Monitoring Cruise at the
Western Long Island Sound
Disposal Site
July 1996

Disposal Area Monitoring System DAMOS

D A M O S

DISPOSAL AREA MONITORING SYSTEM

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13. ABSTRACT

A monitoring survey was conducted at the Western Long Island Sound Disposal Site (WLIS) from 16 to 18 July 1996 as part of the Disposal Area Monitoring System (DAMOS) Program. The field efforts were concentrated over the active southwestern quadrant of WLIS and consisted of precision bathymetry and Remote Ecological Monitoring of the Seafloor (REMOTS®). These surveying techniques were used to monitor the development, stability, and benthic recolonization of the disposal mounds formed on the WLIS seafloor from 1992 through 1996.

Currently, a total of eight discrete disposal mounds exist on the WLIS seafloor within an east-west trending trough that extends through the center of the site. The latest survey activity was concentrated over the three most recent dredged material deposits, the WLIS H, WLIS G, and WLIS F mounds, as well as the southern flank of the older WLIS D mound.

The WLIS H mound is the most recent bottom feature formed within WLIS. The WDA buoy received approximately 15,300 m^3 of sands, silts, and clays from 15 April to 29 May 1996. The deposition of this material resulted in the formation of a 1.5 m high disposal mound, approximately 230 m in width. REMOTS® sediment-profile photography detected a solid Stage I pioneering polychaete community with some evidence of Stage III activity, as well as deep Redox Potential Discontinuity (RPD) depths over the majority of the H mound.

An estimated barge volume of 52,500 m^3 of sediment, originating from coastal New York and Connecticut, was disposed during the 1994-95 disposal season. The resulting dredged material deposit, the WLIS G mound, was found to be 2.5 m high and connected to adjacent disposal mounds (D and F) by a wide apron of dredged material. The infaunal population consists mainly of Stage I individuals with some evidence of Stage III activity.

The WLIS F mound is the product of modest dredged material deposition at WLIS over a three-year period. The DAMOS disposal buoy WDA was positioned in nearly the same location during the 1991-92, 1992-93, and 1993-94 disposal seasons. The final product of three years of dredged material deposition was a sediment mound with a height of 3.0 m at the apex and an overall width of approximately 250 m. Limited REMOTS® sediment-profile data collected over WLIS F found a healthy benthic environment with deep RPD depths and Stage I and Stage III organisms.

The WLIS D mound was developed during the 1989-90 disposal season by the deposition of approximately 185,000 m^3 of material. Annual monitoring efforts with REMOTS® sediment-profile photography in 1991, 1992, and 1993 detected anomalous conditions over the southern flank of the WLIS D mound. Two stations, D200S and D300S, were occupied during the July 1996 survey at WLIS to verify improvement in benthic conditions.

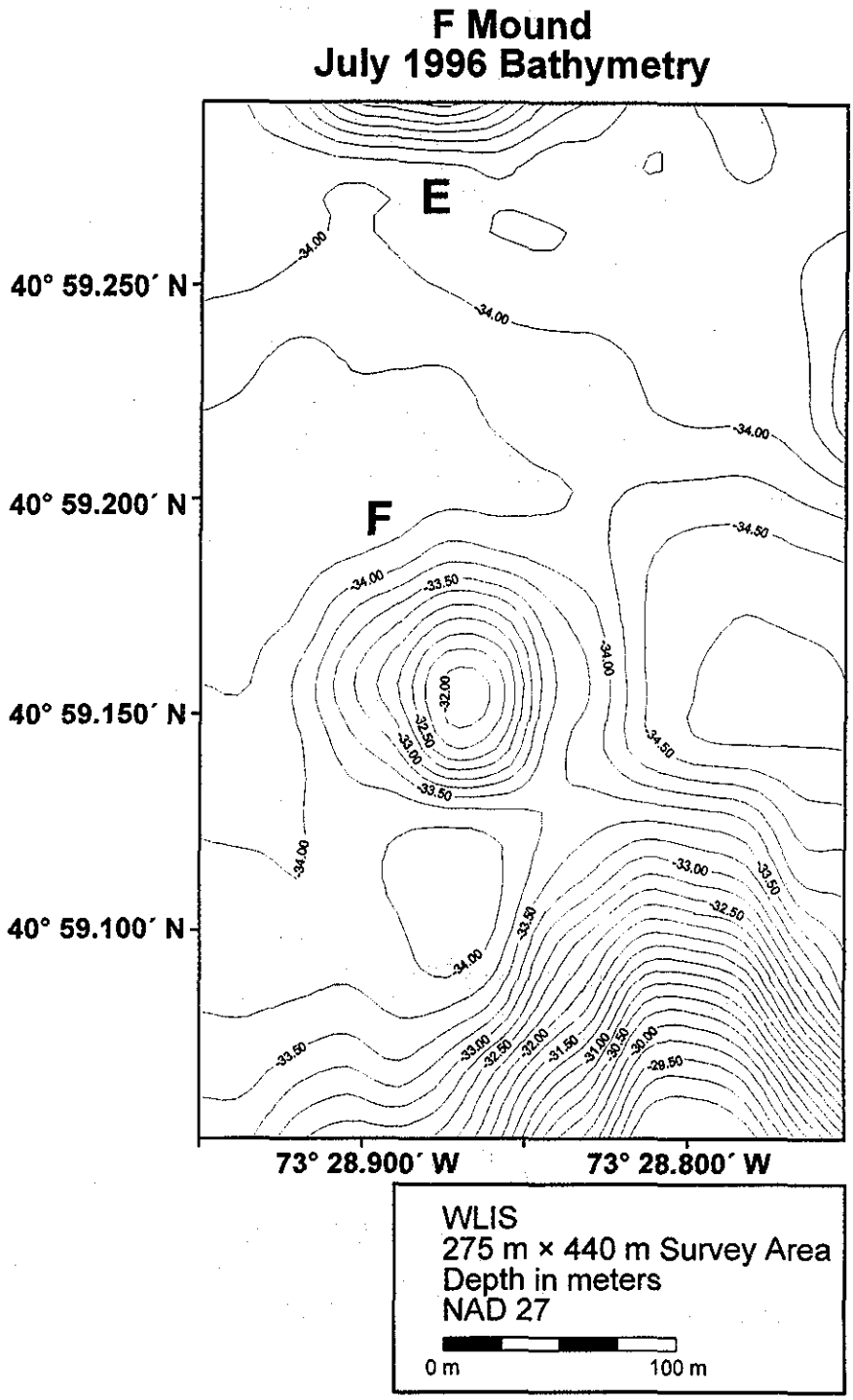

Figure 3-17. Bathymetric chart of the July 1996, 275 m × 440 m analysis area around the F mound, 0.25 m contour interval

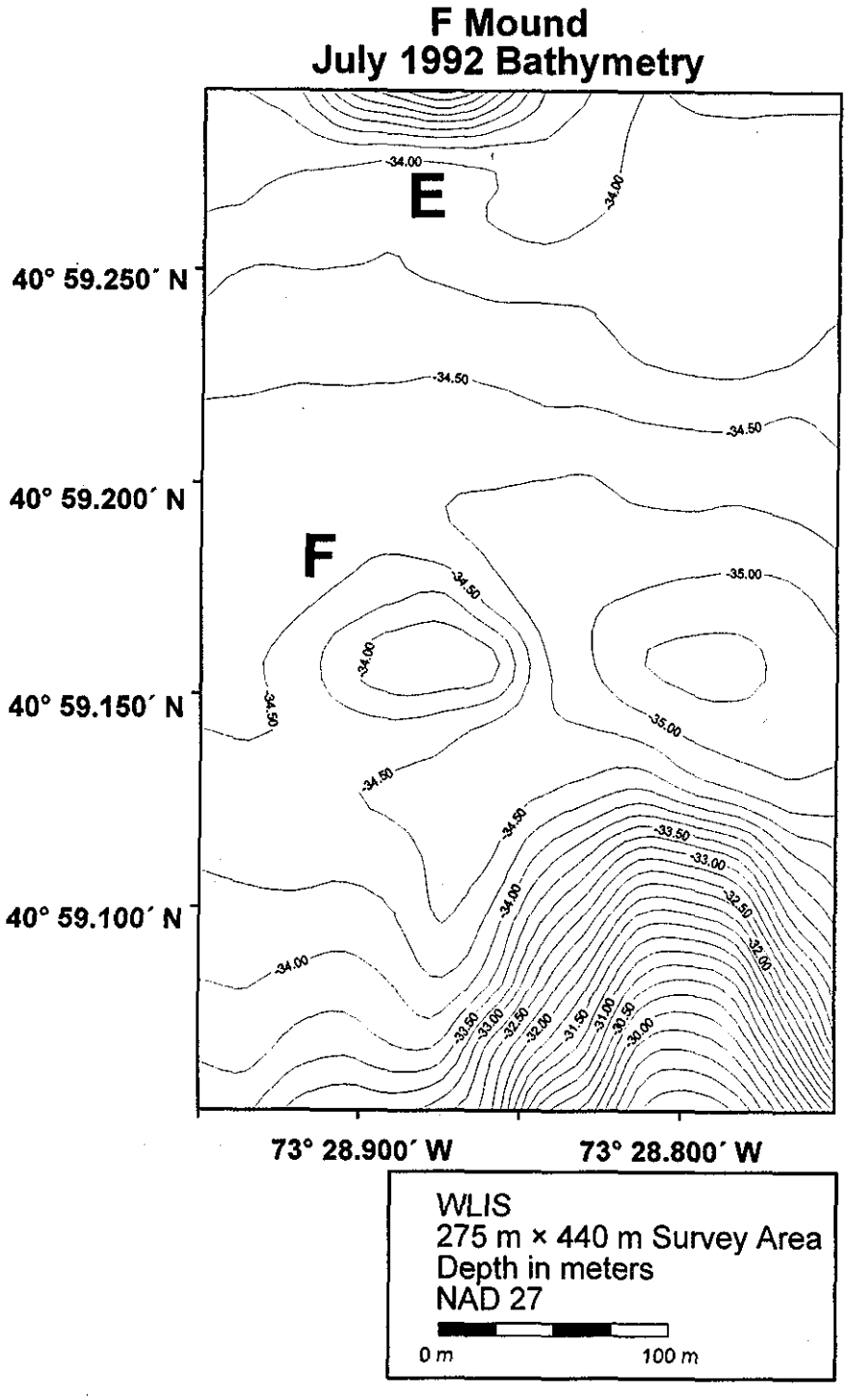

Figure 3-18. Bathymetric chart of the July 1992, 275 m × 440 m analysis area around the F mound, 0.25 m contour interval

