

CITY OF EUREKA

and

**HUMBOLDT BAY HARBOR, RECREATION AND CONSERVATION
DISTRICT**

**COOPERATIVE EUREKA WATERFRONT FACILITIES
MAINTENANCE DREDGING PROJECT**

EUREKA CHANNEL, HUMBOLDT BAY, CALIFORNIA



**SAMOA BEACH SURF ZONE DISPOSAL
PRE PROJECT MONITORING REPORT**

PREPARED BY:



**PACIFIC AFFILIATES, INC.
A CONSULTING ENGINEERING GROUP**

990 W. Waterfront Drive
Eureka, CA 95501

◆
(707) 445-3001

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PACIFIC AFFILIATES, INC.

A CONSULTING ENGINEERING GROUP

990 W. WATERFRONT DRIVE • EUREKA • CA • 95501 • PH (707) 445-3001 • FAX (707) 445-3003

DAVID L. SCHNEIDER R.C.E. 27285
TRAVIS L. SCHNEIDER R.C.E. 67393

November 2, 2006

Mr. Jim Baskin, AICP, Coastal Planner
California Coastal Commission
North Coast District Office
710 E Street, Suite 200
Eureka, CA 95501

Re: City of Eureka and Humboldt Bay, Recreation and Conservation District Eureka Waterfront and Woodley Island Marina Cooperative Maintenance Dredging Project. CDP Nos. 1-05-039 and 1-05-040.

Subject: Submittal of Pre Project Samoa Dunes Monitoring Report

Dear Mr. Baskin:

Please find enclosed the document entitled "Samoa Beach Surf Zone Disposal Pre Project Monitoring Report". The monitoring activities described in the report include hydrographic surveys, land surveys, sediment sampling analyzed for grain size distribution and macro invertebrates counts, water sampling, and aerial photographs of the coastline from the Mad to the Eel Rivers. These monitoring activities were conducted in accordance with the "Samoa Beach Surf Zone Disposal Monitoring Plan" that was approved by the California Coastal Commission on August 21, 2006. The purpose of the pre project monitoring is to determine the baseline conditions at the Samoa beach disposal site and at a control site located south of the disposal site prior to commencement of disposal operation.

The dredging Contractor, Nehalem River Dredging has completed mobilization and is currently installing the pipeline and booster pumps. Dredging is expected to begin during the first week of November, 2006. The next monitoring report will be submitted to your agency in January 2007 and will present the project conditions at the disposal and control sites during dredging operations.

Should you have any questions please contact me at (707) 445-3001 or via email to ytilles@pa-schneiderdock.com

Sincerely,

Yoash Tilles
Project Manager
E.I.T. 117566

Enclosures: Samoa Beach Surf Zone Disposal Monitoring Report

cc: File 04-930/940
David Hull – HBHRCD
Mike Knight – City of Eureka
Mr. Clyde Davis – USACOE

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CITY OF EUREKA AND HUMBOLDT BAY HARBOR, RECREATION AND CONSERVATION DISTRICT

**COOPERATIVE EUREKA WATERFRONT FACILITIES
MAINTENANCE DREDGING PROJECT**

EUREKA CHANNEL, HUMBOLDT BAY, CALIFORNIA

SAMOA BEACH DISPOSAL SITE PRE PROJECT MONITORING

1.0 INTRODUCTION

The City of Eureka and the Humboldt Bay Harbor, Recreation and Conservation District contracted Nehalem River Dredging to conduct the maintenance along Eureka Waterfront and Woodley Island Marina located in the Inner and Outer reach of the Eureka Channel in Humboldt Bay. Dredging is scheduled commence November 1, 2006 and will terminate on March 31, 2006. Approximately 200,000 cubic yards of dredged material will be disposed at the Samoa beach disposal site during the upcoming maintenance dredging project. The California Coastal Commission (CCC) issued Coastal Development Permits (CDP) 1-05-039 and 1-05-040 for the project on August 22, 2006. The CCC approved the Samoa Beach Monitoring Plan on August 26, 2006 as a Special Condition attached to the CDPs. The purpose of the pre project monitoring report is to establish the baseline conditions at the project site and a control prior to commencement of disposal operations.

The pre project surf zone disposal monitoring report provides information on the following natural ocean conditions: (1) the pattern of dispersal of material deposited at the site; (2) sediment characteristics at the disposal site and at the control site; (3) the species composition and abundance of intertidal invertebrates in areas that will be directly affected by the disposal of dredge spoils and at a control site near the disposal area.

This document provides pre project: (a) aerial photographs of shoreline from the Mad to the Eel Rivers conducted on October 9, 2006; (b) hydrographic surveys and turbidity measurements of the beach disposal and control sites conducted on September 27, 2006; (c) sediment core samples of the immediate area of the disposal site and a control site extending from the high tide strand to the swash zone to adequately monitor the movement and dispersal of discharged materials; and (d) sediment core samples of the immediate area of the dredge materials disposal site and control site extending from the high tide strand to the swash zone collected at two (2) meter intervals to adequately characterize the composition of nearshore ocean sediments infauna and epibenthic marine habitat. Sediment samples were collected October 4-6, 2006.

Sediment composition is addressed in Section 2 of this document. Composition and abundance of intertidal invertebrates is addressed in Section 3. Turbidity is measured in terms of Total Suspended Solids (mg/l) and is addressed in Section 4. Hydrographic surveys at the site and a control site and aerial photos from the mouth of the Mad River to the mouth of the Eel River will be used to monitor the dispersal characteristics of the dredged sediment in the nearshore environment and are addressed in Section 6. Should a review by the California Coastal Commission staff of the aerial photographs and sediment characteristics prior and during disposal operations verify that the sediment transport at the project site is overwhelmingly south to north, then all monitoring of sediment composition and intertidal invertebrates south of the site shall be terminated following cessation of disposal operations except at the control site.

1.1 Sediment Sampling Locations

Four (4) transects were established perpendicular to the beach slope for the purpose of sediment sampling (Figure 1). Transects were established in the following locations:

- Transect A: Dredge disposal site, where the pipeline empties into the surf zone,
- Transect B: Control site, on the beach 1,000 meters (~3,280 feet) south of the pipeline terminus.
- Transect C: 100 meters (~328 feet) north of the pipeline terminus
- Transect D: 100 meters (~328 feet) south of the pipeline terminus

A total of 12 grab samples were collected by Yoash Tilles, EIT and Nathan Praytor on October 5 - 6, 2006. A duplicate of each sample was also collected and is stored at Soils Control Lab. Sediment samples were collected at the high tide line, at the swash zone at low tide and at a station in the middle of the transect as depicted on Figure 1 and listed in Table 1. Each station was located and marked on Figure 1 using a Global Positioning System, (GPS) device. The GPS horizontal and vertical accuracy for the Eureka area is within 0.3 feet.

Table 1: Sediment samples collected at the beach disposal site and the control site.

