FT PIERCE, FLORIDA

OCEAN DREDGE MATERIAL DISPOSAL SITE

BENTHIC SURVEYS: 1992 AND 1999

US-EPA

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1.0 BACKGROUND INFORMATION

The Ft Pierce ODMDS is an active disposal site that has been in use since 1949. The original site was used from 1949 until 1991 with approximately 21,200 cubic yards of material deposited on the site annually. In 1991 a video mapping survey conducted on board the OSV Peter W. Anderson by EPA R4 discovered hard or live bottom on the northern end of the site. As a result of this discovery, the site was shifted 0.5 nautical miles south from the original site. In March 1992 a base line benthic survey was conducted to encompass both the old and new sites in order to determine the benthic infaunal community in the sites prior to any future dredge material disposal. Since the 1992 study, over 800,000 cubic yards, (725,000 cubic yards in 1995) of dredged material have been disposed of on the new site. The material disposed of in 1995 was primarily clay, silt, sand, and rubble. The material disposed of prior to 1995 was primarily silty sand and sand. A sediment mapping survey was conducted in February 1998 to determine the movement of sediments disposed of on the site. A follow-up benthic survey with stations selected based upon previous surveys, as well as sediment mapping results was conducted in July 1999.

2.0 OBJECTIVES

Objectives of the survey were to characterize selected representative areas of the sea floor from a sedimentological, chemical, and biological perspective. The objective of the macroinvertebrate sampling was to determine whether or not dredged material that has been placed at the site during the past had caused a recognizable shift in the numbers and kinds of benthic macroinvertebrates and whether any such changes may be deemed as adverse. Further, sampling and chemical analyses of the water and sediments associated with the site was used to characterize conditions at the site as they presently exist and assist in interpretation of benthic community data. Information gleaned from these efforts will be used to guide management decisions relative to future disposal at the site.

3.0 SURVEY/SAMPLING METHODOLOGIES

Station Location

The Ft. Pierce ODMDS is located approximately 2.5 nautical miles (nm) east southeast of the seaward terminus of the Ft. Pierce, Florida entrance channel (Figures 1& 2). The boundaries of the Ft. Pierce ODMDS measure approximately 1.0 x 1.0 Nautical Miles. Eleven stations were established for the 1992 survey (Figure 1, Table 2). These stations were located based upon sediment mapping conducted immediately prior to the biological survey by the Center for Applied Isotope Studies (CAIS) at the University of Georgia. Stations were selected based upon areas with the highest levels of total gamma activity. Sediment mapping was conducted again in February, 1998. The results from this survey were utilized to select stations for the July 1999 benthic survey (Figure 2, Table 3). Results from the 1998 sediment mapping survey indicated dredged material proximate to the locations of the 1992 benthic sampling stations, therefore ten of the twelve stations chosen for the 1992 survey were resampled in the 1999 survey. Two stations (1 and 12) were chosen in order to sample the upper half of the old interim site.

FIGURE 1 - FT. PIERCE SAMPLING STATIONS - MARCH 1992

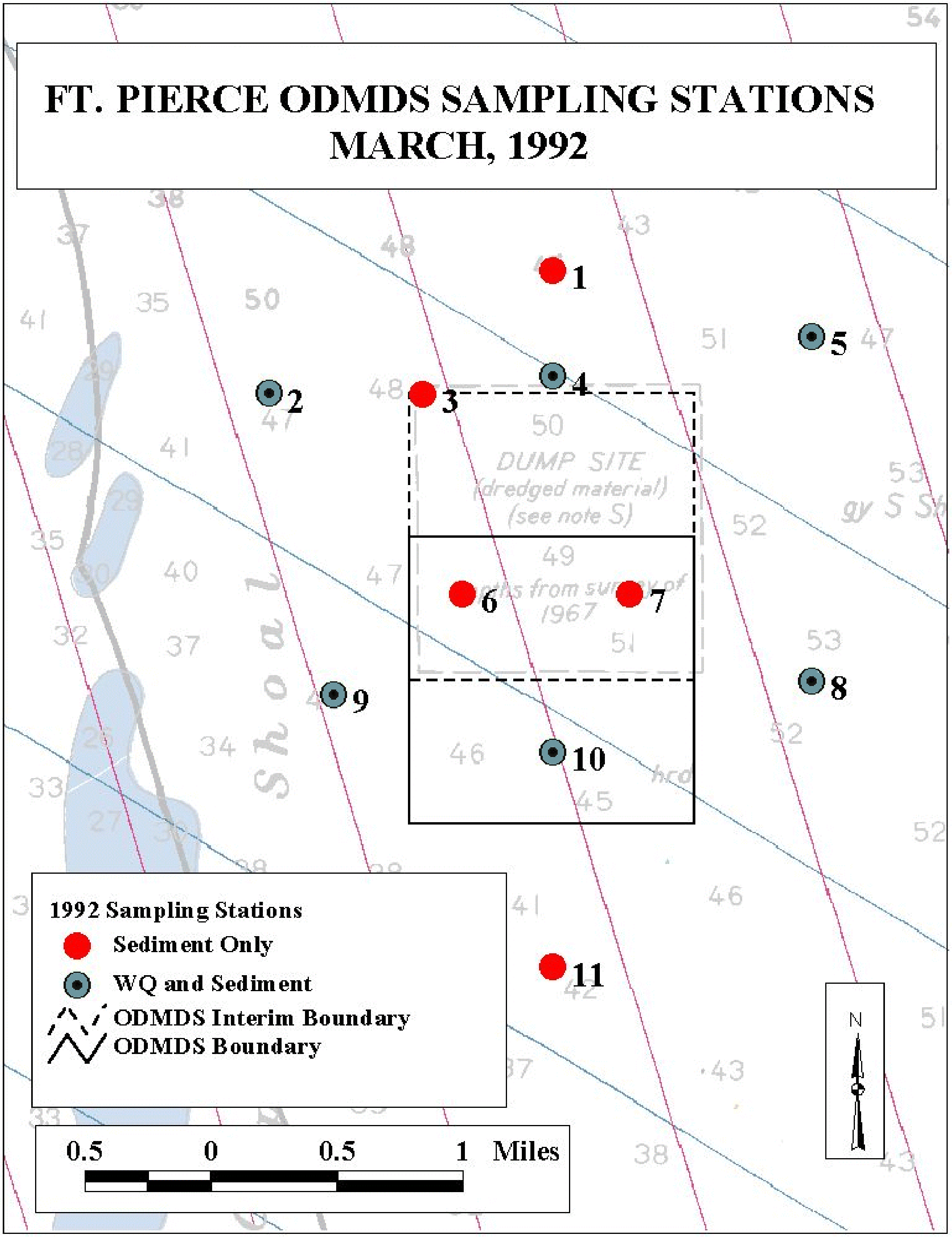
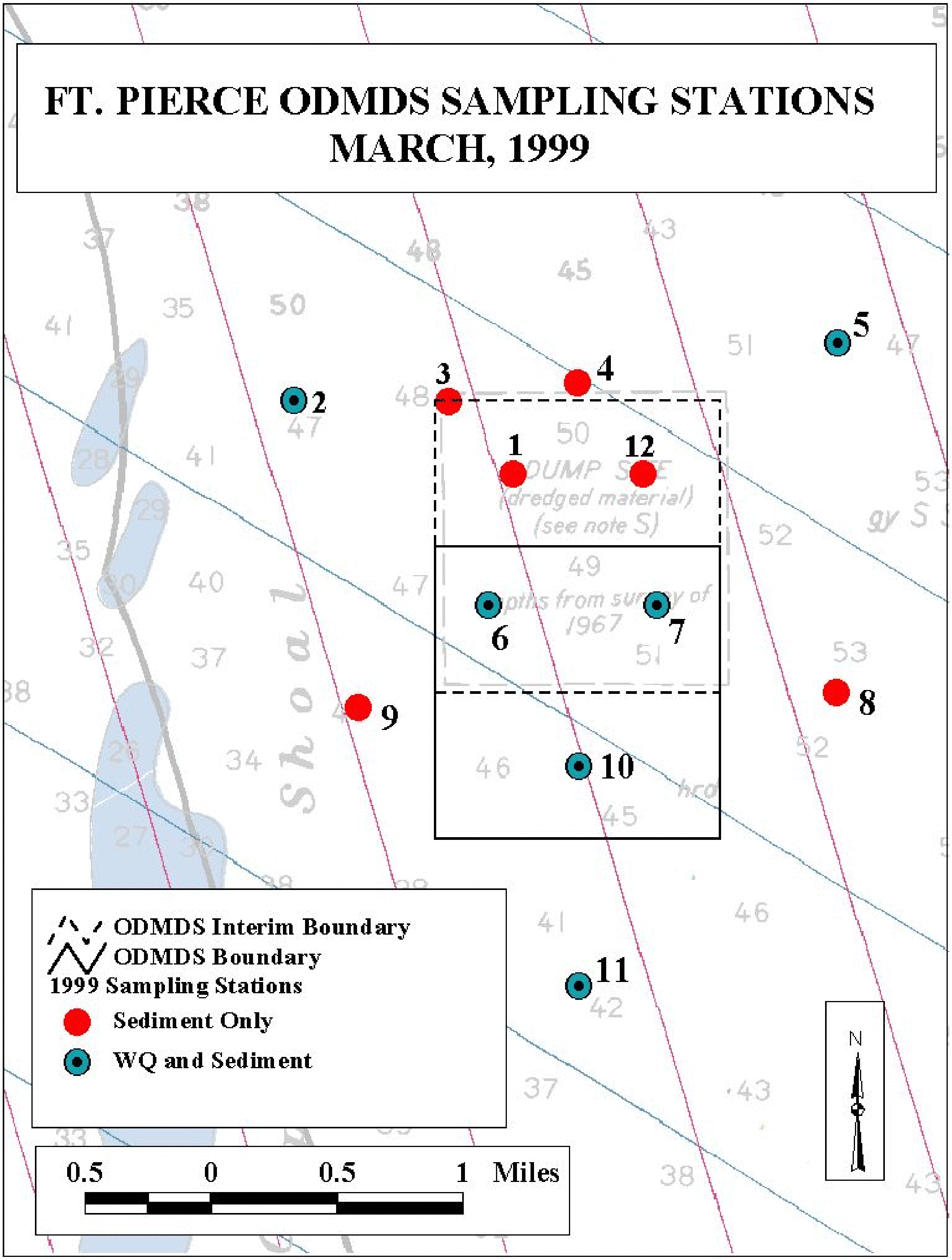


FIGURE 2 - FT. PIERCE SAMPLING STATIONS - JULY 1999



Since no stations fell within the upper half of the old interim site, station 1 was moved to the northwest quadrant of the old interim site and a twelfth station was added to cover the northeast quadrant of the old interim site. Station locations in 1992 were determined by Loran C aboard the dive boat. Station locations in 1999 were determined by Differential Global Positioning System (DGPS) aboard the dive boat.

3.1 Sediment Mapping

Mapping the distribution of dredged material via gamma isotope signatures prior to conducting sediment and benthic infaunal sampling has proven an effective tool for determining sampling locations at ocean disposal sites within Region IV. By defining the approximate distribution of dredged material prior to benthic sampling, sampling locations can be placed within, and external to, the influence of dredged material thereby specifically targeting areas where impacts, if any, should be manifested. This approach best allows for specific assessment of areas known to be affected by dredged material while permitting a reduction in the total number of stations, thus resulting in more definitive data and a savings in cost, time, and manpower.

The Center for Applied Isotope Studies (CAIS) of the University of Georgia conducted sediment mapping of the area surrounding and including the disposal area in March 1992 (CAIS. November, 1992) and February 1998 (CAIS. May, 1998). Two additional sediment mapping surveys were conducted in June 1994 and January 1997 in order to document sediment characteristics for post disposal operation. The objective of the mapping was to determine relative isotopic and elemental concentrations of the sediments in and surrounding the site in order to determine the approximate location of dredged material at the site. Sediment mapping utilizes a combination of Gamma Isotope Mapping System (GIMS) and a Continuous Sediment Sampling System (CS^3). GIMS records seafloor gamma radiation data for selected isotopes, generally ^{214}Bi (Bismuth), ^{208}T1 (Thallium), ^{40}K (Potassium) and total gamma activity. These isotopes are utilized as markers. For example ^{214}Bi is associated with uranium content of phosphatic deposits, ^{208}T1 is associated with heavy minerals, and ^{40}K is often found in clay sediments. The CS^3 consist of a system to pump a continuous slurry of bottom sediments up to the ship where a sample is collected approximately every 305 m. The sample is dewatered by vacuum and the sediment is deposited on a glass fiber filter wafer. The sample is later analyzed for elemental concentrations with the use of X-ray fluorescence (XRF)

The sediment mapping data was utilized to help facilitate station location for both the 1992 and 1999 surveys. Results from the 1998 sediment mapping survey indicated dredged material proximate to the locations of the 1992 benthic sampling stations, therefore ten of the twelve stations chosen for the 1992 survey were resampled in the 1999 survey. Two stations (1 and 12) were chosen in order to sample the upper half of the old interim site.

3.2 Water Quality (WQ)

Tidal ranges at the Ft. Pierce Inlet are 2-3 feet. Offshore, at the disposal area, the impact of tide is minimal, therefore water quality sampling was not coordinated with tidal fluctuations. However, following is a summary of times that WQ samples were collected and associated tidal stages at the Ft. Pierce Inlet.

The WQ portion of the 1999 survey was conducted mid-day between the morning and afternoon dives in order to have the best available light for the light profiles. Stations 2, 5 and 6 were collected on July 13th between the hours of 1300-1400. Stations 7, 10 and 11 were collected on July 14th between the hours of 1200 and 1300. Water samples were collected on an ebbing tide each day. The WQ portion of the 1992 survey was conducted on March 14th between the hours of 0930 and 1330. Water samples in 1992 were collected on a rising tide.

To characterize the general water quality associated with the dump site, the following water column parameters were sampled: dissolved oxygen (DO), salinity, temperature, pH, nitrogen series which include, nitrate-nitrite nitrogen (NO_2+NO_3), ammonia (NH_3), and total kjeldahl nitrogen (TKN), total phosphorus (TP), light extinction, and Chlorophyll a.

Measurements of DO, salinity, temperature, and pH were accomplished utilizing the OSV Peter W. Anderson's CTD/rosette as well as a multiparameter probe. Readings of these parameters were continuous from the surface to one foot above bottom. At the surface, mid-depth, and bottom, bottles attached to the CTD/rosette frame were triggered to obtain grab samples for nutrient analysis. Physicochemical parameters were measured from the RHIB with a multiparameter probe.

Using a calibrated marine photometer, percent visible light transmission was measured along a vertical profile from surface to bottom. Readings were recorded at 5-foot depth increments and used to calculate percent light transmission and light extinction coefficients for each depth increment. At depths where visible light transmission measured 90, 50, and 10 percent of incident light, grab samples of water were obtained with a VanDorn sampler for chlorophyll a analysis of each individual sample.

3.3 Benthic Sampling

Benthic sampling at the selected stations was accomplished by divers using hand operated coring devices. Samples were collected for sediment particle size analyses, sediment chemistry, and benthic macroinvertebrates. The sampling device and handling/preservative protocol for each type of sample follows below:

3.3A - Sediment Particle Size

Samples for particle size were collected with acrylic two inch coring tubes penetrating 15 cm (or to the point of refusal if less than 15 cm) into the substrate. The coring device was maintained in the vertical position, capped at both ends, and returned to the ship. After settling, the structure of the sediment was observed and recorded then the clear water was decanted and the sediment core placed in a whirl pack, labeled, and frozen for return to the lab. Two replicate samples were obtained at each station. Particle size analyses for the 1992 study was determined by the wet sieve method (EPA 1998). Particle size analysis for the 1999 study for particles smaller than 2 millimeters (mm) was determined by a method called laser particle size analysis. For particle size greater than 2 mm, the wet sieve method was utilized. All particle sizes greater than 2 mm were combined into a 'greater than 2 mm' designation. Organic content for each study was determined by high temperature ignition according to SESD SOP (EPA 1998).

The laser particle size analyzer determines particle size on fractions 2 mm in size and smaller. Only a very small aliquot of a well homogenized sample is utilized and results are given as a percentage of total volume. For particle sizes greater than 2 mm, the traditional wet sieve method is utilized and results are given as a percent of weight. To reconcile the two different outputs of the less that 2 mm and the greater than 2 mm, the entire sample is wet sieved into greater than 2 mm and less than 2 mm fractions, then dried and weighed to determine the percentage of sample by weight that is greater than 2 mm versus the percentage of sample by weight that is less than 2 mm. The breakdown of the percentages of each fraction of the sample of the less than 2 mm particle size, as determined by the laser analyzer, are then applied to the weight of the less than 2 mm fraction, as determined by wet sieve, in order to determine by weight, the percent of each fraction that is less than 2 mm .

3.3B - Sediment Chemistry

Analyses for the following parameters were conducted at the SESD laboratory in Athens, Georgia: metals scan, nutrients which includes TP, NO_2+NO_3, NH_3, and TKN, extractable organic compounds, volatile organic compounds (VOC's) and pesticide/PCB analysis. Each analyte concentration was determined by low level analysis. At each station, samples for metals, nutrients, extractable organic analysis and pesticide/PCB analysis were collected in three, 2 inch Teflon coring tubes. Volatile organic samples were collected in a 2 oz VOC container with a septum seal filled with organic free water from the Athens Laboratory. Sample handling of cores was similar to that specified above for particle size. After decanting, the three core samples for metals, nutrients and extractable organic compounds were transferred to a glass pan or Teflon lined pan and thoroughly mixed. The sample was then alloquated into two 8 oz. glass containers and preserved by storing at 4EC until analyzed. One container was analyzed for extractable organic compounds as well as pesticides/PCBs and the other was analyzed for metals and nutrients. VOC collection was conducted utilizing the SW846 Method 5035 to limit the loss of volatile organics and reduce the possibility of contamination from site conditions, (i.e. diesel fumes from ship operations). In the shipboard laboratory, approximately 5 grams of sediment from the 2 oz container were transferred to a pre-weighed 40 ml vial containing 10 mls of milli-Q water that was added at the Athens Laboratory. Two replicates were taken from the 2 oz container. These samples were then tagged and placed in the freezer on their sides in a protective container. The standard method of VOC preservation utilizes sodium bisulfate as a preservative. Sodium bisulfate effervesces when it comes in contact with the calcium carbonate found in all marine sediments in the Southeast. The effervescent action then causes a loss of volatile organics. Therefore, samples were frozen to preserve them. Sediment dry weight was determined after lab analysis by drying in the Ecological Assessment Branch's sediment lab in Athens.

3.3C - Benthic Macroinvertebrate Infauna

Sediment cores were collected by divers to obtain benthic macroinvertebrate organisms. Fifteen replicates per station were collected, in order to assess the macroinvertebrate population at the site. Thirty replicates were collected at two of the stations in order to determine where on the species saturation curve the normal fifteen replicates per station would fall. The first Fifteen replicates of the thirty replicate stations represented 66 % and 72 % of the total number of species in the thirty replicate samples. In discussions with Vittor and Associates, this was deemed to be more than adequate to represent the majority of species at the site. Each replicate was collected with a stainless steel corer measuring 10 cm in diameter and screened at the top with 0.5mm wire mesh. Core penetration was limited to 15 cm or the point of refusal if less than 15 cm. Each core was capped in place, secured into cloth bags, and returned to the ship. On board processing involved washing the bagged core sample contents through a #35 screened (0.5 mm) sieve buckets. The sample retained on the screen after washing was placed in a sample bag, properly labeled, and placed in a five gallon bucket containing a 10% seawater formalin with Rose Bengal staining solution. Sample bags and buckets were labeled both internally and externally and stored for transfer to contract lab facilities for taxonomic identification.