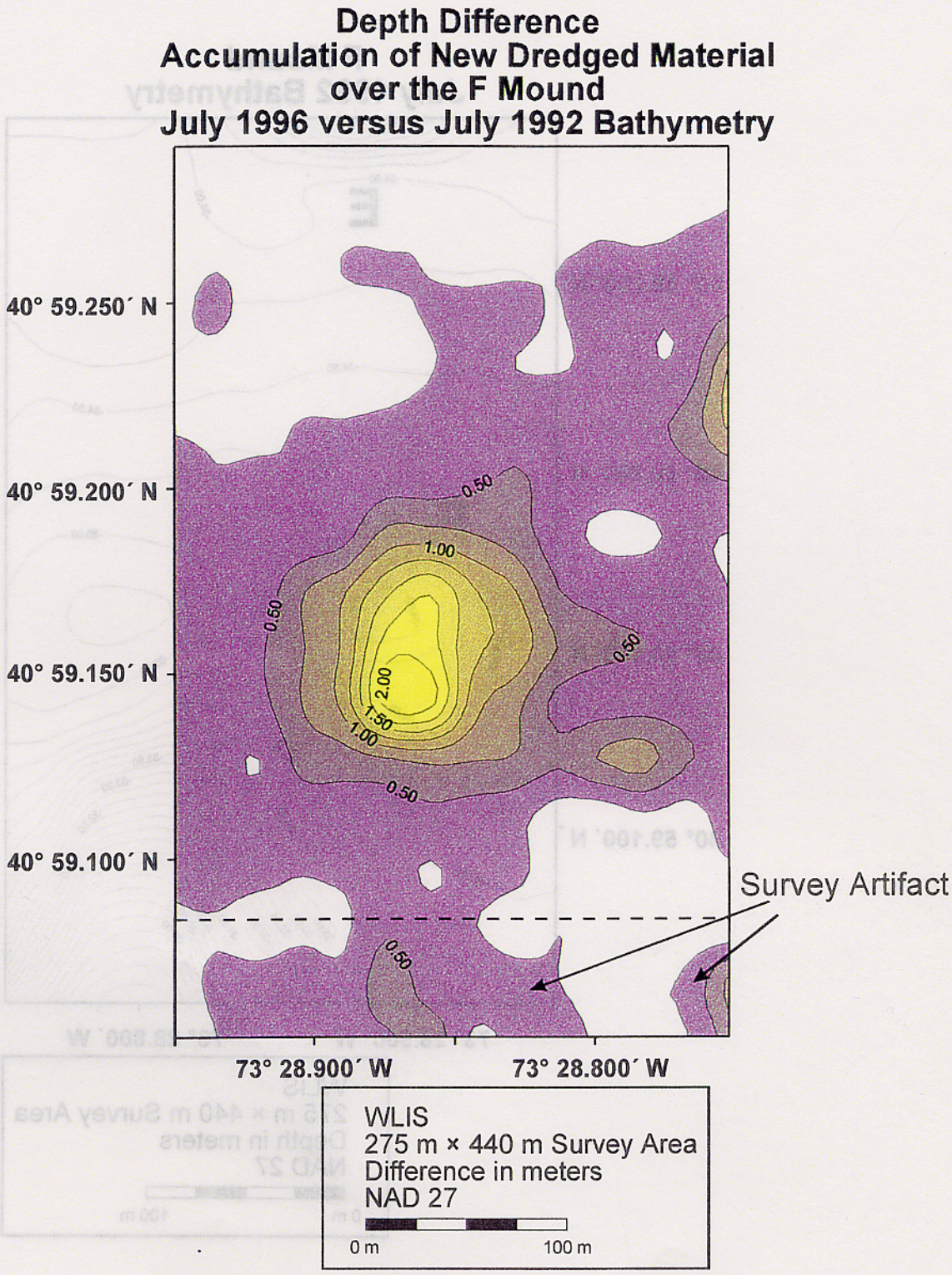

Figure 3-19. Depth difference plot of the 275 m × 440 m analysis area, July 1996 versus July 1992, 0.25 m contour interval

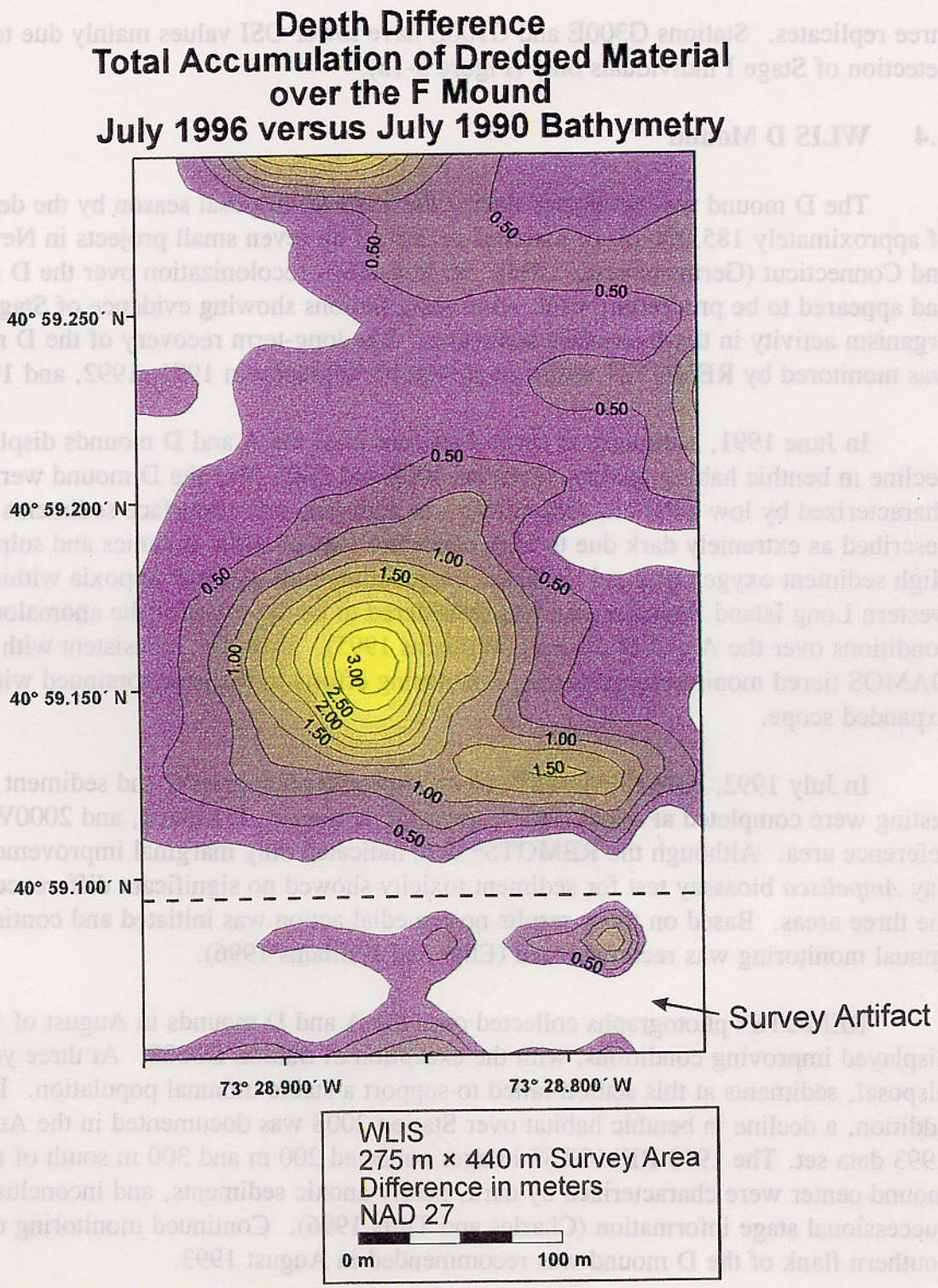

Figure 3-20. Depth difference plot of the 275 m × 440 m analysis area, July 1996 versus July 1990, 0.25 m contour interval

three replicates. Stations G300E and G100E have lower OSI values mainly due to the detection of Stage I individuals only (Figure 3-15).

3.4 WLIS D Mound

The D mound was developed during the 1989-90 disposal season by the deposition of approximately 185,000 m^3 of material generated by seven small projects in New York and Connecticut (Germano et al. 1993). In July 1990, recolonization over the D mound had appeared to be proceeding well, with many stations showing evidence of Stage III organism activity in the subsurface sediments. The long-term recovery of the D mound was monitored by REMOTS® sediment-profile photography in 1991, 1992, and 1993.

In June 1991, sediments at several stations over the A and D mounds displayed a decline in benthic habitat quality. Stations 100S and 300S over the D mound were characterized by low RPD and OSI values. In addition, the subsurface sediments were described as extremely dark due to high concentrations of labile organics and sulphides. High sediment oxygen demand (SOD) in conjunction with seasonal hypoxia within the western Long Island Sound region was considered to be the cause of the anomalous conditions over the A and D mounds (Williams 1995). However, consistent with the DAMOS tiered monitoring protocols, monitoring efforts in the area continued with an expanded scope.

In July 1992, both REMOTS® sediment-profile photography and sediment toxicity testing were completed at select stations over the A mound, D mound, and 2000W reference area. Although the REMOTS® data indicated only marginal improvement, a 10-day *Ampelisca* bioassay test for sediment toxicity showed no significant difference between the three areas. Based on those results no remedial action was initiated and continued annual monitoring was recommended (Eller and Williams 1996).

REMOTS® photographs collected over the A and D mounds in August of 1993 displayed improving conditions, with the exception of Station D300S. At three years post-disposal, sediments at this station failed to support a stable infaunal population. In addition, a decline in benthic habitat over Station 200S was documented in the August 1993 data set. The 1993 REMOTS® images collected 200 m and 300 m south of the D mound center were characterized by dark, nearly anoxic sediments, and inconclusive successional stage information (Charles and Tufts 1996). Continued monitoring of the southern flank of the D mound was recommended in August 1993.

During the July 1996 monitoring cruise at WLIS, Stations 200S and 300S over the D mound were revisited to document the changes in benthic habitat quality. Complete

REMOTS® results for the WLIS D mound are available in Appendix D. The results of the 1996 survey showed significant variability between the three replicates at each station. In general, Station 300S showed strong improvement with a median OSI of 8.0 and RPD depth of 2.74 cm (Figure 3-21; Appendix A, Table 3-3). Stage III individuals were detected in the subsurface sediments in two of three replicates, and biogenic activity was responsible for surface roughness.

One replicate at Station D200S showed excellent benthic conditions with the presence of Stage III activity, an RPD depth of 3.61 cm, and an OSI value of 10. However, the two remaining replicates displayed indications of low DO, Stage I individuals only, and negative OSI values (Figure 3-22). As a result, the replicate-averaged values, and the overall impression of benthic community health were degraded for Station 200S.

The variability between replicates within a 25 m watch circle suggests that the poor benthic conditions are part of a localized problem between the stations 200 m and 300 m south of the D mound center. Further evidence of this isolation are the favorable conditions detected at Station G100W, approximately 25 m north-northeast of D200S (Figure 3-23). Depth difference plots indicated the apron of the newly developed G mound may have spread over D200S and D300S. However, the accumulation was not sufficient to establish a healthy benthic environment in some areas.

3.5 WLIS Reference Areas

As part of the DAMOS tiered monitoring protocols, reference area data are collected to provide a baseline against which results from the dredged material mounds are compared. A total of thirteen stations were occupied over three reference areas (2000W, SOUTH, and SW-REF). Reference area 2000W has been used for comparisons with WLIS sediments since the November 1987 monitoring cruise; SOUTH and SW-REF are recent additions to the DAMOS Program (SAIC 1990). Complete REMOTS® results for the WLIS reference areas are available in Appendix E.

3.5.1 Sediment Grain Size and Stratigraphy

In the past, several reference areas (EAST, WLIS-REF, and 2000S) in the vicinity of WLIS have been abandoned due to detection of the presence of dredged material resulting from earlier deposition at the surrounding historic disposal sites. Unfortunately, the latest REMOTS® data set collected over the 2000W reference area, which is positioned inside the northwestern boundary of the historic Stamford Disposal Site, has detected the presence of dark, reduced sediments and methane gas bubbles indicating the presence of

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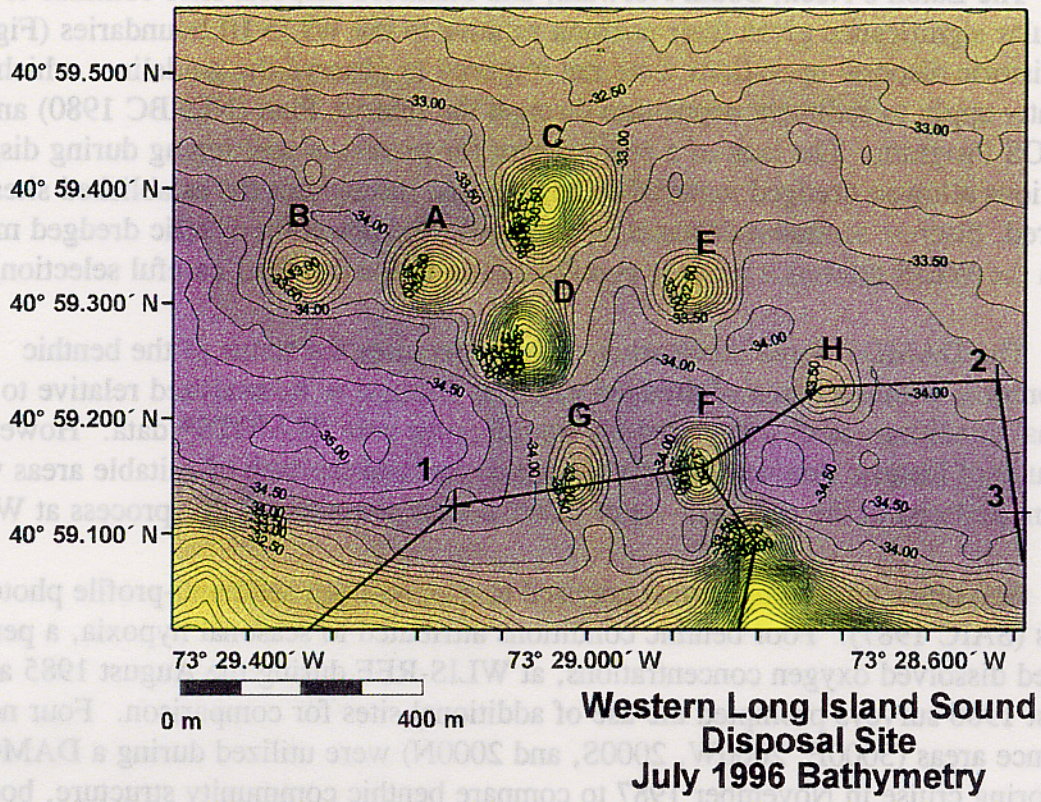


