine grained sand. -graysih brown (10YR-5/2), low plastic fines, trace sand lenses. -sand lense, fine grained sand. **LEAN CLAY (CL)**, grayish brown (10YR-5/2). Bottom of boring at 11.89 meters (39 ft).	122298 CR13-35-122298 CR13-36-122298 CR13-37-122298 CR13-38-122298		

EXPLANATION



Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 12/22/98

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR13 (CONTINUED)

	LITHOLOGY		SAMPLING DATA		
Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	P I D Values (ppm)
		Water.			
5			5		
10			10		
15			15		
20			20		
25			25		
30			30		
35			35		

Continued

EXPLANATION

- Clay
- Silt
- Sand
- Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 12/22/98

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR19

Depth, feet	Graphic Log	Visual Description (Continued)	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		Water.			
40					
45		**LEAN CLAY (CL)**, yellowish brown (10YR-5/4) and greenish gray (1 Gley, 10Y-5/1). -yellowish brown (10YR-5/4), clear crystals up to 10 mm, bladed crystals (flat). -greenish gray (1 Gley, 10Y-5/1).	CR19-46-122298 CR19-47-122298 CR19-48-122298	Sampled and lost	
		-mottled with black streaks, trace crystals. Bottom of boring at 14.94 meters (49 ft).			

LITHOLOGY

SAMPLING DATA

EXPLANATION

Clay

Silt

Sand

Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 12/22/98

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR19 (CONTINUED)

	LITHOLOGY		SAMPLING DATA		
Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		Water.			
5					
10					
15					
20					
		SILT (ML), greenish gray (1 Gley, 10Y-5/1), 100% low plastic fines.	CR20-21-122298		
		-greenish gray (1 Gley, 10Y-5/1), medium to high plastic fines.	CR20-22-122298 CR20-23-122298		
25		-grayish brown (10YR-5/2).	CR20-24-122298		
		LEAN LAY (CL), grayish brown (10YR-5/2), 100% plastic fines.	CR20-25-122298		
		Bottom of boring at 8.08 meters (26.5 ft).	CR20-26-122298		

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

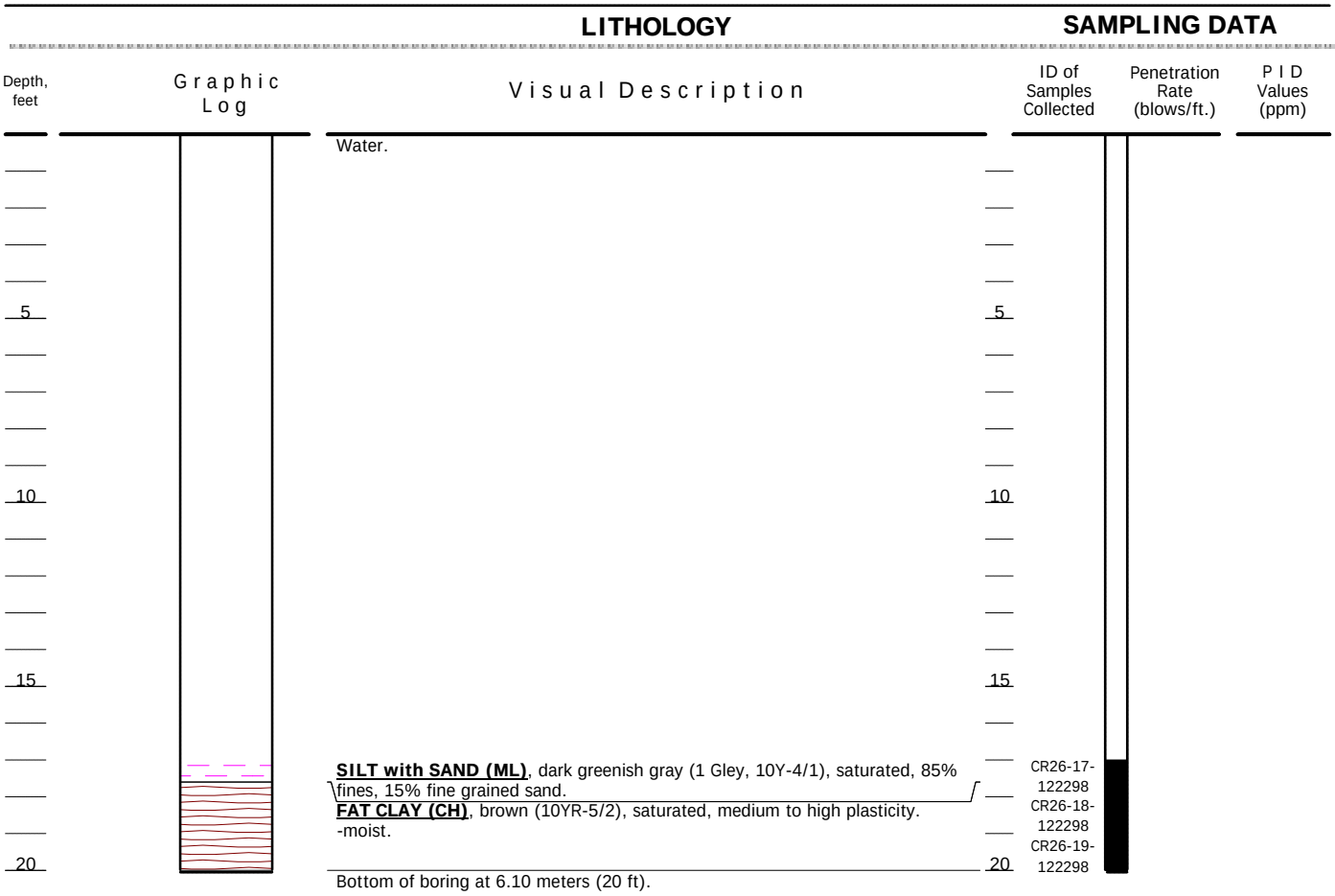
uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 12/22/98

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR20



EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 12/22/98

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR26

	LITHOLOGY		SAMPLING DATA		
Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	P I D Values (ppm)
		Water.			
5					
10					
15					
20					
		FAT CLAY (CH), greenish gray (1 Gley, 10Y-5/1), 100% plastic fines.	CR39-21-122298		
		Bottom of boring at 6.55 meters (21.5 ft).			