Transect	Sample I.D.	Collection		Date Analyzed	Location		Elevation ^a (ft) (MLLW)
		Date	Time		Longitude	Latitude	
A	A1-1-GSA	10-5-06	7:50	10-5-06	40° 49' 37.26949" N	124° 11' 18.23208" W	-3.88
A	A2-1-GSA	10-5-06	7:55	10-5-06	40° 49' 40.01045" N	124° 11' 16.75903" W	-9.60
A	A3-1-GSA	10-5-06	8:00	10-5-06	40° 49' 35.79378" N	124° 11' 14.76144" W	-7.66
B	B1-1-GSA	10-5-06	9:35	10-5-06	40° 49' 11.02532" N	124° 11' 36.53516" W	-2.65
B	B2-1-GSA	10-5-06	9:40	10-5-06	40° 49' 10.26352" N	124° 11' 34.74274" W	-7.87
B	B3-1-GSA	10-5-06	9:45	10-5-06	40° 49' 09.36916" N	124° 11' 32.31773" W	-8.52
C	C1-1-GSA	10-5-06	7:37	10-5-06	40° 49' 40.01045" N	124° 11' 16.75903" W	-3.77
C	C2-1GSA	10-5-06	7:40	10-5-06	40° 49' 39.10706" N	124° 11' 14.67044" W	-9.62
C	C3-1-GSA	10-5-06	7:45	10-5-06	40° 49' 38.70511" N	124° 11' 13.57023" W	-8.99
D	D1-1-GSA	10-5-06	8:20	10-5-06	40° 49' 34.63813" N	124° 11' 20.27323" W	-2.81
D	D2-1-GSA	10-5-06	8:25	10-5-06	40° 49' 33.88451" N	124° 11' 18.41872" W	-9.27
D	D3-1-GSA	10-5-06	8:30	10-5-06	40° 49' 33.19962" N	124° 11' 16.53139" W	-6.29

a – Negative values indicate elevations above MLLW

The sampling team made a special effort to collect the sediment samples from the furthest oceanward locations along each transect that could be reached (Appendix II, Photos 1 and 2). Low tide on October 5, 2006 occurred at 4:42 AM. The predicted tide was -0.11' MLLW and the observed tide was 0.18' MLLW. Sampling began at daylight at 6:30 AM and continued until 9:45 AM.

1.2 Sediment Sampling Methodology

Samples were collected by drive-tube methodology. A sediment sampler was designed and manufactured by AMS, Inc. for this project. The sampler consistently collected undisturbed samples to the required depth below the sediment surface without contaminating the samples (Appendix II, Photo 3). The upper two (2) centimeters of the sediment column were evaluated. When the upper two (2) centimeters of sediment were collected, a minimum penetration depth of four-five (4-5) centimeters was achieved for each acceptable sample. A minimum of 100-150 grams of sediment was collected. The material was then transferred to the appropriately labeled lab supplied wide-mouth 4-Oz glass jars (Appendix II, Figure 4).

The following conditions were present onsite: (1) on a tide below two feet MLLW, (2) with predicted favorable weather conditions and the marine forecast indicating a sea state of four feet or less swell/waves, and (3) during daylight hours.

1.3 Laboratory Procedures

Grain size distribution was determined by sieve analysis for particles greater than 63 micrometers and less than 32 millimeters (Plumb, 1981). Below 63 micrometers fraction size was determined by settling rates. The pipette method was used to determine the settling rates of the particles.

1.4 Sediment Sampling Results

Grain size distribution data is reported as a fraction of particles that pass through sieve sizes ranging from less than 63 micrometers to greater than 32 millimeters (Table 2). The fraction of sand at the Samoa beach disposal site and the control site ranges from 99.50% to 99.95% and the mean is 99.885%. The fraction of silt ranges from 0 to 0.36% and the median is 0.04%. The fraction of clay ranges from 0.02% to 0.14% and the median is 0.075%.

It was noted during the sampling event, that the coarser materials was found in the swash zone below the high tide line. Material collected at the top of the beach was finer than that collected in the swash zone. The grain size analysis results indicate that Samples A3, B3, C3 and D3 located at the top of the beach had higher fractions of sand than other sampling location except for A1 (See Appendix I for Laboratory COC forms and laboratory test results).

Table 2: Grain size distribution in sediment samples collected at the beach disposal and the control sites.

Transect	Sample I.D.	% Sand	% Silt	% Clay
Pipeline	A1-1-GSA	99.95	0.00	0.05
	A2-1-GSA	99.88	0.06	0.06
	A3-1-GSA	99.93	0.03	0.04
Control	B1-1-GSA	99.86	0.12	0.02
	B2-1-GSA	99.87	0.04	0.09
	B3-1-GSA	99.89	0.02	0.09
100 meters North	C1-1-GSA	99.50	0.36	0.14
	C2-1-GSA	99.83	0.05	0.13
	C3-1-GSA	99.92	0.00	0.08
100 meters South	D1-1-GSA	99.83	0.04	0.13
	D2-1-GSA	99.90	0.03	0.07
	D3-1-GSA	99.90	0.08	0.02

Grain size data from pre and during project implementation shall be used to verify that sediment transport is overwhelmingly south to north. If the sediment transport is overwhelmingly south to north, then a very small fraction of fines (less than one (1) percent) should be found in sediment from Transect D.

2.0 COMPOSITION AND ABUNDANCE OF INTERTIDAL INVERTEBRATES

Representative sediment grab samples from the disposal site and the control site shall be used to monitor changes (if any) in species composition and abundance at the disposal site due to dredge disposal operations.

2.1 Benthic Sampling Locations

Prior to commencement of disposal operations, four (4) transects were established perpendicular to the beach slope for the purpose of sediment sampling for monitoring the benthic community (Figure 1):

Transect A: Dredge disposal site, where the pipeline empties into the surf zone,

Transect B: Control site, on the beach 1,000 meters (~3,280 feet) south of the pipeline terminus.

Transect C: 100 meters (~328 feet) north of the pipeline terminus

Transect D: 100 meters (~328 feet) south of the pipeline terminus

When establishing transects and sampling locations:

- a. Each transect was established by inspection of the beach at or near low tide. Each transect begins at the top of the beach and extends to the swash zone.
- b. Samples were taken at two (2) meter intervals along each transect and composited. As different organisms occupy different elevation zones in the intertidal and move with the tides, compositing the whole transect into a single sample ensured that all organisms were sampled.
- c. Three randomly placed transects were established at each sampling site. Replicate transects were separated by at least 5 meters. Transects were located and marked on Figure 1 using a Global Positioning System, (GPS) device.

Table 3: Biological samples collected at the beach disposal site and the control site.

Transect	Sample I.D.	Collection	
		Date	Time
A	A-1-INV	10-4-06	12:30
A	A-1-INV	10-5-06	6:30
A	A-2-INV	10-5-06	7:23
A	A-2-INV	10-4-06	13:11
A	A-3- INV	10-5-06	7:03
A	A-3-INV	10-4-06	13:35
B	B-1- INV	10-5-06	9:40
B	B-2- INV	10-5-06	9:20
B	B-3- INV	10-5-06	9:30
C	C-1- INV	10-4-06	7:48
C	C-1- INV	10-4-06	9:10
C	C-2- INV	10-4-06	9:26
C	C-2- INV	10-4-06	7:46
C	C-3- INV	10-4-06	8:14
C	C-3- INV	10-4-06	9:44
D	D-1- INV	10-4-06	16:06
D	D-1- INV	10-4-06	14:06
D	D-2- INV	10-4-06	14:46
D	D-2- INV	10-4-06	15:25
D	D-3- INV	10-4-06	16:25

Sediment core samples were collected by Yoash Tilles, EIT and Nathan Praytor on October 4-6, 2006. Samples were composited and prepared for analysis in the field to yield a total of 12 composite samples (Appendix II, Photo 5). Samples were analyzed by Mr. Nick Wiersemma over a two (2) week period beginning on October 6, 2006 (Appendix I, MFG, Inc., Sample Processing Log). The summary below was provided by MFG, Inc.