Characterization of the benthic community and sediment size/chemistry at selected stations, followed by analysis of community parameters via statistical treatment, allows for identification and interpretation of changes in the community structure. Qualified benthic ecologists can utilize such community statistics to draw inferences regarding perturbations to the benthic macroinvertebrate community. Such analyses, in conjunction with sediment signature maps identifying dredged material from ambient sea floor sediments, allows for judgements regarding the potential or actual impact of dredged material disposal and migration.

3.3D - QA/QC Procedures

All sampling procedures, sample handling, sample preservation for analyses and calibration of water quality monitoring instrumentation was performed according to the Science and Ecosystem Support Division (SESD) , Ecological Assessment Branch (EAB) Standard Operating Procedures (SOP), (US EPA 1996, 1998).

4.0 RESULTS

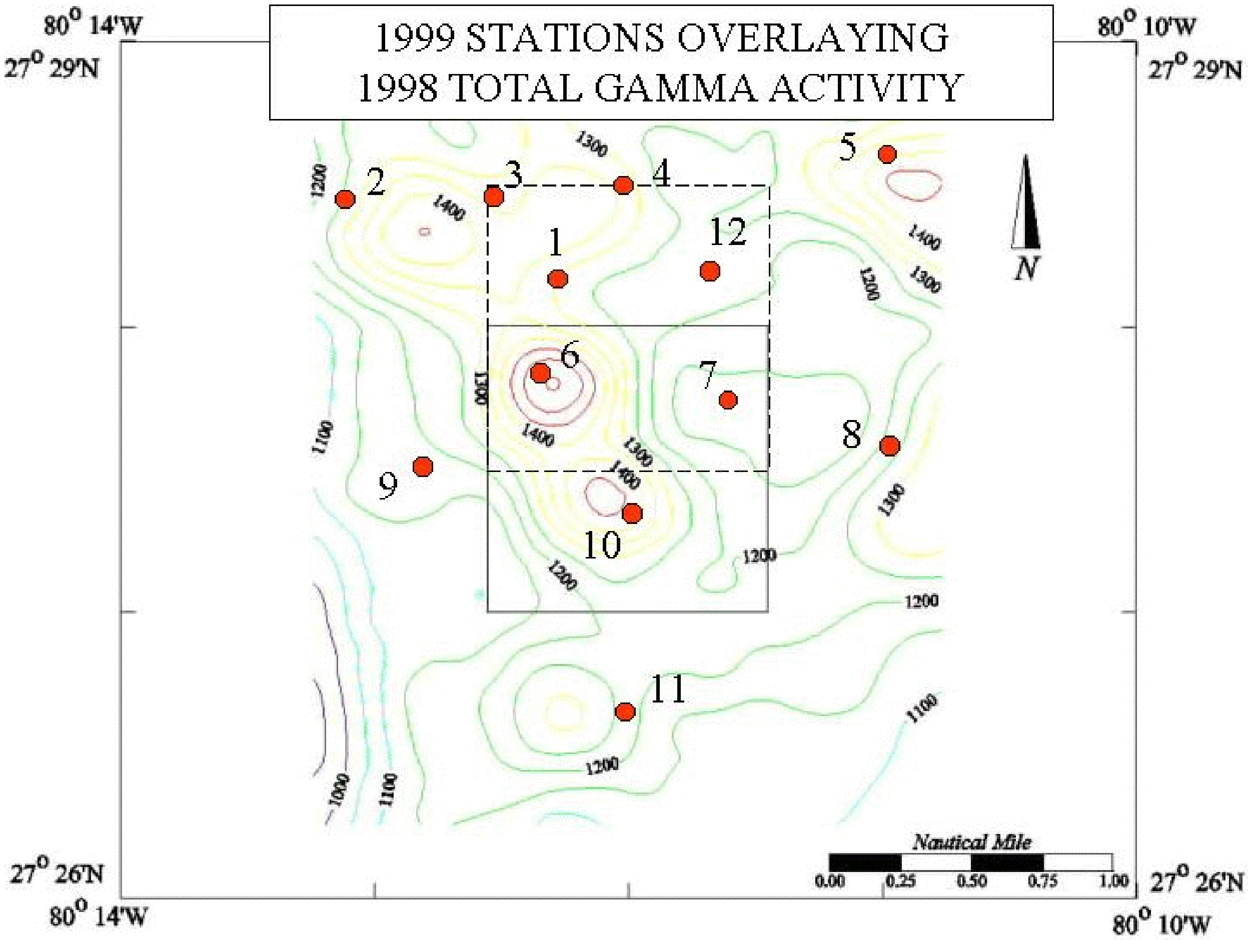
4.1 Sediment Mapping

Sediment mapping with the gamma isotope sled at an area like the Ft. Pierce ODMDS is a useful tool to assist in station selection as well as generalizing where dredged material may be found but it may be difficult to determine precise boundaries of deposited dredged material. The problem is that dredged material may be either fine or coarse grained or a mixture, depending upon the source of the material. The gamma sled seems to provide greater detail when the dredged material is more uniform in nature, particularly if the dredged material is fine material. At Ft. Pierce, sediments both inside and outside the site range from 60 % to 96 % sand, 1% to 39 % shell and 0.3 % to 11 % fines (Appendix F). Station 2, with the greatest percentage of fines (11.62 %) is outside the disposal area to the northwest. Stations 7 and 10 within the disposal area have .75 % and .55 % fines respectively. Station 7 had the lowest relative gamma isotope signature of all stations and station 10 had one of the highest relative gamma isotope signatures (Figure 3). Station 6, with a relatively high percentage of fines (8.37 %), a relatively high gamma isotope signature and it's location within the disposal area is the only station that can, with any degree of certainty, be said to be dredged material.

Sediment mapping results many times will correspond with high gamma isotope readings to mounds of material within the disposal area that show up on the bathymetric surveys. These factors combined are normally reliable indicators of dredged material. At the Ft. Pierce ODMDS, water depths gradually grade off from approximately 40 feet at the southwest corner to approximately 50 feet at the northeast corner of the site. There are no obvious mounds of dredged material within the disposal area that correspond to high gamma activity, again making the ascertation of dredged material problematic.

As mentioned earlier, all but two station locations in 1992 fell proximate to higher total gamma readings determined in the 1998 sediment mapping survey, thus the same locations were utilized in the 1999 survey as the 1992 survey. The two exceptions were stations 1 and 12. Since no stations were located within the upper half of the old interim site, station 1 was moved to the northwest quadrant of the old interim site and station 12 was added in order to sample the northeast quadrant of the old interim site (Figure 3). Stations 1, 2, 3, 4, 5, 6 and 10 all fell in areas of relatively higher total gamma activity. Although, station 2 and 5 were in areas of similar gamma isotope signatures, their sediment characteristics were very different. As mentioned earlier station 2 had 11.62 % fines whereas station 5 had only 0.33 % fines. Based upon the gamma isotope signatures, stations 8, 9, and 11 were chosen as probable reference stations.

FIGURE 3



4.2 Water Quality

Physicochemical parameters were measured at six locations during both surveys. Nutrients at all stations sampled in 1992 and 1999 were all either below analytical detection limits or very low values. Physicochemical parameters, (temperature, salinity, dissolved oxygen and pH), measured by multiparameter probe, were very consistent between background stations outside of the disposal area and stations (Figures 7 and 8) located inside the disposal area. In 1992, the survey was conducted in March and temperatures were consistent from top to bottom. In 1999, the survey was conducted in July so surface temperatures were warmer resulting in a thermocline at approximately 25 feet. Along with the cooler water temperatures (approximately 4° C cooler) below 25 feet, there was a corresponding increase in dissolved oxygen. Salinity and pH were uniform from top to bottom.

Chlorophyll a samples were collected at the same six stations as the physicochemical measurements. During the 1992 survey, concentrations of Chlorophyll a ranged from 1.1 to 2.6 ug/l (Appendix H). The concentrations in 1999 ranged from 1.2 to 4.9 ug/l on the surface, (90 % light transmittance), with most stations around 2 ug/l. The 4.9 value was at the surface on station 5. The values for 50 % light transmittance ranged from .12 - .22 ug/l and the values for 10 % light transmittance ranged from .10 - .18 ug/l. The one relatively high value on the surface at station 5 is probably due to normal temporal changes in the area and not due to effects from disposal material, since all other stations were within the range typical of marine waters.

Nutrients in the water column were all below detection limits in 1999, except for the mid and bottom samples at station five. Concentrations at these two locations of total phosphorus were just above analytical detection limits. During the 1992 survey, TKN was found at four of the six stations at concentrations ranging from 0.16 - 0.41 ug/l. Since TKN is the composite of ammonia and organic nitrogen, and ammonia was below analytical detection limits, these values are likely a result of animal or plant material and not indicative of enrichment. TKN was below analytical detection limits in 1999.

4.3 Particle Size Analysis

During both the 1992 survey and the 1999 survey, sediment at all stations was predominantly sand (Figure 3, 4 and 5) although, eleven of the twelve stations also had a large percentage, (8.86 - 38.89 percent) of gravel size particles. The gravel size particles were predominantly shells and shell fragments from molluscs. Although station 1 was moved to a different location in 1999 as opposed to the 1992 survey, sediment composition was very similar between the two studies, with sand comprising approximately 96-97 percent of the sediment composition. Stations1, 2, 3 and 6 all had increases in fine material with station 2 exhibiting the greatest increase (430 percent) with corresponding decreases in the sand and gravel components (Appendix F). Station six exhibited an increase in both the fines and gravel components, with a corresponding decrease in sand. All other stations that were sampled during the 1992 survey had a decrease in fines, with the percentage of fines accounting for less than 1 percent of the particle size composition. Stations 1, 2, 3, and 6 are all located generally in the northwest quadrant of the study area. These stations also corresponded to the general trend for high gamma isotope readings as well. Station 2 is well outside the disposal area to the northwest, while station 1 and 3 are inside the old interim site and station 6 is inside the current disposal area. Station 10, inside the disposal area, also corresponded to high gamma isotope readings, but had one of the lowest percentage of fines (less than 1 percent). Station 7 also inside the disposal area had less than 1 percent fines as well as falling in the area of lowest gamma isotope signatures. Station 12 which was added for the 1999 survey had 1.85 percent fines. Station 10 inside the disposal area and station 11 located .75 NM to the south of the disposal area were almost identical in sediment composition during both studies, although both had a 5-10 % decrease in sand with a corresponding 5-10 % increase in coarser material. The total organic fraction of the sediments was uniformly low (1.7 percent or less) at all stations.

4.4 Metals

There were some changes in the metals concentrations of the sediments between the 1992 and the 1999 survey (Appendix A). With the exception of arsenic in 1999, the vast majority of metal concentrations were either below laboratory analytical detection limits or were at very low concentrations. In 1992, all metals except base earth metals were below analytical detection limits. In 1999, there were several metals present in the sediments that were below detection limits in 1992. This might possibly be due to lower analytical detection limits during analysis. Prior to 1993, metals analysis was routinely done at normal detection limits. Unfortunately, this may have resulted in below detection limit values for the 1992 study. After 1993, low level detection limits were requested for all analysis in marine sediments. The metals reported in 1999 were, arsenic, barium, chromium, lead, vanadium, yttrium and zinc. Of these metals, all but arsenic were at very low levels. Arsenic values at six of the twelve stations were above the ERL (Effective Range Low) value of 8.2 mg/kg for arsenic. (Long and MacDonald, 1994). The ERL value is the concentration at which toxicity effects begin to show up or where toxicity effects are possible. The six station were 3, 4, 6, 7, 10, and 11. The concentrations for these stations in mg/kg were 9, 11, 10, 13, 11, and 10 respectively. Nine of the twelve stations exceed the threshold effects limit (TEL) of 7.24 mg/kg, which is the same value that US-EPA Region 4 uses for the sediment toxicity screening value of arsenic (Buchman 1999, USEPA 1995). The TEL and EPA screening value represent the concentration of a particular substance, below which adverse effects are expected to occur only rarely. The probable effects limit (PEL) represents the value where toxicity effects are probable (Buchman 1999, USEPA 1995). The concentrations of arsenic at the Ft. Pierce ODMDS are well below the PEL concentration of 41.6 mg/kg. All of these stations with the exception of station 11 are bordering or inside either the old interim disposal site or within the present site. Station 11 is located .5 NM south of the disposal site.

According to the State of Florida Sediment Quality Assessment Guidelines (MacDonald, 1994), arsenic concentrations are found in coastal waters in several areas around Florida, (including the area between Daytona and Jupiter, although not specifically the Ft. Pierce area), that exceed the TEL limit. Fifteen sites around Florida had concentrations of arsenic that exceeded the PEL, (although none in the Daytona to Jupiter area). Only two of the sites that exceeded the PEL were considered anthropogenic in nature. Based on this information and the fact that tests conducted on Ft. Pierce Harbor sediments indicated lower levels of arsenic, it is probable that the arsenic in and around the disposal area is probably not anthropogenic in nature.

Regional curves, developed by Herb Windom, (Windom 1990), comparing metals concentrations in a given sample to that of aluminum in the same sample were utilized to help determine if some of the metal concentrations found at the Ft. Pierce ODMDS could be considered normal levels (Figure 6). Since no metals of concern were detected in the 1992 survey, this comparison was only utilized for the 1999 survey. When comparing the aluminum to metals ratios, the concentrations of lead, chromium and zinc were all within the regional background levels, although, lead was at the upper 95 % limit. All concentrations are well below the US-EPA R4 toxicity screening values (US-EPA, 1995) for sediment.

The use of metals to aluminum ratios is for general comparison only, as Windom utilized a "total digestion" analytical method in the development of his curves while the SESD laboratory utilizes a "total recoverable" method for their analysis. Theoretically EPA's method should recover less aluminum than the total digestion method, resulting in an abnormally high ratio when compared against Windom's regional curves. Since almost all of the metals concentrations actually fall well within the curves, this indicates that there is actually a pretty good correlation between the two methods. If the total digestion method were utilized, then the ratios might actually be closer to the lower 95 percentile of the curve.