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 12/22/98

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR39

LITHOLOGY			SAMPLING DATA		
Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	P I D Values (ppm)
		Water.			
5			5		
10			10		
15			15		
20			20		
25			25		
30			30		
35		Continued	35		

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/20/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR49

Depth, feet	Graphic Log	Visual Description (Continued)	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		Water.			
40		**SILT (ML)**, dark greenish gray (1 Gley, 10Y-4/1), low plastic fines, trace fine grained sand, barnacle layer. -greenish gray (1 Gley, 10Y-6/1), low to medium plastic fines, trace organic carbon, 20% plastic fines. Bottom of boring at 12.34 meters (40.5 ft).	40 CR49-39-12099 CR49-40-12099		

LITHOLOGY

SAMPLING DATA

EXPLANATION

Clay

Silt

Sand

Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/20/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR49 (CONTINUED)

Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		Water.			
5					
10					
15					
20					
25					
30					
35		Continued			

LITHOLOGY

SAMPLING DATA

EXPLANATION

Clay

Silt

Sand

Gravel

Interval Sampled

Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/19/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR50

Depth, feet	Graphic Log	Visual Description (Continued)	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		Water.			
40		**SILT (ML)**, dark greenish gray (1 Gley, 10Y-4/1), 100% low plastic fines.	CR50-39-11999		
		SILT TO LEAN CLAY (ML to CL), pale brown (10YR-6/3), medium plastic fines, carbon streaks, mostly clay - 80%.	CR50-40-11999		
		SILT (ML), light brownish gray (10YR-6/2), 80% fines, 20% clay, trace very fine grained sand, trace mica, trace barnacle pieces. Bottom of boring at 12.8 meters (42 ft).	CR50-41-11999		

LITHOLOGY

SAMPLING DATA

EXPLANATION

Clay

Silt

Sand

Gravel

Interval Sampled

Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/19/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR50 (CONTINUED)

	LITHOLOGY		SAMPLING DATA		
Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	P I D Values (ppm)
		Water.			
5					
10					
15					
20					
25					
30		**SILT (ML)**, dark greenish gray (1 Gley, 10Y-4/1), 100% low plastic fines, 5 cm zone of barnacles. -greenish gray (1 Gley, 5GY-6/1), 95% low plastic fines.	CR51-29-12099 CR51-30-12099 CR51-31-12099		
		LEAN CLAY (CL), light brownish gray (10YR-6/2), moist, medium to high plastic fines. Bottom of boring at 9.60 meters (31.5 ft).			

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/20/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR51

LITHOLOGY			SAMPLING DATA		
Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	P I D Values (ppm)
		Water.			
5			5		
10			10		
15			15		
20			20		
25			25		
30			30		
35		Continued	35		

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

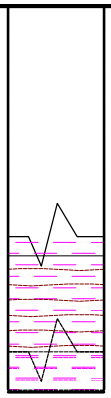
uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/20/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR52

Depth, feet	Graphic Log	Visual Description (Continued)	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		Water.			
40		**SILT (ML)**, dark greenish gray (1 Gley, 10Y-4/1), 100% fines, barnacles in 2 cm layer.	CR52-41-12099		
		LEAN CLAY (CL), light greenish gray (1 Gley, 5GY-7/1), 20% plastic fines.	CR52-42-12099		
		-pale brown (10YR-6/3), 80% low plastic fines, 20% plastic fines, trace organic streaks, 3 mm clear to brown crystals, very small rust colored crystals.	CR52-43-12099		
45		**SILT (ML)**, light greenish gray (1 Gley, 10Y-7/1), moist, low to medium plastic fines, trace caliche nodules, organic streaks.	CR52-44-12099		
		Bottom of boring at 13.72 meters (45 ft).			

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/20/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR52 (CONTINUED)

Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		LITHOLOGY		**SAMPLING DATA**	
		Water.			
5					
10					
15		**SILT (ML)**, dark greenish gray (1 Gley, 10Y-4/1), 100% low plastic fines.	CR55-14-12099		
		-greenish gray (1 Gley, 10Y-5/1), 10% low plastic fines.	CR55-15-12099		
		SILT to LEAN CLAY (ML to CL), light brownish gray (10YR-6/2), moist, 20-30% plastic fines, organic carbon abundant.			
		Bottom of boring at 4.88 meters (16 ft).			

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/20/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR55

Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	P I D Values (ppm)
		Water.			
5					
10					
15					
20					
25					
30					
35		Continued			

LITHOLOGY **SAMPLING DATA**

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/20/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR60

Depth, feet	Graphic Log	Visual Description (Continued)	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		Water.			
40					
45					
		SILT (ML), dark greenish gray (1 Gley, 10Y-4/1).	CR60-48-12099	Lost	
		-greenish gray (1 Gley, 5GY-6/1), low plastic fines, clear light brown crystals 8-10mm.	CR60-49-12099		
50		-dark gray (1 Gley, N-3), small clear crystal layer (max 1mm).			
		LEAN CLAY (CL), mottled color (1 Gley N to 10Y-5/1 to 3/1), medium to high plasticity, 20% plastic fines.	CR60-50-12099		
		-trace organic carbon.	CR60-51-12099		
		-greenish gray (1 Gley, 50Y-5/1).			
		-layers of very fine (0.5-1mm) clear crystals.	CR60-52-12099		
		-30% clay.			
		Bottom of boring at 16.15 meters (53 ft).			

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/20/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR60 (CONTINUED)

LITHOLOGY			SAMPLING DATA		
Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	P I D Values (ppm)
		Water.			
5			5		
10			10		
15			15		
20			20		
25			25		
30			30		
35		Continued	35		

EXPLANATION

- Clay
- Silt
- Sand
- Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/22/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR63

LITHOLOGY			SAMPLING DATA		
Depth, feet	Graphic Log	Visual Description Continued	ID of Samples Collected	Penetration Rate (blows/ft.)	P I D Values (ppm)
		Water.			
40					
45					
50		**SILT (ML)**, greenish gray (1 Gley, GY-6/1), trace plastic fines, abundant amber crystals to 8 mm. -dark gray (1 Gley 4/N), low plastic fines, fine clear crystals. -greenish gray (1 Gley, 5 GY-6/1), 20% plastic fines. Bottom of boring at 15.24 meters (50 ft).	CR63-49-12299		

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/22/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR63 (CONTINUED)

Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		LITHOLOGY			**SAMPLING DATA**
		Water.			
5			5		
10			10		
15			15		
20			20		
25			25		
30			30		
35		Continued	35		

EXPLANATION

- Clay
- Silt
- Sand
- Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/22/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR66

Depth, feet	Graphic Log	Visual Description (Continued)	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		Water.			
40		**SILT (ML)**, greenish gray (1 Gley, 10Y-4/1), 100% low plastic fines. -greenish gray (1 Gley, 10Y-6/1), 10-20% plastic fines, trace barnacles, worms, fine grained sand lense. -pale brown (10YR-6/3), 80% low plastic fines, 20% fine grained sand.	CR66-42-12299 CR66-43-12299		
45		**SILTY CLAY (ML/CL)**, light greenish gray (1 Gley, 10Y-7/1), moderate to high plasticity, organic carbon present.	CR66-44-12299 CR66-45-12299		
		Bottom of boring at 13.87 meters (45.5 ft).			

