



**CITY OF VENICE DISCHARGE
AMBIENT WATER QUALITY
AND BENTHIC MONITORING**

FEBRUARY 1, 1999

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THE CITY OF VENICE
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INTRODUCTION

This report contains the results of the second quarterly monitoring, November 19, 1998, for the pre-discharge baseline period. For the first sampling in August 1998 improper entries into a Global Positioning System (GPS) resulted in samples being taken to the south of the proposed discharge point.

INTRACOASTAL WATERWAY BACKGROUND

The Intracoastal Waterway (ICW) near Venice is a Class III, tidally influenced water body. The ICW was constructed from April 1965 to January 1967 by the U.S. Army Corps of Engineers (USACE) to improve shipping corridors for the transportation of needed materials and goods in the coastal areas. Shipping and boating is still the primary function of the system. The ICW at the point of discharge is approximately 200 feet in width where the side slopes are composed of medium to large rip-rap. Surrounding properties along this area of the ICW are zoned for Light and Warehouse Industrial Use, Commercial Intensive Use, and Government Use.

AMBIENT MONITORING AREA

The City of Venice's concentrate discharge will be located at approximately Latitude 27° 05' 58" North and Longitude 82° 26' 27" West. As defined by FDEP permit FL 0034335, sampling locations are 1) 500 feet north and 45 feet west of the outfall, 2) 500 feet south and 45 feet west of the outfall, 3) selected reference point not within the zone of influence for the discharge, and 4) concentrate sampling at the plant. For the first sampling period (August 1988) there was an error in station positioning, resulting in samples taken from the wrong locations. To compensate for this error the decision was made to re-sample the incorrect stations in November as well as the correct locations, resulting in six (6) sampling locations. Data for stations in the correct positions are labeled with the suffix "true" while those from the incorrect positions are labeled "false". Data from the six locations was compared to determine the level of local variability in the measured parameters. The concentrate outfall location and all six selected sampling locations are depicted in **Figure 1**. The true station coordinates for the three pre-operational sampling locations for the ICW are as follows:

Sampling Point 5N: 500 feet north and 45 feet west of outfall.

Station coordinates were Latitude 27° 06' 01.3" N, and Longitude 82° 26' 08.5" W.

Sampling Point 5S: 500 feet south and 45 feet west of the outfall.

Station coordinates were Latitude 27° 05' 34.3" N, and Longitude 82° 26' 10.7" W.

Sampling Point 10S: 1000 feet south and 45 feet west of outfall.

This point represents the required reference sampling location not within the zone of influence of the concentrate discharge. Station coordinates were Latitude 27° 05' 30.1" N, and Longitude 82° 26' 08.2" W.

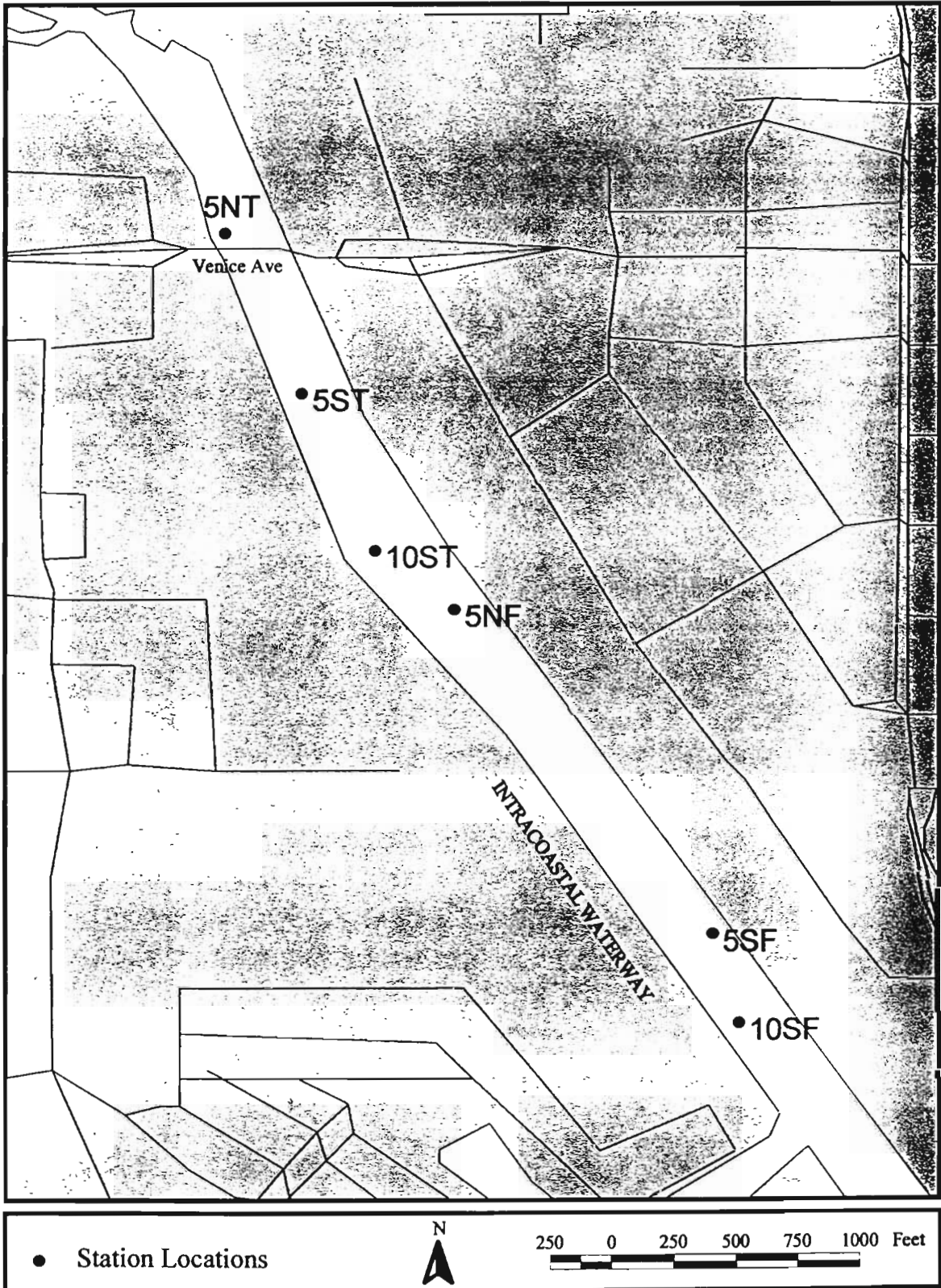


Figure 1. Sampling site locations.