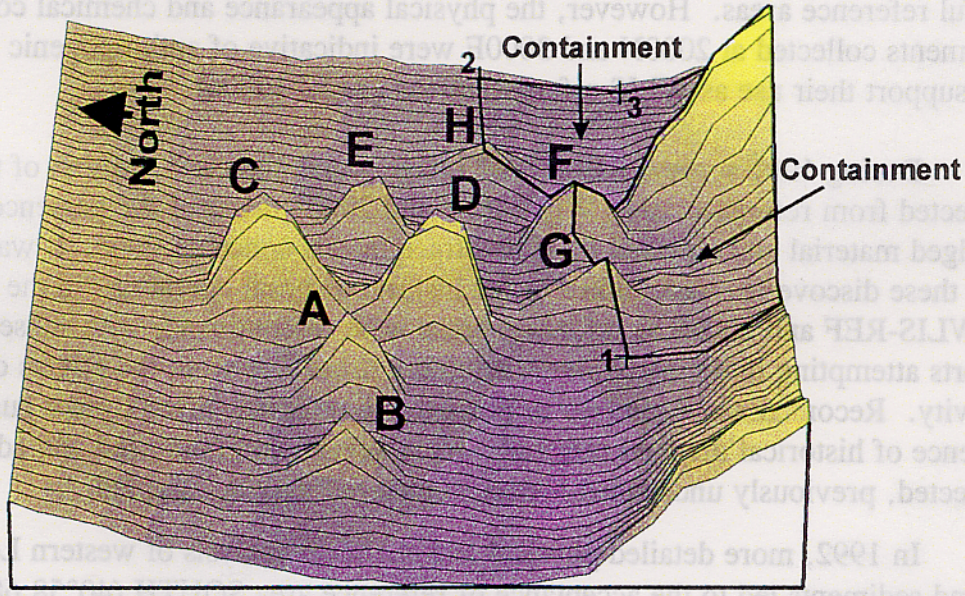


Figure 4-2. Bathymetric chart and three-dimensional view of the 1996 survey area over WLIS with recommended disposal locations to complete supplemental containment areas

The Eaton's Neck, South Norwalk, and Stamford disposal sites continue to be of particular significance given their position relative to the WLIS III boundaries (Figure 4-3). Historic disposal operations were not required to observe the guidelines which currently apply to sediment deposition through the Interim Plan (NERBC 1980) and the DAMOS Program. The lack of a requirement for precision positioning during disposal operations allowed dredged material to be disposed throughout the established sites as scattered, discrete sediment deposits. As a result, the detection of relic dredged material within the WLIS reference areas is possible, even following their careful selection.

The DAMOS tiered monitoring protocol requires the status of the benthic environment within an area of dredged material disposal to be analyzed relative to the regional conditions as characterized by the reference area REMOTS® data. However, the multitude of historic dredged material disposal sites and the lack of suitable areas with ambient material at the sediment-water interface has complicated this process at WLIS.

Reference area comparisons are used to ground-truth sediment-profile photography results (SAIC 1987). Poor benthic conditions attributed to seasonal hypoxia, a period of reduced dissolved oxygen concentrations, at WLIS-REF during the August 1985 and August 1986 surveys prompted the use of additional sites for comparison. Four new reference areas (3000E, 2000W, 2000S, and 2000N) were utilized during a DAMOS monitoring cruise in November 1987 to compare benthic community structure, body burden, and sediment chemistry (Figure 4-3). Stations 2000W and 2000S were accepted as useful reference areas. However, the physical appearance and chemical composition of the sediments collected at 2000N and 3000E were indicative of anthropogenic activity and did not support their use as WLIS reference areas (SAIC 1990a).

During 1991 survey, REMOTS® imagery and chemical analysis of the sediments collected from reference areas WLIS-REF and 2000S detected the presence of relic dredged material and elevated PAH and trace metals concentrations. It was determined that these discoveries were linked to the historic disposal operations in the region. The use of WLIS-REF and 2000S as reference areas were discontinued, with subsequent survey efforts attempting to define two new reference areas free from the effects of anthropogenic activity. Reconnaissance surveys of prospective reference areas cannot guarantee the absence of historical dredged material. As reference areas are used and additional data are collected, previously undetected historical material may be sampled.

In 1992, more detailed physical and chemical analysis of western Long Island Sound sediments led to the acceptance of reference area SOUTH (40°58.688' N latitude, 73°29.201' W longitude) as a replacement for 2000S. A second prospective reference area, EAST (alternate to WLIS-REF), was utilized for comparison with WLIS sediments once (in 1992) before being abandoned due to the subsequent discovery of relic dredged

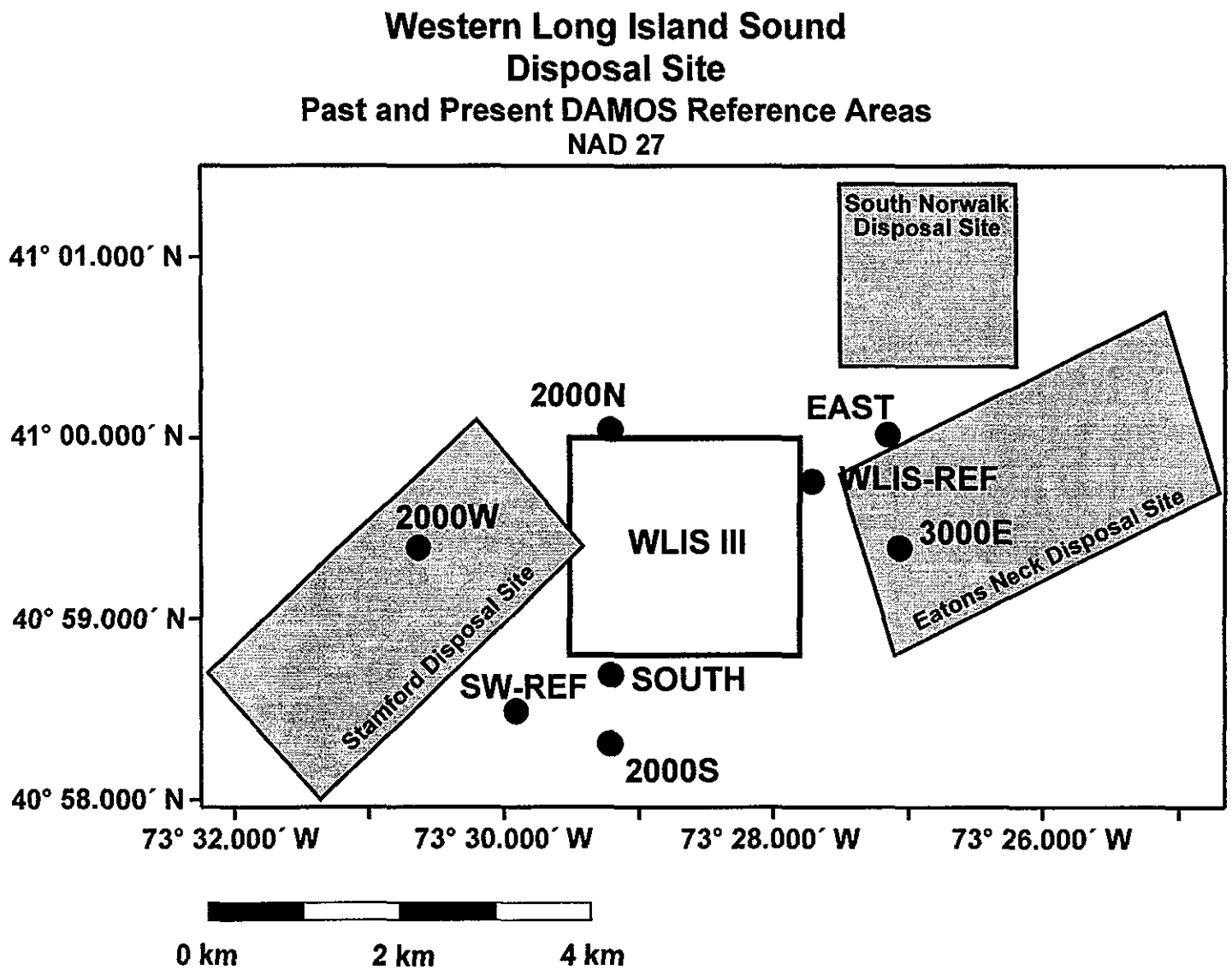


Figure 4-3. Location of past and present WLIS reference areas relative to WLIS III and discontinued disposal site boundaries

material (Eller and Williams 1996). In August 1993, efforts to establish a third reference area at WLIS led to the acceptance of SW-REF (40°58.688' N, 73°29.909' W) as a permanent replacement for WLIS-REF (Charles and Tufts 1996).

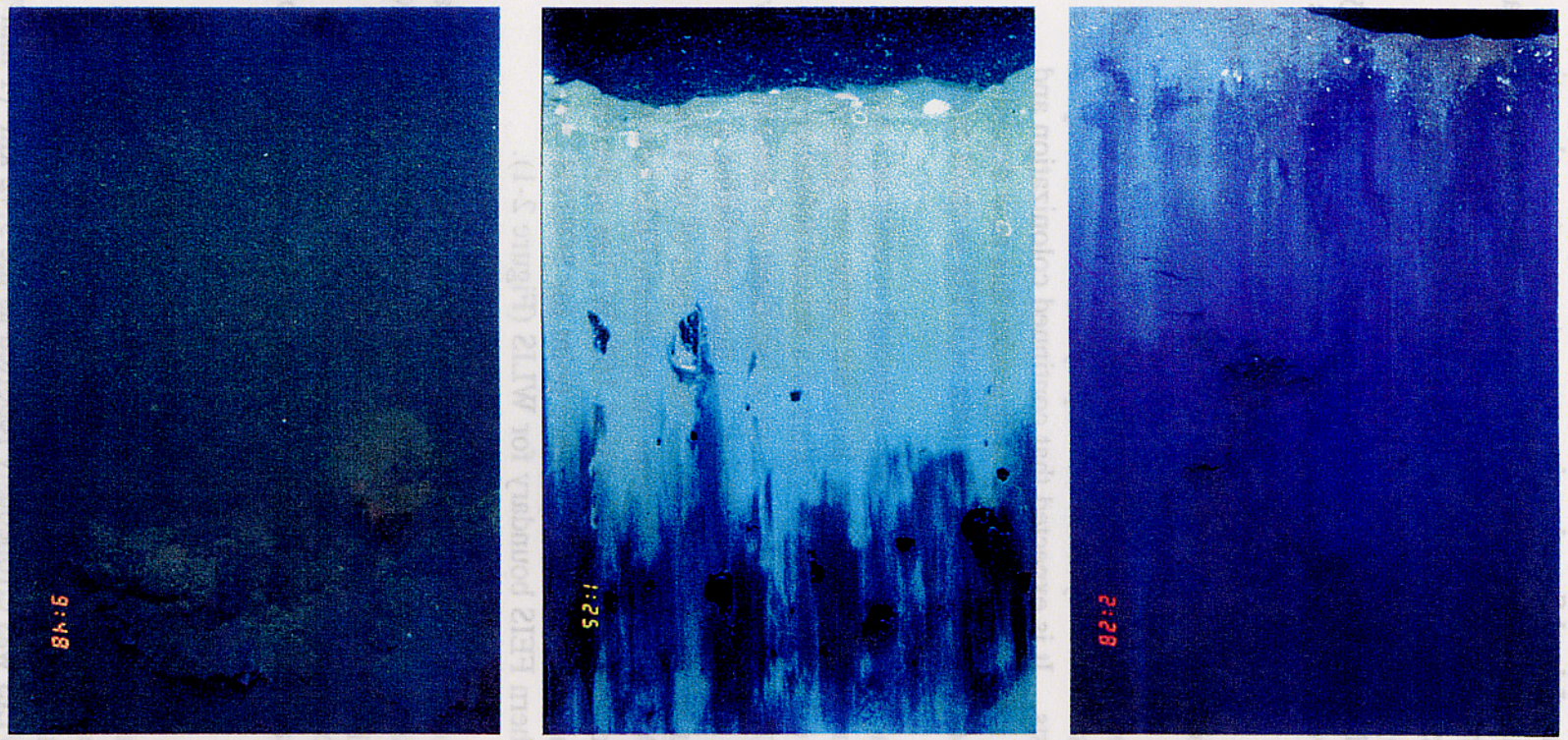
During the 1996 REMOTS® survey, photographs collected over the WLIS reference areas indicated the presence of ambient sediments at SW-REF and SOUTH, as well as dark, reduced sediments and methane gas pockets (indicative of dredged material deposition) at 2000W.