FIGURE 4
FT. PIERCE ODMDS PARTICLE SIZE DISTRIBUTION, 1992 vs 1999

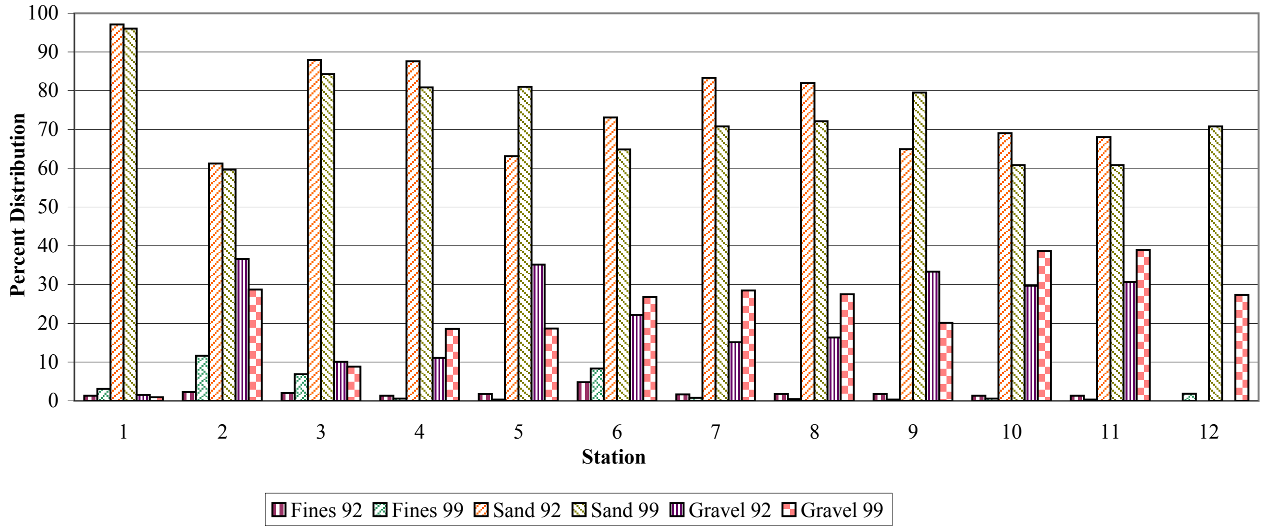


FIGURE 5
FT. PIERCE ODMDS PARTICLE SIZE DISTRIBUTION, MARCH 1992

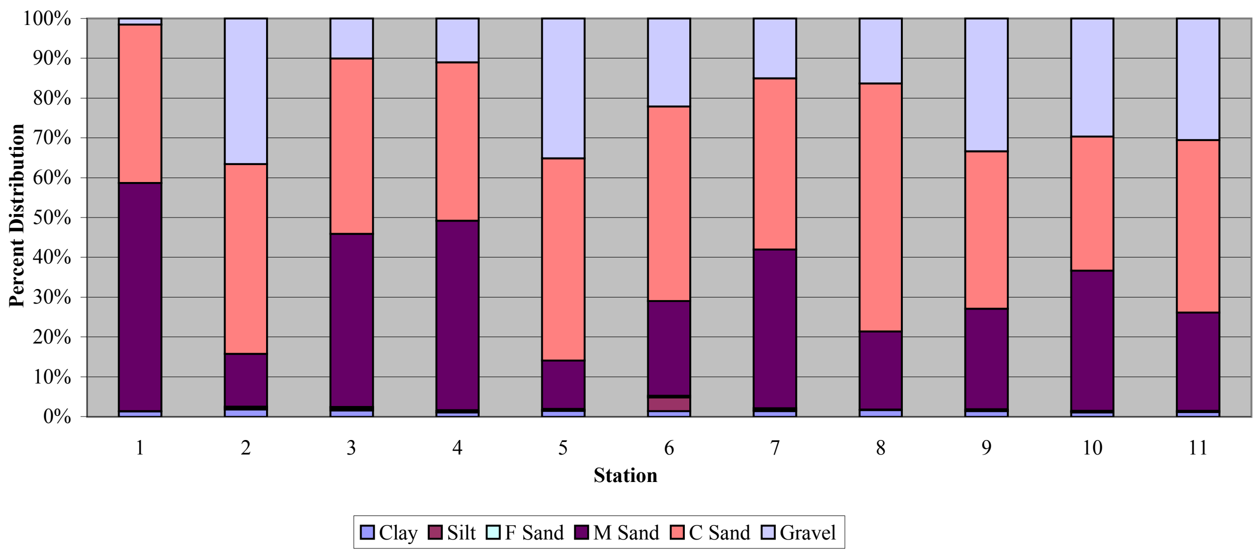


FIGURE 6
FT. PIERCE PARTICLE SIZE DISTRIBUTION, JULY 1999

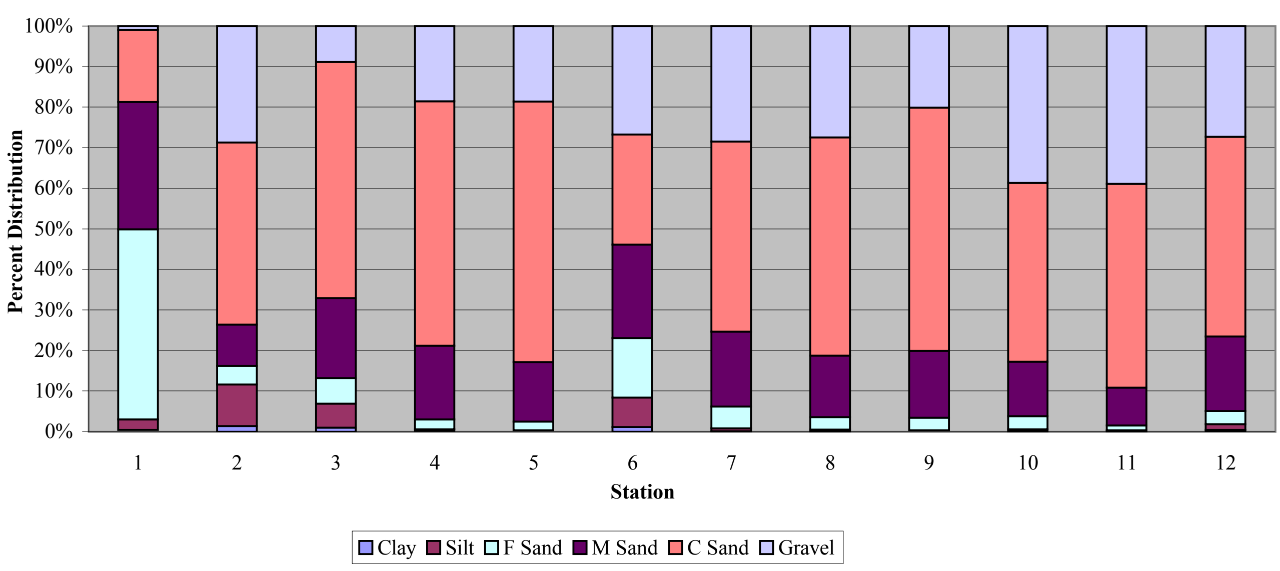
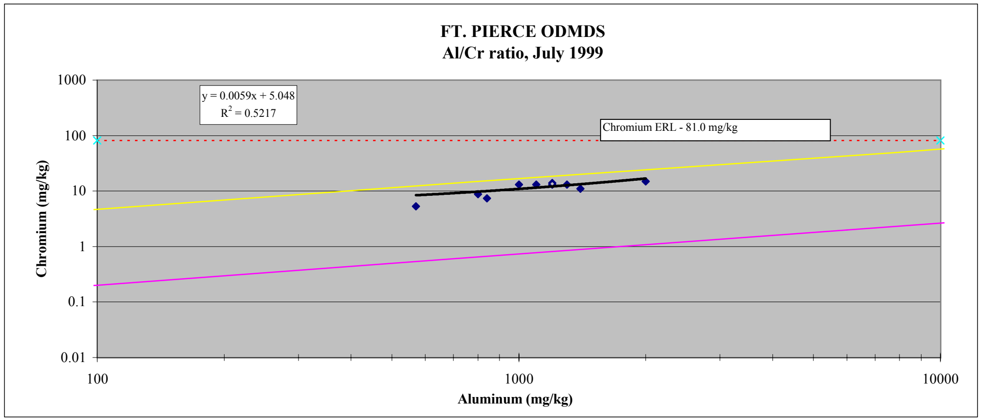
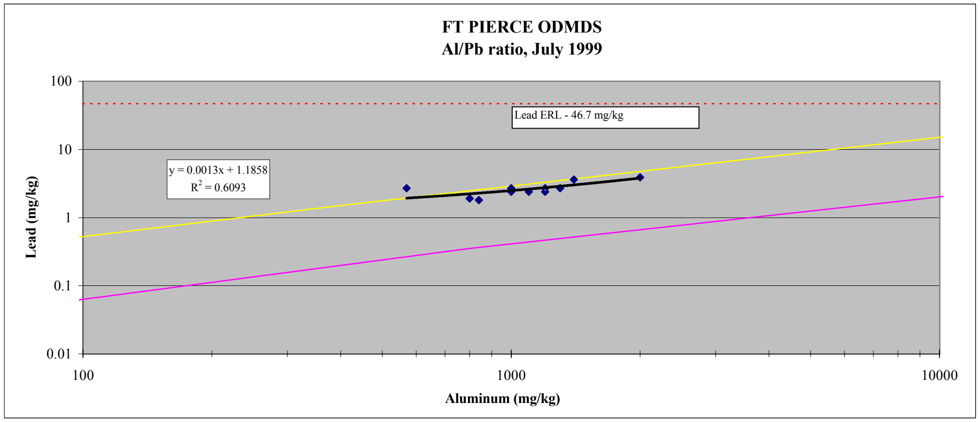
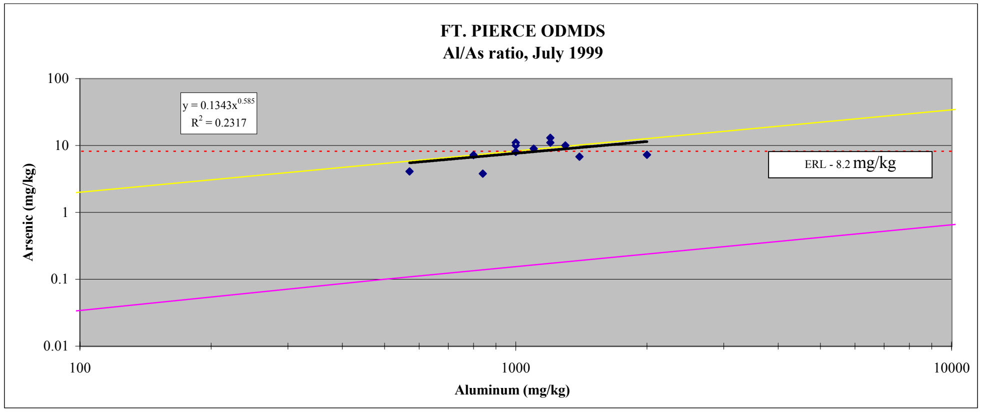


FIGURE 7
ALUMINUM TO METALS COMPARISON - FT. PIERCE ODMDS JULY 1999







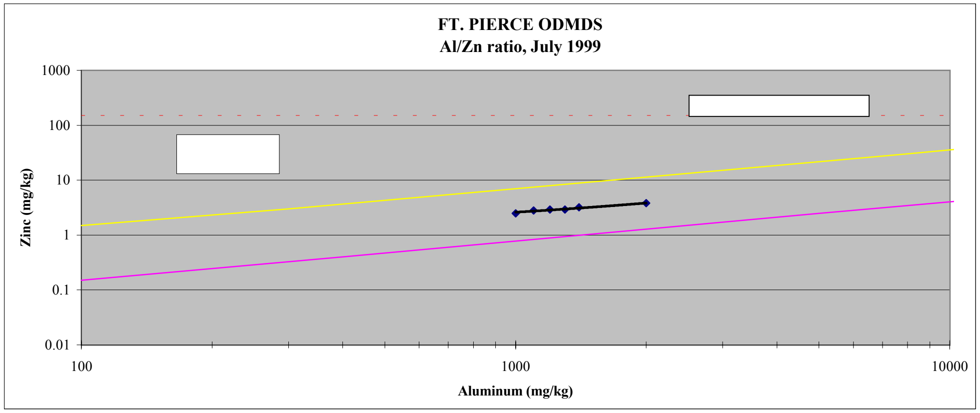
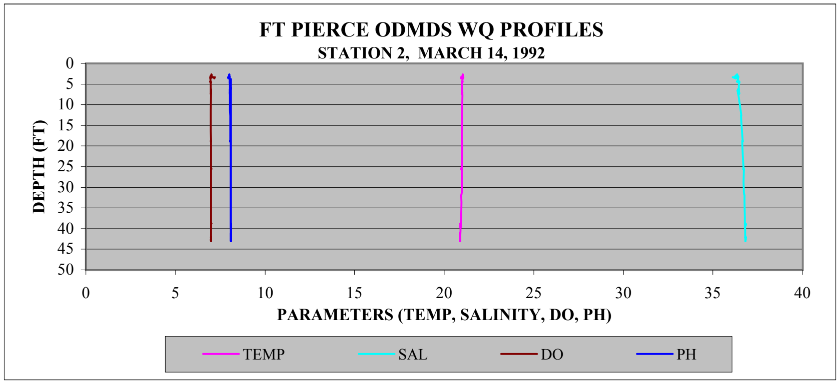
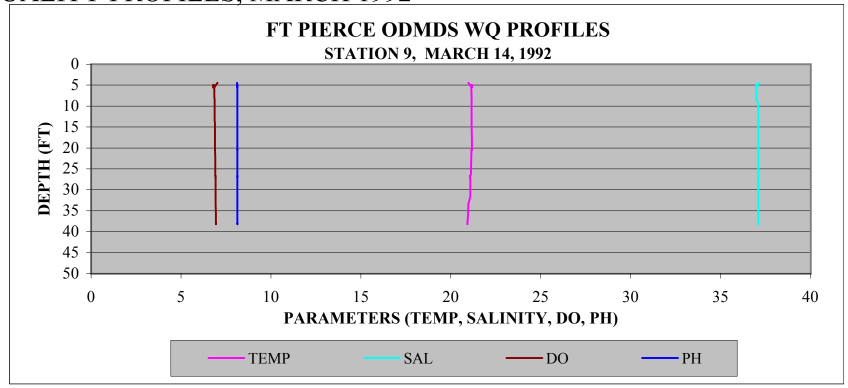
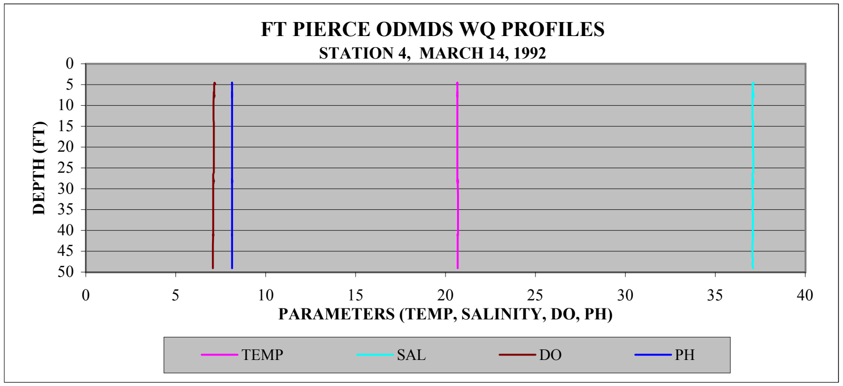
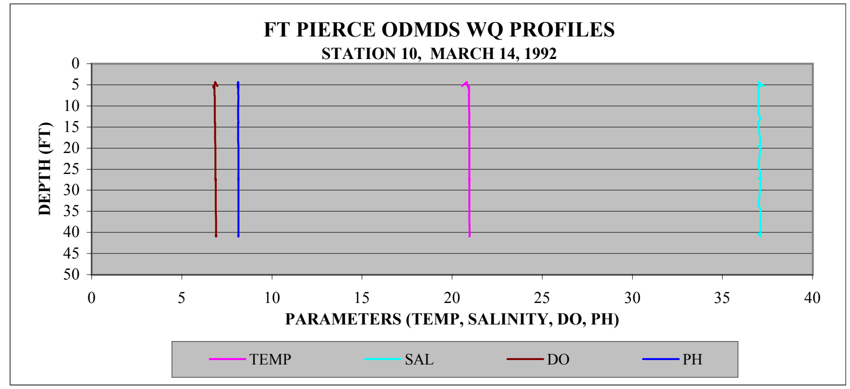


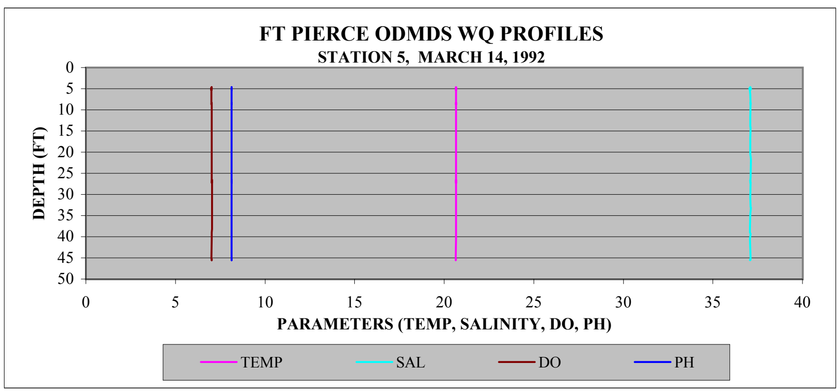
FIGURE 8 - FT. PIERCE WATER QUALITY PROFILES, MARCH 1992

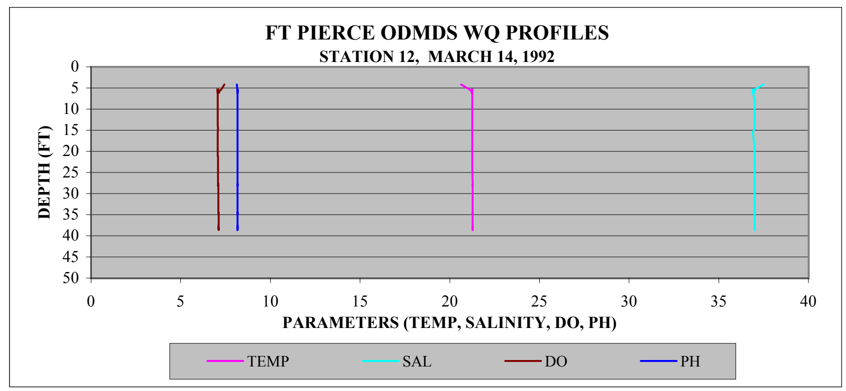












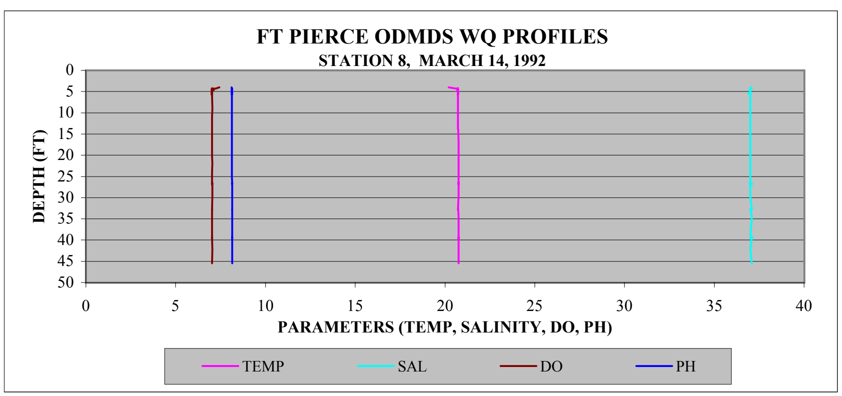
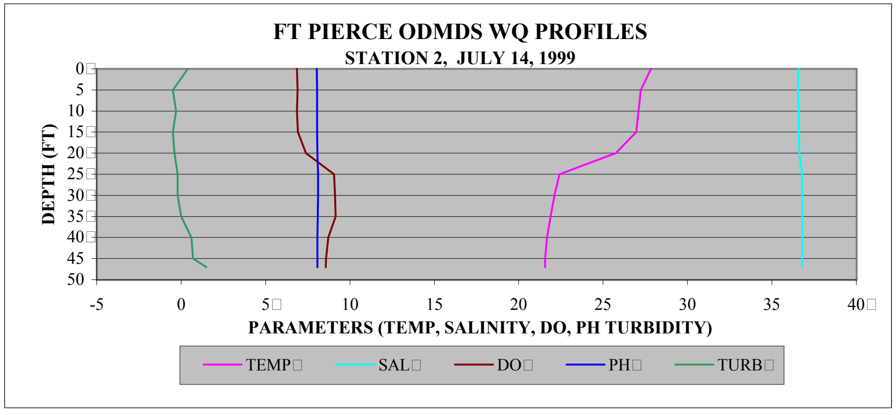
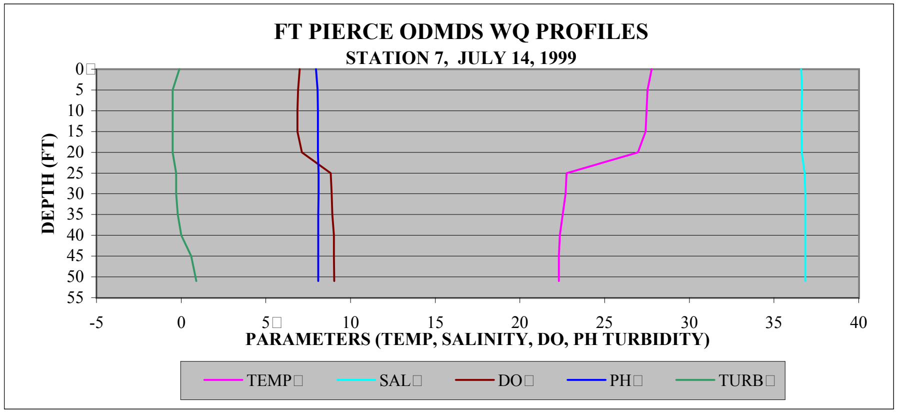
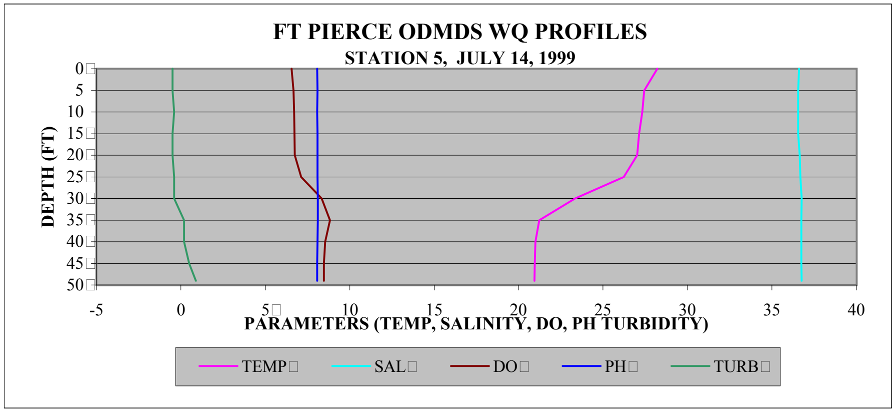
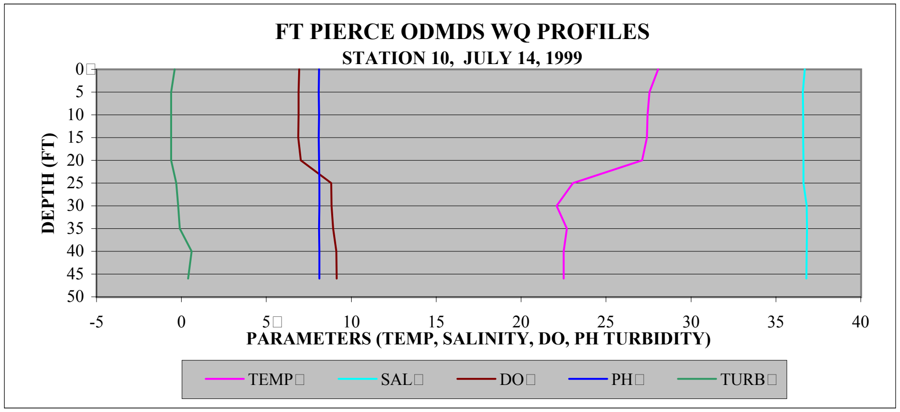


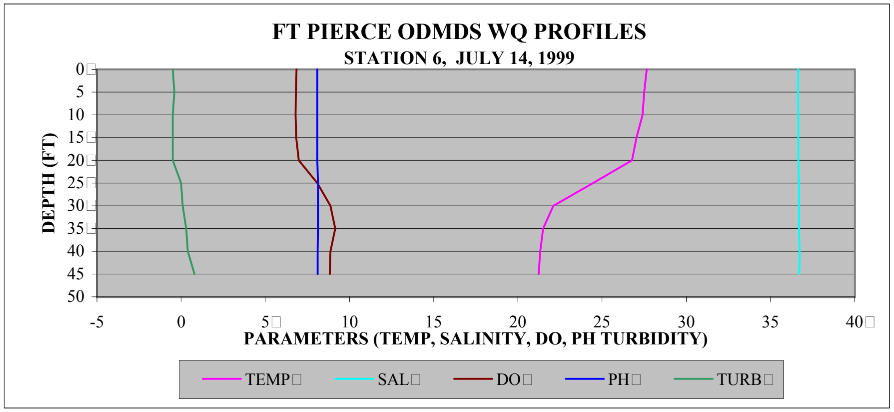
FIGURE 9 - FT. PIERCE WATER QUALITY PROFILES, JULY, 1999

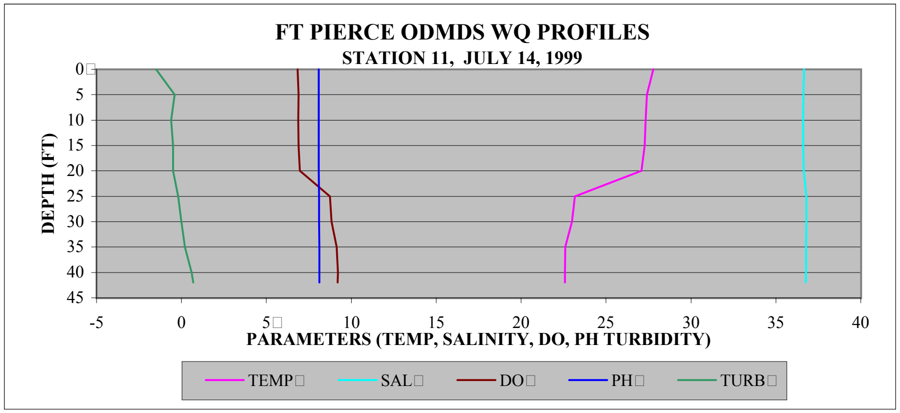












4.5 Nutrients

Nutrient levels in sediment were all low values during both studies (Appendix D). Nitrate-nitrite nitrogen was below analytical detection limits at all stations for both surveys. Total Kjeldahl Nitrogen (TKN) was fairly uniform at all stations during the 1992 survey, ranging from 180-260 mg/l. In 1999, with the exception of stations 1, 2, 3, and 12, TKN had much lower values, ranging from 16-73 mg/kg. Stations 1, 2, 3, and 12 more closely resembled the 1992 values, with concentrations of 130, 250, 230 and 250 mg/kg respectively. Ammonia concentrations were very similar between the two studies with values ranging from 3.6-9.2 mg/kg in 1992 and from 3.6-12 mg/kg in 1999. Phosphorus levels were slightly higher in 1999 as opposed to the 1992 study. Values in 1992 ranged from 130-360 mg/kg, whereas values ranged from 250-520 mg/kg in 1999.