METHODS — LABORATORY

Analytical methods for water quality samples are specified in the Results Section (**Table 2**). Total nitrogen was calculated as the sum of total kjeldahl nitrogen and nitrate-nitrite-nitrogen. Seventy two hours after collection, faunal samples were rinsed in water and transferred to containers with 70% isopropyl alcohol added as a preservative. Fauna were rough sorted under a stereozoom dissecting microscope into four major taxonomic categories: annelids, molluscs, crustaceans and miscellaneous. After rough sorting, fauna from each major category were identified to the lowest practical taxonomic level, usually to the genus or species level.

The following data analyses and community metrics were calculated for the benthic biological monitoring portion of the study: number of individuals per station, number of taxa per station, Shannon-Wiener Diversity Index (H' , for three commonly used log bases), Gini's Index (DM), Margalef's Index (D) and Pielou's Index of equitabilty (J'). Finally, faunal similarity and cluster analysis was conducted on the faunal data to examine similarities in community structure among the six sampling stations.

RESULTS

FIELD OBSERVATIONS

General field conditions and *in situ* physical measurements are summarized in **Table 1**. Predicted tides at Venice Inlet for November 19, 1998 called for a slack low tide of -0.1 feet MLLW at 06:38 EST. Tidal currents in the ICW did not begin flowing again until after field activities were completed. The water surface was clean at all stations; no debris, foam or other materials were present on the surface.

Winds were light and variable and skies partly cloudy. Air temperature ranges from 24.6 to 28.2° C. Water depth (10' 0" to 12' 4") and Secchi depth (1.2 to 1.5 m) was similar among stations and similar to the range for August (1.1 to 1.5). The water column appeared well mixed, with no stratification in salinity or temperature at all stations. Dissolved oxygen levels were similar among all depths (slightly lower at the bottom) and all stations. D.O values were low ranging from 4.32 ppm to 5.30 ppm , which can be typical of early morning hours.

LABORATORY RESULTS (WATER QUALITY)

Table 2 summarizes results from water quality samples, including analytical method, STORET code, units of expression, method detection limit, practical quantifying limit, and date of analysis. Water quality parameters were very similar across all stations.

Table 3 summarizes results from the plant concentrate discharge water samples, including analytical method, units of expression, method detection limit, and date of analysis.

Table 1. General field conditions and *in situ* physical measurements at each ICW Station on November 19, 1998.

STATION 5N

Time: 08:34 Air Temp: 24.7°C Water Depth: 10' 5"
Sky Cond.: 40% Clouds, Fog Secchi Depth: 1.25 m Wind: 0 mph

	<u>Salinity (ppt)</u>	<u>Temperature (°C)</u>	<u>DO (mg/l)</u>	<u>pH</u>	<u>SpC (µmhos/cm)</u>
Surface	24.3	25.66	4.77	7.57	38.26
Middle	24.5	25.65	4.50	7.57	38.47
Bottom	24.5	25.64	4.32	7.56	38.48

STATION 5N - FALSE

Time: 10:57 Air Temp: 28.24°C Water Depth: 11' 1"
Sky Cond.: 30% Scattered Clouds Secchi Depth: 1.2 m Wind: 0 mph

	<u>Salinity (ppt)</u>	<u>Temperature (°C)</u>	<u>DO (mg/l)</u>	<u>pH</u>	<u>SpC (µmhos/cm)</u>
Surface	25.8	25.89	5.30	7.66	40.81
Middle	26.8	25.72	5.20	7.68	41.54
Bottom	27.0	25.63	5.06	7.69	41.97

STATION 5S

Time: 09:15 Air Temp: 24.61°C Water Depth: 10' 3"
Sky Cond.: 40% Scattered Clouds Secchi Depth: 1.5 m Wind: 0 mph

	<u>Salinity (ppt)</u>	<u>Temperature (°C)</u>	<u>DO (mg/l)</u>	<u>pH</u>	<u>SpC (µmhos/cm)</u>
Surface	24.2	25.70	4.88	7.60	38.11
Middle	24.4	25.70	4.62	7.60	38.35
Bottom	24.4	25.66	4.41	7.59	38.35

STATION 5S - FALSE

Time: 10:35 Air Temp: 26.9°C Water Depth: 12' 4"
Sky Cond.: 30% Scattered Clouds Secchi Depth: 1.4 m Wind: 0 mph

	<u>Salinity (ppt)</u>	<u>Temperature (°C)</u>	<u>DO (mg/l)</u>	<u>pH</u>	<u>SpC (µmhos/cm)</u>
Surface	24.4	25.87	4.88	7.60	38.41
Middle	24.5	25.85	4.67	7.60	38.56
Bottom	24.6	25.84	4.45	7.60	38.58

Table 1 (Continued).