2.2 Benthic Sampling Methodology

Provided below is a brief summary of the sampling methodology, a more detailed discussion of the sampling methods is described in Samoa Beach Monitoring Plan (Pacific Affiliates, 2006). At each of the four (4) transect locations, three (3) replicates sampling transects were established. Along each of the four (4) transect locations, individual samples were collected a two (2) meter intervals and composited. Each sample was collected using a 10 centimeter diameter coring device. The coring device was pushed to a depth of 20 centimeters. The cored material was then washed, sieved through a 1000 micron sack, eliminating the finer silts, and sands. The remaining coarse mineral and vegetative debris and organisms were the placed within 16 Oz sampling jars, and preserved as described in the Samoa Beach Monitoring Plan (Appendix II, Photos 6, 7 and 8).

Transects were sampled while the following condition being present onsite: (1) on a tide below two feet MLLW (swash zone section of the transects were sampled during low tide), (2) with predicted favorable weather conditions and the marine forecast indicating a sea state of four feet or less swell/waves, and (3) during daylight hours.

2.3 Processing of Biological Samples

At the Laboratory, each sample was transferred to a 500 micron sieve for washing, to eliminate fine sediments and preservatives. The samples were then transferred to a sorting tray. The infaunal invertebrates were then sorted from the coarse material and vegetative debris. After, the large and obvious invertebrates were sorted out and the remaining material was sieved under a stereo microscope for completeness. All organisms were placed into glass vials with 70% ethanol for preservation. After, 12 samples were sorted the infaunal invertebrates were identified and enumerated. Each species type was additionally weighted. Table 4 below presents the data (see Appendix I for MFG, Inc. Laboratory Report).

All samples are stored at MFG, Inc. in Austin, Texas. Samples were transferred 24 hours following collection to 70% ethyl alcohol and can therefore be held indefinitely

Should the aerial photographs and sediment characteristics from sediment samples collected prior to the commencement of the project and monthly during disposal operations indicate that the sediment transport at the project site is overwhelmingly south to north, then monitoring of Transect D, located south of the disposal site, will be terminated following cessation of disposal operations.

2.4 Biological Analysis Results

Table 4: Macro invertebrates count from the Samoa beach disposal and control sites.

Species	Transect A						Transect B						Transect C						Transect D					
	A-1-INV		A-2-INV		A-3-INV		B-1-INV		B-2-INV		B-3-INV		C-1-INV		C-2-INV		C-3-INV		D-1-INV		D-2-INV		D-3-INV	
	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)
Crustacea																								
<i>Emerita analoga</i>	11	23	4	8	5	5	1	5			3	5	1	<1	2	1	15	8	6	8	5	11	5	6
<i>Archaeomysis grebnitzkii</i>	7	<1	5	<1	16	<1									1	<1	1	<1	8	<1	15	<1	20	<1
<i>Megalorchestia californiana</i>	15	1	6	<1	8	<1	2	<1	1	<1	5	<1	6	<1	1	<1	7	1	10	1	4	<1	7	<1
<i>Megalorchestia columbiana</i>							1	<1	1	<1									2	<1	6	<1	3	<1
<i>Dogielonotus loquax</i>	1	<1											1	<1										
<i>Excirolana linquifrons</i>	81	1	73	1	98	1	25	<1	14	<1	8	<1	66	1	36	<1	53	1	48	<1	46	<1	33	<1
Polychaetes																								
<i>Nephtys californiensis</i>			1	<1	1	1											2	<1	1	<1	2	<1		
<i>Pygospio californica</i>	36	<1	10	<1	3	<1	1	<1			8	<1					1	<1	1	<1	1	<1	4	<1
Insecta																								
<i>Emphayles fucicola</i>							1	---					1	---							1	---		
Total	151	26.5	99	11	131	8.5	30	7	16	1.5	24	6.5	74	2.5	40	2.5	79	11.5	76	11.5	79	14	72	8.5

For total biomass, organisms weighing less than 1 gram were treated as 0.5 gram.

3.0 WATER QUALITY DATA

Total Suspended Solids (TSS) measurements are used to evaluate the water quality, in the vicinity of the disposal site. This analysis provides concentrations of TSS in the nearshore area as a measure of turbidity. Water samples were analyzed by North Coast Laboratories located in Arcata, CA.

3.1 Total Suspended Solids Sampling Locations

A total of three (3) water samples were collected during the pre project hydrographic survey (Table 5). Water samples were collected from Transects A, B and C at approximately 40 ft MLLW (Figure 1). Duplicates of all samples were collected and stored at North Coast Labs for eight (8) days.

3.2 Total Suspended Solids Sampling Methodology

Samples were collected on September 27, 2006 by Yoash Tilles from on board "Hydro I", Pacific Affiliates' hydrographic survey vessel. Samples were collected using a discrete water sampler manufactured by AMS, Inc. for this project and transferred to 500 milliliter plastic bottles. Samples were collected soon after the sampler was brought on board "Hydro I" to minimize settling of suspended material within the sampler. Nonrepresentative particulates such as leaves and sticks were not noted in any of the water samples.

Samples were collected while the following conditions being present onsite: (1) on a high tide to allow the hydrographic survey vessel to reach as close to the beach as safely possible, (2) with predicted favorable weather conditions and the marine forecast indicating a sea state of four feet or less swell/waves, and (3) during daylight hours. A total of three (3) water samples were collected from along Transects A, B and C.

Table 5: Water samples collected from 'HYDRO I' at the beach disposal and control sites.

Transect	Sample I.D.	Collection		Date Analyzed	Elevation (ft) (MLLW)	Location	
		Date	Time			Latitude	Longitude
A	A-1-TSS	9-27-06	13:40	10-3-06	40.30	40° 49' 82.3839" N	124° 11' 70.937" W
A	A-2-TSS	9-27-06	13:45	Replicate	40.30	40° 49' 82.3839" N	124° 11' 70.937" W
B	B-1-TSS	9-27-06	12:58	Replicate	42.40	40° 49' 33.4535" N	124° 12' 02.955" W
B	B-2-TSS	9-27-06	13:02	10-3-06	42.40	40° 49' 33.4535" N	124° 12' 02.955" W
C	C-1-TSS	9-27-06	13:28	Replicate	41.20	40° 49' 77.489" N	124° 11' 73.403" W
C	C-2-TSS	9-27-06	13:34	10-3-06	41.20	40° 49' 77.489" N	124° 11' 73.403" W

3.3 Laboratory Procedures

Provided below is a brief summary of the sampling methodology, a more detailed discussion of the sampling methods can be found within the disposal is described in Samoa Beach Monitoring Plan (Pacific Affiliates, 2006). TSS determination was made according to procedure described in US EPA Method 160.2 and APHA Method 2540 D. The procedures entail the measurements of material retained on filters. However, a 0.40- or 0.45 µm membrane filter was used to remove suspended solids instead of the glass fiber filter specified in US EPA and APHA

methods, because the pores of the membrane filters are more uniform in size than those of the glass fiber filters.

3.4 Total Suspended Solids Results

Analytic work was performed by North Coast Laboratories located at 5680 West End Road, Arcata, CA 95521-9202. Table 5 below shows the TSS analysis results (see Appendix I for laboratory report and COC forms):

Table 6: TSS results from water samples collected at the beach disposal site and control site.