4.6 Extractable organics

In 1992, no extractable organic compounds were found in the Ft. Pierce sediments. In 1999, two miscellaneous extractable organics were reported (Appendix B). The two compounds were hexadecanoic acid and hexadecenoic acid. These compounds were flagged with a “JN” designation. The “J” indicates that the values reported are estimated values and may not be correct. The “N” designation indicates that there is “presumptive evidence that the material may be present” or is only “tentatively identified”. Considering the tentative identification of the compounds, these compounds can be considered insignificant.

4.7 Volatile Organics

Nearly all volatile organic compounds during both the 1992 and 1999 surveys were reported to be below analytical detection limits (Appendix C). In 1992 one miscellaneous compound, thiobismethane, was reported at five stations but all values were flagged with a “JN” designation. In 1999, five volatile organic compounds were reported in the Ft. Pierce Sediments (Appendix C). Of these, two were miscellaneous compounds with “J” or “JN” flags. Of the remaining three compounds, two had actual values at more than one station and the third which was toluene was reported at station 12 with a value that was “J” flagged. The two remaining compounds were bromoform and trichlorofluoromethane. Bromoform is a colorless solvent used for waxes, greases, and oils. Bromoform was reported at station 5 at a concentration of 2.1 ug/kg. It was also reported as “J” flagged data at stations 2, 11 and 12. Bromoform was also reported in the duplicate sample from station 11 at a concentration of 3.0 ug/kg. Trichlorofluoromethane or freon is used as a refrigerant. Trichlorofluoromethane was reported at station 7 at a concentration of 1.4 ug/kg, which is very close to the analytical detection limit and in the trip blank at a concentration of 2.7 ug/kg. Most likely, the freon values were contamination from the freezer where the samples were stored.

Concentrations of volatile organic compounds were very low in the few instances where they were reported and can be considered insignificant. As with the extractable organics, the “J” and “N” values for these compounds cast doubt as to the actual presence and quantity of the compounds indicated.

4.8 Pesticides/PCBs

All pesticides and PCBs were below laboratory analytical detection limits in both 1992 and 1999.

4.9 Macroinvertebrates (Vittor and Assoc., 2000)

For a complete report of the macroinvertebrate assemblages, see the report Ft. Pierce, Florida 1999 ODMDS Benthic Community Assessment (Vittor and Associates, Inc., 2000). In general taxa were extremely diverse and evenly distributed both inside and outside the site with 11,256 organisms representing 417 taxa found in 1992 and 13,391 organisms, representing 489 taxa found in 1999. A portion of the difference in the total number of taxa can be explained by the fact that there were only eleven stations sampled in 1992 versus 12 stations sampled in 1999. Community indices showed considerable uniformity between stations with no predictable pattern within and outside the disposal area. Station mean densities were significantly higher in 1999 than in 1992, although there was no significant difference in station taxa richness between 1999 and 1992. There was no significant difference in mean density or taxa richness at stations inside the disposal area versus stations outside the disposal area in either 1992 or 1999.

Stations 2 and 7 contained large numbers of molluscs and thus due to the shell weight contained by far the most biomass. Station 2, outside the disposal area, had the highest percentage of fines of all stations and station 7, inside the disposal area, had one of the lowest percentage of fines. If molluscs were removed from the calculation, station 10, also with one of the lowest percentage of fines, had almost three times the biomass of other stations. All other stations were very similar in terms of biomass regardless of sediment composition.

In 1992 Annelids comprised the largest number of taxa - 39.3 percent (Figure 10) and the largest number of individuals - 53.4 percent (Figure 11), with polychaetes being the most abundant, representing 37.4 percent of the total assemblage. The most abundant single taxon, (12.7 percent), was the echinoderm, *Ophiuroidea* (brittlestar), although echinodermata accounted for only 15.8 percent of the overall number of individuals. The polychaete, *Goniadides Carolinae* was the second most abundant single taxon (8.7 percent).

In 1999 Annelids again were dominant both in number of taxa - 38 percent (Figure 10) and number of individuals - 55.9 percent (Figure 11), with polychaetes representing 37.8 percent of the total taxa and 50.5 percent of the total assemblage. The polychaete, *Goniadides Carolinae* was the most abundant single taxon, representing 15.9 percent of the total number of individuals. *Ophiuroidea* represented only 1.5 percent of the total individuals in 1999. The decrease in *Ophiuroidea* is most likely due to normal temporal variations in community structure or possibly a seasonal variation since one study was conducted in March and the other was conducted in July. (Vittor and Assoc., February 2002, Personal Communication.)

5.0 CONCLUSIONS

There seems to be no predictable pattern between the sediment mapping results, particle size analysis and macroinvertebrate assemblages at the Ft. Pierce ODMDS.

Overall, there was very little change from the 1992 survey and the 1999 survey. There were slight shifts in sediment particle size composition between the two surveys with a general shift toward coarser sand and more shell fragments. Four stations had an increase in fines, stations 1, 2, 3, and 6. Each of these stations fall generally in the northwest quadrant of the study area.

Macroinvertebrate communities were extremely diverse, and well distributed, with no particular pattern of distribution. The biggest change in macroinvertebrates was a decrease of brittlestars from 12.7 percent of the total number of individuals in 1992, to 1.5 percent of the total number of individuals in 1999. Most likely this due to normal seasonal or temporal variations.

Physicochemical parameters, (Temperature, D.O., Salinity and pH), were similar between all stations. The only variation was cooler, well mixed temperatures in the March, 1992 survey, versus warmer surface temperatures with a thermocline at approximately 25 feet during the July 1999 survey. This resulted in an inverse relationship with dissolved oxygen.

There was almost no change in water chemistry, between the two studies.

With the exception of arsenic, all other metal concentrations were far below any values of concern. Arsenic values were elevated to the point that six of the twelve stations had concentrations above the ERL (Effects Range Low) and nine of the twelve were above US-EPA Region 4's sediment screening value. Although the values were well below the PEL. According to the State of Florida Sediment Quality Assessment Guidelines (Mcdonald, 1994), arsenic concentrations are found in coastal waters in several areas around Florida that exceed the PEL limit, but are not anthropogenic in nature. Therefore it is difficult to determine if arsenic is naturally occurring in the Ft. Pierce sediments or if there may be some anthropogenic input. The arsenic levels at the Ft. Pierce ODMDS may warrant further investigation of the site as well as increased scrutiny with respect to arsenic of the dredged material prior to disposal.

FIGURE 10
MACROINVERTEBRATE PERCENT TAXA COMPOSITION 1992 vs 1999

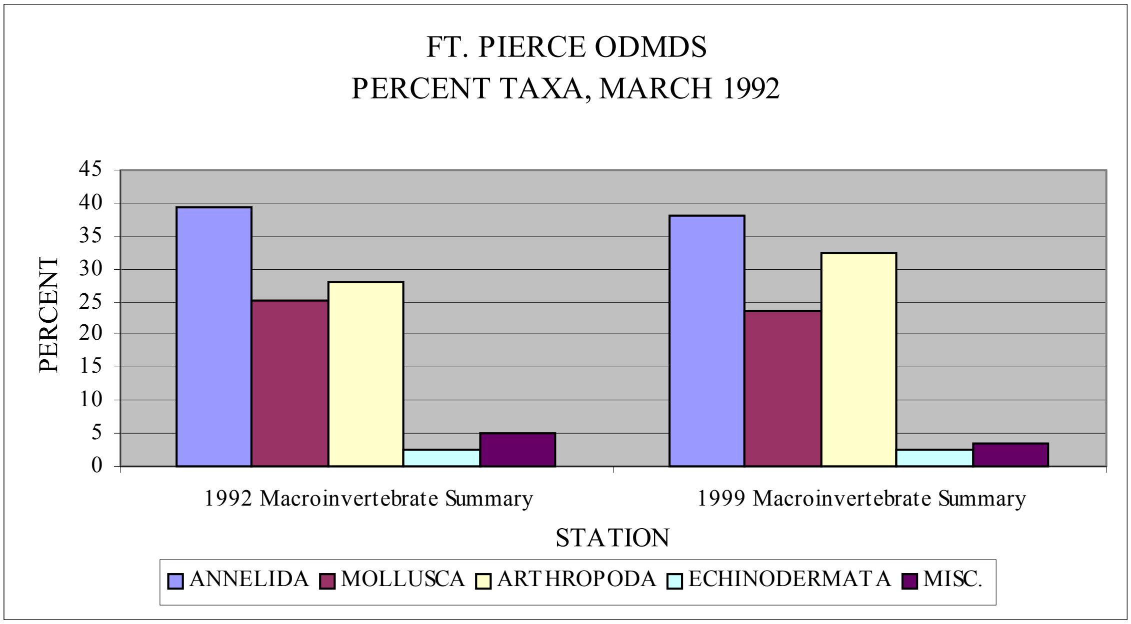


FIGURE 11
MACROINVERTEBRATE PERCENT INDIVIDUAL COMPOSITION 1992 vs 1999

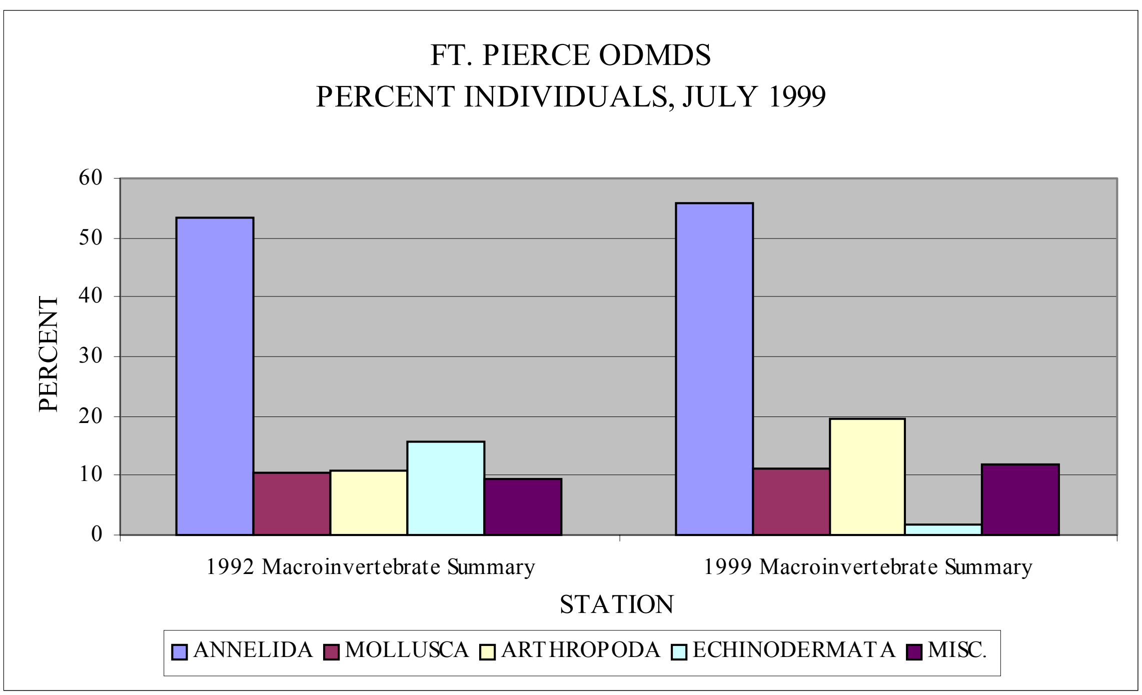


TABLE 1
FT. PIERCE ODMDS CORNER COORDINATES

NORTHWEST CORNER	27E28.00/80E12.50
NORTHEAST CORNER	27E28.00/80E11.50
SOUTHEAST CORNER	27E27.00/80E11.50
SOUTHWEST CORNER	27E27.00/80E12.50

TABLE 2
FT. PIERCE ODMDS STATION LOCATIONS, MARCH 1992

STATION #	LATITUDE	LONGITUDE
1	27E 28.93'	80E 12.00'
2	27E 28.52'	80E 13.10'
3	27E 28.52'	80E 12.55'
4	27E 28.56'	80E 11.97'
5	27E 28.70'	80E 11.00'
6	27E 27.79'	80E 12.37'
7	27E 27.79'	80E 11.72'
8	27E 27.50'	80E 10.88'
9	27E 27.45'	80E 12.83'
10	27E 27.27'	80E 12.00'
11	27E 26.50'	80E 12.00'

TABLE 3
FT. PIERCE ODMDS STATION LOCATIONS, JULY, 1999

STATION #	LATITUDE	LONGITUDE
1	27E 28.25'	80E 12.25'
2	27E 28.50'	80E 13.10'
3	27E 28.50'	80E 12.50'
4	27E 28.56'	80E 12.00'
5	27E 28.70'	80E 11.00'
6	27E 27.80'	80E 12.35'
7	27E 27.80'	80E 11.70'
8	27E 27.50'	80E 11.00'
9	27E 27.45'	80E 12.85'
10	27E 27.25'	80E 12.00'
11	27E 26.50'	80E 12.00'
12	27E 28.25'	80E 11.75'

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7.0 APPENDICES

APPENDIX A:	METALS ANALYSIS IN SEDIMENT
APPENDIX B:	EXTRACTABLE ORGANICS ANALYSIS IN SEDIMENT
APPENDIX C:	VOLATILE ORGANICS ANALYSIS IN SEDIMENT
APPENDIX D:	NUTRIENT ANALYSIS IN SEDIMENT
APPENDIX E:	NUTRIENT ANALYSIS IN WATER
APPENDIX F:	PARTICLE SIZE ANALYSIS
APPENDIX G:	LIGHT TRANSMISSION PROFILES
APPENDIX H:	CHLOROPHYLL a
APPENDIX I:	MACROINVERTEBRATE COMPOSITION SUMMARY

APPENDIX A
METALS ANALYSIS IN SEDIMENT

APPENDIX A-1
FT PIERCE ODMDS, MARCH 1992 - SEDIMENT METALS SCAN

STA	DATE	TIME	ALUMINUM		ANTIMONY		ARSENIC		BARIUM		BERYLLIUM		CADMIUM		CALCIUM		CHROMIUM		COPPER		IRON	
1	03/15/92	1007	1000		45	UJ	45	U	15	U	7.5	U	7.5	U	200000		15	U	15	U	6200	
2	03/15/92	1440	1200		60	UJ	60	U	20	U	10	U	10	U	310000		20	U	20	U	5000	
3	03/15/92	1340	1000		75	UJ	75	U	25	U	12	U	12	U	290000		25	U	25	U	5400	
4	03/15/92	1243	1000		60	UJ	60	U	20	U	10	U	10	U	270000		20	U	20	U	5700	
5	03/16/92	1110	1100		75	UJ	75	U	25	U	12	U	12	U	310000		25	U	25	U	6000	
6	03/15/92	1545	720		45	UJ	45	U	15	U	7.5	U	7.5	U	180000		15	U	15	U	4300	
7	03/16/92	1243	940		60	UJ	60	U	20	U	10	U	10	U	290000		20	U	20	U	5200	
8	03/16/92	1128	1400		75	UJ	75	U	25	U	12	U	12	U	330000		25	U	25	U	8200	
9	03/16/92	916	1200		60	UJ	60	U	20	U	10	U	10	U	270000		20	U	20	U	5600	
10	03/15/92	1638	1100		75	UJ	75	U	25	U	12	U	12	U	310000		25	U	25	U	6500	
11	03/16/92	1021	840		60	UJ	60	U	20	U	10	U	10	U	300000		20	U	20	U	4400	

STA	DATE	TIME	LEAD		MAGNESIUM		MANGANESE		MERCURY		MOLYBDENUM		NICKEL		POTASSIUM		SELENIUM		SILVER		SODIUM	
1	03/15/92	1007	60	U	5100		49		0.08	U	15	U	30	U	3000	U	60	U	15	U	5500	
2	03/15/92	1440	80	U	4900		42		0.06		20	U	40	U	4000	U	80	U	20	U	6000	
3	03/15/92	1340	100	U	6400		63		0.06		25	U	50	U	5000	U	100	U	25	U	8100	
4	03/15/92	1243	80	U	5500		47		0.09		20	U	40	U	4000	U	80	U	20	U	6000	
5	03/16/92	1110	100	U	5600		43		0.07		25	U	50	U	5000	U	100	U	25	U	6900	
6	03/15/92	1545	60	U	3700		33		0.07		15	U	30	U	3000	U	60	U	15	U	4300	
7	03/16/92	1243	80	U	4800		41		0.07		20	U	40	U	4000	U	80	U	20	U	5900	
8	03/16/92	1128	100	U	6800		59		0.05	U	25	U	50	U	5000	U	100	U	25	U	7100	
9	03/16/92	916	80	U	5100		47		0.05	U	20	U	40	U	4000	U	80	U	20	U	5300	
10	03/15/92	1638	100	U	5100		50		0.05	U	25	U	50	U	5000	U	100	U	2.5	U	6600	
11	03/16/92	1021	80	U	4100		40		0.05	U	20	U	40	U	4000	U	80	U	20	U	6400	

STA	DATE	TIME	STRONTIUM		TELLURIUM		THALLIUM		TIN		TITANIUM		MERCURY		VANADIUM		YTTRIUM		ZINC	
1	03/15/92	1007	2000		75	U	150	U	38	U	35		0.08	U	15	U	15	U	15	U
2	03/15/92	1440	2100		100	U	200	U	50	U	44		0.06	U	20	U	20	U	20	U
3	03/15/92	1340	2500		120	U	250	U	62	U	40		0.06	U	25	U	25	U	25	U
4	03/15/92	1243	2300		100	U	200	U	50	U	44		0.09	U	20	U	20	U	20	U
5	03/16/92	1110	2500		120	U	250	U	62	U	40		0.07	U	25	U	25	U	25	U
6	03/15/92	1545	1500		75	U	150	U	38	U	28		0.07	U	15	U	15	U	15	U
7	03/16/92	1243	2000		100	U	200	U	50	U	44		0.07	U	20	U	20	U	20	U
8	03/16/92	1128	2700		120	U	250	U	62	U	40		0.05	U	25	U	25	U	25	U
9	03/16/92	916	2200		100	U	200	U	50	U	45		0.05	U	20	U	20	U	20	U
10	03/15/92	1638	2600		120	U	250	U	62	U	44		0.05	U	2.5	U	2.5	U	2.5	U
11	03/16/92	1021	2100		100	U	200	U	50	U	40		0.05	U	20	U	20	U	20	U

Data Qualifiers

A-Average value. NA-Not analyzed. NAI-Interferences. J-Estimated value.