STATION 10S

Time: 09:42 Air Temp: 25.58°C Water Depth: 10' 0"
Sky Cond.: 10% Scattered Clouds Secchi Depth: 1.25 m Wind: <5 mph, from south

	<u>Salinity (ppt)</u>	<u>Temperature (°C)</u>	<u>DO (mg/l)</u>	<u>pH</u>	<u>SpC (µmhos/cm)</u>
Surface	21.4	25.74	4.87	7.83	38.13
Middle	24.4	25.71	4.47	7.81	38.37
Bottom	24.3	25.70	4.39	7.81	38.23

STATION 10S - FALSE

Time: 10:13 Air Temp: 26.35°C Water Depth: 11' 2"
Sky Cond.: 30% Scattered Clouds Secchi Depth: 1.3 m Wind: 5 mph, from south

	<u>Salinity (ppt)</u>	<u>Temperature (°C)</u>	<u>DO (mg/l)</u>	<u>pH</u>	<u>SpC (µmhos/cm)</u>
Surface	24.1	25.86	4.56	7.59	37.92
Middle	24.2	25.83	4.46	7.59	38.03
Bottom	24.2	25.82	4.42	7.59	38.11

LABORATORY RESULTS (BENTHIC MACROINFAUNA)

Summary statistics of benthic macroinfauna for all stations and replicates are summarized in **Table 4**. Number of taxa collected from a station ranged from 14 (5S false) to 28 (5N). The stations in the vicinity of the outfall (5N, 5S & 10S) exhibited a greater number of taxa the false stations located further south in the ICW. The same trend was observed for the number of individuals recovered from a station which ranged from 47 (5S false) to 175 (5S). Overall, all stations had an abundant and diverse benthic faunal community with no indication of adverse impacts from poor environmental conditions.

Shannon-Wiener diversity (log base 2) ranged from 2.91 at station 5S to 3.95 at station 10S false. Diversity indices for all stations were within the range normally associated with healthy soft substrates found within the study area. Pielou's Index of Equitability, which describes the evenness of distribution of fauna among the species present, shows a relatively high degree of evenness at all stations ranging from 0.61 to 0.91. This is another indication that the faunal community throughout the study area is not under the influence of any strong environmental impact.

Table 5 presents a composite list of all taxa found at all stations. A phylogenetic list of all species/taxa collected from this study is presented in the **Appendix**. The most abundant species were the cephalochordate, *Branchiostoma floridae*, and the bivalve *Semele nukuloides*. All other species were present in relatively low numbers.

There are limited benthic data for this area. The only data identified consists of 2 surveys conducted by MML in 1992 and 1993. Copies of these reports were submitted with the first quarterly monitoring report.

Figure 2 and **Table 5** show cluster analysis and similarity index for benthic fauna, respectively. From the trellis diagram (figure 2) there were no high similarity comparisons and 14 comparisons of moderate similarity (indicated by +++). The low number of high and moderate similarities indicates that there was not a strong faunal zonation pattern within the ICW. The cluster diagram, which illustrates no distinct station clusters, reinforces this conclusion. A zonation would have been evident if the 3 samples from each station were all linked at a high level of similarity, as opposed to the pattern illustrated which shows samples from various stations in a mixed pattern.

The lack of data from the immediate proposed discharge area for August does not appear to be a serious deficiency. The fauna of the ICW is fairly diverse and abundant and does not show any strong patterns of zonation within the area. In addition the collection of twice the required number of samples from November provides a broader picture of the benthos within the Venice ICW.

The next quarterly sampling has been scheduled for February 18, 1999 contingent on favorable tides and in agreement with the City of Venice Utilities Department.

Table 2. Water quality results, City of Venice ambient water quality and benthic monitoring, November 1998.

Parameter	Method	Storet Code	Station							Units	Method Detection Limit	Practical Quantitation Limit	Date of Analysis
			5N	5N*	5S	5S*	10S	10S*	10Rep				
NH ₄ -N	SM 4500-NH3 H	610	.069	.042	.067	.041	.070	.061	.067	mg/l	0.005 mg/l	0.020 mg/l	09/03/98
NO ₃ -N	EPA 353.2	630	.038	.034	.039	.038	.039	.040	.040	mg/l	0.005 mg/l	0.020 mg/l	09/30/98
TKN	EPA 351.2	625	.44	.27	.35	.39	.35	.37	.35	mg/l	0.05 mg/l	0.2 mg/l	09/11/98
Total N	Calculated	600	0.48	0.30	0.39	0.43	0.39	0.41	0.39	mg/l	—	—	—
PO ₄ -P	SM 4500-PF	70507	.099	.078	.096	.096	.098	.099	.097	mg/l	0.005 mg/l	0.020 mg/l	08/28/98
Total P	EPA 365.4	665	.20	.17	.19	.19	.19	.20	.19	mg/l	0.05 mg/l	0.20 mg/l	09/11/98
TSS	SM 2540 D	530	7.00	5.00	5.00	5.00	7.00	7.00	5.00	mg/l	2 mg/l	6 mg/l	08/28/98
CHL α	SM 10200 H (1.2)	32211	4.80	4.90	3.80	5.10	4.20	4.70	5.20	mg/m ³	0.5 mg/m ³	2.0 mg/m ³	09/10/98
H ₂ S	SM 4500-52	71875	U1	U1	U1	U1	**	U1	U1	mg/l	1 mg/l	4 mg/l	08/27/98
BOD5	SM 4500-52	310	1.0	1.0	1.1	1.0	1.2	1.0	1.0	mg/l	1 mg/l	4 mg/l	08/27/98

U1 = less than method detection limit

* Indicates False station (incorrect site) see introduction for details.

** Insufficient sample to process, two surrogate samples had U1 levels.

Table 3. Water quality results for samples of discharge water taken by and analyzed by Thornton Laboratories, November 1998.

Parameter	Method	Result*	Standard Detection Limit Units	Analysis Date
Cadmium (Cd)	EPA 213.2	D	0.1 µg/L	December 4, 1998
Copper (Cu)	EPA 220.2	0.002	0.001 mg/L	December 7, 1998
Iron (Fe)	EPA 236.1	0.014	0.005 mg/L	December 3, 1998
Lead (Pb)	EPA 239.2	D	0.001 mg/L	November 25, 1998
Thallium (Tl)	EPA 279.2	D	0.001 mg/L	December 3, 1998
Zinc (Zn)	EPA 289.2	0.014	0.1 µg/L	December 3, 1998
Gross Alpha 95% Confidence Interval, +/-	SM 7110 B	46.4 22.1	pCi/L	December 3, 1998 December 3, 1998
Radium 226 95% Confidence Interval, +/-	SM 7500-Ra C	8.2 0.3	pCi/L	December 3, 1998 December 3, 1998
Radium 228 95% Confidence Interval, +/-	Brooks & Blanchard	2.0 0.7	pCi/L	December 3, 1998 December 3, 1998
Chloride (Cl)	EPA 325.3	865	0.5 mg/L	November 24, 1998
Fluoride (F)	EPA 340.2	3.3	0.1 mg/L	November 30, 1998

* A letter D indicates that none of that parameter was found at the standard detection limit. Values followed by D indicate that a different detection limit was determined for this sample.