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/22/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR66 (CONTINUED)

Depth, feet	Graphic Log	Visual Description	ID of Samples Collected	Penetration Rate (blows/ft.)	PID Values (ppm)
		LITHOLOGY		**SAMPLING DATA**	
		Water.			
5					
10		**SILT (ML)**, dark greenish gray (1 Gley, 10Y-4/1), 5% plastic fines, trace fine grained sand, light sulfur odor.	CR72-11-12199		
		-greenish gray (1 Gley, 10Y-6/1), 10-15% plastic fines (~1cm of low plastic on top).	CR72-12-12199		
		-trace mica, ~20% plastic fines.	CR72-13-12199		
		-trace organic carbon, increasing plasticity with depth.			
15		-dark yellowish brown (10YR-4/4), moist, 20-30% plasticity, trace barnacles.	CR72-14-12199		
		Bottom of boring at 4.57 meters (15 ft).			

EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

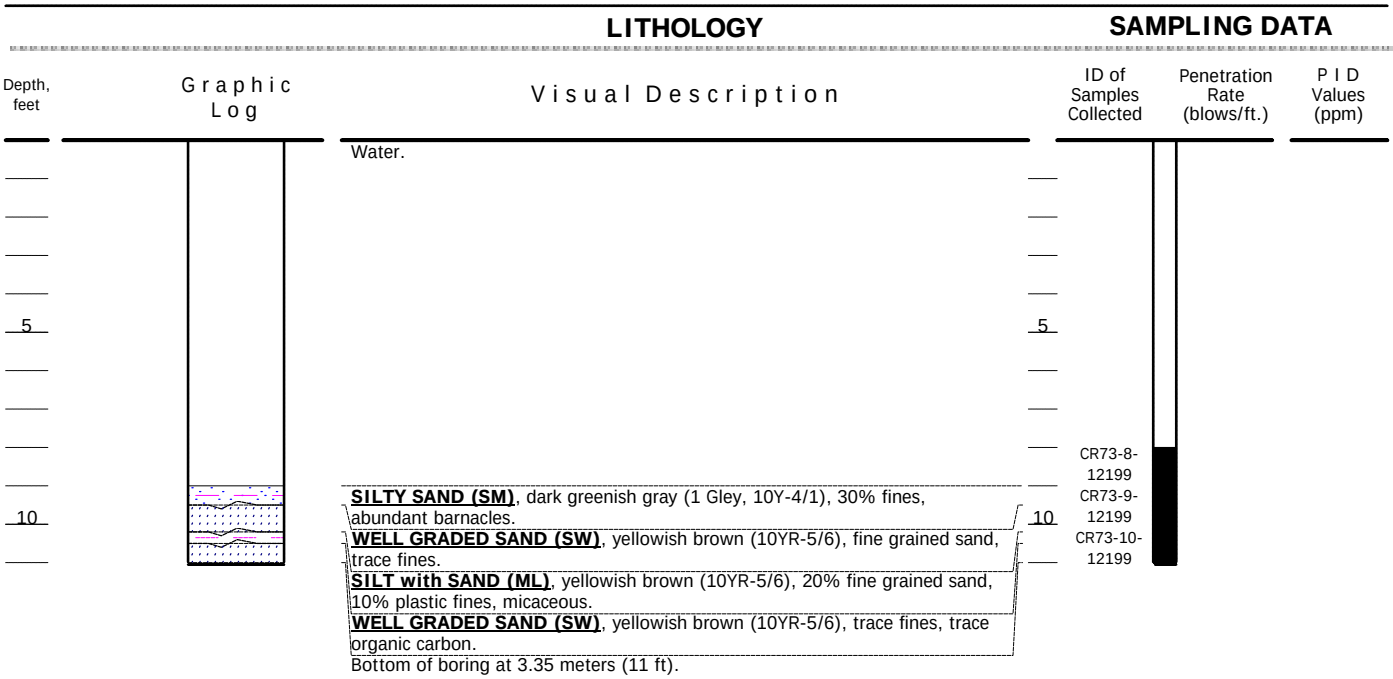
uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/21/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR72



EXPLANATION

Clay
Silt
Sand
Gravel

Interval Sampled
Sample Retained

uu: unconsolidated undrained triaxial (confining pressure, psi)

Date boring drilled: 1/21/99

L • F • R Field Staff: Richard Vogl

Approved by:

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING CR73

APPENDIX D

Chain-of-Custody Forms

CHAIN OF CUSTODY / ANALYSES REQUEST FORM

Project No.:	Field Logbook No.:	Date:	Serial No.:
Project Name:	Project Location:		
Sampler (Signature) :			Samplers:

ANALYSES

SAMPLES: SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE								HOLD	REMARKS

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector:

Levine-Fricke-Recon
1920 MAIN STREET, SUITE 750
IRVINE, CALIFORNIA 92614-7211
(714) 955-1390 FAX (714) 955-0883

Analytical Laboratory:

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FORM NO. 86/COC/ARF

CHAIN OF CUSTODY / ANALYSES REQUEST FORM

Project No.:	Field Logbook No.:	Date:	Serial No.:
Project Name:	Project Location:		No. P-0179
Sampler (Signature):			Samplers:

SAMPLES						ANALYSES								
SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE								HOLD	RUSH	REMARKS
						X	X	X	X	X	X		X		
													X		
													X		
													X		
													X		
													X		
													X		
													X		
													X		
													X		
						X	X	X	X	X	X				
						X	X				X				5260 only

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector:

Levine-Fricke-Recon
1920 MAIN STREET, SUITE 750
IRVINE, CALIFORNIA 92614-7211
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory:

Shipping (White) Lab Copy (Green) File Copy (Yellow) Copy (Pink) FORM NO /COC/ARF

CHAIN OF CUSTODY / ANALYSES REQUEST FORM

Project No.: 6924.0002	Field Logbook No.:	Date: 12/18/98	Serial No.: № P-0181
Project Name: SALTON SEA	Project Location: RIVERSIDE/IMPERIAL COUNTIES		
Sampler (Signature): [signature]			Samplers: RNH, RAJ, RBD, JWW

SAMPLES / **ANALYSES** (EPA METHODS)

SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CON-TAINERS	SAMPLE TYPE	6010	8270	8080	8140	[illegible]	CAM 17	[illegible]	HOLD	~~PARTICLE SIZE~~	REMARKS
GB21-4.1-121898	12/18/98	930A		6	[illegible]	X	X	X	X	X	X		X		
GB22-23.4-121898	↓	942A		↓	↓	↓	↓	↓	↓	↓	↓		↓		
GB23-54.8-121898	↓	955A		↓	↓	↓	↓	↓	↓	↓	↓		↓		
GB24-24.4-121898	↓	1007A		1	↓	↓	↓	↓	↓	↓	↓		↓		
GB18-16.2-121898	↓	1045A		6	↓	↓	↓	↓	↓	↓	↓		↓		
GB27-12-121898	↓	1120A		↓	↓	↓	↓	↓	↓	↓	↓		↓		
GB28-14.2-121898	↓	1230P		↓	↓	↓	↓	↓	↓	↓	↓		↓		
GB29-17.2-121898	↓	1253P		↓	↓	↓	↓	↓	↓	↓	↓		↓		
GB31-35.2-121898	↓	148P		↓	↓	↓	↓	↓	↓	↓	↓		↓		
GB32-56.5-121898	↓	224P		↓	↓	↓	↓	↓	↓	↓	↓		X		
GB32-4.5-121898	↓	234P		↓	↓	X	X	X	X	X	X				
GB33-33-121898	↓	255P		↓	↓	↓	↓	↓	↓	↓	↓		X		
GB34-33-121898	↓	315P		↓	↓	↓	↓	↓	↓	↓	↓		↓		
GB35-24-121898	↓	332P		↓	↓	↓	↓	↓	↓	↓	↓		↓		
GB13-46.3-121898	↓	402P		↓	↓	↓	↓	↓	↓	↓	↓		↓		
GB14-46.8-121898	↓	427P		↓	↓	X	X	X	X	X	X		X		