N-Presumptive evidence of presence of material.

NR-Not Reported

K-Actual value is known to be less than value given.

L-Actual value is known to be greater than value given.

U-Material was analyzed for but not detected.

R-QC indicates that data unusable. Compound may or may not be present. Resampling and reanalysis is necessary for verification.

C-Confirmed by GCMS.

1.When no value is reported, see chlordane constituents.

2.Constituents or metabolites of technical chlordane.

FT PIERCE ODMDS, JULY 1999 - SEDIMENT METALS SCAN

STA	DATE	TIME	ALUMINUM		ANTIMONY		ARSENIC		BARIUM		BERYLLIUM		CADMIUM		CALCIUM		CHROMIUM		COPPER		IRON	
1	07/13/99	1846	840		0.5	UJ	3.8		8.5		0.5	U	0.5	U	150000		7.4		2.5	U	2500	
2	07/13/99	910	1400		0.5	UJ	6.8		21		0.5	U	0.5	U	330000		11		2.5	U	5100	
3	07/13/99	1023	1100		0.5	UJ	9		17		0.5	U	0.5	U	300000		13		2.5	U	5600	
4	07/13/99	1517	1000		0.5	UJ	11		18		0.5	U	0.5	U	320000		13		2.5	U	5800	
5	07/13/99	1622	570		0.5	UJ	4.1		11		0.5	U	0.5	U	190000		5.3		2.5	U	1600	
6	07/13/99	1719	1300		0.5	UJ	10		18		0.5	U	0.5	U	300000		13		2.5	U	6100	
7	07/14/99	941	1200		0.5	UJ	13	A	18		0.5	U	0.5	U	300000		13	A	2.5	U	6400	A
8	07/14/99	1037	1000		0.5	UJ	8		17		0.5	U	0.5	U	300000		13		2.5	U	4900	
9	07/14/99	1545	800		0.5	UJ	7.2		15		0.5	U	0.5	U	280000		8.8		2.5	U	4000	
10	07/14/99	1334	1200		0.5	UJ	11		19		0.5	U	0.5	U	330000		14		2.5	U	6300	
11	07/14/99	1431	1000		0.5	UJ	10		15		0.5	U	0.5	U	260000		13		2.5	U	5900	
12	07/14/99	848	2000		0.5	UJ	7.3		16		0.5	U	0.5	U	260000		15		2.5	U	5900	
QA6	07/13/99	1721	2300		0.5	UJ	5.2		13		0.5	U	0.5	U	190000		9.7		2.5	U	2900	
QA11	07/14/99	1435	1000		0.5	UJ	10		17		0.5	U	0.5	U	320000		13		2.5	U	5700	

STA	DATE	TIME	LEAD		MAGNESIUM		MANGANESE		MOLYBDENUM		NICKEL		POTASSIUM		SELENIUM		SILVER		SODIUM	
1	07/13/99	1846	1.8		3400		27		2.5	U	2.5	U	280		2.5	U	2.5	U	5100	
2	07/13/99	910	3.6		6500		48		2.5	U	2.5	U	410		2.5	U	2.5	U	7900	
3	07/13/99	1023	2.4		6000		44		2.5	U	2.5	U	330		2.5	U	2.5	U	7200	
4	07/13/99	1517	2.5		6400		38		2.5	U	2.5	U	300		2.5	U	2.5	U	6700	
5	07/13/99	1622	2.7		2500		24		2.5	U	2.5	U	220		2.5	U	2.5	U	5700	
6	07/13/99	1719	2.7		6000		42		2.5	U	2.5	U	340		2.5	U	2.5	U	6800	
7	07/14/99	941	2.7		6100	A	44	A	2.5	U	2.5	U	310		2.5	U	2.5	U	6500	
8	07/14/99	1037	2.4		5800		40		2.5	U	2.5	U	270		2.5	U	2.5	U	6300	
9	07/14/99	1545	1.9		4200		30		2.5	U	2.5	U	280		2.5	U	2.5	U	6800	
10	07/14/99	1334	2.4		6500		48		2.5	U	2.5	U	300		2.5	U	2.5	U	7000	
11	07/14/99	1431	2.7		5900		39		2.5	U	2.5	U	270		2.5	U	2.5	U	5900	
12	07/14/99	848	3.9		6400		46		2.5	U	2.5	U	410		2.5	U	2.5	U	6500	
QA6	07/13/99	1721	2.3		2900		46		2.5	U	2.5	U	470		2.5	U	2.5	U	5900	
QA11	07/14/99	1435	2.3		5600		43		2.5	U	2.5	U	310		2.5	U	2.5	U	6500	

STA	DATE	TIME	STRONTIUM		TELLURIUM		THALLIUM		TIN		TITANIUM		MERCURY		VANADIUM		YTTRIUM		ZINC	
1	07/13/99	1846	1000		0.5	U	2.5	U	3	U	20		0.049	U	4.6		4.8		2.5	U
2	07/13/99	910	2300		0.5	U	2.5	U	3	U	14		0.049	U	6.9		4.4		3.2	
3	07/13/99	1023	2200		0.5	U	2.5	U	2.5	U	14		0.048	U	11		5		2.8	
4	07/13/99	1517	2400		0.5	U	2.5	U	3	U	12		0.047	U	12		4.2		2.5	
5	07/13/99	1622	1200		0.5	U	2.5	U	5	U	10		0.048	U	3.1		3.1		2.5	U
6	07/13/99	1719	2100		0.5	U	2.5	U	3	U	16		0.049	U	12		4.2		2.9	
7	07/14/99	941	2100		0.5	U	2.5	U	2.5	U	14		0.048	U	13	A	3.8		2.9	
8	07/14/99	1037	2100		0.5	U	2.5	U	3	U	10		0.048	U	6.4		4.5		2.5	U
9	07/14/99	1545	1800		0.5	U	2.5	U	2.5	U	9.8		0.049	U	8		3.1		2.5	U
10	07/14/99	1334	2300		0.5	U	2.5	U	3	U	14		0.048	U	12		4.2		2.5	U
11	07/14/99	1431	1900		0.5	U	2.5	U	2.5	U	13		0.049	U	10		4.6		2.5	U
12	07/14/99	848	1900		0.5	U	2.5	U	3	U	23		0.048	U	10		5.2		3.8	
QA6	07/13/99	1721	1200		0.5	U	2.5	U	2.5	U	29		0.048	U	8.2		3.9		4.4	
QA11	07/14/99	1435	2200		0.5	U	2.5	U	3	U	12		0.049	U	12		3.9		2.7	

Data Qualifiers

A-Average value. NA-Not analyzed. NAI-Interferences. J-Estimated value.

N-Presumptive evidence of presence of material.

NR-Not Reported

K-Actual value is known to be less than value given.

L-Actual value is known to be greater than value given.

U-Material was analyzed for but not detected.

R-QC indicates that data unusable. Compound may or may not be present. Resampling and reanalysis is necessary for verification.

C-Confirmed by GCMS.

1.When no value is reported, see chlordane constituents.

2.Constituents or metabolites of technical chlordane.

APPENDIX B
EXTRACTABLE ORGANICS ANALYSIS IN SEDIMENT

APPENDIX B-1
FT. PIERCE ODMDS - MARCH 1992
EXTRACTABLE ORGANICS ANALYSIS IN SEDIMENTS (ug/kg) - PAGE 1 OF 2

STA	TIME	(3-AND/OR 4-)METHYLPHENOL		1,2,4-TRICHLOROBENZENE		2,3,4,6-TETRACHLOROPHENOL		2,4,5-TRICHLOROPHENOL		2,4,6-TRICHLOROPHENOL		2,4-DICHLOROPHENOL		2,4-DIMETHYLPHENOL	
2	1440	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U
4	1243	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
5	1110	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U
8	1128	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U
9	916	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
10	1638	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U

STA	TIME	2,4-DINITROPHENOL		2,4-DINITROTOLUENE		2,6-DINITROTOLUENE		2-CHLORONAPHTHALENE		2-CHLOROPHENOL		2-METHYL-4,6-DINITROPHENOL		2-METHYLNAPHTHALENE	
2	1440	3400	U	1700	U	1700	U	1700	U	1700	U	3400	U	1700	U
4	1243	3200	U	1600	U	1600	U	1600	U	1600	U	3200	U	1600	U
5	1110	3100	U	1500	U	1500	U	1500	U	1500	U	3100	U	1500	U
8	1128	2800	U	1400	U	1400	U	1400	U	1400	U	2800	U	1400	U
9	916	3200	U	1600	U	1600	U	1600	U	1600	U	3200	U	1600	U
10	1638	3300	U	1600	U	1600	U	1600	U	1600	U	3300	U	1600	U

STA	TIME	2-METHYLPHENOL		2-NITROANILINE		2-NITROPHENOL		3,3'-DICHLOROBENZIDINE		3-NITROANILINE		4-BROMOPHENYL PHENYL ETHER		4-CHLORO-3-METHYLPHENOL	
2	1440	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U
4	1243	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
5	1110	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U
8	1128	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U
9	916	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
10	1638	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U

STA	TIME	4-CHLOROANILINE		4-CHLOROPHENYL PHENYL ETHER		4-NITROANILINE		4-NITROPHENOL		ACENAPHTHENE		ACENAPHTHYLENE		ANTHRACENE	
2	1440	1700	U	1700	U	1700	U	3400	U	1700	U	1700	U	1700	U
4	1243	1600	U	1600	U	1600	U	3200	U	1600	U	1600	U	1600	U
5	1110	1500	U	1500	U	1500	U	3100	U	1500	U	1500	U	1500	U
8	1128	1400	U	1400	U	1400	U	2800	U	1400	U	1400	U	1400	U
9	916	1600	U	1600	U	1600	U	3200	U	1600	U	1600	U	1600	U
10	1638	1600	U	1600	U	1600	U	3300	U	1600	U	1600	U	1600	U

STA	TIME	BENZO(A)ANTHRACENE		BENZO(B)FLUORANTHENE		BENZO(GHI)PERYLENE		BENZO(K)FLUORANTHENE		BENZO-A-PYRENE		BENZYL BUTYL PHTHALATE		BIS(2-CHLOROETHOXY)METHANE	
2	1440	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U
4	1243	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
5	1110	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U
8	1128	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U
9	916	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
10	1638	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U

Data Qualifiers

A-Average value. NA-Not analyzed. NAI-Interferences. J-Estimated value.
N-Presumptive evidence of presence of material.
NR-Not Reported
K-Actual value is known to be less than value given.
L-Actual value is known to be greater than value given.

U-Material was analyzed for but not detected. The number is the minimum quantitation limit.
R-QC indicates that data unusable. Compound may or may not be present. Resampling and reanalysis is necessary for verification.
C-Confirmed by GCMS.
1.When no value is reported, see chlordane constituents.
2.Constituents or metabolites of technical chlordane.

APPENDIX B-1 CONTINUED
FT. PIERCE ODMDS - MARCH 1992
EXTRACTABLE ORGANICS ANALYSIS IN SEDIMENTS (ug/kg) - PAGE 2 OF 2

STA	TIME	BIS(2-CHLOROETHYL) ETHER		BIS(2-CHLOROISOPROPYL) ETHER		BIS(2-ETHYLHEXYL) PHTHALATE		CARBAZOLE		CHRYSENE		DIBENZO(A,H)ANTHRACENE		DIBENZOFURAN	
2	1440	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U
4	1243	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
5	1110	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U
8	1128	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U
9	916	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
10	1638	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U

STA	TIME	DIETHYL PHTHALATE		DIMETHYL PHTHALATE		DI-N-BUTYLPHTHALATE		DI-N-OCTYLPHTHALATE		FLUORANTHENE		FLUORENE		HEXACHLOROBENZENE (HCB)	
2	1440	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U
4	1243	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
5	1110	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U
8	1128	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U
9	916	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
10	1638	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U

STA	TIME	HEXACHLOROBUTADIENE		HEXACHLOROCYCLOPENTADIENE (HCCP)		HEXACHLOROETHANE		INDENO (1,2,3-CD) PYRENE		ISOPHORONE		NAPHTHALENE		NITROBENZENE	
2	1440	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U	1700	U
4	1243	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
5	1110	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U	1500	U
8	1128	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U	1400	U
9	916	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U
10	1638	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U	1600	U

STA	TIME	N-NITROSODI-N-PROPYLAMINE		N-NITROSODIPHENYLAMINE/DIPHENYLAMINE		PENTACHLOROPHENOL		PHENANTHRENE		PHENOL		PYRENE	
2	1440	1700	U	1700	U	3400	U	1700	U	1700	U	1700	U
4	1243	1600	U	1600	U	3200	U	1600	U	1600	U	1600	U
5	1110	1500	U	1500	U	3100	U	1500	U	1500	U	1500	U
8	1128	1400	U	1400	U	2800	U	1400	U	1400	U	1400	U
9	916	1600	U	1600	U	3200	U	1600	U	1600	U	1600	U
10	1638	1600	U	1600	U	3300	U	1600	U	1600	U	1600	U

Data Qualifiers

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R-QC indicates that data unusable. Compound may or may not be present. Resampling and reanalysis is necessary for verification.
C-Confirmed by GCMS.
1.When no value is reported, see chlordane constituents.
2.Constituents or metabolites of technical chlordane.

APPENDIX B-2
FT. PIERCE ODMDS - JULY 1999
EXTRACTABLE ORGANICS ANALYSIS IN SEDIMENTS (ug/kg) - PAGE 1 OF 3

STA	DATE	TIME	(3-AND/OR 4-)METHYLPHENOL		1,2,4-TRICHLOROBENZENE		2,3,4,6-TETRACHLOROPHENOL		2,4,5-TRICHLOROPHENOL		2,4,6-TRICHLOROPHENOL		2,4-DICHLOROPHENOL		2,4-DIMETHYLPHENOL		2,4-DINITROPHENOL	
FP001SD	07/13/99	1846	650	U	650	U	650	U	650	U	650	U	650	U	650	U	1300	U
FP002SD	07/13/99	910	660	U	660	U	660	U	660	U	660	U	660	U	660	U	1300	U
FP003SD	07/13/99	1023	790	U	790	U	790	U	790	U	790	U	790	U	790	U	1600	U
FP004SD	07/13/99	1517	760	U	760	U	760	U	760	U	760	U	760	U	760	U	1500	U
FP005SD	07/13/99	1622	780	U	780	U	780	U	780	U	780	U	780	U	780	U	1600	U
FP006SD	07/13/99	1719	710	U	710	U	710	U	710	U	710	U	710	U	710	U	1400	U
FP007SD	07/14/99	941	700	U	700	U	700	U	700	U	700	U	700	U	700	U	1400	U
FP008SD	07/14/99	1037	800	U	800	U	800	U	800	U	800	U	800	U	800	U	1600	U
FP009SD	07/14/99	1545	790	U	790	U	790	U	790	U	790	U	790	U	790	U	1600	U
FP010SD	07/14/99	1334	710	U	710	U	710	U	710	U	710	U	710	U	710	U	1400	U
FP011SD	07/14/99	1431	730	U	730	U	730	U	730	U	730	U	730	U	730	U	1500	U
FP012SD	07/14/99	848	820	U	820	U	820	U	820	U	820	U	820	U	820	U	1600	U
QA006SD	07/13/99	1721	720	U	720	U	720	U	720	U	720	U	720	U	720	U	1400	U
QA011SD	07/14/99	1435	780	U	780	U	780	U	780	U	780	U	780	U	780	U	1600	U

STA	DATE	TIME	2,4-DINITROTOLUENE		2,6-DINITROTOLUENE		2-CHLORONAPHTHALENE		2-CHLOROPHENOL		2-METHYL-4,6-DINITROPHENOL		2-METHYLNAPHTHALENE		2-METHYLPHENOL	
FP001SD	07/13/99	1846	650	U	650	U	650	U	650	U	1300	U	650	U	650	U
FP002SD	07/13/99	910	660	U	660	U	660	U	660	U	1300	U	660	U	660	U
FP003SD	07/13/99	1023	790	U	790	U	790	U	790	U	1600	U	790	U	790	U
FP004SD	07/13/99	1517	760	U	760	U	760	U	760	U	1500	U	760	U	760	U
FP005SD	07/13/99	1622	780	U	780	U	780	U	780	U	1600	U	780	U	780	U
FP006SD	07/13/99	1719	710	U	710	U	710	U	710	U	1400	U	710	U	710	U
FP007SD	07/14/99	941	700	U	700	U	700	U	700	U	1400	U	700	U	700	U
FP008SD	07/14/99	1037	800	U	800	U	800	U	800	U	1600	U	800	U	800	U
FP009SD	07/14/99	1545	790	U	790	U	790	U	790	U	1600	U	790	U	790	U
FP010SD	07/14/99	1334	710	U	710	U	710	U	710	U	1400	U	710	U	710	U
FP011SD	07/14/99	1431	730	U	730	U	730	U	730	U	1500	U	730	U	730	U
FP012SD	07/14/99	848	820	U	820	U	820	U	820	U	1600	U	820	U	820	U
QA006SD	07/13/99	1721	720	U	720	U	720	U	720	U	1400	U	720	U	720	U
QA011SD	07/14/99	1435	780	U	780	U	780	U	780	U	1600	U	780	U	780	U

STA	DATE	TIME	2-NITROANILINE		2-NITROPHENOL		3,3'-DICHLOROBENZIDINE		3-NITROANILINE		4-BROMOPHENYL PHENYL ETHER		4-CHLORO-3-METHYLPHENOL		4-CHLOROANILINE	
FP001SD	07/13/99	1846	650	U	650	U	650	U	650	U	650	U	650	U	650	U
FP002SD	07/13/99	910	660	U	660	U	660	U	660	U	660	U	660	U	660	U
FP003SD	07/13/99	1023	790	U	790	U	790	U	790	U	790	U	790	U	790	U
FP004SD	07/13/99	1517	760	U	760	U	760	U	760	U	760	U	760	U	760	U
FP005SD	07/13/99	1622	780	U	780	U	780	U	780	U	780	U	780	U	780	U
FP006SD	07/13/99	1719	710	U	710	U	710	U	710	U	710	U	710	U	710	U
FP007SD	07/14/99	941	700	U	700	U	700	U	700	U	700	U	700	U	700	U
FP008SD	07/14/99	1037	800	U	800	U	800	U	800	U	800	U	800	U	800	U
FP009SD	07/14/99	1545	790	U	790	U	790	U	790	U	790	U	790	U	790	U
FP010SD	07/14/99	1334	710	U	710	U	710	U	710	U	710	U	710	U	710	U
FP011SD	07/14/99	1431	730	U	730	U	730	U	730	U	730	U	730	U	730	U
FP012SD	07/14/99	848	820	U	820	U	820	U	820	U	820	U	820	U	820	U
QA006SD	07/13/99	1721	720	U	720	U	720	U	720	U	720	U	720	U	720	U
QA011SD	07/14/99	1435	780	U	780	U	780	U	780	U	780	U	780	U	780	U

Data Qualifiers

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NR-Not Reported
K-Actual value is known to be less than value given.
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R-QC indicates that data unusable. Compound may or may not be present. Resampling and reanalysis is necessary for verification.
C-Confirmed by GCMS.
1.When no value is reported, see chlordane constituents.
2.Constituents or metabolites of technical chlordane.