Table 4. Summary statistics of benthic fauna for each replicate and total of replicates, for November 19, 1998.

<u>Station</u>	<u>Replicate</u>	<u>No. of Taxa</u>	<u>No. of Individuals</u>	<u>Individuals per m²</u>	<u>Shannon logE</u>	<u>Shannon log10</u>	<u>Shannon log2</u>	<u>Pielou</u>	<u>Margalef</u>	<u>Simpson</u>	<u>Gini</u>
5N	1	5	17	733	1.12	.49	1.61	.69	1.41	.42	.58
5N	2	14	19	819	2.51	1.09	3.62	.95	4.42	.05	.95
5N	3	17	45	1940	2.40	1.04	3.46	.85	4.20	.12	.88
5N	Total	28	81	1164	2.58	1.12	3.72	.77	6.14	.15	.85
5N*	1	10	20	862	2.08	.90	3.00	.90	3.00	.11	.89
5N*	2	4	8	345	1.26	.55	1.81	.91	1.44	.21	.79
5N*	3	5	8	345	1.56	.68	2.25	.97	1.92	.11	.89
5N*	Total	15	36	517	2.23	.97	3.21	.82	3.91	.14	.86
5S	1	14	49	2112	1.81	.79	2.61	.69	3.34	.24	.76
5S	2	15	96	4138	1.66	.72	2.39	.61	3.07	.35	.65
5S	3	10	30	1293	1.89	.82	2.72	.82	2.65	.20	.80
5S	Total	27	175	2514	2.02	.88	2.91	.61	5.03	.27	.73
5S*	1	11	18	776	2.25	.98	3.24	.94	3.46	.07	.93
5S*	2	5	8	345	1.49	.65	2.16	.93	1.92	.14	.86
5S*	3	8	21	905	1.98	.86	2.86	.95	2.30	.10	.90
5S*	Total	14	47	675	2.41	1.05	3.47	.91	3.38	.09	.91
10S	1	15	40	1724	1.78	.77	2.57	.66	3.80	.33	.67
10S	2	10	34	1466	1.60	.69	2.31	.69	2.55	.30	.70
10S	3	9	15	647	2.03	.88	2.92	.92	2.95	.10	.90
10S	Total	23	89	1279	2.07	.90	2.99	.66	4.90	.27	.73
10S*	1	12	24	1034	2.30	1.00	3.32	.93	3.46	.08	.92
10S*	2	10	14	603	2.21	.96	3.18	.96	3.41	.05	.95
10S*	3	12	27	1164	2.24	.97	3.23	.90	3.34	.10	.90
10S*	Total	22	65	934	2.74	1.19	3.95	.89	5.03	.07	.93

Table 5. Phylogenetic species list for each sampling location, November 1998. (* indicates sample taken at same location as August 1998 samples).

<u>Taxa</u>	<u>10S*</u>	<u>10S</u>	<u>5N*</u>	<u>5N</u>	<u>5S*</u>	<u>5S</u>
PHYLUM CNIDARIA						
CLASS ANTHOZOA						
ORDER ACTINIARIA						
Actinaria	4	0	0	1	0	1
PHYLUM PLATYHELMINTHES						
Platyhelminthes	1	0	0	1	2	0
PHYLUM NEMERTEA						
Nemertea	2	2	0	5	4	11
PHYLUM ANNELIDA						
CLASS POLYCHAETA						
FAMILY POLYNOIDAE						
<i>Malmgreniella maccraryae</i>	0	0	0	1	0	0
FAMILY PHYLLODOCIDAE						
<i>Eteone heteropoda</i>	1	0	0	0	0	0
<i>Genetyllis castanea</i>	0	0	1	0	0	0
<i>Eumida sanguinea</i>	0	0	0	2	0	0
FAMILY SYLLIDAE						
<i>Ehlersia cornuta</i>	0	1	2	1	1	6
<i>Typosyllis</i>	0	1	0	0	0	0
<i>Exogone dispar</i>	0	0	0	0	0	1
<i>Brania wellfleetensis</i>	7	3	3	0	4	7
<i>Syllides</i>	0	0	0	1	0	0
<i>Streptosyllis pettiboneae</i>	4	1	0	1	0	2
FAMILY NEREIDAE						
<i>Neanthes succinea</i>	0	0	0	2	0	0
<i>Nereis riisei</i>	0	0	0	0	0	1
FAMILY GLYCERIDAE						
<i>Glycera americana</i>	0	0	0	0	0	1
<i>Hemipodus roseus</i>	0	1	3	0	6	1
FAMILY GONIADIDAE						
<i>Goniadides carolinae</i>	0	0	0	0	1	0
FAMILY LUMBRINERIDAE						
<i>Lumbrineris</i>	0	0	0	0	0	1
<i>Lumbrineris verrilli</i>	1	0	0	0	0	0
FAMILY ARABELLIDAE						
<i>Arabella mutans</i>	0	0	0	3	0	0

Table 5 (continued).