RELINQUISHED BY: (Signature) [signature]	DATE 12/18/98	TIME 530	RECEIVED BY: (Signature) [signature]		DATE 12/18/98	TIME [illegible]
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)		DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)		DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:			

Sample Collector: RNH RAJ RBD JWW

Levine·Fricke·Recon
1920 MAIN STREET, SUITE 750
IRVINE, CALIFORNIA 92614-7211
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory: [illegible] ANALYTICS

CHAIN OF CUSTODY / ANALYSES REQUEST FORM

Project No.: 1824.00.02	Field Logbook No.:	Date: 12/15/98	Serial No.: No P-0182
Project Name: SALTON SEA	Project Location: RIVERSIDE/IMPERIAL COUNTIES		
Sampler (Signature): Susan Ellery			Samplers: RNH RAU RBD JWW

SAMPLES						ANALYSES (EPA METHODS)								
SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE	5520	5270	5030	8140	8151/8 CAN'T SPLIT			HOLD	REMARKS
GE 16 453-121898	12/18	4418P		6	Sediment	X	X	X	X	X	X		X	
FB3-121898		6201		10	LIQ	X	X	X	X	X	X			

RELINQUISHED BY: (Signature)	DATE 12/21/98	TIME 1130	RECEIVED BY: (Signature)	DATE 12/21/98	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector: FMT RAU RBD JWW

Levine-Fricke-Recon
1920 MAIN STREET, SUITE 750
IRVINE, CALIFORNIA 92614-7211
(714) 955-1390 FAX (714) 955-0883

Analytical Laboratory: Apollo Analytics

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FORM NO. 96/COC/ARF

CHAIN OF CUSTODY / ANALYSES REQUEST FORM

Project No.: [illegible]	Field Logbook No.:	Date: 12/23/98	Serial No.: № P-0183
Project Name: [illegible]	Project Location: [illegible]		
Sampler (Signature): [illegible]			Samplers: [illegible]

SAMPLES: SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE	ANALYSES: 8260	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	HOLD	[illegible]	REMARKS
[illegible]	[illegible]	[illegible]		6	[illegible]	X	X	X	X	X	X			X	
[illegible]	↓	[illegible]		↓	↓	↓	↓	↓	↓	↓	↓			X	
[illegible]		12:[illegible]													
[illegible]		11:[illegible]												X	
[illegible]		[illegible]													
[illegible]		[illegible]												X	
[illegible]		[illegible]		6										X	
[illegible]		[illegible]		3											
[illegible]		[illegible]		10	[illegible]										
[illegible]	[illegible]	[illegible]		6	[illegible]									X	
[illegible]	↓	[illegible]		↓	↓									X	
[illegible]		[illegible]												X	
[illegible]		[illegible]												X	
[illegible]		[illegible]												X	
[illegible]		[illegible]												X	

RELINQUISHED BY: (Signature) [illegible]	DATE [illegible]	TIME [illegible]	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature) [illegible]	DATE	TIME
METHOD OF SHIPMENT: [illegible]	DATE [illegible]	TIME	LAB COMMENTS:		

Sample Collector: [illegible]	Analytical Laboratory: [illegible] ANALYTICAL

Levine-Fricke-Recon
1920 MAIN STREET, SUITE 750
IRVINE, CALIFORNIA 92614-7211
(714) 955-1390 FAX (714) 955-0683

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CHAIN OF CUSTODY / ANALYSES REQUEST FORM

Project No.:	Field Logbook No.:	Date: 12/5/12	Serial No.: No P-0184
Project Name:	Project Location:		
Sampler (Signature) :			Samplers:

SAMPLES						ANALYSES								
SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE								HOLD	REMARKS
						X	X	X	X	X	X		X	
													X	
													X	
													X	
													X	
													X	
													X	
													X	
													X	
													X	
													X	
													X	
													X	

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector:

Levine-Fricke-Recon
1920 MAIN STREET, SUITE 750
IRVINE, CALIFORNIA 92614-7211
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory: ALPHA ANALYTICAL

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CHAIN OF CUSTODY / ANALYSES REQUEST FORM

Project No.:	Field Logbook No.:	Date:	Serial No.: № P-0185
Project Name:	Project Location:		
Sampler (Signature):			Samplers:

SAMPLES / **ANALYSES**

SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CON-TAINERS	SAMPLE TYPE								HOLD	RUSH	REMARKS
						X	X	X	X	X	X		X		
											X		X		
													X		
14															
15															
18															
47															
						X	X	X	X	X	X		X		

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector:

Levine·Fricke·Recon
1920 MAIN STREET, SUITE 750
IRVINE, CALIFORNIA 92614-7211
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory:

Shipping Copy (White) Lab Copy (Green) File Copy (Yellow) Field Copy (Pink) FORM NO. 86/COC/ARF

CHAIN OF CUSTODY / ANALYSES REQUEST FORM

Project No.:	Field Logbook No.:	Date:	Serial No.: 109 P-0187
Project Name:	Project Location:		
Sampler (Signature) :			Samplers:

SAMPLES					ANALYSES								
SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE	8240	8270	CAM 8080	8010	8015		HOLD	RUSH	REMARKS
[illegible]	↓			2	1	X	X	X	X	X	X		X	
[illegible]				3		↓	↓	↓	↓	↓	↓		↓	
[illegible]				3		↓	↓	↓	↓	↓	↓		↓	

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE 4/20	TIME 2:00
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector:

Levine-Fricke-Recon
1920 MAIN STREET, SUITE 750
IRVINE, CALIFORNIA 92614-7211
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory:

Shipping (White) Lab Copy (Green) File Copy (Yellow) d Copy (Pink) FORM NO ./COC/ARF

CHAIN OF CUSTODY / ANALYSES REQUEST FORM

Project No.: 12400.03	Field Logbook No.:	Date: 1-21 99	Serial No.: No P-0189
Project Name: SACRAMENTO	Project Location:		
Sampler (Signature):			Samplers: LAVERNE INOUYE