Sample I.D.	TSS (mg/l)
A-1-TSS	5.7
B-1-TSS	4.2
C-1-TSS	6.4

4.0 PATTERN AND RATE OF DISPERSAL

The pattern and rates of dispersal of deposited material at the beach disposal site shall be monitored by conducting hydrographic surveys and obtaining aerial photographs of the beach disposal site in addition to collecting sediment grab samples as discussed in Section 2, Hydrographic Surveys.

Data was recorded using Pacific Affiliates' survey vessel "Hydro I" on September 27, 2006 between 12:00 and 3:00 PM. "Hydro I" is a class I survey vessel in accordance with the specifications of the "Manual of Hydrographic Surveying". Bathymetric measurements were taken using a sonar scanning device five (5) times each second while conducting the hydrographic survey. "Hydro I" is also equipped with a GPS system. Beach transects use MLLW as the vertical datum reference and referenced horizontally to NAD 27, California Coordinate System, Zone 1, Lambert Conformal Project.

Hydrographic surveys were conducted on September 27, 2006 between 12:00 and 3:00 PM. Crew members aboard 'Hydro I' include Travis Schneider, RCE, Yoash Tilles, EIT and Nathan Praytor. Mr. Praytor was the skipper, Mr. Schneider collected hydrographic survey data, and Mr. Tilles observed for safety and collected water samples.

Weather conditions were cloudy with visibility was up to 3 miles. Foggy weather conditions at Woodley Island Wind from the northwest at 3 knots. High tide was at 14:47 pm 6.65 ft. Air temperature was 53° F. and the pressure was 30.1 inches.

Hydrographic surveys were conducted along the same transects established for sediment sampling (Transects A, B, C and D) and were extended approximately 3,000 feet (900 meters) from the point of discharge to the closure depth of approximately -36.1 feet MLLW (-40 feet mean sea level). Land surveys were conducted along the length of transects that were not accessible with 'HYDRO I' due to the shallow bottom elevation along the beach and the intertidal zone (Table 1). The plan view of Transects A, C, and D, disposal site, and the plan view of Transect B, control site, are shown in Figures 1A and 1B respectively. Figures 2-5 show the cross sections of the respective transects.

Due to optimal sea and weather conditions, land surveys and hydrographic surveys were combined to form almost a continuous transect. The interpolated distance between land and hydrographic surveys was less than 200 feet (60 meters) for all transects. Pacific Affiliates cannot guarantee that winter surveys shall yield the same number of data points.

4.5 Aerial Photographs

Aerial photographs were taken on October 9, 2006 between 10:00 AM and 12:30 PM by Cartwright Aerial Surveys, Inc. to provide the natural ocean water conditions along the shoreline. Pre project aerial photographs of the surf zone disposal area and the shoreline from the mouth of the Eel River to the mouth of the Mad River cover an area of approximately 46.5 square miles, extending approximately 27.25 miles from the Mad to the Eel River mouths and 0.75 miles perpendicular to the shoreline (see Figure 6 for Vicinity Map).

Bill Calmes of Cartwright Aerial Surveys reported that the flight was made under very good weather conditions. Visibility was clear, and no turbulence was encountered. Black and white photography was obtained in two (2) flight lines (29) exposures on the first, (11) on the second. Photography was initiated at 11:48 PDT and concluded at 12:08. The direction of travel was northerly. The photo scale is 1" = ±1,000'.

All images were captured with a high-resolution Zeiss RMK TOP 15 mapping camera for photo acquisition. The camera is equipped with FMC (Forward Motion Compensation). The cameras' platform was a 2000 Cessna T06H Statioair. Tom Hutcheon was the pilot in command. Jim Fonts was the camera operator.

Weather and sea conditions during the time of the flight as reported by the National Weather Service, are reported in Appendix I. Weather conditions were obtained from the Eel River buoy located 17 nautical miles west-southwest of Eureka, CA. Ocean current conditions were obtained from St. Georges buoy located 8 nautical miles west-northwest of Crescent City, CA. The data indicates that the currents vary between

5.0 REFERENCES

Pacific Affiliates, Inc. August, 2006. City of Eureka and Humboldt Bay Harbor, Recreation, and Conservation District Cooperative Eureka Waterfront Facilities Maintenance Dredging Project, Eureka Channel, Humboldt Bay, CA. *Samoa Beach Disposal Site Monitoring Plan*.

MFG, Inc. October 18-30, 2006. *Samoa Beach Dredge Disposal Infaunal Community Survey Report*. Prepared for Pacific Affiliates, Inc.

Cartwright Aerial Surveys, Inc. October 9, 2006. Flight Comments Letter.

North Coast Laboratories. October 6, 2006. Total Suspended Solids Data.

Soils Control Lab. October 13, 2006. Grain Size Data.

National Oceanic and Atmospheric Administration. National Data Buoy Center.
Station 46022 – EEL RIVER – 17NM West-Southwest of Eureka, CA.
http://www.ndbc.noaa.gov/station_page.php?station=46022
Station 46027 – ST. GEORGES – 8NM West-Northwest of Crescent City, CA.
http://www.ndbc.noaa.gov/station_page.php?station=46027

APPENDIX I

COC FORMS & LABORATORY RESULTS

- **GRAIN SIZE – SOILS CONTROL LAB**
- **TOTAL SUSPENDED SOLIDS – NORTH COAST LABORATORIES**
- **MACROFAUNA – MFG, INC.**
- **AERIAL PHOTOS – CARTWRIGHT AERIALS**

Pacific Affiliates
990 W. Waterfront Drive
Eureka, CA 95501
Attn: Yoash Tilles

November 1, 2006

Dear Yoash:

Per your request I am writing to document the “improvements” I made to the Plumb 1981 method that we are using for the “Grain Size Analysis” that we are conducting for the City of Eureka & Harbor District Maintenance Dredging project.

First, some background: The coarse particles (>63 micron which is classified as sand) are determined by sieving. The fine particles (<63 micron which is silt and clay) are determined by pipetting sub-samples out of a 1L cylinder at specific depths and times. Then these samples are evaporated to dryness and weighed to determine their density.

The problem with the samples for this project is that the samples are almost entirely sand which leaves us with very small weights in the evaporation dishes. The low concentration of fine particles makes it so that the “dissolved salts” in the samples are very significant to the final calculation of clay. In order to correct for the dissolved salts I took the conductivity of the solutions in the columns and calculated a salt concentration to subtract from the dishes. This significantly improved the quality of the results for these “atypical” samples.

If you have any further questions please let me know.