APPENDIX B-2 - CONTINUED
FT. PIERCE ODMDS - JULY 1999
EXTRACTABLE ORGANICS ANALYSIS IN SEDIMENTS (ug/kg) - PAGE 2 OF 3

STA	DATE	TIME	4-CHLOROPHENYL PHENYL ETHER		4-NITROANILINE		4-NITROPHENOL		ACENAPHTHENE		ACENAPHTHYLENE		ANTHRACENE		BENZO(A)ANTHRACENE	
FP001SD	07/13/99	1846	650	U	650	U	1300	U	650	U	650	U	650	U	650	U
FP002SD	07/13/99	910	660	U	660	U	1300	U	660	U	660	U	660	U	660	U
FP003SD	07/13/99	1023	790	U	790	U	1600	U	790	U	790	U	790	U	790	U
FP004SD	07/13/99	1517	760	U	760	U	1500	U	760	U	760	U	760	U	760	U
FP005SD	07/13/99	1622	780	U	780	U	1600	U	780	U	780	U	780	U	780	U
FP006SD	07/13/99	1719	710	U	710	U	1400	U	710	U	710	U	710	U	710	U
FP007SD	07/14/99	941	700	U	700	U	1400	U	700	U	700	U	700	U	700	U
FP008SD	07/14/99	1037	800	U	800	U	1600	U	800	U	800	U	800	U	800	U
FP009SD	07/14/99	1545	790	U	790	U	1600	U	790	U	790	U	790	U	790	U
FP010SD	07/14/99	1334	710	U	710	U	1400	U	710	U	710	U	710	U	710	U
FP011SD	07/14/99	1431	730	U	730	U	1500	U	730	U	730	U	730	U	730	U
FP012SD	07/14/99	848	820	U	820	U	1600	U	820	U	820	U	820	U	820	U
QA006SD	07/13/99	1721	720	U	720	U	1400	U	720	U	720	U	720	U	720	U
QA011SD	07/14/99	1435	780	U	780	U	1600	U	780	U	780	U	780	U	780	U

STA	DATE	TIME	BENZO(B)FLUORANTHENE		BENZO(GHI)PERYLENE		BENZO(K)FLUORANTHENE		BENZO-A-PYRENE		BENZYL BUTYL PHTHALATE		BIS(2-CHLOROETHOXY)METHANE		BIS(2-CHLOROETHYL) ETHER	
FP001SD	07/13/99	1846	650	U	650	U	650	U	650	U	650	U	650	U	650	U
FP002SD	07/13/99	910	660	U	660	U	660	U	660	U	660	U	660	U	660	U
FP003SD	07/13/99	1023	790	U	790	U	790	U	790	U	790	U	790	U	790	U
FP004SD	07/13/99	1517	760	U	760	U	760	U	760	U	760	U	760	U	760	U
FP005SD	07/13/99	1622	780	U	780	U	780	U	780	U	780	U	780	U	780	U
FP006SD	07/13/99	1719	710	U	710	U	710	U	710	U	710	U	710	U	710	U
FP007SD	07/14/99	941	700	U	700	U	700	U	700	U	700	U	700	U	700	U
FP008SD	07/14/99	1037	800	U	800	U	800	U	800	U	800	U	800	U	800	U
FP009SD	07/14/99	1545	790	U	790	U	790	U	790	U	790	U	790	U	790	U
FP010SD	07/14/99	1334	710	U	710	U	710	U	710	U	710	U	710	U	710	U
FP011SD	07/14/99	1431	730	U	730	U	730	U	730	U	730	U	730	U	730	U
FP012SD	07/14/99	848	820	U	820	U	820	U	820	U	820	U	820	U	820	U
QA006SD	07/13/99	1721	720	U	720	U	720	U	720	U	720	U	720	U	720	U
QA011SD	07/14/99	1435	780	U	780	U	780	U	780	U	780	U	780	U	780	U

STA	DATE	TIME	BIS(2-CHLOROISOPROPYL) ETHER		BIS(2-ETHYLHEXYL) PHTHALATE		CARBAZOLE		CHRYSENE		DIBENZO(A,H)ANTHRACENE		DIBENZOFURAN		DIETHYL PHTHALATE	
FP001SD	07/13/99	1846	650	U	650	U	650	U	650	U	650	U	650	U	650	U
FP002SD	07/13/99	910	660	U	660	U	660	U	660	U	660	U	660	U	660	U
FP003SD	07/13/99	1023	790	U	790	U	790	U	790	U	790	U	790	U	790	U
FP004SD	07/13/99	1517	760	U	760	U	760	U	760	U	760	U	760	U	760	U
FP005SD	07/13/99	1622	780	U	780	U	780	U	780	U	780	U	780	U	780	U
FP006SD	07/13/99	1719	710	U	710	U	710	U	710	U	710	U	710	U	710	U
FP007SD	07/14/99	941	700	U	700	U	700	U	700	U	700	U	700	U	700	U
FP008SD	07/14/99	1037	800	U	800	U	800	U	800	U	800	U	800	U	800	U
FP009SD	07/14/99	1545	790	U	790	U	790	U	790	U	790	U	790	U	790	U
FP010SD	07/14/99	1334	710	U	710	U	710	U	710	U	710	U	710	U	710	U
FP011SD	07/14/99	1431	730	U	730	U	730	U	730	U	730	U	730	U	730	U
FP012SD	07/14/99	848	820	U	820	U	820	U	820	U	820	U	820	U	820	U
QA006SD	07/13/99	1721	720	U	720	U	720	U	720	U	720	U	720	U	720	U
QA011SD	07/14/99	1435	780	U	780	U	780	U	780	U	780	U	780	U	780	U

Data Qualifiers

A-Average value. NA-Not analyzed. NAI-Interferences. J-Estimated value.
N-Presumptive evidence of presence of material.
NR-Not Reported
K-Actual value is known to be less than value given.
L-Actual value is known to be greater than value given.

U-Material was analyzed for but not detected. The number is the minimum quantitation limit.
R-QC indicates that data unusable. Compound may or may not be present. Resampling and reanalysis is necessary for verification.
C-Confirmed by GCMS.
1.When no value is reported, see chlordane constituents.
2.Constituents or metabolites of technical chlordane.

APPENDIX B-2 - CONTINUED
FT. PIERCE ODMDS - JULY 1999
EXTRACTABLE ORGANICS ANALYSIS IN SEDIMENTS (ug/kg) - PAGE 3 OF 3

STA	DATE	TIME	DIMETHYL PHTHALATE		DI-N-BUTYLPHTHALATE		DI-N-OCTYLPHTHALATE		FLUORANTHENE		FLUORENE		HEXACHLOROBENZENE (HCB)		HEXACHLOROBUTADIENE	
FP001SD	07/13/99	1846	650	U	650	U	650	U	650	U	650	U	650	U	650	U
FP002SD	07/13/99	910	660	U	660	U	660	U	660	U	660	U	660	U	660	U
FP003SD	07/13/99	1023	790	U	790	U	790	U	790	U	790	U	790	U	790	U
FP004SD	07/13/99	1517	760	U	760	U	760	U	760	U	760	U	760	U	760	U
FP005SD	07/13/99	1622	780	U	780	U	780	U	780	U	780	U	780	U	780	U
FP006SD	07/13/99	1719	710	U	710	U	710	U	710	U	710	U	710	U	710	U
FP007SD	07/14/99	941	700	U	700	U	700	U	700	U	700	U	700	U	700	U
FP008SD	07/14/99	1037	800	U	800	U	800	U	800	U	800	U	800	U	800	U
FP009SD	07/14/99	1545	790	U	790	U	790	U	790	U	790	U	790	U	790	U
FP010SD	07/14/99	1334	710	U	710	U	710	U	710	U	710	U	710	U	710	U
FP011SD	07/14/99	1431	730	U	730	U	730	U	730	U	730	U	730	U	730	U
FP012SD	07/14/99	848	820	U	820	U	820	U	820	U	820	U	820	U	820	U
QA006SD	07/13/99	1721	720	U	720	U	720	U	720	U	720	U	720	U	720	U
QA011SD	07/14/99	1435	780	U	780	U	780	U	780	U	780	U	780	U	780	U

STA	DATE	TIME	HEXACHLOROCYCLOPENTADIENE (HCCP)		HEXACHLOROETHANE		INDENO (1,2,3-CD) PYRENE		ISOPHORONE		NAPHTHALENE		NITROBENZENE		N-NITROSODI-N-PROPYLAMINE	
FP001SD	07/13/99	1846	650	U	650	U	650	U	650	U	650	U	650	U	650	U
FP002SD	07/13/99	910	660	U	660	U	660	U	660	U	660	U	660	U	660	U
FP003SD	07/13/99	1023	790	U	790	U	790	U	790	U	790	U	790	U	790	U
FP004SD	07/13/99	1517	760	U	760	U	760	U	760	U	760	U	760	U	760	U
FP005SD	07/13/99	1622	780	U	780	U	780	U	780	U	780	U	780	U	780	U
FP006SD	07/13/99	1719	710	U	710	U	710	U	710	U	710	U	710	U	710	U
FP007SD	07/14/99	941	700	U	700	U	700	U	700	U	700	U	700	U	700	U
FP008SD	07/14/99	1037	800	U	800	U	800	U	800	U	800	U	800	U	800	U
FP009SD	07/14/99	1545	790	U	790	U	790	U	790	U	790	U	790	U	790	U
FP010SD	07/14/99	1334	710	U	710	U	710	U	710	U	710	U	710	U	710	U
FP011SD	07/14/99	1431	730	U	730	U	730	U	730	U	730	U	730	U	730	U
FP012SD	07/14/99	848	820	U	820	U	820	U	820	U	820	U	820	U	820	U
QA006SD	07/13/99	1721	720	U	720	U	720	U	720	U	720	U	720	U	720	U
QA011SD	07/14/99	1435	780	U	780	U	780	U	780	U	780	U	780	U	780	U

STA	DATE	TIME	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE		PENTACHLOROPHENOL		PHENANTHRENE		PHENOL		PYRENE		HEXADECANOIC ACID		HEXADECENOIC ACID	
FP001SD	07/13/99	1846	650	U	1300	U	650	U	650	U	650	U		NA		NA
FP002SD	07/13/99	910	660	U	1300	U	660	U	660	U	660	U	1000	JN	800	JN
FP003SD	07/13/99	1023	790	U	1600	U	790	U	790	U	790	U	2000	JN	800	JN
FP004SD	07/13/99	1517	760	U	1500	U	760	U	760	U	760	U	1000	JN	1000	JN
FP005SD	07/13/99	1622	780	U	1600	U	780	U	780	U	780	U	1000	JN	1000	JN
FP006SD	07/13/99	1719	710	U	1400	U	710	U	710	U	710	U	1000	JN		NR
FP007SD	07/14/99	941	700	U	1400	U	700	U	700	U	700	U	2000	JN	1000	JN
FP008SD	07/14/99	1037	800	U	1600	U	800	U	800	U	800	U	1000	JN		NR
FP009SD	07/14/99	1545	790	U	1600	U	790	U	790	U	790	U	1000	JN	800	JN
FP010SD	07/14/99	1334	710	U	1400	U	710	U	710	U	710	U	2000	JN	2000	JN
FP011SD	07/14/99	1431	730	U	1500	U	730	U	730	U	730	U	1000	JN		NR
FP012SD	07/14/99	848	820	U	1600	U	820	U	820	U	820	U	800	JN	800	JN
QA006SD	07/13/99	1721	720	U	1400	U	720	U	720	U	720	U				
QA011SD	07/14/99	1435	780	U	1600	U	780	U	780	U	780	U				

Data Qualifiers

A-Average value. NA-Not analyzed. NAI-Interferences. J-Estimated value.
N-Presumptive evidence of presence of material.
NR-Not Reported
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L-Actual value is known to be greater than value given.

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R-QC indicates that data unusable. Compound may or may not be present. Resampling and reanalysis is necessary for verification.
C-Confirmed by GCMS.
1.When no value is reported, see chlordane constituents.
2.Constituents or metabolites of technical chlordane.

APPENDIX C
VOLATILE ORGANICS ANALYSIS IN SEDIMENT

APPENDIX C-1
FT. PIERCE ODMDS - MARCH, 1992
VOLATILES ORGANIC ANALYSIS IN SEDIMENTS (ug/kg) - PAGE 1 OF 2

STA	TME	(M- AND/OR P-)XYLENE		1,1,1,2-TETRACHLOROETHANE		1,1,1-TRICHLOROETHANE		1,1,2,2-TETRACHLOROETHANE		1,1,2-TRICHLOROETHANE		1,1-DICHLOROETHANE		1,1-DICHLOROETHENE (1,1-DICHLOROETHYLENE)	
2	1440	63	U	63	U	63	U	63	U	63	U	63	U	63	U
4	1243	50	U	50	U	50	U	50	U	50	U	50	U	50	U
5	1110	63	U	63	U	63	U	63	U	63	U	63	U	63	U
8	1128	58	U	58	U	58	U	58	U	58	U	58	U	58	U
9	916	62	U	62	U	62	U	62	U	62	U	62	U	62	U
10	1638	64	U	64	U	64	U	64	U	64	U	64	U	64	U

STA	TME	1,1-DICHLOROPROPENE		1,2,3-TRICHLOROPROPANE		1,2-DICHLOROBENZENE		1,2-DICHLOROETHANE		1,2-DICHLOROPROPANE		1,3-DICHLOROBENZENE		1,3-DICHLOROPROPANE	
2	1440	63	U	63	U	63	U	63	U	63	U	63	U	63	U
4	1243	50	U	50	U	50	U	50	U	50	U	50	U	50	U
5	1110	63	U	63	U	63	U	63	U	63	U	63	U	63	U
8	1128	58	U	58	U	58	U	58	U	58	U	58	U	58	U
9	916	62	U	62	U	62	U	62	U	62	U	62	U	62	U
10	1638	64	U	64	U	64	U	64	U	64	U	64	U	64	U

STA	TME	1,4-DICHLOROBENZENE		2,2-DICHLOROPROPANE		ACETONE		BENZENE		BROMOBENZENE		BROMOCHLOROMETHANE		BROMODICHLOROMETHANE	
2	1440	63	U	63	U	630	U	63	U	63	U	63	U	63	U
4	1243	50	U	50	U	500	U	50	U	50	U	50	U	50	U
5	1110	63	U	63	U	630	U	63	U	63	U	63	U	63	U
8	1128	58	U	58	U	580	U	58	U	58	U	58	U	58	U
9	916	62	U	62	U	620	U	62	U	62	U	62	U	62	U
10	1638	64	U	64	U	640	U	64	U	64	U	64	U	64	U

STA	TME	BROMOFORM		BROMOMETHANE		CARBON DISULFIDE		CARBON TETRACHLORIDE		CHLOROBENZENE		CHLOROETHANE		CHLOROFORM	
2	1440	63	U	63	U	160	U	63	U	63	U	63	U	1.5	U
4	1243	50	J	50	U	14	J	50	U	50	U	50	U	2.1	U
5	1110	63	U	63	U	160	U	63	U	63	U	63	U	2.1	U
8	1128	58	U	58	U	140	U	58	U	58	U	58	U	1.3	U
9	916	62		62	U	160	U	62	U	62	U	62	U	1.8	U
10	1638	64	U	64	U	160	U	64	U	64	U	64	U	1.5	U

Data Qualifiers

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2.Constituents or metabolites of technical chlordane.

APPENDIX C-1 - CONTINUED
FT. PIERCE ODMDS - MARCH, 1992
VOLATILES ORGANIC ANALYSIS IN SEDIMENTS (ug/kg) - PAGE 2 OF 2

STA	TME	CHLOROMETHANE		CIS-1,2-DICHLOROETHENE		CIS-1,3-DICHLOROPROPENE		DIBROMOCHLOROMETHANE		DIBROMOMETHANE		ETHYL BENZENE		METHYL BUTYL KETONE	
2	1440	1.5	U	63	U	63	U	63	U	63	U	63	U	160	U
4	1243	2.1	U	50	U	50	U	50	U	50	U	50	U	120	U
5	1110	2.1	U	63	U	63	U	63	U	63	U	63	U	160	U
8	1128	1.3	U	58	U	58	U	58	U	58	U	58	U	140	U
9	916	1.8	U	62	U	62	U	62	U	62	U	62	U	160	U
10	1638	1.5	U	64	U	64	U	64	U	64	U	64	U	160	U

STA	TME	METHYL ETHYL KETONE		METHYL ISOBUTYL KETONE		METHYLENE CHLORIDE		O-CHLOROTOLUENE		O-XYLENE		P-CHLOROTOLUENE		STYRENE	
2	1440	630	U	160	U	63	U	63	U	63	U	63	U	63	U
4	1243	500	U	120	U	50	U	50	U	50	U	50	U	50	U
5	1110	630	U	160	U	63	U	63	U	63	U	63	U	63	U
8	1128	580	U	140	U	58	U	58	U	58	U	58	U	58	U
9	916	620	U	160	U	62	U	62	U	62	U	62	U	62	U
10	1638	640	U	160	U	64	U	64	U	64	U	64	U	64	U

STA	TME	TETRACHLOROETHENE		TOLUENE		TRANS-1,2-DICHLOROETHENE		TRANS-1,3-DICHLOROPROPENE		TRICHLOROETHENE (TRICHLOROETHYLENE)		TRICHLOROFLUOROMETHANE		VINYL CHLORIDE		THIOBISMETHANE	
2	1440	63	U	63	U	63	U	63	U	63	U	63	U	63	U	20	JN
4	1243	50	U	50	U	50	U	50	U	50	U	50	U	50	U	30	JN
5	1110	63	U	63	U	63	U	63	U	63	U	63	U	63	U	300	JN
8	1128	58	U	58	U	58	U	58	U	58	U	58	U	58	U	30	JN
9	916	62	U	62	U	62	U	62	U	62	U	62	U	62	U	80	JN
10	1638	64	U	64	U	64	U	64	U	64	U	64	U	64	U		

Data Qualifiers

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N-Presumptive evidence of presence of material.
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L-Actual value is known to be greater than value given.

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2.Constituents or metabolites of technical chlordane.