Reference area 2000W lies within the boundaries of the historic Stamford Disposal Site and has been utilized for sediment and benthic habitat comparison with the material deposited at WLIS since 1987. Although not directly linked to recent (1982 to present) dredged material deposition, conditions indicative of anthropogenic activity have been detected during REMOTS® surveys in 1991 and 1992 (Eller and Williams 1996; Figure 4-4). The July 1996 survey found darker and finer grained sediments at 2000W relative to SOUTH and SW-REF stations. Although the majority of replicate photographs obtained over 2000W display a well-defined RPD and Stage I or Stage I on III benthic infaunal community, data collected at STA 1 and STA 4 raise questions concerning the validity of this reference area.

High boundary roughness measurements, no discernible RPD, successional stage classifications of indeterminate or azoic, and correspondingly low OSI values were detected in one replicate of STA 1 and two replicates of STA 4 at 2000W. These conditions could be attributable to recent physical disturbances at the sediment-water interface (i.e., trawling, dragging of lobster gear across the bottom, etc.). However, the dark appearance of the subsurface sediments, the presence of methane gas, and the questionable history of the reference area suggest the poor benthic conditions could be due to chronic problems below the penetration limit of the REMOTS® camera.

Without detailed physical and chemical analysis of the 2000W sediments through comprehensive grab sampling and geotechnical coring, a definitive cause for the poor benthic conditions will not be found. Despite this lack of data, visual comparisons between the three reference areas show that portions of 2000W presently do not reflect the benthic conditions displayed in ambient western Long Island Sound sediments. To date, a total of three WLIS reference areas (EAST, WLIS-REF, and 2000S) have been abandoned due to the presence of dredged material. The same course of action is recommended for 2000W, with a replacement reference area being delineated to the southeast of WLIS, away from present and historic disposal activity.

The discovery of a thin layer of reduced material over oxidized sediments in one replicate of STA 8 may also be attributed to dredged material disposal in the region. It is possible that a small amount of disposal barge spillage had occurred over reference area SOUTH during the final phase of deposition at the WDA 95 buoy position (WLIS H



June 1991

Physically Disturbed Surface Layers
Presence of Non-Ambient, Larger Grains

July 1992

Shell Fragments
Deep RPD
Dark, Sulphidic Sub-Surface Sediments
Abundance of Methane Gas

July 1996

Shell Hash
Low DO Conditions
Dark, Sulphidic Sub-Surface Sediments
Methane Gas

Reference Area 2000W

Figure 4-4. REMOTS® photographs collected over reference area 2000W depicting effects of anthropogenic activity detected during survey operations in June 1991, July 1992, and July 1996

mound). However, the western Long Island Sound region supports an extremely active American lobster fishery, with thousands of traps, or "pots", deployed and recovered on a daily basis. Given the size, angular shape, and gray color of the sediment clasts, the deposit detected in one replicate photograph collected at STA 8 is probably attributable to the recent (one to two weeks) deployment or recovery of lobster fishing gear within the confines of the reference area. As lobster traps are dragged along the bottom, silt and clay collect in the wire mesh and will eventually be dislodged, falling to the seafloor as clumps of sediment.

The gray clasts of recently deposited sediment appear to be supporting an early Stage I population with small tubes and areas of oxidized sediment visible over their surfaces (Figure 3-25A). In addition, Stage III foraging activity has begun to incorporate this new material into the surficial sediment layers as errant polychaete worms exploit the organic content of the sediment clasts. It is expected that continued colonization and bioturbation activity by the benthic infaunal community will render this new deposit indistinguishable from the surface sediments of reference area SOUTH in short order.

The scrutiny given to this one replicate photograph collected at reference area SOUTH has resulted in the discovery of another issue. Reference areas are generally sampled at randomly selected stations within a 300 m radius of a central reference point (SOUTH: 40°58.688' N, 73°29.201' W; Figure 4-5). Station locations are determined by assigning a range and bearing from the central reference point, then calculating a geographic location (latitude and longitude) in NAD 27. Although part of the reference area random sampling scheme, STA 8 actually lies within the southern FEIS boundary of WLIS (Figure 2-1). STA 8, located at 40°58.839' N, 73°29.162' W, lies approximately 285 m north-northeast (11° azimuth) of the central reference point for SOUTH, but falls approximately 72 m inside the southern FEIS boundary for WLIS (Figure 2-1).

Reference area selection criteria in July 1992 required finding a suitable area with a comparable water depth to WLIS, located outside active or discontinued disposal sites, and in relatively close proximity to the previously utilized 2000S reference area (Eller and Williams 1996). The geographic locations of the several proposed WLIS reference areas were selected from a NOAA nautical chart (No. 12363) and compared to the boundaries of the disposal site.

The results of the July 1992 field investigations determined the proposed SOUTH reference area to be a suitable replacement for 2000S, free of dredged material deposition and other indications of anthropogenic activity. The new reference point was located 392 m south of the disposal site with a water depth of approximately 23 m (75 ft) at MLLW. However, in July 1992 WLIS was erroneously reported as the 3.42 km^2 (1 nmi^2) area by the DAMOS Program, not taking into account the description of the disposal site

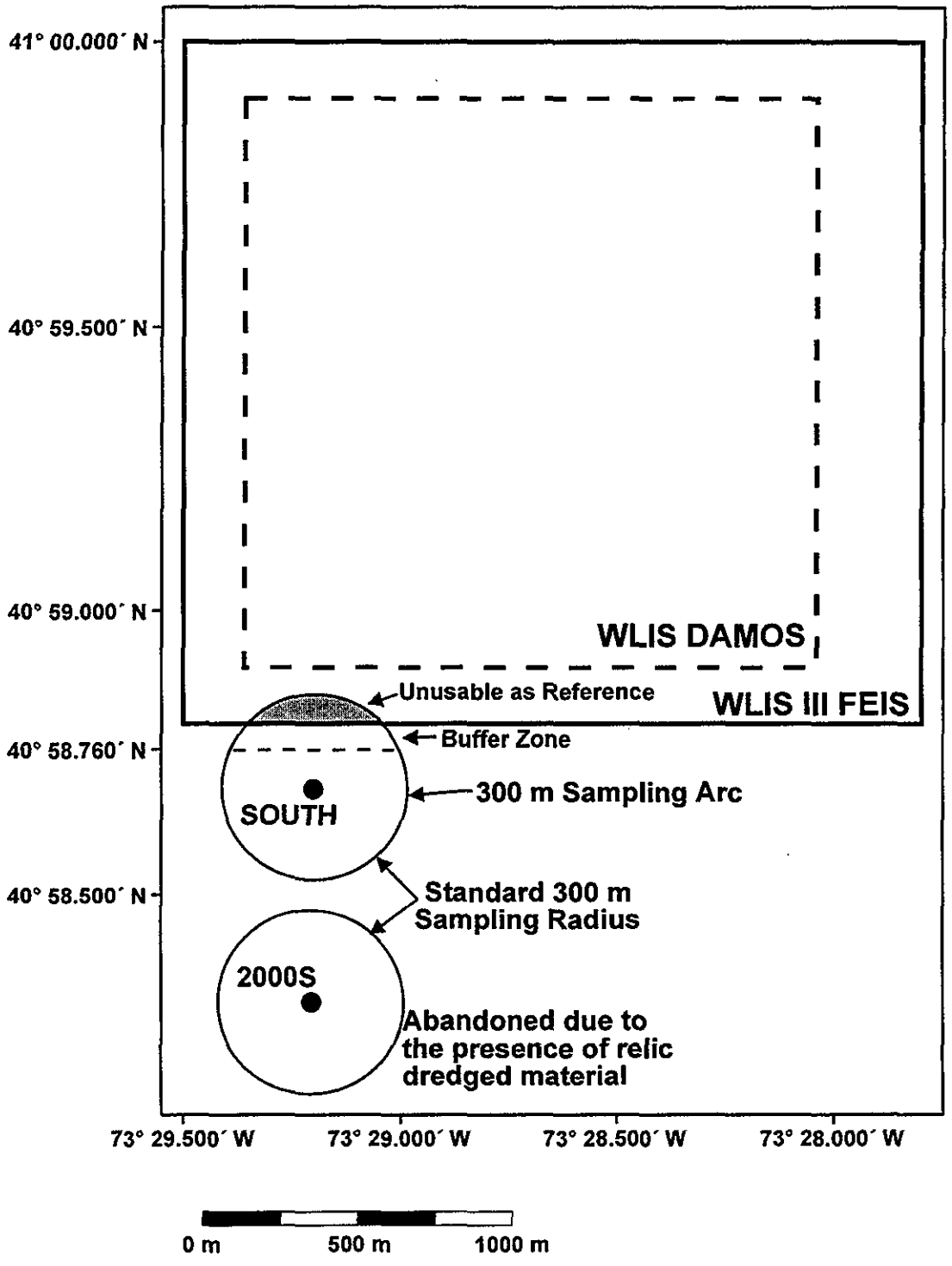


Figure 4-5. Base map displaying the FEIS and previously used DAMOS disposal site boundaries relative to the sampling radii of reference area SOUTH, and former reference area 2000S

as outlined in the 1982 FEIS. The use of the WLIS III boundaries, in conjunction with the SOUTH reference area location, provides only 207 m of separation between the disposal site and the central reference point (Figure 4-5).

The satisfaction of a minimum distance requirement has not been part of the selection criteria for the reference areas utilized by the DAMOS Program. In fact, the DAMOS tiered monitoring protocols recommend that reference areas and disposal sites should be as near to one another as possible without subjecting the reference stations to the possibility of corruption by disposal operations or postdisposal transport (Germano et. al. 1994). Given the depositional nature of the area surrounding WLIS, and the confinement of disposal operations to the east-west trending bottom depression, SOUTH is expected to remain free of dredged material deposits and valid for comparison with conditions on the WLIS seafloor.

Therefore, it is recommended that future sampling schemes at SOUTH be designed to restrict REMOTS® sediment-profile photography and the collection of surface sediment grabs samples. This would require the institution of a 300 m arc around the central reference point of SOUTH, terminating at a latitude of 40° 58.760′ N (Figure 4-5). Although this approach does not conform to the standard operating procedures followed at other DAMOS reference areas, the semi-circular configuration would provide a better areal representation of the western Long Island Sound seafloor, relative to a reduced sampling radius. In addition, the proposed 300 m arc would establish a 75 m buffer zone between the southern boundary of WLIS and the reference sediments of SOUTH. An alternative would be to move the center of SOUTH 150 m south to eliminate overlap with the disposal site boundary. However, this would require investigation of the area between SOUTH and 2000S, to rule out the presence of relic dredged material. Given the difficulty of finding suitable reference stations for WLIS, the continued use of 2000S, as discussed, is recommended.

Although the results of Stations 1 through 4 over 2000W and STA 8 over SOUTH cannot be used for comparison with the sediments of the WLIS disposal mounds, the remaining stations over WLIS reference areas SOUTH and SW-REF remain valid. The ambient Long Island Sound sediments appeared to be relatively undisturbed with stable benthic infaunal populations and deep RPDs. OSI values of >6 are generally considered indicative of a healthy benthic environment, and the majority of REMOTS® stations over SOUTH and SW-REF met or exceeded that criterion. With respect to all of the physical and biological parameters used to assess the benthic environment through REMOTS® sediment-profile photography, SW-REF exhibited the highest indices of the three reference areas.