<u>Taxa</u>	<u>10S*</u>	<u>10S</u>	<u>5N*</u>	<u>5N</u>	<u>5S*</u>	<u>5S</u>
FAMILY ORBINIIDAE						
<i>Scoloplos rubra</i>	0	1	0	1	0	0
FAMILY PARAONIDAE						
<i>Aricidea cf. catherinae</i>	0	0	0	1	0	11
<i>Aricidea philbinae</i>	2	0	0	0	0	0
<i>Cirrophorus</i>	0	0	1	0	0	0
FAMILY SPIONIDAE						
Spionidae	0	0	1	0	0	0
<i>Polydora socialis</i>	0	0	0	0	0	2
<i>Prionospio</i>	0	0	0	0	0	1
<i>Apoprionospio pygmaea</i>	0	2	0	0	0	0
<i>Prionospio fallax</i>	0	1	0	1	2	0
<i>Spio pettiboneae</i>	1	0	1	1	0	1
FAMILY MAGELONIDAE						
<i>Magelona sp. B</i>	0	0	1	0	0	0
FAMILY CIRRATULIDAE						
<i>Caulleriella</i>	0	0	0	0	0	1
FAMILY OPHELIIDAE						
<i>Travisia hobsonae</i>	1	1	0	0	0	0
FAMILY CAPITELLIDAE						
<i>Mediomastus californiensis</i>	5	4	1	3	3	3
FAMILY AMPHARETIDAE						
<i>Isolda pulchella</i>	1	0	0	0	0	0
FAMILY TERESELLIDAE						
<i>Polycirrus</i>	0	0	0	1	0	0
FAMILY SABELLIDAE						
Sabellidae	0	1	0	3	0	0
<i>Fabriciola trilobata</i>	0	0	0	0	0	2
CLASS OLIGOCHAETA						
Oligochaeta	4	2	1	29	4	86
PHYLUM MOLLUSCA						
CLASS GASTROPODA						
ORDER CEPHALASPIDEA						
FAMILY CYLICHNIDAE						
<i>Acteocina canaliculata</i>	0	1	0	0	0	0
FAMILY HAMINOEIDAE						
<i>Haminoea succinea</i>	0	1	0	0	0	0
CLASS BIVALVIA						

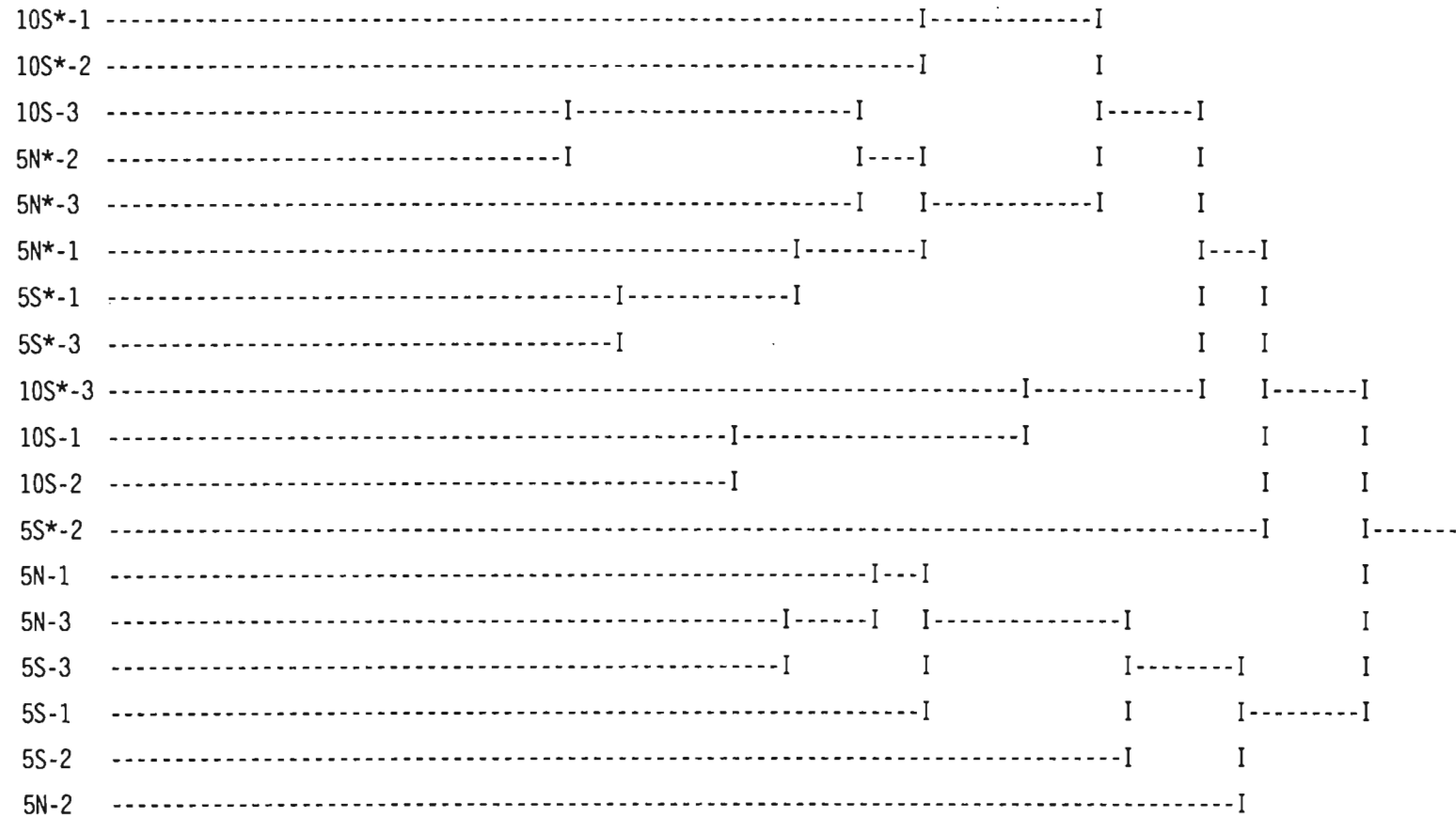
Table 5 (continued).