SAMPLES						ANALYSES								
SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE	8260	8270	8080	8140	8155	CAM 17 Metals	HOLD	PAC ~~RUSH~~ SIZE	REMARKS
1	1-15-99	1320		3	Water	X	X	X	X	X	X		X	
2		1410												
3		1505												
4		1540												
5		1555												
6		1558											X	
7		1600		2										
8	1-18-99	1410		2									X	
9		1415		3									X	
10		1423		1										
11	1-21-99	1555		3									X	
12		1550		3	Grab	X	X	X	X	X	X			
13		1600		4	Water	X	X	X	X	X	X		X	
14		1135		3										
15		1155		3										
16		1200		2										

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE / TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE / TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE / TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:	

Sample Collector:

Levine-Fricke-Recon
1920 MAIN STREET, SUITE 750
IRVINE, CALIFORNIA 92614-7211
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory: ALTA ANALYTICS

Shipping Copy (White) Lab Copy (Green) File Copy (Yellow) Field Copy (Pink)

FORM NO. 86/COC/ARF

CHAIN OF CUSTODY / ANALYSES REQUEST FORM

Project No.:	Field Logbook No.:	Date: 11/2/99	Serial No.: No P-0190
Project Name:	Project Location:		
Sampler (Signature):			Samplers:

SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE	ANALYSES: TPH (8015)	8260	8010	8140	8150	8021		HOLD	REMARKS
	11/2/99	1145		1		X	X	X	X	X	X			
		1115		3		X	X	X	X	X	X		X	
		1130		2		X	X	X	X	X	X			

RELINQUISHED BY: (Signature)	DATE 11/2/99	TIME 1225	RECEIVED BY: (Signature)	DATE 11/2/99	TIME 1225
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector:

Levine-Fricke-Recon
1920 MAIN STREET, SUITE 750
IRVINE, CALIFORNIA 92614-7211
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory:

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FORM NO /COC/ARF

CHAIN OF CUSTODY / ANALYSES REQUEST FORM

Project No.:	Field Logbook No.:	Date:	Serial No.:
Project Name:	Project Location:		

Sampler (Signature) :

Samplers:

SAMPLES						ANALYSES								
SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE								HOLD	REMARKS
GB56-179-11999-0														
GB59-45-11999														
				7										

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector:

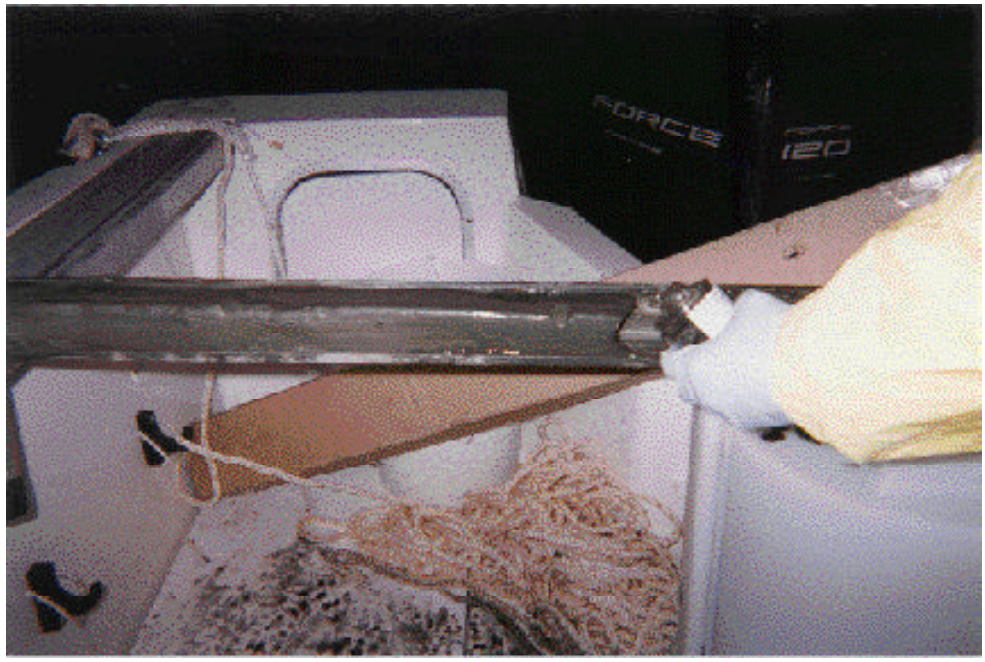
Levine-Fricke-Recon
1920 MAIN STREET, SUITE 750
IRVINE, CALIFORNIA 92614-7211
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory:

Shipping Copy (White) Lab Copy (Green) File Copy (Yellow) Field Copy (Pink) FORM NO. 86/COC/ARF