Sincerely,

Mike Galloway
Lab Manager

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: D3-1-GSA, collected 10/05/06 08:30
 Our Laboratory #: 6100169-12

Pebbles as percent of whole sample

SIZE INTERVAL

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.00	0.00
-1 4- 2	0.00	0.00

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	0.00	0.00
1 1-0.5	0.63	0.63
2 0.5-0.25	87.35	87.98
3 0.25-0.125	11.84	99.82
4 0.125-0.062	0.08	99.90
5 0.062-0.031	0.00	99.90
6 0.031-0.016	0.00	99.90
7 0.016-0.008	0.08	99.98
8 0.008-0.004	0.00	99.98
9 0.004-0.002	0.00	99.98
>9 < 0.002	0.02	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.90	0.08	0.02

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: D2-1-GSA, collected 10/05/06 08:25
 Our Laboratory #: 6100169-11

Pebbles as percent of whole sample

SIZE INTERVAL

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.00	0.00
-1 4- 2	0.00	0.00

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	0.00	0.00
1 1-0.5	0.21	0.21
2 0.5-0.25	80.25	80.46
3 0.25-0.125	19.40	99.86
4 0.125-0.062	0.03	99.90
5 0.062-0.031	0.01	99.90
6 0.031-0.016	0.00	99.90
7 0.016-0.008	0.00	99.90
8 0.008-0.004	0.03	99.93
9 0.004-0.002	0.07	100.00
>9 < 0.002	0.00	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.90	0.03	0.07

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: D1-1-GSA, collected 10/05/06 08:20
 Our Laboratory #: 6100169-10

Pebbles as percent of whole sample

SIZE INTERVAL

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.00	0.00
-1 4- 2	0.00	0.00

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	0.00	0.00
1 1-0.5	0.09	0.09
2 0.5-0.25	61.57	61.67
3 0.25-0.125	37.96	99.63
4 0.125-0.062	0.20	99.83
5 0.062-0.031	0.01	99.84
6 0.031-0.016	0.03	99.87
7 0.016-0.008	0.00	99.87
8 0.008-0.004	0.00	99.87
9 0.004-0.002	0.05	99.92
>9 < 0.002	0.08	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.83	0.04	0.13

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: C3-1-GSA, collected 10/05/06 07:45
 Our Laboratory #: 6100169-9

Pebbles as percent of whole sample

SIZE INTERVAL

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.00	0.00
-1 4- 2	0.00	0.00

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	0.00	0.00
1 1-0.5	1.89	1.89
2 0.5-0.25	80.87	82.76
3 0.25-0.125	17.13	99.88
4 0.125-0.062	0.04	99.92
5 0.062-0.031	0.00	99.92
6 0.031-0.016	0.00	99.92
7 0.016-0.008	0.00	99.92
8 0.008-0.004	0.00	99.92
9 0.004-0.002	0.00	99.92
>9 < 0.002	0.08	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.92	0.00	0.08

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: C2-1-GSA, collected 10/05/06 07:40
 Our Laboratory #: 6100169-8

Pebbles as percent of whole sample

SIZE INTERVAL

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.00	0.00
-1 4- 2	0.00	0.00

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	0.00	0.00
1 1-0.5	1.04	1.04
2 0.5-0.25	83.24	84.28
3 0.25-0.125	15.28	99.56
4 0.125-0.062	0.27	99.83
5 0.062-0.031	0.00	99.83
6 0.031-0.016	0.05	99.87
7 0.016-0.008	0.00	99.87
8 0.008-0.004	0.00	99.87
9 0.004-0.002	0.01	99.88
>9 < 0.002	0.12	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.83	0.05	0.13

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: C1-1-GSA, collected 10/05/06 07:37
 Our Laboratory #: 6100169-7

Pebbles as percent of whole sample

SIZE INTERVAL

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.00	0.00
-1 4- 2	0.00	0.00

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	0.00	0.00
1 1-0.5	0.06	0.06
2 0.5-0.25	44.68	44.74
3 0.25-0.125	53.02	97.77
4 0.125-0.062	1.74	99.50
5 0.062-0.031	0.36	99.86
6 0.031-0.016	0.00	99.86
7 0.016-0.008	0.00	99.86
8 0.008-0.004	0.00	99.86
9 0.004-0.002	0.02	99.88
>9 < 0.002	0.12	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.50	0.36	0.14

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: B3-1-GSA, collected 10/05/06 09:45
 Our Laboratory #: 6100169-6

Pebbles as percent of whole sample

SIZE INTERVAL

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.00	0.00
-1 4- 2	0.00	0.00

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	0.00	0.00
1 1-0.5	0.19	0.19
2 0.5-0.25	52.81	53.00
3 0.25-0.125	45.75	98.75
4 0.125-0.062	1.14	99.89
5 0.062-0.031	0.00	99.89
6 0.031-0.016	0.00	99.89
7 0.016-0.008	0.01	99.90
8 0.008-0.004	0.01	99.91
9 0.004-0.002	0.00	99.91
>9 < 0.002	0.09	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.89	0.02	0.09

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: B2-1-GSA, collected 10/05/06 09:40
 Our Laboratory #: 6100169-5

Pebbles as percent of whole sample

SIZE INTERVAL

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.43	0.43
-1 4- 2	1.88	2.30

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	6.31	6.31
1 1-0.5	47.27	53.57
2 0.5-0.25	42.27	95.85
3 0.25-0.125	4.02	99.87
4 0.125-0.062	0.00	99.87
5 0.062-0.031	0.02	99.89
6 0.031-0.016	0.00	99.89
7 0.016-0.008	0.02	99.91
8 0.008-0.004	0.00	99.91
9 0.004-0.002	0.00	99.91
>9 < 0.002	0.09	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.87	0.04	0.09

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: B1-1-GSA, collected 10/05/06 09:35
 Our Laboratory #: 6100169-4

Pebbles as percent of whole sample

SIZE INTERVAL

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.00	0.00
-1 4- 2	2.05	2.05

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	9.23	9.23
1 1-0.5	40.91	50.14
2 0.5-0.25	47.56	97.70
3 0.25-0.125	2.17	99.86
4 0.125-0.062	0.00	99.86
5 0.062-0.031	0.00	99.86
6 0.031-0.016	0.12	99.98
7 0.016-0.008	0.00	99.98
8 0.008-0.004	0.00	99.98
9 0.004-0.002	0.02	100.00
>9 < 0.002	0.00	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.86	0.12	0.02

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: A3-1-GSA, collected 10/05/06 08:00
 Our Laboratory #: 6100169-3

Pebbles as percent of whole sample

SIZE INTERVAL

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.00	0.00
-1 4- 2	0.00	0.00

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	0.37	0.37
1 1-0.5	29.72	30.10
2 0.5-0.25	65.95	96.04
3 0.25-0.125	3.86	99.90
4 0.125-0.062	0.04	99.93
5 0.062-0.031	0.00	99.93
6 0.031-0.016	0.01	99.94
7 0.016-0.008	0.02	99.96
8 0.008-0.004	0.00	99.96
9 0.004-0.002	0.04	100.00
>9 < 0.002	0.00	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.93	0.03	0.04

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: A2-1-GSA, collected 10/05/06 07:55
 Our Laboratory #: 6100169-2

Pebbles as percent of whole sample

SIZE INTERVAL

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.00	0.00
-1 4- 2	0.00	0.00

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	0.00	0.00
1 1-0.5	0.03	0.03
2 0.5-0.25	77.18	77.22
3 0.25-0.125	22.55	99.76
4 0.125-0.062	0.12	99.88
5 0.062-0.031	0.00	99.88
6 0.031-0.016	0.00	99.88
7 0.016-0.008	0.06	99.94
8 0.008-0.004	0.00	99.94
9 0.004-0.002	0.00	99.94
>9 < 0.002	0.06	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.88	0.06	0.06

Pacific Affiliates
 990 W. Waterfront Drive
 Eureka, CA 95501
 Attn: Yoash Tilles

Project #/Name: 930/940 / City of Eureka & Harbor District Maintenance Dredging - Beach
 Method: Plumb 1981
 Date Analyzed: October 9, 2006
 Matrix: Sediment
 Client Site ID: None
 Client Sample ID: A1-1-GSA, collected 10/05/06 07:50
 Our Laboratory #: 6100169-1