<u>Taxa</u>	<u>10S*</u>	<u>10S</u>	<u>5N*</u>	<u>5N</u>	<u>5S*</u>	<u>5S</u>
Bivalvia	1	0	0	1	0	0
ORDER MYTILOIDA						
FAMILY MYTILIDAE						
<i>Brachidontes exustus</i>	0	0	0	0	0	1
ORDER VENEROIDA						
FAMILY PSAMMOBIIDAE						
<i>Tagelus divisus</i>	0	0	0	0	0	1
FAMILY SEMELIDAE						
<i>Semele bellastrata</i>	0	0	0	1	0	0
<i>Semele nuculoides</i>	8	10	10	0	10	1
ORDER MYNA						
FAMILY CORBULIDAE						
<i>Corbula contracta</i>	0	0	0	0	0	2
FAMILY LYONSIIDAE						
<i>Lyonsia hyalina floridana</i>	0	0	0	0	0	1
PHYLUM ARTHROPODA						
CLASS CRUSTACEA						
ORDER ISOPODA						
FAMILY ANTHURIDAE						
<i>Amakusanthura</i>	0	0	0	4	0	0
<i>Amakusanthura cf. signata</i>	2	2	0	0	1	4
ORDER TANAIDACEA						
<i>Tanaidacea</i>	0	0	0	1	0	0
ORDER AMPHIPODA						
<i>Amphipoda</i>	0	0	0	1	0	0
FAMILY AMPELISCIDAE						
<i>Ampelisca</i>	12	3	1	1	0	0
FAMILY COROPHIIDAE						
<i>Corophium</i>	0	1	0	0	0	0
<i>Ericthonius</i>	0	0	0	3	0	0
FAMILY CAPRELLIDAE						
Caprellidae	0	0	0	1	0	0
<i>Deutella</i>	0	1	0	0	0	0
ORDER DECAPODA						
FAMILY PAGURIDAE						
Paguridae	0	1	0	0	0	1
FAMILY PINNOTHERIDAE						
<i>Pinnixa chaetoptera</i>	0	0	0	0	1	0

Table 5 (continued).

Taxa	10S*	10S	5N*	5N	5S*	5S
PHYLUM BRACHIOPODA						
ORDER LINGULIDA						
FAMILY LINGULIDAE						
<i>Glottidia</i>	0	0	1	0	0	0
PHYLUM ECHINODERMATA						
CLASS STELLEROIDEA						
(SUBCLASS OPHIUROIDEA)						
Ophiuroidea	0	0	0	1	0	0
CLASS ECHINOIDEA						
Echinoidea	1	3	0	0	3	0
ORDER CLYPEASTEROIDA						
FAMILY MELLITIDAE						
<i>Mellita tenuis</i>	1	0	0	0	0	0
PHYLUM CHORDATA						
SUBPHYLUM CEPHALOCHORDATA						
FAMILY BRANCHIOSTOMIDAE						
<i>Branchiostoma floridae</i>	6	45	9	9	5	24
SUBPHYLUM VERTEBRATA						
CLASS OSTEICHTHYES						
ORDER PERCIFORMES						
FAMILY SCIAENIDAE						
<i>Cynoscion nebulosus</i>	0	0	0	0	0	1

Figure 2. Cluster analysis based Bray-Curtis Index and group-averaged sorting, November 1998 monitoring.



High Similarity

Low Similarity

Figure 3. Bray-Curtis faunal dis-similarity index values, November 1998 monitoring.

	<u>10S*-1</u>	<u>10S*-2</u>	<u>10S*-3</u>	<u>10S-1</u>	<u>10S-2</u>	<u>10S-3</u>	<u>5N*-1</u>	<u>5N*-2</u>	<u>5N*-3</u>	<u>5N-1</u>	<u>5N-2</u>	<u>5N-3</u>	<u>5S*-1</u>	<u>5S*-2</u>	<u>5S*-3</u>	<u>5S-1</u>	<u>5S-2</u>	<u>5S-3</u>	
10S*-1	---	---	...	...	---	...	...	...	...	...	...	...	...	---	...	...	...	...
10S*-2	.526	---	...	...	---	+++	---	---	...	...	...	...	---	...	+++	...	...	...
10S*-3	.529	.659	---	---	---	---	---	---	...	...	...	...	---	...	...	...	...	...
10S-1	.781	.815	.612	---	+++	...	...	...	...	...	...	...	---	...	...	---	...	...
10S-2	.828	.708	.574	.405	---	---	---	---	...	...	...	...	---	...	---	---	...	...
10S-3	.641	.448	.619	.709	.633	---	+++	+++	+++	...	...	...	---	...	+++	...	...	...
5N*-1	.773	.588	.660	.800	.593	.429	---	---	---	...	...	...	+++	...	+++	...	...	...
5N*-2	.750	.545	.657	.750	.667	.304	.571	---	---	...	...	...	---	---	+++	...	...	...
5N*-3	.813	.727	.771	.833	.810	.478	.643	.500	---	...	...	...	---	...	---	...	...	...
5N-1	.805	.935	.864	.860	.922	.813	.892	.760	.840	---	---	---	---	---	---	...	+++
5N-2	.721	.879	.783	.797	.887	.765	.846	.704	.852	.556	---	---	...	...	---	...	...	...
5N-3	.826	.864	.750	.741	.823	.733	.846	.811	.887	.548	.750	---	---	...	---	---	---	...	+++
5S*-1	.762	.563	.689	.690	.692	.515	.474	.538	.538	.886	.784	.810	---	---	+++	...	...	...
5S*-2	.750	.727	.771	.833	.762	.739	.857	.625	.750	1.000	.778	.962	.692	---	---	...	...	...
5S*-3	.556	.486	.708	.705	.673	.444	.415	.448	.655	.684	.600	.697	.333	.724	---	---	---	...	
5S-1	.836	.905	.763	.506	.566	.813	.826	.860	.895	.576	.794	.511	.791	1.000	.686	---	---	...	+++
5S-2	.800	.891	.805	.794	.892	.820	.862	.885	.885	.752	.826	.645	.842	.962	.761	.572	---	---	---
5S-3	.778	.818	.789	.743	.875	.733	.840	.737	.842	.447	.714	.440	.750	.947	.569	.494	.667	---	---

... Very Low Similarity
 --- Low Similarity
 +++ Moderate Similarity

APPENDIX

APPENDIX TABLE 1

**EXHIBIT 1.
THORNTON LABORATORIES TEST RESULTS**

Appendix Table 1. Phylogenic List. (* indicates False)