APPENDIX E

Core Photographs

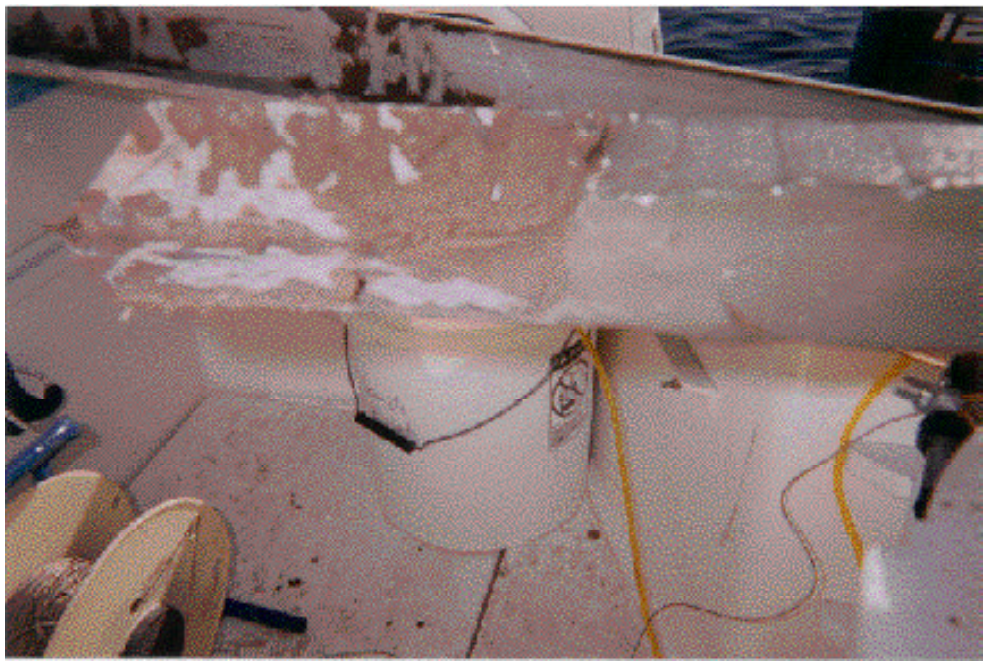


Core #CR6, taken on 12/21/1998

Core #CR6, taken on 12/21/1998

Core #CR6, taken on 12/21/1998

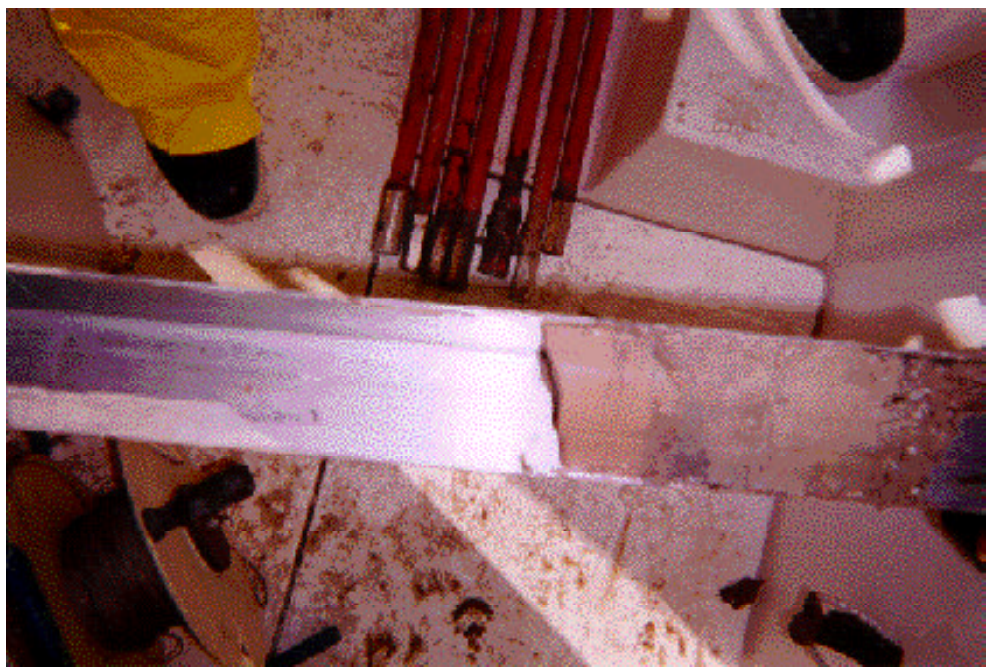
Core #CR6 Refusal, taken on 12/21/1998



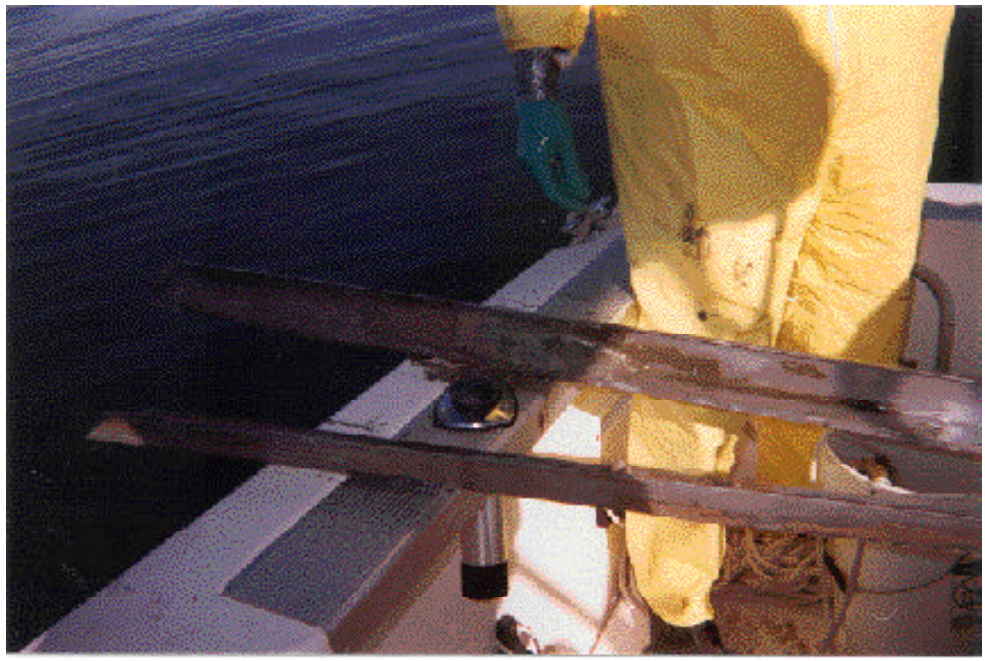
Core #CR13, taken on 12/22/1998

Core #CR13, taken on 12/22/1998

Core #CR19, taken on 12/22/1998



Core #CR19, taken on 12/22/1998



Core #CR19, taken on 12/22/1998

Core #CR20, taken on 12/22/1998

Core #CR20, taken on 12/22/1998

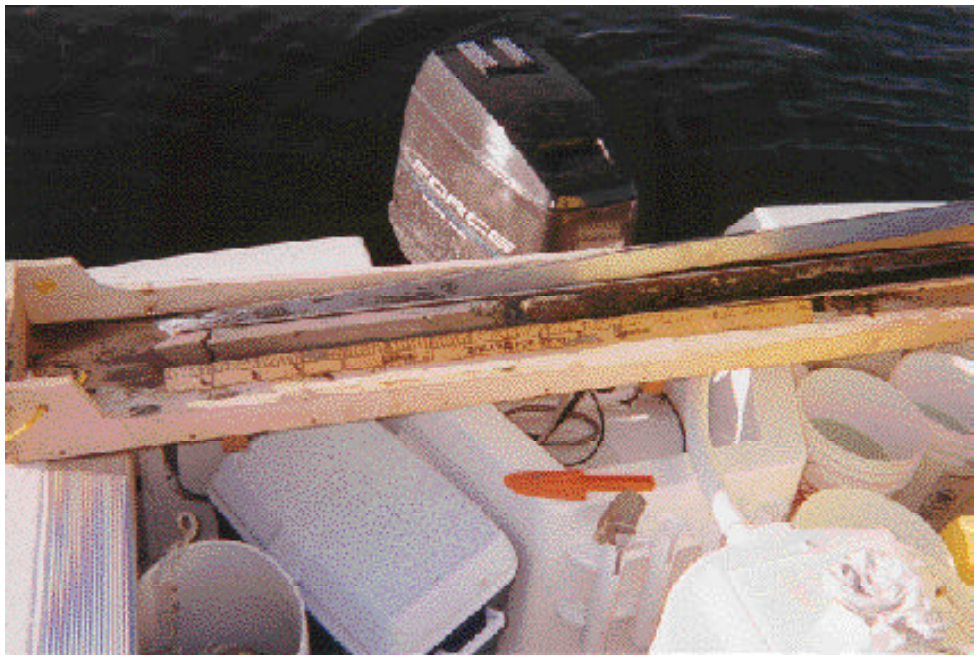
Core #CR26, taken on 12/22/1998