Pebbles as percent of whole sample

SIZE INTERVAL

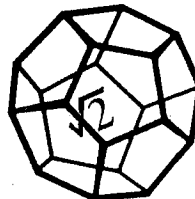
<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
<-5 >32	0.00	0.00
-4 32-16	0.00	0.00
-3 16- 8	0.00	0.00
-2 8- 4	0.00	0.00
-1 4- 2	0.00	0.00

Analysis of fraction that is less than 2mm

<u>Phi</u> <u>mm</u>	<u>INTERVAL (%)</u>	<u>CUMULATIVE (%)</u>
0 2- 1	0.00	0.00
1 1-0.5	0.05	0.05
2 0.5-0.25	46.29	46.34
3 0.25-0.125	53.07	99.41
4 0.125-0.062	0.55	99.95
5 0.062-0.031	0.00	99.95
6 0.031-0.016	0.00	99.95
7 0.016-0.008	0.00	99.95
8 0.008-0.004	0.00	99.95
9 0.004-0.002	0.03	99.99
>9 < 0.002	0.01	100.00

These percentages are of the portion passing a 2mm sieve

% sand	% silt	% clay
99.95	0.00	0.05



**NORTH COAST
LABORATORIES LTD.**

October 06, 2006

Pacific Affiliates
990 W. Waterfront Drive
Eureka, CA 95501

Attn: Yoash Tilles

RE: 930/940 City of Eureka & Harbor District

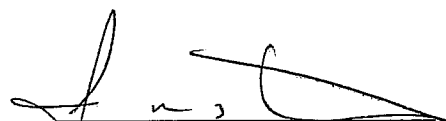
Order No.: 0609608
Invoice No.: 61481
PO No.:
ELAP No. 1247-Expires July 2008


SAMPLE IDENTIFICATION


Fraction	Client Sample Description
01A	A-1-TSS
03A	B-1-TSS
05A	C-1-TSS

ND = Not Detected at the Reporting Limit
Limit = Reporting Limit
All solid results are expressed on a wet-weight basis unless otherwise noted.

REPORT CERTIFIED BY


Laboratory Supervisor(s)


QA Unit


Jesse G. Chaney, Jr.
Laboratory Director

North Coast Laboratories, Ltd.

Date: 06-Oct-2006

CLIENT: Pacific Affiliates
Project: 930/940 City of Eureka & Harbor District
Lab Order: 0609608

CASE NARRATIVE

The samples in this report are for City of Eureka and Humboldt Bay, Harbor Recreation and Conservation Cooperative Maintenance Dredging Project. (P.A. Job # 04-930/940)

Date: 06-Oct-2006
WorkOrder: 0609608

ANALYTICAL REPORT

Client Sample ID: A-1-TSS
Lab ID: 0609608-01A

Received: 9/27/06

Collected: 9/27/06 13:40

Test Name: Non-Filterable Residue (TSS)

Reference: EPA 160.2

<u>Parameter</u>	<u>Result</u>	<u>Limit</u>	<u>Units</u>	<u>DF</u>	<u>Extracted</u>	<u>Analyzed</u>
Non-Filterable Residue(TSS)	5.7	1.0	mg/L	1.0		10/3/06

Client Sample ID: B-1-TSS
Lab ID: 0609608-03A

Received: 9/27/06

Collected: 9/27/06 12:58

Test Name: Non-Filterable Residue (TSS)

Reference: EPA 160.2

<u>Parameter</u>	<u>Result</u>	<u>Limit</u>	<u>Units</u>	<u>DF</u>	<u>Extracted</u>	<u>Analyzed</u>
Non-Filterable Residue(TSS)	4.2	1.0	mg/L	1.0		10/3/06

Client Sample ID: C-1-TSS
Lab ID: 0609608-05A

Received: 9/27/06

Collected: 9/27/06 13:28

Test Name: Non-Filterable Residue (TSS)

Reference: EPA 160.2

<u>Parameter</u>	<u>Result</u>	<u>Limit</u>	<u>Units</u>	<u>DF</u>	<u>Extracted</u>	<u>Analyzed</u>
Non-Filterable Residue(TSS)	6.4	1.0	mg/L	1.0		10/3/06

**October 9, 2006 Ocean Conditions from Station 46022 - EEL RIVER -
17NM West-Southwest of Eureka, CA**

hh	mm	WDIR	WSPD (m/s)	GST (m/s)	WVHT (meters)	DPD (seconds)	ATMP (Celsius)	WTMP (Celsius)
23	50	MM	0	1	1.9	8	13.7	12.1
22	50	10	4	4	2	8	12.9	12
21	50	350	4	5	2.1	8	12.6	11.9
20	50	350	5	6	2.2	8	12.4	11.8
19	50	360	4	4	2.5	8	12.3	11.7
18	50	360	5	6	2.4	8	12.2	11.7
17	50	350	6	6	2.3	8	12.2	11.6
16	50	360	6	7	2.4	8	12.3	11.6
15	50	360	6	7	2.3	8	12.5	11.6
14	50	10	5	6	2.2	8	12.4	11.6
13	50	20	5	6	2.5	8	12.3	11.6
12	50	10	5	7	2.7	8	12.4	11.6
11	50	10	5	7	2.3	8	12.5	11.7
10	50	10	6	7	2.3	8	12.6	11.7
9	50	360	6	7	2.2	8	12.7	11.7
8	50	10	6	7	2.8	8	12.9	11.7
7	50	20	6	7	2.9	8	13	11.8
6	50	20	6	8	3.3	9	13.1	11.8
5	50	10	8	9	3.6	9	13.1	11.9
4	50	10	9	11	3.6	9	13.4	11.9
3	50	10	10	13	3.4	8	13.8	12
2	50	10	10	13	3.7	9	13.8	11.9
1	50	20	9	12	3.6	8	14	11.9
0	50	360	8	10	2.8	8	14.1	11.8

Definitions:

WDIR: Wind direction (the direction the wind is coming from in degrees clockwise from true N) during the same period used for WSPD.

WSPD: Wind speed (m/s) averaged over an eight-minute period for buoys and a two-minute period for land stations. Reported Hourly.

GST: Peak 5 or 8 second gust speed (m/s) measured during the eight-minute or two-minute period.

WVHT: Significant wave height (meters) is calculated as the average of the highest one-third of all of the wave heights during the 20-minute sampling period.

DPD: Dominant wave period (seconds) of all waves with the maximum wave energy.

ATMP: Air temperature (Celsius).

WTMP: Sea surface temperature (Celsius).