<u>Station</u>	<u>Taxa</u>	<u>Nodc</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>Total</u>
10S	<i>Branchiostoma floridae</i>	8500010102	23	18	4	45
10S	<i>Semele nuculoides</i>	5515350601	1	6	3	10
10S	<i>Mediomastus californiensis</i>	5001600402	2	1	1	4
10S	<i>Brania wellfleetensis</i>	5001230903	1	0	2	3
10S	<i>Ampelisca</i>	61690201	0	2	1	3
10S	Echinoidea	8136	1	2	0	3
10S	Nemertea	43	2	0	0	2
10S	<i>Apoprionospio pygmaea</i>	5001430507	1	1	0	2
10S	Oligochaeta	5003	1	0	1	2
10S	<i>Amakusanthura cf. signata</i>	6160012002CF	2	0	0	2
10S	<i>Ehlersia cornuta</i>	5001230306	0	0	1	1
10S	<i>Typosyllis</i>	50012305	0	1	0	1
10S	<i>Streptosyllis pettiboneae</i>	5001231605	1	0	0	1
10S	<i>Hemipodus roseus</i>	5001270201	0	1	0	1
10S	<i>Scoloplos rubra</i>	5001400307	1	0	0	1
10S	<i>Prionospio fallax</i>	5001430512	1	0	0	1
10S	<i>Travisia hobsonae</i>	5001580406	0	1	0	1
10S	Sabellidae	500170	1	0	0	1
10S	<i>Acteocina canaliculata</i>	5110040103	0	0	1	1
10S	<i>Haminoea succinea</i>	5110120104	0	0	1	1
10S	<i>Corophium</i>	61691502	1	0	0	1
10S	<i>Deutella</i>	61710102	1	0	0	1
10S	Paguridae	618306	0	1	0	1
10S*	<i>Ampelisca</i>	61690201	4	3	5	12
10S*	<i>Semele nuculoides</i>	5515350601	2	4	2	8
10S*	<i>Brania wellfleetensis</i>	5001230903	5	2	0	7
10S*	<i>Branchiostoma floridae</i>	8500010102	0	0	6	6
10S*	<i>Mediomastus californiensis</i>	5001600402	2	1	2	5
10S*	Actiniaria	3758	0	0	4	4
10S*	<i>Streptosyllis pettiboneae</i>	5001231605	2	0	2	4
10S*	Oligochaeta	5003	3	1	0	4
10S*	Nemertea	43	0	1	1	2
10S*	<i>Aricidea philbinae</i>	5001410221	1	0	1	2
10S*	<i>Amakusanthura cf. signata</i>	6160012002CF	1	0	1	2
10S*	<i>Platyhelminthes</i>	39	1	0	0	1
10S*	<i>Eteone heteropoda</i>	5001130207	0	1	0	1
10S*	<i>Lumbrineris verrilli</i>	5001310124	1	0	0	1
10S*	<i>Spio pettiboneae</i>	5001430706	0	0	1	1
10S*	<i>Travisia hobsonae</i>	5001580406	0	0	1	1
10S*	<i>Isolda pulchella</i>	5001672101	0	1	0	1
10S*	Bivalvia	55	1	0	0	1
10S*	Echinoidea	8136	0	0	1	1

Appendix Table 1 (continued).

<u>Station</u>	<u>Taxa</u>	<u>Node</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>Total</u>
10S*	<i>Mellita tenuis</i>	8155040101	1	0	0	1
5N	Oligochaeta	5003	11	4	14	29
5N	<i>Branchiostoma floridae</i>	8500010102	2	2	5	9
5N	Nemertea	43	0	0	5	5
5N	<i>Amakusanthura</i>	61600120	2	2	0	4
5N	<i>Arabella mutans</i>	5001330202	0	1	2	3
5N	<i>Mediomastus californiensis</i>	5001600402	0	1	2	3
5N	Sabellidae	500170	0	0	3	3
5N	<i>Erichthonius</i>	61691503	1	0	2	3
5N	<i>Eumida sanguinea</i>	5001131101	0	0	2	2
5N	<i>Neanthes succinea</i>	5001240309	0	0	2	2
5N	Actiniaria	3758	0	1	0	1
5N	Platyhelminthes	39	0	1	0	1
5N	<i>Malmgreniella maccraryae</i>	5001022602	0	1	0	1
5N	<i>Ehlersia cornuta</i>	5001230306	0	0	1	1
5N	<i>Syllides</i>	50012315	0	0	1	1
5N	<i>Streptosyllis pettiboneae</i>	5001231605	1	0	0	1
5N	<i>Scoloplos rubra</i>	5001400307	0	1	0	1
5N	<i>Aricidea cf. catherinae</i>	5001410206CF	0	1	0	1
5N	<i>Prionospio fallax</i>	5001430512	0	1	0	1
5N	<i>Spio pettiboneae</i>	5001430706	0	1	0	1
5N	<i>Polycirrus</i>	50016808	0	0	1	1
5N	Bivalvia	55	0	1	0	1
5N	<i>Semele bellastrata</i>	5515350102	0	0	1	1
5N	Amphipoda	6168	0	0	1	1
5N	Tanaidacea	6169	0	0	1	1
5N	<i>Ampelisca</i>	61690201	0	0	1	1
5N	Caprellidae	617101	0	0	1	1
5N	Ophiuroidea	8120	0	1	0	1
5N*	<i>Semele nuculoides</i>	5515350601	5	3	2	10
5N*	<i>Branchiostoma floridae</i>	8500010102	4	3	2	9
5N*	<i>Brania wellfleetensis</i>	5001230903	2	0	1	3
5N*	<i>Hemipodus roseus</i>	5001270201	3	0	0	3
5N*	<i>Ehlersia cornuta</i>	5001230306	0	0	2	2
5N*	<i>Genetyllis castanea</i>	5001130701	1	0	0	1
5N*	<i>Cirrophorus</i>	50014106	1	0	0	1
5N*	Spionidae	500143	1	0	0	1
5N*	<i>Spio pettiboneae</i>	5001430706	1	0	0	1
5N*	<i>Magelona sp. B</i>	5001440198	1	0	0	1
5N*	<i>Mediomastus californiensis</i>	5001600402	0	1	0	1
5N*	Oligochaeta	5003	0	1	0	1
5N*	<i>Ampelisca</i>	61690201	1	0	0	1

Appendix Table 1 (continued).