APPENDIX C-2
FT. PIERCE ODMDS - JULY 1999
VOLATILES ORGANIC ANALYSIS IN SEDIMENTS (ug/kg) - PAGE 1 OF 3

STA	TME	(M- AND/OR P-)XYLENE		1,1,1,2-TETRACHLOROETHANE		1,1,1-TRICHLOROETHANE		1,1,2,2-TETRACHLOROETHANE		1,1,2-TRICHLOROETHANE		1,1-DICHLOROETHANE		1,1-DICHLOROETHENE (1,1-DICHLOROETHYLENE)	
FP001SD	1846	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP002SD	910	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP003SD	1023	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP004SD	1517	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP005SD	1622	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U
FP006SD	1719	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP007SD	941	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
FP008SD	1037	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U
FP009SD	1545	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP010SD	1334	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP011SD	1431	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP012SD	848	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
QA006SD	1721	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
QA011SD	1435	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
QA013SDI	1315	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
QA013SDT	1600	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U

STA	TME	1,1-DICHLOROPROPENE		1,2,3-TRICHLOROBENZENE		1,2,3-TRICHLOROPROPANE		1,2,4-TRICHLOROBENZENE		1,2,4-TRIMETHYLBENZENE		1,2-DIBROMO-3-CHLOROPROPANE (DBCP)		1,2-DIBROMOETHANE (EDB)	
FP001SD	1846	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP002SD	910	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP003SD	1023	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP004SD	1517	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP005SD	1622	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U
FP006SD	1719	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP007SD	941	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
FP008SD	1037	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U
FP009SD	1545	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP010SD	1334	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP011SD	1431	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP012SD	848	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
QA006SD	1721	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
QA011SD	1435	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
QA013SDI	1315	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
QA013SDT	1600	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U

STA	TME	1,2-DICHLOROBENZENE		1,2-DICHLOROETHANE		1,2-DICHLOROPROPANE		1,3,5-TRIMETHYLBENZENE		1,3-DICHLOROBENZENE		1,3-DICHLOROPROPANE		1,4-DICHLOROBENZENE	
FP001SD	1846	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP002SD	910	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP003SD	1023	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP004SD	1517	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP005SD	1622	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U
FP006SD	1719	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP007SD	941	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
FP008SD	1037	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U
FP009SD	1545	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP010SD	1334	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP011SD	1431	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP012SD	848	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
QA006SD	1721	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
QA011SD	1435	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
QA013SDI	1315	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
QA013SDT	1600	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U

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APPENDIX C-2 - CONTINUED
FT. PIERCE ODMDS - JULY, 1999
VOLATILES ORGANIC ANALYSIS IN SEDIMENTS (ug/kg) - PAGE 2 OF 3

STA	TME	2,2-DICHLOROPROPANE		ACETONE		BENZENE		BROMOBENZENE		BROMOCHLOROMETHANE		BROMODICHLOROMETHANE		BROMOFORM	
FP001SD	1846	1.5	U	37	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP002SD	910	2.1	U	52	U	2.1	U	2.1	U	2.1	U	2.1	U	0.67	J
FP003SD	1023	2.1	U	52	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP004SD	1517	1.3	U	32	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP005SD	1622	1.8	U	44	U	1.8	U	1.8	U	1.8	U	1.8	U	2.1	
FP006SD	1719	1.5	U	37	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP007SD	941	1.4	U	35	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
FP008SD	1037	0.95	U	24	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U
FP009SD	1545	1.2	U	31	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP010SD	1334	1.2	U	30	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP011SD	1431	1.3	U	33	U	1.3	U	1.3	U	1.3	U	1.3	U	0.53	J
FP012SD	848	1.9	U	48	U	1.9	U	1.9	U	1.9	U	1.9	U	0.76	J
QA006SD	1721	1.3	U	32	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
QA011SD	1435	1.6	U	41	U	1.6	U	1.6	U	1.6	U	1.6	U	3	
QA013SDB	1315	2.1	U	53	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
QA013SDT	1600	1.5	U	38	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U

STA	TME	BROMOMETHANE		CARBON DISULFIDE		CARBON TETRACHLORIDE		CHLOROBENZENE		CHLOROETHANE		CHLOROFORM		CHLOROMETHANE	
FP001SD	1846	1.5	U	3.7	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP002SD	910	2.1	U	5.2	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP003SD	1023	2.1	U	5.2	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP004SD	1517	1.3	U	3.2	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP005SD	1622	1.8	U	4.4	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U
FP006SD	1719	1.5	U	3.7	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP007SD	941	1.4	U	3.5	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
FP008SD	1037	0.95	U	2.4	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U
FP009SD	1545	1.2	U	3.1	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP010SD	1334	1.2	U	3	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP011SD	1431	1.3	U	3.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP012SD	848	1.9	U	4.8	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
QA006SD	1721	1.3	U	3.2	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
QA011SD	1435	1.6	U	4.1	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
QA013SDB	1315	2.1	U	5.3	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
QA013SDT	1600	1.5	U	3.8	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U

STA	TME	CIS-1,2-DICHLOROETHENE		CIS-1,3-DICHLOROPROPENE		DIBROMOCHLOROMETHANE		DIBROMOMETHANE		DICHLORODIFLUOROMETHANE		ETHYL BENZENE		HEXACHLORO-1,3-BUTADIENE	
FP001SD	1846	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP002SD	910	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP003SD	1023	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP004SD	1517	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP005SD	1622	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U
FP006SD	1719	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP007SD	941	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
FP008SD	1037	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U
FP009SD	1545	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP010SD	1334	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP011SD	1431	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP012SD	848	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
QA006SD	1721	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
QA011SD	1435	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
QA013SDB	1315	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
QA013SDT	1600	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U

Data Qualifiers

A-Average value. NA-Not analyzed. NAI-Interferences. J-Estimated value.
N-Presumptive evidence of presence of material.
NR-Not Reported
K-Actual value is known to be less than value given.
L-Actual value is known to be greater than value given.

U-Material was analyzed for but not detected. The number is the minimum quantitation limit.
R-QC indicates that data unusable. Compound may or may not be present. Resampling and reanalysis is necessary for verification.
C-Confirmed by GCMS.
1.When no value is reported, see chlordane constituents.
2.Constituents or metabolites of technical chlordane.

APPENDIX C-2 - CONTINUED
FT. PIERCE ODMDS - JULY, 1999
VOLATILES ORGANIC ANALYSIS IN SEDIMENTS (ug/kg) - PAGE 3 OF 3

STA	TME	ISOPROPYLBENZENE		METHYL BUTYL KETONE		METHYL ETHYL KETONE		METHYL ISOBUTYL KETONE		METHYLENE CHLORIDE		N-BUTYLBENZENE		N-PROPYLBENZENE		O-CHLOROTOLUENE	
FP001SD	1846	1.5	U	3.7	U	37	U	3.7	U	7.4	U	1.5	U	1.5	U	1.5	U
FP002SD	910	2.1	U	5.2	U	52	U	5.2	U	10	U	2.1	U	2.1	U	2.1	U
FP003SD	1023	2.1	U	5.2	U	52	U	5.2	U	10	U	2.1	U	2.1	U	2.1	U
FP004SD	1517	1.3	U	3.2	U	32	U	3.2	U	6.5	U	1.3	U	1.3	U	1.3	U
FP005SD	1622	1.8	U	4.4	U	44	U	4.4	U	8.8	U	1.8	U	1.8	U	1.8	U
FP006SD	1719	1.5	U	3.7	U	37	U	3.7	U	7.5	U	1.5	U	1.5	U	1.5	U
FP007SD	941	1.4	U	3.5	U	35	U	3.5	U	6.9	U	1.4	U	1.4	U	1.4	U
FP008SD	1037	0.95	U	2.4	U	24	U	2.4	U	4.8	U	0.95	U	0.95	U	0.95	U
FP009SD	1545	1.2	U	3.1	U	31	U	3.1	U	6.2	U	1.2	U	1.2	U	1.2	U
FP010SD	1334	1.2	U	3	U	30	U	3	U	6	U	1.2	U	1.2	U	1.2	U
FP011SD	1431	1.3	U	3.3	U	33	U	3.3	U	6.6	U	1.3	U	1.3	U	1.3	U
FP012SD	848	1.9	U	4.8	U	48	U	4.8	U	9.6	U	1.9	U	1.9	U	1.9	U
QA006SD	1721	1.3	U	3.2	U	32	U	3.2	U	6.3	U	1.3	U	1.3	U	1.3	U
QA011SD	1435	1.6	U	4.1	U	41	U	4.1	U	8.2	U	1.6	U	1.6	U	1.6	U
QA013SDB	1315	2.1	U	5.3	U	53	U	5.3	U	11	U	2.1	U	2.1	U	2.1	U
QA013SDT	1600	1.5	U	3.8	U	38	U	3.8	U	7.7	U	1.5	U	1.5	U	1.5	U

STA	TME	O-XYLENE		P-CHLOROTOLUENE		P-ISOPROPYLTOLUENE		SEC-BUTYLBENZENE		STYRENE		TERT-BUTYLBENZENE		TETRACHLOROETHENE		TOLUENE	
FP001SD	1846	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP002SD	910	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP003SD	1023	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
FP004SD	1517	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP005SD	1622	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U
FP006SD	1719	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
FP007SD	941	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
FP008SD	1037	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U
FP009SD	1545	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP010SD	1334	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
FP011SD	1431	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
FP012SD	848	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	0.65	J
QA006SD	1721	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
QA011SD	1435	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
QA013SDB	1315	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U
QA013SDT	1600	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U

STA	TME	TRANS-1,2-DICHLOROETHENE		TRANS-1,3-DICHLOROPROPENE		TRICHLOROETHENE (TRICHLOROETHYLENE)		TRICHLOROFLUOROMETHANE		VINYL CHLORIDE		BUTENYLCYCLOHEPTADIENE		DIMETHYL SULFIDE	
FP001SD	1846	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U		NR	200	JN
FP002SD	910	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U		NR	50	JN
FP003SD	1023	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U		NR	30	JN
FP004SD	1517	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U		NR	100	JN
FP005SD	1622	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U	10	JN	50	JN
FP006SD	1719	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U		NR	40	JN
FP007SD	941	1.4	U	1.4	U	1.4	U	1.4		1.4	U		NR	10	JN
FP008SD	1037	0.95	U	0.95	U	0.95	U	0.95	U	0.95	U		NR	100	JN
FP009SD	1545	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U		NR	100	JN
FP010SD	1334	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U		NR	70	JN
FP011SD	1431	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	20	JN	200	JN
FP012SD	848	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U		NR	40	JN
QA006SD	1721	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U		NR	70	JN
QA011SD	1435	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U				
QA013SDB	1315	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U				
QA013SDT	1600	1.5	U	1.5	U	1.5	U	2.7		1.5	U				

Data Qualifiers

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NR-Not Reported
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L-Actual value is known to be greater than value given.

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R-QC indicates that data unusable. Compound may or may not be present. Resampling and reanalysis is necessary for verification.
C-Confirmed by GCMS.
1.When no value is reported, see chlordane constituents.
2.Constituents or metabolites of technical chlordane.

APPENDIX D
NUTRIENT ANALYSIS IN SEDIMENTS

FT. PIERCE ODMDS, NUTRIENTS IN SEDIMENT (mg/kg), MARCH 1992										
STA	DATE	TIME	AMMONIA		NITRATE-NITRITE NITROGEN		TKN		TOTAL PHOSPHORUS	
1	03/15/92	1007	4		16	U	220		360	
2	03/15/92	1440	2.8	U	16	U	200		130	
3	03/15/92	1340	9.2		16	U	250		360	
4	03/15/92	1243	5.4		16	U	200		200	
5	03/16/92	1110	7.2		15	U	240		270	
6	03/15/92	1545	4.5		15	U	260		240	
7	03/16/92	1243	5.3		16	U	210		230	
8	03/16/92	1128	3.6		15	U	260		250	
9	03/16/92	916	5.2		16	U	180		180	
10	03/15/92	1638	4		15	U	160		240	
11	03/16/92	1021	3	U	14	U	180		190	

FT. PIERCE ODMDS - NUTRIENTS IN SEDIMENT (mg/kg), JULY 1999										
STA	DATE	TIME	AMMONIA		NITRATE-NITRITE NITROGEN		TKN		TOTAL PHOSPHORUS	
1	07/13/99	1846	4.2	A	18	U	130	A	520	A
2	07/13/99	910	12		18	U	250		320	
3	07/13/99	1023	7.7		18	U	230		380	
4	07/13/99	1517	6.7		18	U	73		270	
5	07/13/99	1622	9.4		18	U	62		280	
6	07/13/99	1719	3.6		17	U	16		360	
7	07/14/99	941	5		18	U	37		330	
8	07/14/99	1037	4.8	A	18	U	25		270	
9	07/14/99	1545	4.5		18	U	56		290	
10	07/14/99	1334	4.7		18	U	43		250	
11	07/14/99	1431	5.6		17	U	56		290	
12	07/14/99	848	5.6		25	U	250	A	330	A

Data Qualifiers
A-Average value. NA-Not analyzed. NAI-Interferences. J-Estimated value.
N-Presumptive evidence of presence of material.
NR-Not Reported
K-Actual value is known to be less than value given.
L-Actual value is known to be greater than value given.
U-Material was analyzed for but not detected. The number is the minimum quantitation limit.
R-QC indicates that data unusable. Compound may or may not be present. Resampling and reanalysis is necessary for verification.
C-Confirmed by GCMS.
1.When no value is reported, see chlordane constituents.
2.Constituents or metabolites of technical chlordane.

APPENDIX E
NUTRIENT ANALYSIS IN WATER

FT. PIERCE ODMDS - NUTRIENTS IN WATER, MARCH 14, 1992										
STA	STRATA	TIME	AMMONIA		$NO_2 + NO_3$		TKN		TOTAL PHOSPHORUS	
2	TOP	940	0.05	U	0.05	U	0.1	U	0.02	U
2	MID	940	0.05	U	0.05	U	0.1	U	0.02	U
2	BOTTOM	940	0.05	U	0.05	U	0.1	U	0.02	U
4	TOP	1010	0.05	U	0.05	U	0.1	U	0.02	U
4	MID	1010	0.05	U	0.05	U	0.1	U	0.02	U
4	BOTTOM	1010	0.05	U	0.05	U	0.1	U	0.02	U
5	TOP	1040	0.05	U	0.05	U	0.3		0.02	U
5	MID	1040	0.05	U	0.05	U	0.41		0.02	U
5	BOTTOM	1040	0.05	U	0.05	U	0.33		0.02	U
8	TOP	1115	0.05	U	0.05	U	0.29		0.02	U
8	MID	1115	0.05	U	0.05	U	0.28		0.02	U
8	BOTTOM	1115	0.05	U	0.05	U	0.29		0.02	U
9	TOP	1235	0.05	U	0.05	U	0.2		0.02	U
9	MID	1235	0.05	U	0.05	U	0.16		0.02	U
9	BOTTOM	1235	0.05	U	0.05	U	0.16		0.02	U
10	TOP	1148	0.05	U	0.05	U	0.22		0.02	U
10	MID	1148	0.05	U	0.05	U	0.22		0.02	U
10	BOTTOM	1148	0.05	U	0.05	U	0.19		0.02	U
12	TOP	1310	0.05	U	0.05	U	0.25		0.02	J
12	MID	1310	0.05	U	0.05	U	0.28		0.02	U

FT. PIERCE ODMDS - NUTRIENTS IN WATER, JULY 13-14, 1999										
STA	STRATA	TIME	AMMONIA		$NO_2 + NO_3$		TKN		TOTAL PHOSPHORUS	
2	TOP	1300	0.05	U	0.05	U	0.1	U	0.02	U
2	MID	1300	0.05	U	0.05	U	0.1	U	0.02	U
2	BOTTOM	1300	0.05	U	0.05	U	0.1	U	0.02	U
5	TOP	1330	0.05	U	0.05	U	0.1	U	0.02	U
5	MID	1330	0.05	U	0.05	U	0.1	U	0.03	
5	BOTTOM	1330	0.05	U	0.05	U	0.1	U	0.02	
6	TOP	1348	0.05	U	0.05	U	0.1	U	0.02	U
6	MID	1348	0.05	U	0.05	U	0.1	U	0.02	U
6	BOTTOM	1348	0.05	U	0.05	U	0.1	U	0.02	U
7	TOP	1205	0.05	U	0.05	U	0.1	U	0.02	U
7	MID	1205	0.05	U	0.05	U	0.1	U	0.02	U
7	BOTTOM	1205	0.05	U	0.05	U	0.1	U	0.02	U
10	TOP	1230	0.05	U	0.05	U	0.1	U	0.02	U
10	MID	1230	0.05	U	0.05	U	0.1	U	0.02	U
10	BOTTOM	1230	0.05	U	0.05	U	0.1	U	0.02	U
11	TOP	1245	0.05	U	0.05	U	0.1	U	0.02	U
11	MID	1245	0.05	U	0.05	U	0.1	U	0.02	U
11	BOTTOM	1245	0.05	U	0.05	U	0.1	U	0.02	U

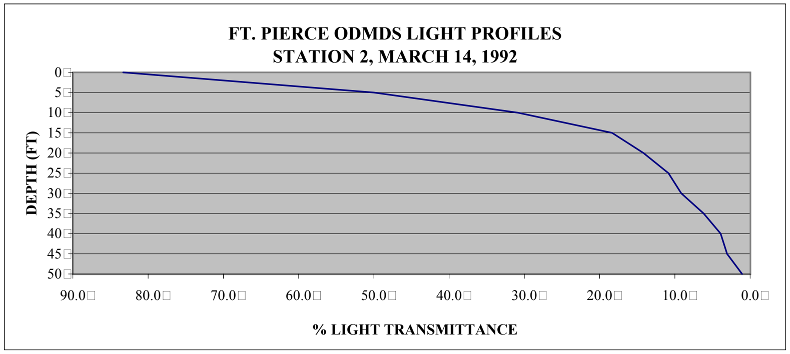
APPENDIX F
PARTICLE SIZE ANALYSIS

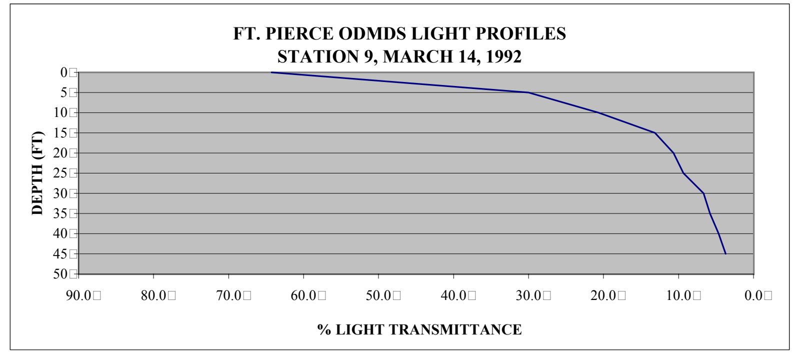
FT. PIERCE ODMDS PARTICLE SIZE SUMMARY - MARCH 1992										
Sta	Clay	Silt	F Sand	M Sand	C Sand	Gravel	% Gravel	% Sand	% Fines	% Organics
1	1.28	0.03	0.09	57.25	39.80	1.50	1.50	97.13	1.31	0.85
2	1.73	0.47	0.31	13.24	47.65	36.61	36.61	61.19	2.19	1.59
3	1.56	0.42	0.47	43.43	44.06	10.07	10.07	87.96	1.98	1.77
4	1.05	0.28	0.29	47.58	39.76	11.05	11.05	87.63	1.33	1.93
5	1.44	0.29	0.24	12.11	50.78	35.15	35.15	63.12	1.73	2.17
6	1.39	3.41	0.39	23.80	48.90	22.11	22.11	73.09	4.80	2.10
7	1.36	0.27	0.47	39.85	42.99	15.06	15.06	83.30	1.64	1.91
8	1.59	0.11	0.04	19.61	62.35	16.30	16.30	82.00	1.70	1.97
9	1.37	0.33	0.16	25.24	39.57	33.33	33.33	64.97	1.70	1.94
10	1.06	0.22	0.19	35.19	33.67	29.67	29.67	69.05	1.28	1.96
11	1.13	0.20	0.14	24.62	43.33	30.57	30.57	68.10	1.33	2.01