Reference: http://www.ndbc.noaa.gov/station_realtime.php?station=46022

**October 9, 2006 Ocean Current Data from Station 46027 -
ST GEORGES - 8NM West Northwest of Crescent City, CA**

hh	DEP01	DIR01	SPD01	DEP02	DIR02	SPD02	DEP03	DIR03	SPD03	DEP04	DIR04	SPD04	DEP05	DIR05	SPD05	DEP06	DIR06	SPD06
23	6	180	16	8	180	12	10	180	11	12	180	8	14	180	7	16	170	6
22	6	150	7	8	160	4	10	130	4	12	110	5	14	90	6	16	90	7
21	6	70	6	8	40	3	10	30	4	12	20	4	14	30	3	16	20	3
20	6	60	10	8	60	6	10	60	7	12	60	7	14	50	7	16	50	7
19	6	340	4	8	290	3	10	290	4	12	310	4	14	320	6	16	330	8
18	6	10	6	8	340	4	10	340	3	12	340	4	14	350	4	16	350	5
17	6	50	6	8	50	3	10	30	3	12	20	3	14	30	3	16	30	3
16	6	120	3	8	170	2	10	180	3	12	170	2	14	180	1	16	160	2
15	6	180	11	8	180	7	10	190	7	12	190	7	14	200	6	16	200	7
14	6	180	13	8	190	9	10	190	9	12	190	8	14	190	9	16	200	9
13	6	200	20	8	200	18	10	200	19	12	200	18	14	190	17	16	190	18
12	6	170	14	8	180	12	10	180	12	12	180	11	14	190	11	16	200	12
11	6	160	11	8	170	8	10	170	6	12	170	6	14	190	6	16	190	7
10	6	170	10	8	180	10	10	180	12	12	190	10	14	200	10	16	200	10
9	6	180	6	8	200	5	10	170	4	12	140	3	14	110	2	16	110	2
8	6	80	8	8	80	4	10	90	4	12	80	3	14	70	3	16	80	2
7	6	160	1	8	240	2	10	260	4	12	270	4	14	260	4	16	210	3
6	6	270	10	8	270	8	10	270	8	12	270	7	14	270	5	16	250	1
5	6	190	13	8	190	11	10	200	10	12	190	9	14	160	9	16	140	10
4	6	210	21	8	200	18	10	200	16	12	200	15	14	190	13	16	190	13
3	6	210	23	8	210	20	10	210	19	12	200	19	14	200	19	16	200	20
2	6	200	30	8	200	28	10	200	28	12	200	27	14	200	28	16	200	28
1	6	200	39	8	200	40	10	200	40	12	200	40	14	200	39	16	200	39
0	6	200	35	8	200	35	10	190	35	12	200	35	14	200	34	16	190	34

Definitions:

DEP01: The distance from the sea surface to the middle of the depth cells, or bins, measured in meters.

DIR01: The direction the ocean current is flowing toward. 0-360 degrees, 360 is due north, 0 means no measurable current.

SPD01: The speed of the ocean current measured in cm/s.

Reference: <http://www.ndbc.noaa.gov/measdes.shtml#stdmet>

**October 9, 2006 Ocean Current Data from Station 46027 -
ST GEORGES - 8NM West Northwest of Crescent City, CA**

hh	DIR07	SPD07	DEP08	DIR08	SPD08	DEP09	DIR09	SPD09	DEP10	DIR10	SPD10	DEP11	DIR11	SPD11	DEP12	DIR12	SPD12	DEP13	DIR13	SPD13
23	170	6	20	170	7	22	170	7	24	170	7	26	180	8	28	180	7	30	170	7
22	90	6	20	100	7	22	100	7	24	100	6	26	100	6	28	100	5	30	90	5
21	30	3	20	30	4	22	40	4	24	30	3	26	30	3	28	40	3	30	50	4
20	50	8	20	50	8	22	50	8	24	50	9	26	50	9	28	50	10	30	50	9
19	360	9	20	20	10	22	40	12	24	40	13	26	40	13	28	50	14	30	50	14
18	350	4	20	350	4	22	340	4	24	350	4	26	360	6	28	10	8	30	20	9
17	40	4	20	50	3	22	40	3	24	30	3	26	30	3	28	40	2	30	50	2
16	150	2	20	160	1	22	130	1	24	110	1	26	160	2	28	160	1	30	150	2
15	200	7	20	190	7	22	190	6	24	180	7	26	180	7	28	180	7	30	180	8
14	200	10	20	200	10	22	200	10	24	200	10	26	190	11	28	190	11	30	190	12
13	200	18	20	200	18	22	200	19	24	200	20	26	200	22	28	210	22	30	210	20
12	210	14	20	210	16	22	220	17	24	210	17	26	220	16	28	220	16	30	230	18
11	190	8	20	210	8	22	220	7	24	220	8	26	220	9	28	210	9	30	210	8
10	200	11	20	210	12	22	210	12	24	210	12	26	220	12	28	220	10	30	220	8
9	90	3	20	70	2	22	70	3	24	80	3	26	70	2	28	50	2	30	30	3
8	80	1	20	90	1	22	90	2	24	160	1	26	190	2	28	190	3	30	190	4
7	170	3	20	150	3	22	150	4	24	140	4	26	150	5	28	160	5	30	160	5
6	110	5	20	100	7	22	100	9	24	100	10	26	100	11	28	90	12	30	90	11
5	130	13	20	120	13	22	120	13	24	130	12	26	130	10	28	140	8	30	150	6
4	190	13	20	180	14	22	190	14	24	190	15	26	190	14	28	190	14	30	200	14
3	200	19	20	190	20	22	190	21	24	200	22	26	190	21	28	190	21	30	200	21
2	200	29	20	200	30	22	200	31	24	200	31	26	200	31	28	200	31	30	200	30
1	200	39	20	200	38	22	200	39	24	200	38	26	200	38	28	200	37	30	200	37
0	190	35	20	190	34	22	190	34	24	190	34	26	190	34	28	200	32	30	190	31

**October 9, 2006 Ocean Current Data from Station 46027 -
ST GEORGES - 8NM West Northwest of Crescent City, CA**

hh	DEP14	DIR14	SPD14	DEP15	DIR15	SPD15	DEP16	DIR16	SPD16	DEP17	DIR17	SPD17	DEP18	DIR18	SPD18	DEP19	DIR19	SPD19	DEP20	DIR20	SPD20
23	32	180	6	34	190	5	36	200	5	38	220	4	40	230	4	42	260	5	44	270	6
22	32	70	5	34	70	4	36	50	3	38	20	3	40	10	3	42	350	5	44	330	5
21	32	40	4	34	50	4	36	50	5	38	50	4	40	50	4	42	50	3	44	10	2
20	32	50	10	34	50	10	36	50	11	38	50	12	40	50	12	42	40	12	44	40	10
19	32	60	15	34	60	16	36	60	16	38	60	17	40	60	16	42	60	16	44	60	16
18	32	20	11	34	30	13	36	50	16	38	50	18	40	60	18	42	60	17	44	60	15
17	32	60	3	34	60	2	36	60	2	38	60	2	40	60	3	42	50	4	44	50	5
16	32	140	2	34	160	3	36	160	3	38	170	4	40	180	4	42	180	3	44	200	2
15	32	180	8	34	180	8	36	180	8	38	190	8	40	190	8	42	200	8	44	190	6
14	32	200	12	34	200	13	36	200	14	38	200	15	40	210	15	42	210	14	44	210	12
13	32	210	18	34	210	16	36	210	17	38	200	17	40	200	17	42	200	17	44	200	14
12	32	230	17	34	220	16	36	220	15	38	220	15	40	210	15	42	210	15	44	200	15
11	32	200	8	34	200	8	36	200	7	38	200	7	40	200	8	42	200	8	44	190	7
10	32	210	7	34	210	8	36	210	9	38	200	8	40	210	7	42	190	5	44	180	5
9	32	30	4	34	50	3	36	90	3	38	120	4	40	120	5	42	120	5	44	130	6
8	32	180	5	34	190	4	36	190	4	38	200	3	40	200	4	42	210	4	44	210	4
7	32	160	5	34	170	5	36	180	5	38	190	5	40	190	5	42	190	5	44	200	5
6	32	90	10	34	80	7	36	80	5	38	100	3	40	90	1	42	220	0	44	240	0
5	32	180	6	34	200	6	36	210	8	38	210	10	40	210	11	42	210	10	44	210	12
4	32	200	15	34	200	15	36	200	15	38	200	13	40	200	12	42	210	12	44	200	12
3	32	200	20	34	190	20	36	190	20	38	200	20	40	200	20	42	190	20	44	190	19
2	32	200	29	34	200	29	36	200	28	38	200	27	40	200	25	42	200	23	44	200	21
1	32	200	36	34	200	35	36	200	33	38	200	31	40	200	28	42	200	24	44	200	21
0	32	200	31	34	200	29	36	200	28	38	200	26	40	200	24	42	200	22	44	210	17




consulting
scientists and
engineers

MFG, Inc.
A TETRA TECH COMPANY

4807 Spicewood Springs Road
Building 4, 1st Floor
Austin, Texas 78759
512/338-1667
Fax: 512/338-1331

October 30, 2006

MFG Project No. 240101

Mr. Yoash Tilles
Pacific Affiliates, Inc.
990 W. Waterfront Drive
Eureka, California 95501