Core #CR26, taken on 12/22/1998

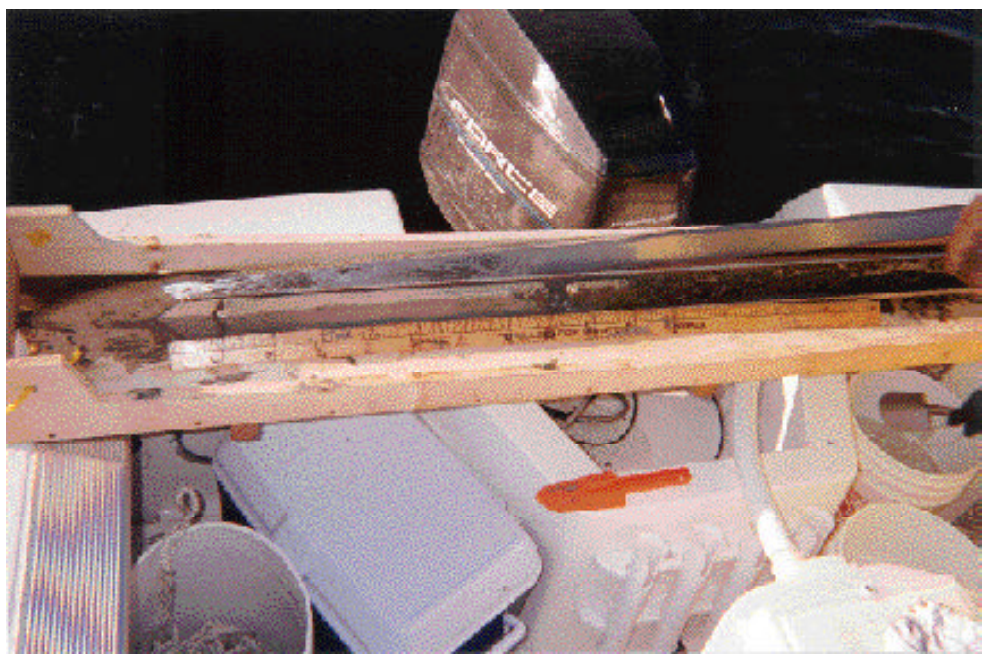
Core #CR39, taken on 12/22/1998

Core #CR39, taken on 12/22/1998

Core #CR49, taken on 1/20/1999



Core #CR50, taken on 1/19/1999



Core #CR50, taken on 1/19/1999

Core #CR51, taken on 1/20/1998

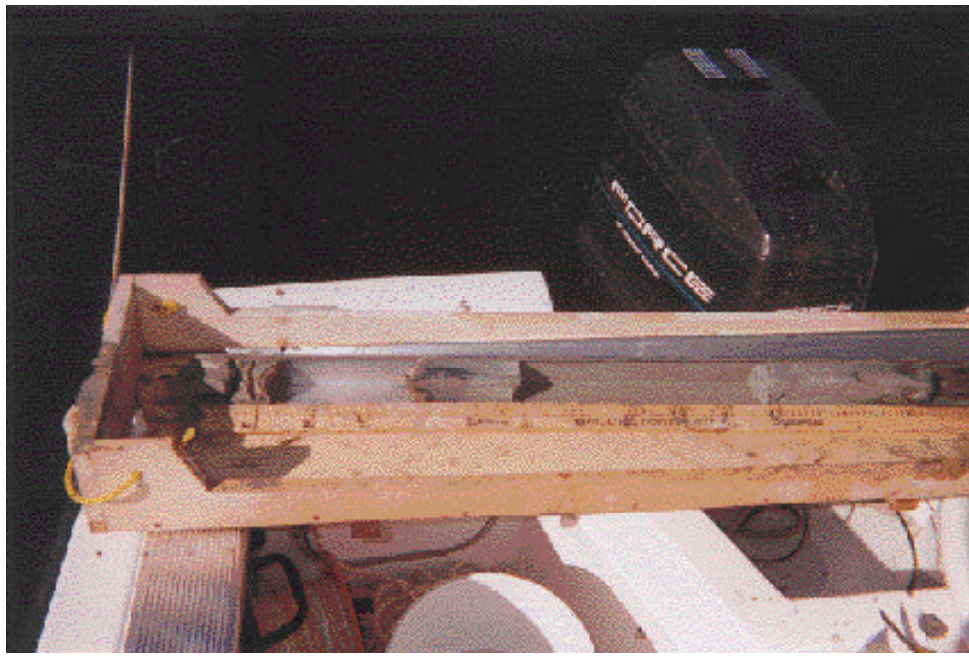
Core #CR51, taken on 1/20/1999

Core #CR51, taken on 1/20/1999

Core #CR51, taken on 1/20/1999

Core #CR52, taken on 1/20/1999

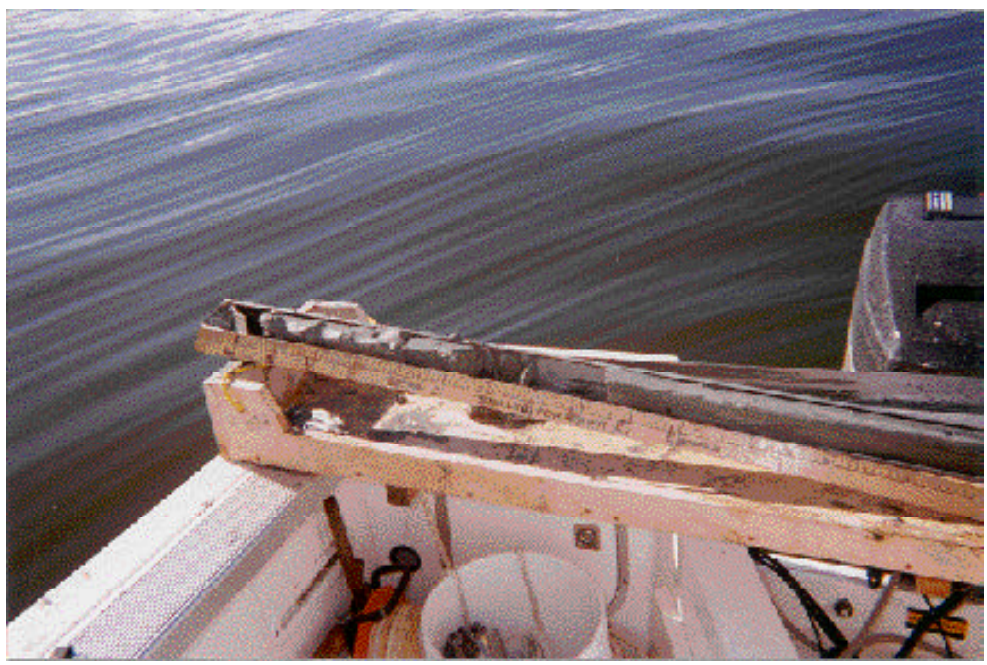
Core #CR52, taken on 1/20/1999



Core #CR52, taken on 1/20/1999

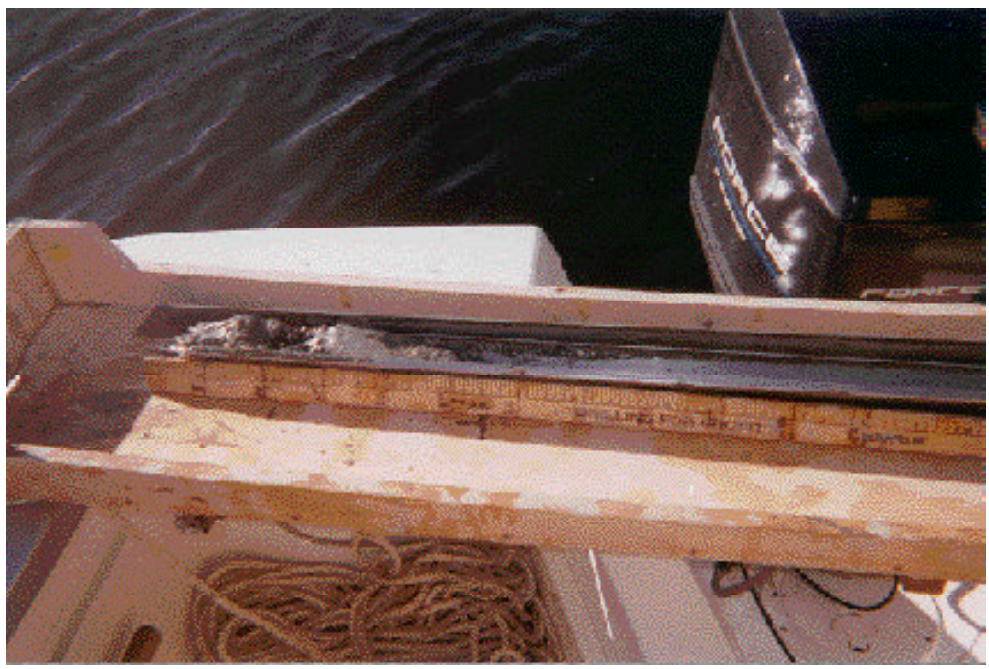