Relative to the reference areas, data collected over the majority of the WLIS H, G, and F mounds indicate they are consistent with the normal pattern of recolonization following dredged material disposal. The newest bottom features at WLIS appear to be recolonizing as expected, with the exception of sediments at Station H50W. The WLIS H and G mounds should continue to be monitored on an annual or every other year basis, respectively, to ensure complete recolonization, including the presence of stable, mature, benthic assemblages consistent with the DAMOS tiered monitoring protocol.

Stations 200S and 300S over the D mound were revisited in 1996 due to concern over slow recolonization rates. Station D300S has shown dramatic improvement since the 1993 REMOTS® survey, while slow recolonization at 200S persists (Figures 3-21 and 3-22). The variability between replicates of D200S and D300S and the satisfactory benthic conditions over the nearby G mound indicate that the problem is localized.

In July 1992, it was determined that elevated levels of labile organics were responsible for the poor benthic conditions observed over the southern flank of the WLIS D mound. Dredged material mounds with elevated levels of organic material tend to recover at a slower rate due to the increased chemical oxygen demand (COD) caused by oxidation of the labile organics. Monitored periodically, the southern flank of the D mound has been given six years to allow microbial action and chemical oxidation to break down the organic load in the subsurface sediments. Within those six years, limited improvement in benthic conditions has been documented in the surficial sediment layers. The progression in habitat quality documented at D300S during the July 1996 survey is most likely due to the construction of WLIS G approximately 60 m to the northeast. The development of a wide apron around the G mound provided 10 cm to 20 cm of new sediment to overlay the historic dredged material composing the southern flank of the D mound.

A final solution to the localized problem between D200S and D300S that would facilitate the improvement of benthic conditions, as well as complement a recommended management plan for the disposal site, is the development of a new disposal mound southwest of the G mound center (Figure 4-2). A new sediment deposit composed of high quality dredged material with a lower primary nutrient and organic detritus content would overlie the southern flank of the D mound, covering any existing problems in the subsurface sediment layers. In addition, the new material would assist in closing the supplemental lateral containment cell described above, while promoting a healthy benthic environment through faster recolonization and increased bioturbation.

Sediments with low COD tend to facilitate the development of a healthy benthic environment. By reducing the COD in the subsurface sediments, a higher percentage of the available bottom water dissolved oxygen (DO) can be utilized for biological processes,

promoting rapid benthic recolonization. The availability of oxygen in the bottom waters of western Long Island Sound is always a major concern during the summer months. In comparison to other Long Island Sound disposal sites (CLIS, NLDS) benthic recolonization at WLIS tends to be slower, due to the profound effects of seasonal hypoxia.

Hypoxia is a condition of reduced DO concentrations in the water column, generally occurring within the western and central regions of Long Island Sound in mid to late August. The complications associated with seasonal hypoxia and benthic recolonization at WLIS has been documented by DAMOS monitoring efforts since 1985 (SAIC 1987). This annual decrease in DO is the direct result of eutrophication, the influx of primary nutrients from terrestrial sources into the protected waters of western and central Long Island Sound. Although the cause of hypoxia is clearly defined, its onset and severity are directly dependent on many other environmental factors (i.e., nutrient input, frequency of storms, fresh water input, water temperature, etc.).

The Long Island Sound Study (LISS), a US Environmental Protection Agency (EPA) monitoring program, officially recognizes the onset of hypoxia at a DO concentration of 3.0 $mg \cdot l^{-1}$. However, the appearance of hypoxic conditions in the bottom waters and surficial sediment layers has been documented with DO concentrations as high as 5.0 $mg \cdot l^{-1}$ (LISS 1990). Furthermore, bottom water DO concentrations in the East River and extreme western Long Island Sound have been known to fall to anoxic levels (0.0 $mg \cdot l^{-1}$) during the month of August, decimating the entire infaunal population.

During prior monitoring efforts at WLIS, a CTD probe equipped with a DO sensor was used to monitor oxygen concentrations at the disposal site and reference areas (Williams 1995; Eller and Williams 1996). In recent field operations, this practice has been discontinued due to the shortcomings associated with the instantaneous measurement of DO. The collection of DO profiles of the water column during the relatively short survey period did not provide the data necessary to discern the possible influences of dredged material deposition from the seasonal effects within the region.

In order to track the development of hypoxic conditions in Long Island Sound, a comprehensive DO data set for stations located throughout the region was obtained from the Connecticut Department of Environmental Protection (CTDEP), Bureau of Water Management. The data was collected as part of the CTDEP Long Island Sound Summer Hypoxia Monitoring Program and consisted of surface and bottom water DO values for eighteen primary stations monitored throughout 1996, as well as a number of secondary summer stations (June through September). Seasonal monitoring stations 5, 8, and 9, and annual monitoring stations C2 and D3 were chosen due to their location relative to WLIS (Figure 4-6).

The CTDEP water quality data indicate DO concentrations steadily declined from 12.2 $mg \cdot l^{-1}$ in mid-March (Julian Day 75) to approximately 2.5 $mg \cdot l^{-1}$ in early September (Julian Day 250). The July 1996 monitoring cruise (Julian Day 198) was completed before the expected seasonal reduction in available oxygen within the western Long Island Sound region (Figure 4-6). In mid-July, bottom water DO concentrations at the primary (C2 and D3) and secondary (5, 8, and 9) water quality monitoring stations ranged from 4.8 $mg \cdot l^{-1}$ to 6.75 $mg \cdot l^{-1}$.

Oxygen concentrations of ≥ 5.0 $mg \cdot l^{-1}$ are thought to be protective of most Long Island Sound marine life (LISS 1990). Warm bottom waters and a consistent supply of molecular oxygen (O_2) promote increased bioturbational activity within the infaunal populations of the disposal mounds and reference areas. The feeding and foraging efforts of errant polychaete worms composing a Stage III assemblage incorporate oxygen-rich bottom waters into the surficial sediments, resulting in deeper RPD depths and elevated OSI values. As DO concentrations decrease through the spring and summer months, the level of oxygenation within the surface sediments also decreases, resulting in shallower RPDs and the appearance of redox rebound intervals. Environmental stress and mortality within the infaunal populations and resident macrofauna result in a reduction in habitat quality, decreased biological productivity, and lower OSI values.

As expected, the CTDEP data recorded the start of the seasonal hypoxia event in the bottom waters of the western Long Island Sound region approximately four weeks after the 1996 survey activity. DO concentrations dropped below 3.0 $mg \cdot l^{-1}$ (Julian Day 225) and remained at hypoxic levels for an additional four weeks, reaching a seasonal low on Julian Day 250. Bottom water DO concentrations in early September ranged from 2.2 $mg \cdot l^{-1}$ at C2 to 2.8 $mg \cdot l^{-1}$ at Station 9. Near anoxic conditions (0.7 $mg \cdot l^{-1}$) were found over the seafloor at Stations A4 and B3 in extreme western Long Island Sound during the same time period. By the third week in September, bottom water DO concentrations in the region had returned to levels greater than 6.0 $mg \cdot l^{-1}$, favorable for reestablishing a solid benthic community.

In the past, annual monitoring surveys at the Long Island Sound disposal sites were performed in mid-summer, allowing four or more weeks between the end of the disposal season (31 May) and any benthic community assessment operations. In addition, the summer months provide warmer bottom water temperatures (17 to 21°C), which increase the metabolic rates and bioturbation activity of the benthic infaunal populations. However, the occurrence of seasonal hypoxia in the western Long Island Sound region in mid-summer has been identified as an obstacle to benthic recolonization at WLIS since 1985 (SAIC 1988).

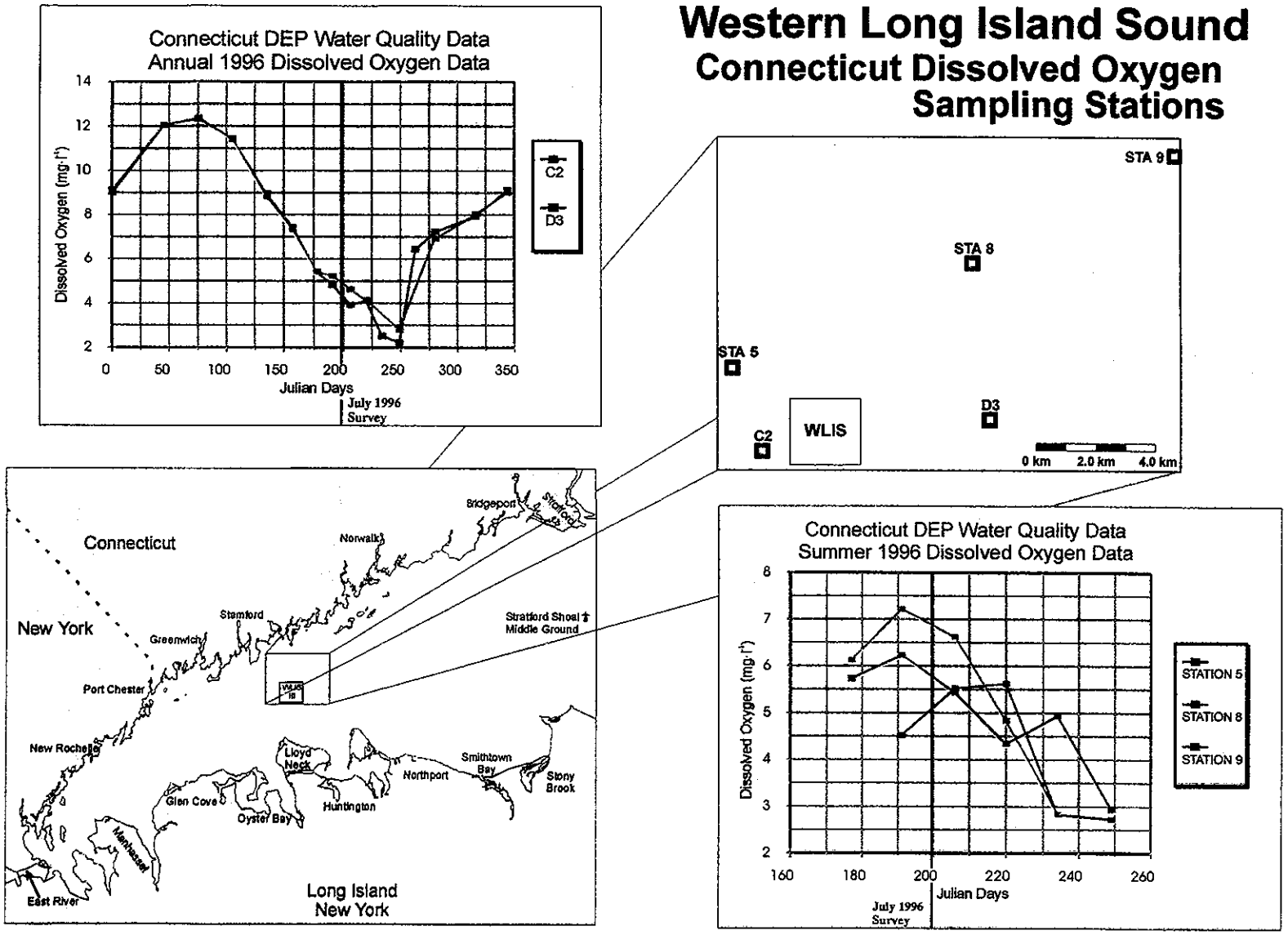


Figure 4-6. Position of the Connecticut Department of Environmental Protection Dissolved Oxygen Sampling Stations and bottom DO trends at both the annual and seasonal monitoring stations

Upon review of the benthic community assessment data collected at WLIS since 1984, a trend of shallow RPD depths, indications of low DO, and poor benthic habitat can be associated with mid-summer monitoring efforts. The results obtained during the July 1996 and other recent surveys (June 1991 and July 1992) suggest the completion of benthic community assessment operations in early summer, before the development of hypoxia and the deterioration of conditions provide a more realistic perspective into the condition of the benthic environment.

Prior DAMOS experience has determined that intensive recruitment of opportunistic, pioneering polychaetes (Stage I individuals) occurs 1-2 weeks after the completion of disposal activity (Germano et al. 1994). Therefore, it is recommended that future survey operations at WLIS requiring the assessment of benthic infaunal recolonization be scheduled for late June or early July. Monitoring surveys conducted within this time frame should provide adequate recruitment time on the surface of a new dredged material deposit, as well as avoid the negative effects of summer hypoxia in the region.