RE: October 2006 Pre-dredge Disposal Beach Infaunal Community Report

Dear Mr. Tilles:

Enclosed is the finalized Samoa Beach Dredge Disposal Infaunal Community Report for the Pre-dredge Disposal Sampling activities in October 2006.

Please contact me if there are any questions or concerns. We appreciate the opportunity to provide these services.

Sincerely,

MFG, INC.

Nick Wiersema
Project Ecologist

tac
Enclosure

**SAMOA BEACH DREDGE DISPOSAL
INFAUNAL COMMUNITY SURVEY REPORT**

PRE-DREDGE DISPOSAL SAMPLING OCTOBER 2006

PREPARED FOR:
PACIFIC AFFILIATES, INC.
A CONSULTING AND ENGINEERING GROUP
990 W. WATERFRONT DRIVE
EUREKA, CA 95501

PREPARED BY:
TETRA TECH, INC.
4807 SPICEWOOD SPRING RD.
AUSTIN, TX 78759
CONTACT:
N.A. WIERSEMA
Ph: 512-338-1667

OCTOBER 30, 2006

INTRODUCTION

In 2006 four transect locations were sampled on October 4th through the 5th. Three of these locations correspond approximately to those transect locations sampled as part of previous dredge disposal events. This sampling event was performed to characterize pre-dredge disposal conditions. The four transect locations are as follows:

- Transect A: Dredge disposal site. Location where dredge pipeline empties into the surf zone.
- Transect B: Control site. Located on the beach approximately 1,000 meters south of the pipeline terminus.
- Transect C: 100 meters north of the pipeline terminus (Transect A).
- Transect D: 100 meters south of the pipeline terminus (Transect A).

SAMPLING METHODOLOGY

Provided below is a brief summary of the sampling methodology, a more detailed discussion of the sampling methods can be found within the dredge disposal monitoring plan (Pacific Affiliates, 2006). At each of the four transect locations, three replicate sampling transects were established. Along each of these replicate transects, individual samples were collected at 2-meter intervals and composited. Each sample was collected using a 10 centimeter diameter coring device. The coring device was pushed to a depth of 20 centimeters. The cored material was then washed, sieving the material through a 1000 micron sack, eliminating the finer silts, and sands. The remaining coarse mineral and vegetative debris and organisms were then placed within sample jars, and preserved as described within the dredge disposal monitoring plan (Pacific Affiliates, 2006).

SAMPLE PROCESSING

Each sample was transferred to a 500 micron sieve for washing, to eliminate fine sediments, and preservatives. The samples were then transferred to a sorting tray. The infaunal invertebrates were then sorted from the coarse material and vegetative debris. After, the large and obvious invertebrates were sorted out the remaining material was viewed under a stereo microscope for completeness. All organisms were placed into glass vials with 70% ethanol for preservation. The infaunal invertebrates were then identified and enumerated. Each species type was additionally weighed. Table 1, presents these data.

REFERENCES

Pacific Affiliates, 2006. Samoa Beach Surf Zone Disposal Monitoring Plan. Cooperative Eureka Waterfront Facilities Maintenance Dredging Project. Prepared for the City of Eureka and Humboldt Bay Harbor, Recreation and Conservation District. Revision IV, August 2006.

Table 1. Species Abundance and Biomass

Species	Transect A						Transect B						Transect C						Transect D						
	A-1-INV		A-2-INV		A-3-INV		B-1-INV		B-2-INV		B-3-INV		C-1-INV		C-2-INV		C-3-INV		D-1-INV		D-2-INV		D-3-INV		
	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	
Crustacea																									
<i>Emerita analoga</i>	11	23	4	8	5	5	1	5																	
<i>Archaeomysis grebnitzkii</i>	7	<1	5	<1	16	<1																			
<i>Megalorchesia californiana</i>	15	1	6	<1	8	<1	2	<1	1	<1	5	<1	6	<1	1	<1	7	1	10	1	4	<1	7	<1	
<i>Megalorchesia columbiana</i>							1	<1	1	<1									2	<1	6	<1	3	<1	
<i>Dogielnotus loquax</i>	1	<1																							
<i>Excrolana iniquifrons</i>	81	1	73	1	98	1	25	<1	14	<1	8	<1	66	1	36	<1	53	1	48	<1	46	<1	33	<1	
Polychaetes																									
<i>Nephtys californiensis</i>			1	<1	1	1											2	<1	1	<1	2	<1			
<i>Pygospio californica</i>	36	<1	10	<1	3	<1	1	<1			8	<1					1	<1	1	<1	1	<1	4	<1	
Insecta																									
<i>Emphayles fucicola</i>							1	---					1	---							1	---			
Total	151	26.5	99	11	131	8.5	30	7	16	1.5	24	6.5	74	2.5	40	2.5	79	11.5	76	11.5	79	14	72	8.5	

For total biomass, organisms weighing less than 1 gram were treated as 0.5 gram.

SAMPLE RECEIPT AND PROCESSING LOG

LAB_ID	CLIENT_ID	SAMPLING_DATE	CONDITION	PROCESSING_START_DATE
1	A-1-INV	10/5/2006	good	10/6/2006
2	A-2-INV	10/5/2006	good	10/6/2006
3	A-3-INV	10/5/2006	good	10/9/2006
4	B-1-INV	10/5/2006	good	10/9/2006
5	B-2-INV	10/5/2006	good	10/9/2006
6	B-3-INV	10/5/2006	good	10/10/2006
7	C-1-INV	10/4/2006	good	10/10/2006
8	C-2-INV	10/4/2006	good	10/11/2006
9	C-3-INV	10/4/2006	good	10/11/2006
10	D-1-INV	10/4/2006	good	10/12/2006
11	D-2-INV	10/4/2006	good	10/12/2006
12	D-3-INV	10/4/2006	good	10/13/2006

Received By:	Received Date:	Signature:
Nick Wiersema	10/6/2006	<i>Nick Wiersema</i>

APPENDIX II - SAMPLING PHOTOGRAPHS October 2006



Photos 1 and 2: Sediment samples collected in the swash zone at low tide (October 5, 2006).



Photo 3: Undisturbed core samples (October 5, 2006)



Photo 4: Sediment transferred to 4 oz jars.



Photo 5: Marked sampling points at 2 meter intervals at low tide.



Photo 6: Samples collected (October 4, 2006).



Photo 6: Equipment used to prepare biological samples (October 5, 2006).



Photo 7: Sieved material in Wildco Inc. manufactured bucket.



Photo 8: Sieving sample (October 5, 2006)