Core #CR60, taken on 1/20/1999

Core #CR60, taken on 1/20/1999



Core #CR60, taken on 1/20/1999

Core #CR60, taken on 1/20/1999



Core #CR63, taken on 1/22/1999

Core #CR66, taken on 1/22/1999

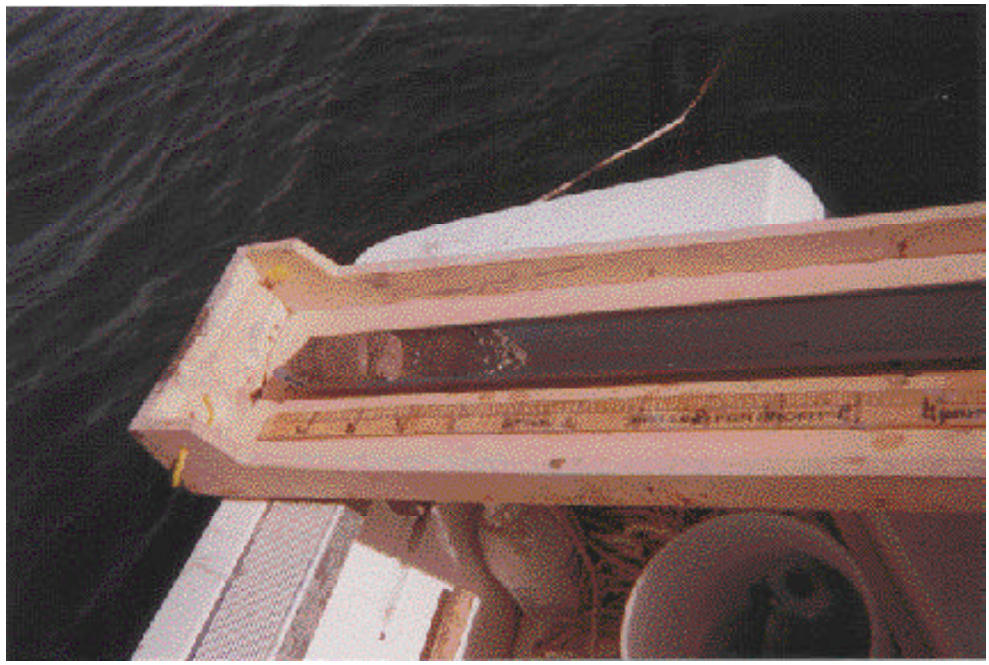
Core #CR66, taken on 1/22/1999

Core #CR72, taken on 1/21/1999

Core #CR72, taken on 1/21/1999

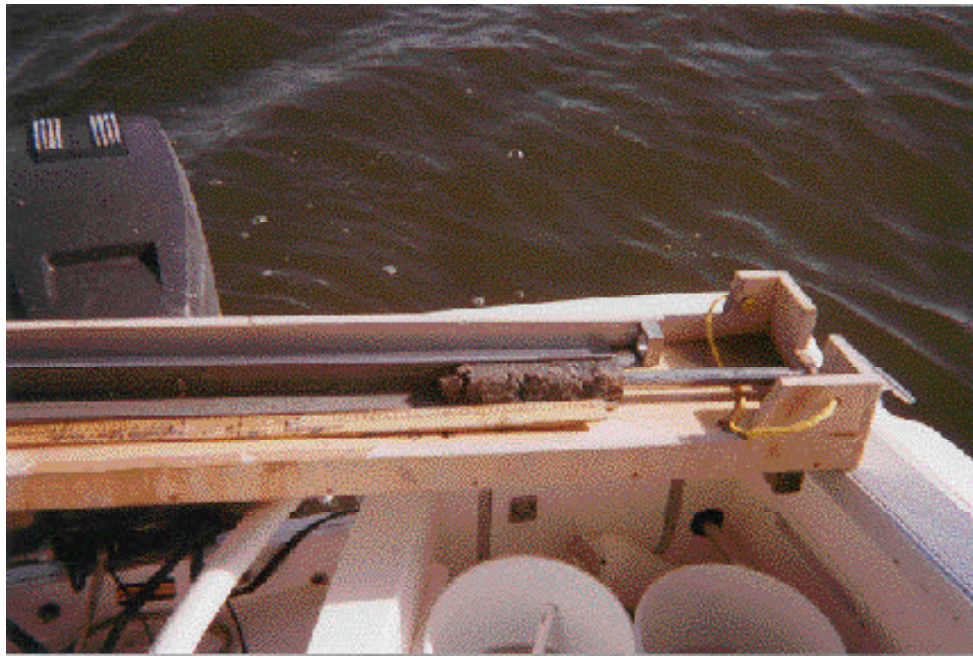
Core #CR72, taken on 1/21/1999

Core #CR72, taken on 1/21/1999



Core #CR73 (first attempt), taken on 1/21/1999

Core #CR73, taken on 1/21/1999



Core #CR73, taken on 1/21/1999

Core #CR73, taken on 1/21/1999