5.0 CONCLUSIONS

Since 1992, the WLIS seafloor has seen light to moderate disposal activity, receiving a total estimated barge volume of 148,000 m^3 of sediment dredged from the ports and harbors of coastal Connecticut and New York. In accordance with the successful management strategy demonstrated at CLIS, the recent disposal activity at WLIS has been tightly controlled to construct rings of disposal mounds in order to form an artificial containment cell (Morris et al. 1996). The implementation and long-term use of this management strategy will facilitate the deposition of large volumes of dredged material, minimizing its lateral spread on the seafloor, and maximizing the available space within the 5.29 km^2 area of the disposal site. The July 1996 field efforts allowed SAIC and NAE to document the development of three individual disposal mounds as well as examine the status of the artificial containment cell and observe changes in the benthic environment resulting from the deposition of new material.

The controlled disposal of this material was successful in forming two new sediment mounds, WLIS G and H, as well as further developing the preexisting WLIS F mound. Depth difference comparisons between with the 1996, 1992, and 1990 bathymetric surveys display the three disposal mounds as discrete bottom features connected by a ridge of material 0.25 m thick, formed by overlapping mound aprons. As of July 1996, the first artificial containment cell on the WLIS seafloor nears completion as the historic WLIS D and E mounds, in conjunction with the F, G, and H mounds, begin to form an artificial containment ridge. Supplemental containment facilities could also be formed by employing the properties of the naturally occurring ridges and basins within the boundaries of WLIS.

As the most recent bottom feature on the WLIS seafloor, the H mound displayed evidence of moderate to deep RPD depths over most of the mound surface, as well as strong benthic recolonization. Stage I individuals were discovered in every replicate photograph, and Stage III activity was documented at six of the thirteen stations occupied. With the exception of Station H50W, OSI values ranging from 4.0 to 8.0, suggesting benthic recovery over this disposal mound, should continue as expected. Disposal operations over WLIS H were completed on 29 May 1996 (Julian Day 149). According to the 1996 CTDEP data set, benthic recovery over the surface of this sediment deposit progressed for approximately six weeks before declining bottom water DO concentrations would have caused elevations in environmental stress levels. Given the history of the WLIS A and D mounds and the severity of recurring seasonal hypoxia in the region, continued monitoring of this new sediment deposit on an annual or every other year basis is recommended to ensure long-term benthic recovery.

The sediments of WLIS G were subjected to hypoxic conditions during the summer of 1995 and allowed to recover over the fall and winter months. This one-year-old sediment deposit now supports a stable Stage I infaunal population over the center of the mound with progression to Stage III on the mound periphery. The solid successional stage status and moderate to deep RPD depths indicate this sediment deposit is continuing to recover despite the reduction of bottom water DO concentrations during the summer months. The G mound should display a mature benthic assemblage over its entire surface in future monitoring efforts. In order to verify this prediction, an additional REMOTS® sediment-profile photography survey should be conducted over WLIS G during the 1998 monitoring cruise.

Although found to be recovering as expected in the initial benthic community assessment survey in 1990, the southern flank of the historic WLIS D mound displayed signs of benthic habitat degradation during subsequent survey operations. Two stations over WLIS D, 200 m and 300 m south of the mound center, were revisited in July 1996 to document improvement in the benthic environment. The results of the 1996 survey show dramatic improvement in benthic conditions at D300S while OSI values for 200S remain quite low.

The variability between replicates, as well as the strong signs of benthic recovery detected over the eastern and southern G mound REMOTS® stations, suggest the problem area is localized between the Stations D200S and D300S. The progression in habitat quality documented at D300S during the July 1996 survey is most likely due to the construction of WLIS G approximately 60 m to the northeast. The development of a wide apron around the G mound provided 10 cm to 20 cm of new sediment to overlay the historic dredged material composing the southern flank of the D mound.

A final solution to the localized problem between D200S and D300S that would facilitate the improvement of benthic conditions, as well as complement a recommended management plan for the disposal site, is the development of a new disposal mound southwest of the G mound center. The new sediment would overlie the southern flank of the D mound, covering any existing problems in the subsurface sediment layers. In addition, the new material would assist in closing the supplemental lateral containment cell described above while promoting benthic conditions comparable to those of the WLIS reference areas.

The DAMOS Program uses reference areas to provide a baseline against which results from the dredged material mounds are compared. However, the lack of ambient western Long Island Sound sediments within some of the previously selected reference areas has complicated this process. Benthic conditions at reference area 2000W, as detected at STA 1 and STA 4, appear to be highly disturbed due to the presence of dark,

sulphidic sediments, larger grains, and pockets of methane gas. These indicators can be linked to past dredged material disposal operations at the historic Stamford Disposal Site. To date, a total of three WLIS reference areas (EAST, WLIS-REF, and 2000S) have been abandoned due to the presence of dredged material. Due to recurring indications of anthropogenic activity, and the lack of comparability between 2000W and the two other DAMOS reference areas at WLIS, it is recommended that 2000W be abandoned and a replacement reference area be sought to the southeast of the current WLIS boundaries.

Clasts of reduced sediments were also discovered at the sediment-water interface in one replicate of STA 8 over reference area SOUTH. The presence of two gray clasts of newly deposited silts may be attributable to a small amount of disposal barge spillage during the final phase of deposition over the WLIS H mound. However, the area surrounding WLIS is subjected to intense lobster fishing activity throughout the spring, summer, and fall. Furthermore, the gray color and angular shape of the clumps of fine-grained material suggest these reduced clasts are linked to the recent deployment or recovery of lobster fishing gear.

There were no adverse impacts detected in association with the presence of clumps of reduced material, but the attention focused on STA 8 and reference area SOUTH, did reveal a second issue. Reference area SOUTH was accepted for comparison with WLIS sediments in July 1992 when the disposal site was erroneously reported as the 3.42 km^2 (1 nmi^2) area by the DAMOS Program. The new reference point was located 392 m south of the disposal site with a water depth of approximately 23 m (75 ft) at MLLW. The use of the WLIS III boundaries provides only 207 m of separation between the disposal site and the center of SOUTH, reducing the available sampling area to the north of the central reference point. In order to maintain a random sampling scheme for statistical validity, it is recommended that future sampling activity at SOUTH be confined to a 300 m semi-circular area to maintain a buffer zone between the reference area and the southern boundary of WLIS or relocate SOUTH 150 m south to eliminate overlap.

The newest WLIS reference area, SW-REF, appeared to be healthy, relatively undisturbed, and supporting a stable benthic infaunal population. REMOTS® photographs detected Stage I organisms in all fourteen replicates with evidence of Stage III individuals represented in eight photographs, as well as deep RPD depths, resulting in high OSI values. Physical and biological indicators suggest SW-REF remains valid for continued use as a DAMOS reference area for WLIS without modification to its location or sampling radius.

Past DAMOS monitoring activity at the Long Island Sound disposal sites was conducted in mid-summer, allowing four or more weeks for benthic recovery after the completion of the disposal activity. This practice tended to promote the completion of

community assessment activities during a period of hypoxia or near-hypoxia (5.0 $mg \cdot l^{-1}$ to 3.0 $mg \cdot l^{-1}$), skewing the entire data set. The July 1996 survey at WLIS was successful in avoiding the profoundly negative effects associated with the seasonal hypoxia event in central Long Island Sound. By conducting the benthic community assessment activities in early summer, a more realistic perspective into the condition of the benthic environment was gained.

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Appendix A

Tables

Appendix A, Table 1-1

1991 through 1996 DAMOS Disposal Buoy Locations at WLIS

WLIS Disposal Site Buoy Positions NAD 1927			
Disposal Season	Latitude	Longitude	Mound
1991-92	40° 59.162′ N	73° 28.880′ W	F
1992-93	40° 59.161′ N	73° 28.880′ W	F
1993-94	40° 59.161′ N	73° 28.879′ W	F
1994-95	40° 59.158′ N	73° 29.020′ W	G
1995-96	40° 59.228′ N	73° 28.732′ W	H

Appendix A, Table 2-1

REMOTS® Sediment-Profile Photography Stations over the D Mound, G Mound, H Mound, and Reference Areas

WLIS 1996 REMOTS® Stations NAD 1927			
Area	Station	Latitude	Longitude
WLIS H MOUND 40° 59.228′ N 73° 28.732′ W (1995-96)	CTR	40° 59.228′ N	73° 28.732′ W
	50N	40° 59.255′ N	73° 28.732′ W
	100N	40° 59.282′ N	73° 28.732′ W
	150N	40° 59.309′ N	73° 28.732′ W
	50S	40° 59.201′ N	73° 28.732′ W
	100S	40° 59.174′ N	73° 28.732′ W
	150S	40° 59.147′ N	73° 28.732′ W
	50E	40° 59.228′ N	73° 28.696′ W
	100E	40° 59.228′ N	73° 28.661′ W
	150E	40° 59.228′ N	73° 28.625′ W
	50W	40° 59.228′ N	73° 28.768′ W
	100W	40° 59.228′ N	73° 28.803′ W
	150W	40° 59.228′ N	73° 28.839′ W
WLIS G MOUND 40° 59.158′ N 73° 29.020′ W (1994-95)	CTR	40° 59.158′ N	73° 29.020′ W
	100N	40° 59.212′ N	73° 29.020′ W
	200N	40° 59.266′ N	73° 29.020′ W
	300N	40° 59.320′ N	73° 29.020′ W
	100S	40° 59.103′ N	73° 29.020′ W
	200S	40° 59.049′ N	73° 29.020′ W
	300S	40° 58.995′ N	73° 29.020′ W
	100E	40° 59.158′ N	73° 28.948′ W
	200E	40° 59.158′ N	73° 28.877′ W
	300E	40° 59.158′ N	73° 28.806′ W
	100W	40° 59.158′ N	73° 29.091′ W
	200W	40° 59.158′ N	73° 29.162′ W
	300W	40° 59.158′ N	73° 29.233′ W
Reference Areas			
2000W 40° 59.393′ N 73° 30.632′ W	STA 1	40° 59.410′ N	73° 30.625′ W
	STA 2	40° 59.426′ N	73° 30.586′ W
	STA 3	40° 59.370′ N	73° 30.559′ W
	STA 4	40° 59.356′ N	73° 30.825′ W
SOUTH 40° 58.688′ N 73° 29.201′ W	STA 5	40° 58.699′ N	73° 29.239′ W
	STA 6	40° 58.641′ N	73° 29.173′ W
	STA 7	40° 58.677′ N	73° 29.105′ W
	STA 8	40° 58.839′ N	73° 29.162′ W
SWREF 40° 58.487′ N 73° 29.909′ W	STA 9	40° 58.489′ N	73° 29.927′ W
	STA 10	40° 58.409′ N	73° 29.942′ W
	STA 11	40° 58.451′ N	73° 29.872′ W
	STA 12	40° 58.471′ N	73° 29.714′ W
	STA 13	40° 58.566′ N	73° 29.827′ W
Supplemental Areas			
D MOUND 40° 59.254′ N 73° 29.095′ W	D200S	40° 59.146′ N	73° 29.095′ W
	D300S	40° 59.092′ N	73° 29.095′ W

Appendix A, Table 3-1

WLIS H Mound REMOTS® Parameters Summary Table

Station	Mean RPD (cm)	Median OSI	Mean Camera Penetration (cm)	Mean Boundary Roughness (cm)
CTR	2.77	7.0	13.03	1.17
50N	2.27	5.0	18.57	1.71
50S	2.71	7.0	16.68	1.94
50E	1.88	4.0	17.46	1.51
50W	0.39	0.0	18.35	1.59
100N	2.32	4.0	17.63	0.75
100S	2.54	5.0	15.96	3.24
100E	2.29	4.0	16.32	0.64
100W	2.75	8.0	12.98	2.42
150N	2.91	5.0	17.87	1.22
150S	2.65	5.0	17.48	1.76
150E	4.88	6.5	15.03	1.22
150W	1.60	4.0	16.83	0.77