<u>Station</u>	<u>Taxa</u>	<u>Node</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>Total</u>
5N*	<i>Glottidia</i>	80100101	0	0	1	1
5S	Oligochaeta	5003	18	55	13	86
5S	<i>Branchiostoma floridae</i>	8500010102	16	5	3	24
5S	Nemertea	43	4	4	3	11
5S	<i>Aricidea cf. catherinae</i>	5001410206CF	1	10	0	11
5S	<i>Brania wellfleetensis</i>	5001230903	1	5	1	7
5S	<i>Ehlersia cornuta</i>	5001230306	0	6	0	6
5S	<i>Amakusanthura cf. signata</i>	6160012002CF	1	3	0	4
5S	<i>Mediomastus californiensis</i>	5001600402	0	1	2	3
5S	<i>Streptosyllis pettiboneae</i>	5001231605	1	1	0	2
5S	<i>Polydora socialis</i>	5001430402	0	0	2	2
5S	<i>Fabriciola trilobata</i>	5001701907	0	0	2	2
5S	<i>Corbula contracta</i>	5517020201	0	0	2	2
5S	Actiniaria	3758	0	1	0	1
5S	<i>Exogone dispar</i>	5001230701	0	1	0	1
5S	<i>Nereis riisei</i>	5001240418	1	0	0	1
5S	<i>Glycera americana</i>	5001270104	0	1	0	1
5S	<i>Hemipodus roseus</i>	5001270201	1	0	0	1
5S	<i>Lumbrineris</i>	50013101	1	0	0	1
5S	<i>Prionospio</i>	50014305	0	0	1	1
5S	<i>Spio pettiboneae</i>	5001430706	0	1	0	1
5S	<i>Caulleriella</i>	50015002	0	1	0	1
5S	<i>Brachidontes exustus</i>	5507010902	1	0	0	1
5S	<i>Tagelus divisus</i>	5515330202	0	0	1	1
5S	<i>Semele nuculoides</i>	5515350601	0	1	0	1
5S	<i>Lyonsia hyalina floridana</i>	552005020601	1	0	0	1
5S	Paguridae	618306	1	0	0	1
5S	<i>Cynoscion nebulosus</i>	8835440102	1	0	0	1
5S*	<i>Semele nuculoides</i>	5515350601	4	2	4	10
5S*	<i>Hemipodus roseus</i>	5001270201	3	0	3	6
5S*	<i>Branchiostoma floridae</i>	8500010102	2	0	3	5
5S*	Nemertea	43	2	0	2	4
5S*	<i>Brania wellfleetensis</i>	5001230903	1	0	3	4
5S*	Oligochaeta	5003	0	0	4	4
5S*	<i>Mediomastus californiensis</i>	5001600402	1	1	1	3
5S*	Echinoidea	8136	0	3	0	3
5S*	Platyhelminthes	39	0	1	1	2
5S*	<i>Prionospio fallax</i>	5001430512	1	1	0	2
5S*	<i>Ehlersia cornuta</i>	5001230306	1	0	0	1
5S*	<i>Goniadides carolinae</i>	5001280501	1	0	0	1
5S*	<i>Amakusanthura cf. signata</i>	6160012002CF	1	0	0	1
5S*	<i>Pinnixa chaetoptera</i>	6189060405	1	0	0	1



THORNTON LABORATORIES, INC.
MARINE, ANALYTICAL AND ENVIRONMENTAL SERVICES

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7-Dec-1998

Page 1

Report For: City of Venice
200 N. Marfield Ave.
Venice Fl 34292

Sample Identification:

Surface Water - Outfall 001 Attn: Bill Green
Lab Composite of 4 Samples Permit #FL0035335
1) Sampled by Tim Cheeming on 11/18/98 @1300 hrs. 2) Sampled by Eric Barr on
11/18/98 @1900 hrs. 3) Sampled by Jaime Sefton on 11/19/98 @0100 hrs.
4) Sampled by Tim Cheeming on 11/19/98 @0700 hrs.

Date Received: 20-Nov-1998

Laboratory Number: 0928782

CERTIFICATE OF ANALYSIS

* A letter D indicates that none of that parameter was found at the standard detection limit. Values followed by D indicate that a different detection limit was determined for this sample.

Method	Parameter	Result*	Standard Detection Limit- Units	Analysis Date	Analyst
EPA 213.2	Cadmium (Cd)	D	0.1 ug/L	4-Dec-1998	Allen Moody
EPA 220.2	Copper (Cu)	0.002	0.001 mg/L	7-Dec-1998	Wayne Rosbach
EPA 236.1	Iron (Fe)	0.014	0.005 mg/L	3-Dec-1998	Sandy Lundgren
EPA 239.2	Lead (Pb)	D	0.001 mg/L	25-Nov-1998	Allen Moody
EPA 279.2	Thallium (Tl)	D	0.001 mg/L	3-Dec-1998	Allen Moody
EPA 289.2	Zinc (Zn)	0.014	0.1 ug/L	3-Dec-1998	Sandy Lundgren
SM 7110 B.	Gross Alpha	46.4	pCi/L	3-Dec-1998	Charmatee Rodrigues
	95% Confidence Interval, +/-	22.1		3-Dec-1998	Charmatee Rodrigues
SM 7500-Ra C.	Radium 226	8.2	pCi/L	3-Dec-1998	Charmatee Rodrigues
	95% Confidence Interval, +/-	0.3		3-Dec-1998	Charmatee Rodrigues
Brooks & Blanchard	Radium 228	2.0	pCi/L	3-Dec-1998	Charmatee Rodrigues
	95% Confidence Interval, +/-	0.7		3-Dec-1998	Charmatee Rodrigues
EPA 325.3	Chloride (Cl)	865	0.5 mg/L	24-Nov-1998	Ellen Smith Demers
EPA 340.2	Fluoride (F)	3.3	0.1 mg/L	30-Nov-1998	Frances Meadows

THORNTON LABORATORIES, INC.
Randy Cigarran