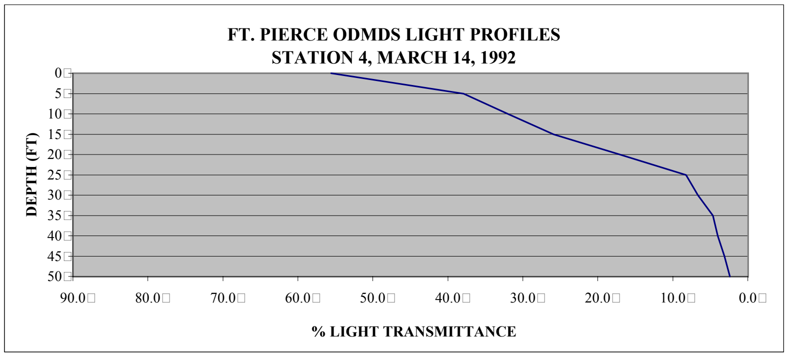
FT. PIERCE ODMDS PARTICLE SIZE SUMMARY - JULY 1999										
Sta	Clay	Silt	F Sand	M Sand	C Sand	Gravel	% Gravel	% Sand	% Fines	% Organics
1	0.40	2.64	46.84	31.45	17.73	0.93	0.93	96.03	3.04	0.76
2	1.35	10.27	4.60	10.12	44.94	28.73	28.73	59.65	11.62	1.71
3	0.98	5.86	6.37	19.70	58.24	8.86	8.86	84.31	6.84	1.63
4	0.13	0.46	2.44	18.14	60.25	18.58	18.58	80.83	0.59	1.35
5	0.09	0.24	2.15	14.65	64.23	18.65	18.65	81.02	0.33	1.36
6	1.08	7.29	14.67	23.04	27.18	26.74	26.74	64.89	8.37	0.91
7	0.12	0.63	5.44	18.45	46.88	28.49	28.49	70.76	0.75	1.47
8	0.08	0.36	3.08	15.19	53.81	27.48	27.48	72.08	0.44	1.54
9	0.09	0.26	3.06	16.48	60.00	20.11	20.11	79.54	0.35	1.29
10	0.08	0.47	3.21	13.42	44.17	38.65	38.65	60.81	0.55	1.25
11	0.08	0.21	1.20	9.33	50.29	38.89	38.89	60.82	0.29	1.53
12	0.40	1.45	3.18	18.41	49.24	27.32	27.32	70.83	1.85	1.37

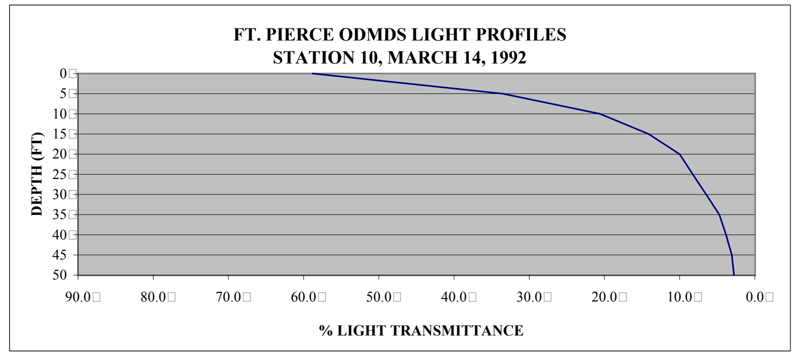
APPENDIX G
LIGHT TRANSMISSION PROFILES

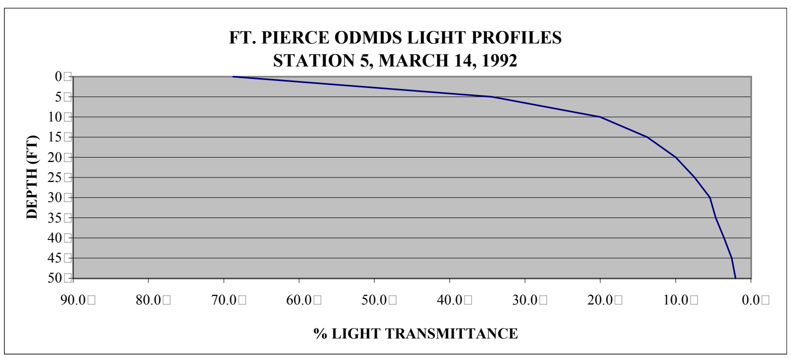
APPENDIX G-1

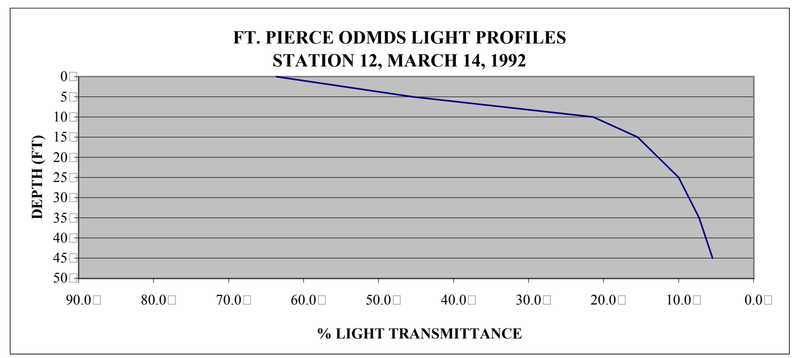

FT. PIERCE ODMDS LIGHT PROFILES
STATION 2, MARCH 14, 1992
DEPTH (FT)
0 5 10 15 20 25 30 35 40 45 50
90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0
% LIGHT TRANSMITTANCE

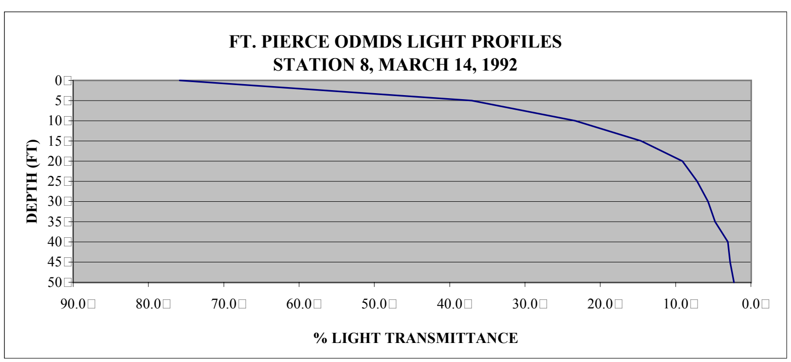

FT. PIERCE ODMDS LIGHT PROFILES
STATION 9, MARCH 14, 1992
DEPTH (FT)
0 5 10 15 20 25 30 35 40 45 50
90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0
% LIGHT TRANSMITTANCE


FT. PIERCE ODMDS LIGHT PROFILES
STATION 4, MARCH 14, 1992
DEPTH (FT)
0 5 10 15 20 25 30 35 40 45 50
90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0
% LIGHT TRANSMITTANCE

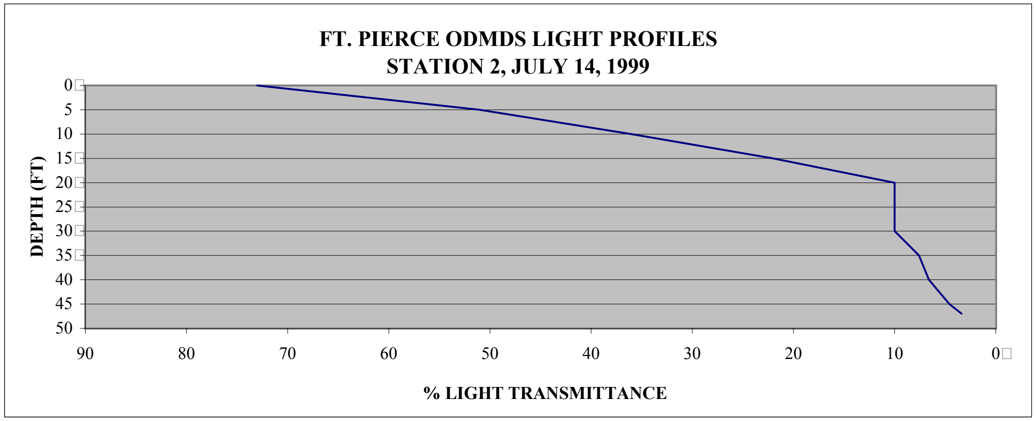

FT. PIERCE ODMDS LIGHT PROFILES
STATION 10, MARCH 14, 1992
DEPTH (FT)
0 5 10 15 20 25 30 35 40 45 50
90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0
% LIGHT TRANSMITTANCE

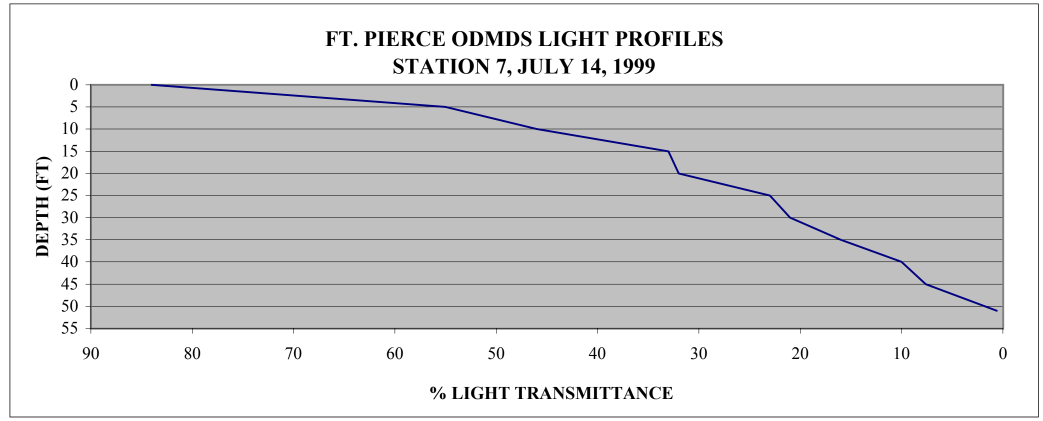

FT. PIERCE ODMDS LIGHT PROFILES
STATION 5, MARCH 14, 1992
DEPTH (FT)
0 5 10 15 20 25 30 35 40 45 50
90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0
% LIGHT TRANSMITTANCE

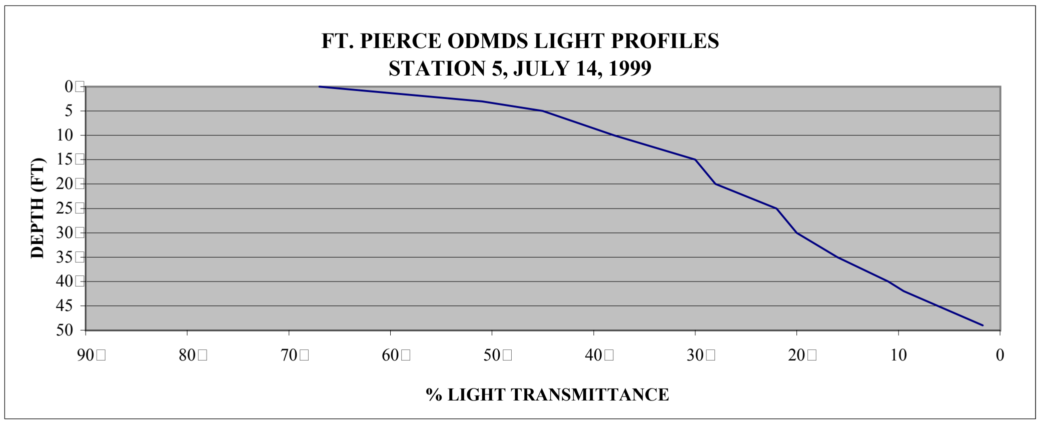

FT. PIERCE ODMDS LIGHT PROFILES
STATION 12, MARCH 14, 1992
DEPTH (FT)
0 5 10 15 20 25 30 35 40 45 50
90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0
% LIGHT TRANSMITTANCE

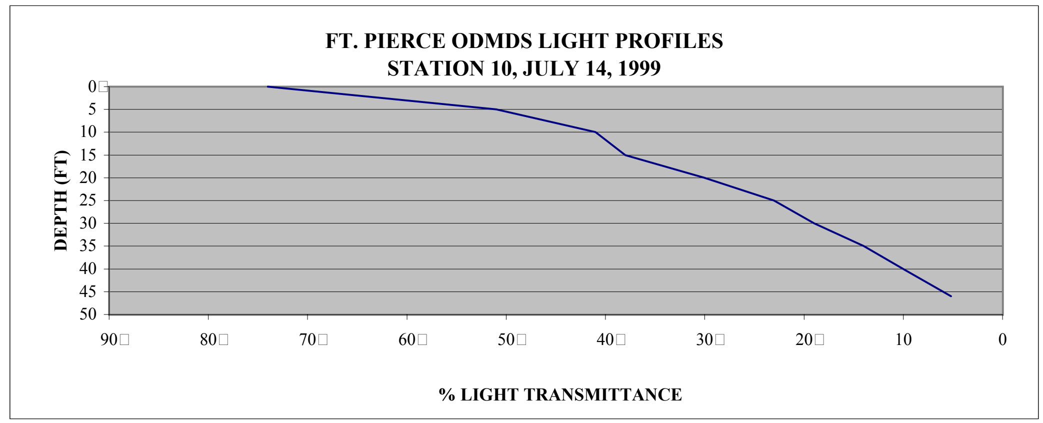

FT. PIERCE ODMDS LIGHT PROFILES
STATION 8, MARCH 14, 1992
DEPTH (FT)
0 5 10 15 20 25 30 35 40 45 50
90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0
% LIGHT TRANSMITTANCE

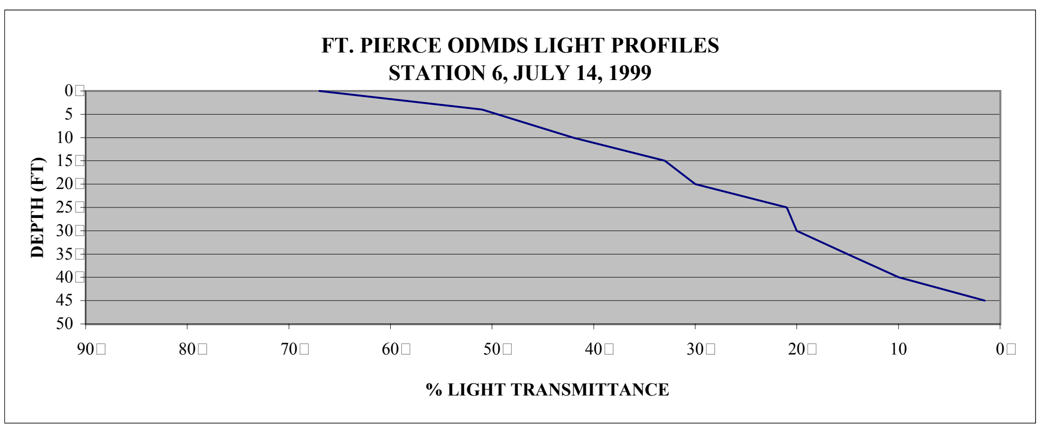
APPENDIX G-2

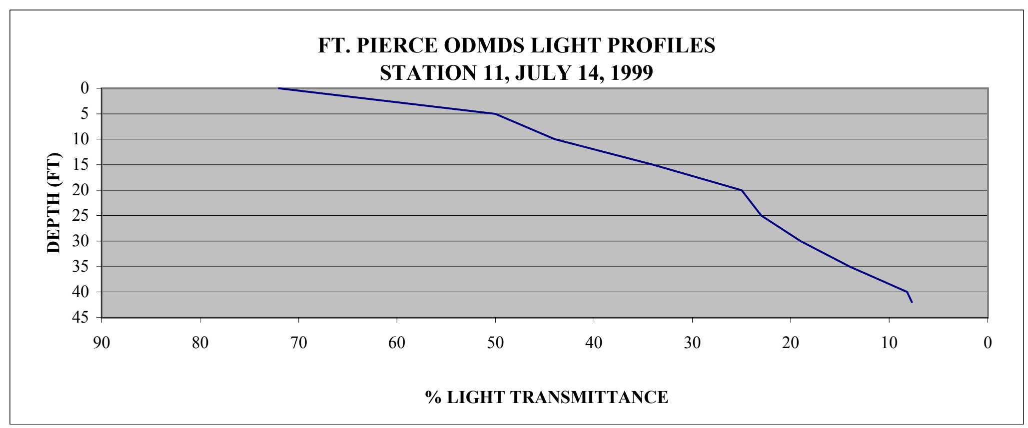

FT. PIERCE ODMDS LIGHT PROFILES
STATION 2, JULY 14, 1999
DEPTH (FT)
% LIGHT TRANSMITTANCE


FT. PIERCE ODMDS LIGHT PROFILES
STATION 7, JULY 14, 1999
DEPTH (FT)
% LIGHT TRANSMITTANCE


FT. PIERCE ODMDS LIGHT PROFILES
STATION 5, JULY 14, 1999
DEPTH (FT)
% LIGHT TRANSMITTANCE


FT. PIERCE ODMDS LIGHT PROFILES
STATION 10, JULY 14, 1999
DEPTH (FT)
% LIGHT TRANSMITTANCE


FT. PIERCE ODMDS LIGHT PROFILES
STATION 6, JULY 14, 1999
DEPTH (FT)
% LIGHT TRANSMITTANCE


FT. PIERCE ODMDS LIGHT PROFILES
STATION 11, JULY 14, 1999
DEPTH (FT)
% LIGHT TRANSMITTANCE

APPENDIX H
CHLOROPHYLL a

CHLOROPHYLL a - FT. PIERCE ODMDS, MARCH 14, 1992				
STA	DATE	% LIGHT	DEPTH (Ft.)	CHLOROPHYLL a (ug/l)
2	03/14/92	90	SURF.	1.2
2	03/14/92	50	5	1.6
2	03/14/92	10	28	1.7
4	03/14/92	90	SURF.	2.1
4	03/14/92	50	1	1.6
4	03/14/92	10	24	2.1
5	03/14/92	90	SURF.	1.6
5	03/14/92	50	3	2.4
5	03/14/92	10	20	2.1
8	03/14/92	90	SURF.	1.6
8	03/14/92	50	3	2.6
8	03/14/92	10	19	2.4
9	03/14/92	90	SURF.	1.1
9	03/14/92	50	3	1.1
9	03/14/92	10	21	1.1
10	03/14/92	90	SURF.	2.1
10	03/14/92	50	2	2.1
10	03/14/92	10	20	1.6
12	03/14/92	90	SURF.	1.3
12	03/14/92	50	3	1.6
12	03/14/92	10	25	1.1

CHLOROPHYLL a - FT. PIERCE ODMDS, JULY 14, 1999				
STA	DATE	% LIGHT	DEPTH (Ft.)	CHLOROPHYLL a (ug/l)
2	07/13/99	90	SURF.	2.2
2	07/13/99	50	5	0.13
2	07/13/99	10	30	0.13
5	07/13/99	90	SURF.	4.9
5	07/13/99	50	3	0.18
5	07/13/99	10	41	0.16
6	07/13/99	90	SURF.	2.3
6	07/13/99	50	4	0.22
6	07/13/99	10	40	0.18
7	07/14/99	90	SURF.	2.6
7	07/14/99	50	5	0.15
7	07/14/99	10	40	0.11
10	07/14/99	90	SURF.	1.9
10	07/14/99	50	5	0.2
10	07/14/99	10	40	0.13
11	07/14/99	90	SURF.	1.2
11	07/14/99	50	5	0.12
11	07/14/99	10	39	0.1

APPENDIX I
MACROINVERTEBRATE COMPOSITION SUMMARY

1992 FT. PIERCE ODMDS MACROINVERTEBRATE SUMMARY				
PHYLUM	**TOTAL # TAXA**	**%TAXA**	**TOTAL INDIVIDUALS**	**%INDIVIDUALS**
ANNELIDA	164	39.3	6006	53.4
MOLLUSCA	105	25.2	1192	10.6
ARTHROPODA	117	28.1	1211	10.8
ECHINODERMATA	10	2.4	1781	15.8
MISC.	21	5.0	1066	9.5
TOTAL	417		11256	

1999 FT. PIERCE ODMDS MACROINVERTEBRATE SUMMARY				
PHYLUM	**TOTAL # TAXA**	**%TAXA**	**TOTAL INDIVIDUALS**	**%INDIVIDUALS**
ANNELIDA	186	38.0	7483	55.9
MOLLUSCA	116	23.7	1497	11.2
ARTHROPODA	158	32.3	2622	19.6
ECHINODERMATA	12	2.5	224	1.7
MISC.	17	3.5	1565	11.7
TOTAL	489		13391	