Appendix A, Table 3-2

WLIS G Mound REMOTS® Parameters Summary Table

Station	Mean RPD (cm)	Median OSI	Mean Camera Penetration (cm)	Mean Boundary Roughness (cm)
CTR	1.84	4.0	13.58	1.41
100N	3.05	5.5	10.70	2.24
100S	2.74	5.0	14.80	0.47
100E	3.23	5.0	16.66	0.71
100W	1.90	4.0	13.36	0.42
200N	1.83	4.0	16.07	2.20
200S	1.33	3.0	14.67	1.02
200E	3.59	10.5	17.76	1.47
200W	2.86	7.0	12.24	1.03
300N	2.42	8.0	15.36	0.71
300S	1.36	4.0	10.32	0.75
300E	2.15	4.0	13.61	1.49
300W	3.18	9.0	17.31	0.66

Appendix A, Table 3-3

WLIS D Mound REMOTS® Parameters Summary Table

Station	Mean RPD (cm)	Median OSI	Mean Camera Penetration (cm)	Mean Boundary Roughness (cm)
200S	1.77	-1.0	14.94	0.47
300S	2.74	8.0	15.34	1.20

Appendix A, Table 3-4

WLIS Reference Areas REMOTS® Parameters Summary Table

Station	Mean RPD (cm)	Median OSI	Mean Camera Penetration (cm)	Mean Boundary Roughness (cm)
2000W				
STA 1	1.62	4.0	17.68	2.71
STA 2	2.88	5.0	18.37	1.49
STA 3	2.59	5.0	19.98	0.41
STA 4	0.92	-2.0	15.64	5.02
SOUTH				
STA 5	2.51	5.0	11.89	0.93
STA 6	1.61	3.5	10.03	0.83
STA 7	2.37	7.0	7.57	0.79
STA 8	2.66	9.0	14.09	0.84
SW-REF				
STA 9	3.89	11.0	9.82	0.46
STA 10	3.10	6.0	9.97	0.49
STA 11	3.81	7.0	9.22	1.67
STA 12	3.19	10.0	11.36	0.84
STA 13	1.86	4.0	4.60	1.75

Appendix B

Appendix B

REMOTS® Data from the WLIS H MOUND

Station	Replicate	Date	Time	Successional Stage	Grain Size (ph)			Mud Clasts			Camera Penetration			Dredged Material Thickness				Redox Rebound Thickness				Apparent RPD Thickness			Methane	OSI	Surface Roughness	Low DO	Comments
					Min	Max	Maj Mode	Count	Avg Diam		Min	Max	Range	Mean	Area	Min	Max	Mean	Area	Min	Max	Mean						
HCTR	E	7/18/96	8:55	ST_I	3	>4	>4	0	0		9.43	9.46	0.03	9.46	126.39	9.12	9.54	9.34	0	0	0	28.088	1.13	5.68	2.96	No	5	BIOGENIC	NO	large microfaunal burrow
HCTR	F	7/18/96	8:58	ST_I	3	>4	>4	0	0.52		12.99	15.15	2.16	14.07	184.93	7.99	15	13.45	2.32	9.02	5.67	53.498	2.08	10.05	3.94	No	7	PHYSICAL	NO	DGP,possible unidentified organism on reduced clast
HCTR	G	7/18/96	8:58	ST_I_ON_III	3	>4	>4	0	0.36		14.9	15.2	1.3	15.55	219.5	4.17	16.7	15.33	2.32	6.49	4.41	18.318	0.81	2.44	1.39	No	7	INDET	NO	DGP,possible relic voids
50N	A	7/17/96	16:32	ST_I	3	>4	>4	8	0.56		18.04	19.64	0.61	19.34	262.3	16.68	19.75	19.06	2.59	7.72	5.15	31.066	1.52	2.69	2.27	No	5	INDET	NO	DGP,some shell hash
50N	C	7/17/96	16:33	ST_I	3	>4	>4	5	0.37		18.4	19.2	2.8	17.8	258.16	1.55	19.53	18.13	0	0	0	NA	NA	NA	NA	No	90	PHYSICAL	NO	wiper streak over RPD,stage I near camera artifact,DGP,S/M
50S	B	7/17/96	16:28	ST_I_ON_III	3	>4	>4	0	0.52		12.79	15.79	3.01	14.29	217.24	4.87	18.23	15.11	5.96	9.89	7.92	16.49	0.58	3.2	1.61	No	8	PHYSICAL	NO	DGP,relic voids;S/M
50S	C	7/17/96	16:28	ST_I	3	>4	>4	3	0.33		18.63	19.51	0.87	19.07	284.41	16.69	19.45	18.11	4.64	6.31	6.48	50.429	1.26	5.25	3.01	No	8	INDET	NO	DGP,relic voids
50E	B	7/17/96	15:55	ST_I	3	>4	>4	3	0.43		16.78	19.89	3.14	18.32	252.1	16.81	19.78	18.47	0	0	0	27.093	0.99	2.46	1.86	No	4	PHYSICAL	NO	DGP; sloping topography,rebounded RPD?
50E	C	7/17/96	15:55	ST_I	3	>4	>4	0	0		18.45	19.41	0.96	18.93	254.48	7.75	19.38	18.66	4.38	7.33	5.86	25.238	1.36	2.15	1.75	No	4	BIOGENIC	NO	DGP; relic voids at depth; possible mulma?
50E	E	7/18/96	9:00	ST_I	3	>4	>4	4	0.3		14.92	15.35	0.43	15.13	203.29	3.85	15.29	14.76	4.38	7.06	5.72	32.451	0.5	3.02	2	No	4	BIOGENIC	NO	DGP;possible relic voids mid depth
50W	A	7/17/96	15:43	ST_I	3	>4	>4	2	0.21		14.71	17.66	3.18	16.28	212.99	3.85	17.81	15.77	0	0	0	0	0	0	0	No	-3	PHYSICAL	YES	sulfidic to surface,DGP
50W	B	7/17/96	15:43	ST_I	3	>4	>4	0	0.29		19.04	19.89	0.86	19.47	258.83	18.72	19.84	19.2	3.32	10	6.66	10.185	0.05	1.27	0.76	No	3	PHYSICAL	NO	DGP,relic feeding voids
50W	C	7/17/96	15:44	ST_I	3	>4	>4	4	0.32		19.03	19.68	0.75	19.3	261.25	18.66	19.84	19.18	0	0	0	NA	NA	NA	NA	No	99	INDET	NO	DGP,wiper smear over RPD
100N	A	7/17/96	16:37	ST_I_ON_III	3	>4	>4	1	0.25		17.87	18.12	0.48	17.89	242.06	4.47	18.22	17.68	2.03	7.92	4.97	43.497	1.32	4.62	3.32	No	10	INDET	NO	DGP,large feeding void(not oxidized)
100N	B	7/17/96	16:38	ST_I	3	3	>4	1	0.43		15.84	16.4	0.48	16.17	224.42	5.38	16.85	16.09	2.54	11	6.77	29.521	0.05	3.5	1.84	No	4	PHYSICAL	NO	possible relic feeding voids,DGP,object dragged down by camera at bottom frame
100N	C	7/17/96	16:38	ST_I	3	>4	>4	4	0.47		18.17	19.49	1.32	18.83	255.78	18.17	19.54	18.84	0	0	0	24.795	1.27	3.25	1.71	No	4	INDET	NO	2 small craters at sediment surface with clasts;DGP,S/M
100S	A	7/17/96	16:21	ST_I	3	>4	>4	0	0		17.98	18.63	0.66	18.31	250.07	9.78	18.42	17.97	3.17	7.54	5.36	36.537	0.16	4.54	2.89	No	5	INDET	NO	DGP,large relic feeding voids
100S	B	7/17/96	16:22	ST_I	3	>4	>4	0	0.62		8.12	14.37	8.25	10.25	164.81	5.41	14.54	12.83	0	0	0	19.656	0.27	2.73	1.73	No	4	PHYSICAL	NO	chaotic fabric
100S	C	7/17/96	16:22	ST_I	3	>4	>4	1	0.26		18.91	19.73	0.82	19.32	282.46	9.4	19.84	18.95	3.11	9.51	6.31	41.003	2.13	3.83	2.99	No	5	INDET	NO	DGP,relic feeding void,grey mud clast at depth
100E	A	7/17/96	15:58	ST_I_ON_III	3	>4	>4	0	0		17.93	18.79	0.86	18.36	245.87	17.93	18.54	18.22	3.89	6.82	5.25	47.192	1.97	4.95	3.68	No	10	BIOGENIC	NO	DGP,feeding void at depth,relic void middepth
100E	D	7/18/96	9:03	ST_I	3	>4	>4	1	0.26		14.14	14.95	0.81	14.55	193.81	14.04	14.65	14.43	2.73	4.29	3.51	28.538	1.51	2.24	1.9	No	4	INDET	NO	DGP,stage I tube
100E	E	7/18/96	9:04	ST_I	3	>4	>4	0	0		15.91	18.18	0.23	18.04	214.52	15.66	18.18	15.96	1.82	6.54	5.18	17.845	0.25	2.83	1.3	No	3	BIOGENIC	NO	DGP,stage I tube,some smearing
100W	A	7/17/96	15:19	ST_I_ON_III	3	>4	>4	5	0.4		17.58	18.34	0.96	17.88	240.13	13.51	18.4	17.67	2.46	5.72	4.09	60.374	2.44	6.14	4.92	No	11	BIOGENIC	NO	DGP,feeding voids
100W	E	7/17/96	8:27	ST_I	3	>4	>4	2	0.27		6.04	11.93	5.88	8.98	122.7	6.1	12.03	8.98	2.51	5.45	3.98	24.992	1.02	2.57	1.79	No	4	PHYSICAL	NO	DGP,sloping topography,hermit crab?
100W	F	7/16/96	8:27	ST_I_ON_III	3	>4	>4	0	0		11.87	12.3	0.43	12.08	182.03	11.66	12.3	12.01	2.41	4.65	3.53	28.124	1.18	2.87	1.84	No	8	INDET	NO	DGP,relic and active feeding voids,stage I assemblage,S/M
150N	A	7/17/96	16:42	ST_I	3	>4	>4	0	0.19		13.74	15.5	1.76	14.62	206.39	13.72	16.12	14.06	2.81	7.19	5	31.147	0.41	3.72	2.28	No	5	PHYSICAL	NO	surface layer disturbed; black subsurface streak due to marker pen,sulfidic
150N	B	7/17/96	16:43	ST_I	3	>4	>4	2	0.39		19.5	20.28	0.77	19.89	278.51	4.48	20.39	19.65	3.09	8.18	5.64	31.804	0.33	3.09	2.24	No	4	biogenic	NO	DGP,sulfidic streak over RPD
150N	C	7/17/96	16:44	ST_I	3	>4	>4	8	0.32		18.54	19.68	1.14	19.11	252.84	12.99	18.68	18.23	3.3	8.43	4.86	51.807	0.49	5.89	4.21	No	7	INDET	NO	possible camera dragdown center of slide;DGP
150S	A	7/17/96	16:14	ST_I	3	>4	>4	0	0		18.69	19.23	0.55	18.96	258.99	4.43	19.4	18.67	3.17	6.5	4.84	39.445	1.69	5.38	3.68	No	8	INDET	NO	less compact; reworked surface layer,possible relic void,DGP
150S	B	7/17/96	16:15	ST_I	3	>4	>4	0	0		11.78	15.11	3.33	13.44	192.16	7.17	14.94	13.75	2.01	5.58	3.78	27.232	1	2.58	1.89	No	4	PHYSICAL	NO	sloping topography; relic feeding void,DGP,S/M
150S	C	7/17/96	16:15	ST_I	3	>4	>4	0	0		19.33	20.72	1.39	20.03	282.05	19.33	20.72	20.11	4.11	8.89	6.5	33.671	1.87	3.84	2.37	No	5	INDET	NO	DGP,dark brown OM at depth,near OPen,S/M
150E	D	7/18/96	9:07	ST_I	3	>4	>4	0	0		15.58	16.11	0.56	15.83	210.93	5.51	18.06	15.45	6.5	7.5	7	45.434	0.81	4.29	3.46	No	6	BIOGENIC	NO	DGP,stage I tubes,S/M
150E	E	7/18/96	9:08	ST_I	3	3	>4	0	0		8.58	11.16	2.58	9.87	131.55	4.44	10.68	8.7	0	0	0	NA	NA	NA	NA	No	99	BIOGENIC	NO	DGP,smearing over RPD,dense stage I,S/M,pull away
150E	F	7/18/96	9:09	ST_I	3	>4	>4	0	0.94		19.14	19.65	0.51	19.39	259.17	6.99	19.8	18.09	7.66	10.05	8.06	83.739	0.3	7.83	6.29	No	7	INDET	NO	DGP,near OP,reduced clasts at surface
150W	D	7/18/96	8:39	ST_I	3	>4	>4	0	0		18.18	18.97	0.81	18.57	252.58	7.03	18.81	18.18	0	0	0	19.147	0.48	2.35	1.48	No	3	INDET	NO	DGP,possible collapsed void,some shell hash,S/M
150W	F	7/18/96	8:48	ST_I	3	>4	>4	1	0.32		14.97	15.35	0.37	15.16	204.28	3.37	15.45	14.82	2.87	5.4	4.04	20.304	0.27	3.37	1.58	No	4	BIOGENIC	NO	DGP,relic feeding void;S/M
150W	G	7/18/96	8:47	ST_I_ON_III	3	>4	>4	1	0.22		16.2	17.33	1.12	16.76	225.95	15.4	17.33	16.72	3.16	5.51	4.33	24.149	0.48	2.83	1.77	No	8	INDET	NO	DGP, several relic feeding voids;one active

Appendix C

Appendix C

REMOTS® Data from the WLIS G Mound

Station	Replicate	Date	Time	Successional Stage	Grain Size (phi)			Mud Clasts		Camera Penetration				Dredged Material Thickn			Redox Rebound Thickness			Apparent RPD Thickness			Methane	OSI	Surface Roughness	Low DO	Comments
					Min	Max	Maj Mode	Count	Avg Diam	Min	Max	Range	Mean	Area	Max	Mean	Min	Max	Mean	Area	Min	Max	Mean					
GCTR	A	7/16/96	9:20	ST_I	3	>4	>4	0	0	6.97	9.44	2.47	8.2	113.55	9.34	8.32	0	0	0	NA	NA	NA	NA	No	99	PHYSICAL	NO	DGP;rocks,hydroids; crepidula shell,S/M
GCTR	B	7/16/96	9:20	ST_I	3	>4	>4	0	0	14.04	15.15	1.11	14.59	197.93	15.1	14.71	0	0	0	17.706	0.05	2.63	1.41	No	3	INDET	NO	DGP;relic void;sulfidic
GCTR	C	7/16/96	9:21	ST_I	3	>4	>4	2	1.97	17.62	18.28	0.66	17.95	243.73	18.28	17.68	2.8	9.68	6.5	31.18	0.5	3.79	2.26	No	5	PHYSICAL	NO	DGP;reduced wiper clasts in sed;relict feeding voids
100N	A	7/16/96	9:03	ST_I	3	>4	>4	0	0	13.38	13.38	0	13.38	179.83	13.53	13.16	0	0	4	39.413	0.91	4.19	2.04	No	4	BIOGENIC	NO	DGP;sulfidic;S/M
100N	B	7/16/96	9:04	ST_I	3	>4	>4	2	0.64	10.96	12.52	1.57	11.74	158.3	12.47	11.65	0	0	0	NA	NA	NA	NA	No	99	INDET	NO	DGP;reduced clast at surface;RPD obscured by wiper residue
100N	C	7/16/96	9:04	ST_I	3	>4	4 to 3	0	0	4.39	9.54	5.15	6.97	90.51	9.44	6.74	0	0	0	56.264	0.86	5.2	4.06	No	7	INDET	NO	
100S	A	7/16/96	9:27	ST_I	3	>4	>4	0	0	15.13	15.23	0.1	15.18	206.13	15.23	15.18	3.81	5.48	4.65	38.358	0.96	4.11	2.99	No	5	BIOGENIC	NO	relic voids at depth,ambient?
100S	B	7/16/96	9:28	ST_I	3	>4	>4	0	0	14.72	15.23	0.51	14.97	204.78	15.38	14.89	3.12	11.13	7.12	36.444	0.15	6.4	2.99	No	5	INDET	NO	DGP;relic feeding voids;sulfidic
100S	C	7/16/96	9:28	ST_I ON_III	3	>4	>4	0	0	13.86	14.67	0.81	14.26	189.71	14.67	13.93	0	0	0	28.312	0.1	5.03	2.25	No	8	INDET	NO	DGP;feeding voids at depth;sulfidic;ambient
100E	A	7/17/96	11:59	ST_I	3	>4	>4	0	0	18.12	18.22	0.1	18.17	243.8	18.32	17.72	3	7	4	68.025	2.28	5.74	4.95	No	7	BIOGENIC	NO	DGP;mulinia?,forams
100E	B	7/17/96	11:59	ST_I	3	>4	>4	1	1.65	15.12	16.7	1.57	15.91	213.82	16.49	15.7	8.5	11.5	8	NA	NA	NA	NA	No	99	PHYSICAL	NO	DGP;wiper clast over RPD
100E	C	7/17/96	12:00	ST_I	3	>4	>4	4	0.84	15.68	16.14	0.46	15.91	226.46	16.65	15.97	0	0	0	18.668	0.1	3.1	1.5	No	3	INDET	NO	DGP;sulfidic;reduced wiper clasts at surface
100W	A	7/17/96	11:51	ST_I	3	>4	>4	0	0	12.54	12.69	0.15	12.61	167.71	12.69	12.36	2.49	4.67	3.58	20.08	0.71	2.49	1.56	No	4	BIOGENIC	NO	DGP;sulfidic;water spots on film,S/M,forams
100W	B	7/17/96	11:51	ST_I	3	>4	>4	0	0	12.84	13.75	0.91	13.3	180.51	13.88	13.28	3.15	5.18	4.16	28.37	0.81	3.05	2.04	No	4	BIOGENIC	NO	DGP;sulfidic;S/M
100W	C	7/17/96	11:52	ST_I	3	>4	>4	0	0	14.08	14.28	0.2	14.18	188.26	14.28	13.88	0	0	0	28.74	1.87	2.89	2.09	No	4	INDET	NO	DGP;sulfidic;relic void at depth,S/M,forams
200N	A	7/16/96	8:44	ST_I ON_III	3	>4	>4	0	0	10.98	12.32	1.38	11.64	158.2	12.32	11.64	4.03	7.22	5.5	21.088	0.1	4.29	1.77	No	8	BIOGENIC	NO	DGP;feeding void,S/M,ambient?
200N	D	7/16/96	10:06	ST_I	3	>4	>4	0	0	15.91	20.15	4.24	18.03	251.98	20.15	18.44	0	0	0	21.053	0.5	2.83	1.54	No	4	PHYSICAL	NO	DGP;slight OP,feeding void middle,sulfidic,slight wiper smearing
200N	E	7/16/96	10:07	ST_I	3	>4	>4	1	0.77	18.02	19.03	1.01	18.53	247.56	18.78	18.25	0	0	0	29.808	0.81	3.53	2.17	No	4	INDET	NO	DGP;no direct evidence stageIII,stage I tube,sulfidic
200S	A	7/16/96	9:33	ST_I	3	>4	>4	3	0.48	13.71	15.58	1.88	14.64	197.79	15.48	14.55	0	0	0	16.255	0.36	2.03	1.18	No	3	INDET	NO	DGP;sulfidic;S/M
200S	B	7/16/96	9:34	ST_I	3	>4	>4	0	0	12.94	13.3	0.36	13.12	174.25	13.3	12.82	0	0	0	16.255	0.36	2.03	1.18	No	3	BIOGENIC	NO	DGP;SULFIDIC;some wiper smearing over RPD
200S	C	7/16/96	9:34	ST_I ON_III	3	>4	>4	4	0.64	15.84	16.65	0.81	16.24	219.04	16.85	16.53	0	0	0	18.836	0.36	3.3	1.62	No	8	PHYSICAL	NO	DGP;sulfidic;void at base of oxidized zone(left)
200E	A	7/17/96	12:04	ST_I ON_III	3	>4	>4	0	0	17.92	18.78	0.86	18.35	223.52	18.98	17.38	6	9	3	50.553	0.56	5.69	3.96	No	11	BIOGENIC	NO	DGP;large macrofaunal burrow,old DM?
200E	B	7/17/96	12:05	ST_I ON_III	3	>4	>4	2	0.52	14.46	17.05	2.59	15.76	225.22	17	16.58	0	0	0	35.474	0.05	6.24	3.2	No	10	PHYSICAL	NO	DGP
200E	C	7/17/96	12:05	ST_I	3	>4	>4	3	0.91	18.68	19.64	0.96	19.16	258.9	19.54	18.88	0	0	0	NA	NA	NA	NA	No	99	PHYSICAL	NO	DGP;reduced wiper clast
200W	A	7/17/96	11:46	ST_I ON_III	3	>4	>4	0	0	13.35	14.52	1.17	13.93	189.29	14.41	13.91	4.47	7.16	5.81	50.559	1.58	5.18	3.66	No	10	INDET	NO	DGP;active feeding void,old DM ?
200W	B	7/17/96	11:46	ST_I	3	>4	>4	0	0	14.67	15.02	0.36	14.85	199.47	15.07	14.6	0	0	0	25.032	0.2	4.62	2.06	No	4	BIOGENIC	NO	DGP;relic void at depth,sulfidic,mulinia?,forams
200W	C	7/17/96	11:47	ST_I	3	>4	>4	0	0	7.18	8.73	1.57	7.94	108.32	8.68	7.95	0	0	0	NA	NA	NA	NA	No	99	PHYSICAL	NO	DGP;little RPD,wiper smear
300N	A	7/16/96	8:32	ST_I	3	>4	>4	2	0.55	16.82	17.93	1.11	17.37	235.76	17.98	17.08	6.17	8.75	7.46	23.002	0.15	8.31	3.45	No	6	INDET	NO	DGP?;possible relic void,detritus
300N	B	7/16/96	8:32	ST_I ON_III	3	>4	>4	0	0.67	13.03	13.78	0.76	13.4	203.73	14.61	13.98	0	0	0	24.207	0.05	2.52	1.75	No	8	PHYSICAL	NO	DGP;feeding voids;sulfidic S/M,methane?
300N	C	7/16/96	8:33	ST_I ON_III	3	>4	>4	0	0.25	15.2	15.45	0.25	15.32	182.53	12.37	11.97	0	0	0	25.188	0.1	4.39	2.05	No	8	INDET	NO	DGP;feeding voids at depth;sulfidic
300S	A	7/16/96	9:40	ST_I	3	>4	>4	0	0	18.7	19.53	0.83	19.11	260.01	19.64	19.09	0	0	0	20.157	0.57	2.55	1.54	No	4	INDET	NO	DGP;sulfidic,possible relic voids,forams upper 3 cm
300S	E	7/16/96	9:49	ST_I ON_III	3	>4	>4	0	0	8.04	8.2	0.16	8.12	80.87	8.2	8.12	0	0	0	15.385	0.62	2.55	1.57	No	8	INDET	NO	DGP;active feeding void
300S	F	7/16/96	9:50	ST_I	3	>4	>4	0	0	5.1	6.35	1.25	5.73	81.1	6.51	5.79	0	0	0	14.339	0.36	1.55	0.97	No	3	PHYSICAL	NO	DGP;erosional
300E	C	7/17/96	12:12	ST_I	3	>4	>4	3	0.84	18.12	19.06	0.98	18.6	253.79	19.08	18.36	0	0	0	12.971	1.49	2.58	2.17	No	4	PHYSICAL	NO	DGP;reduced wiper clasts,S/M,forams
300E	D	7/18/96	9:38	ST_I	3	>4	>4	0	0	14.77	15.78	1.02	15.28	253.79	19.08	18.36	0	0	0	40.375	0.1	4.57	3.08	No	8	BIOGENIC	NO	DGP;relic voids;old Dm
300E	E	7/18/96	9:39	ST_I	4	>4	>4	0	0	5.71	8.21	2.5	6.96	98	8.42	7.15	0	0	0	18.643	0.15	4.34	1.21	No	3	INDET	NO	DGP;shallow RPD;S/M
300W	A	7/16/96	9:50	ST_I ON_III	3	>4	>4	0	0	18.32	18.73	0.41	18.52	249.29	18.88	18.29	0	0	0	69.874	2.94	6.29	5.26	No	11	BIOGENIC	NO	DGP;mulinia,forams
300W	B	7/16/96	9:51	ST_I ON_III	3	>4	>4	3	0.76	16.14	16.75	0.61	16.44	225.08	17.05	16.47	0	0	0	18.057	0.05	5.79	2.7	No	9	INDET	NO	DGP;active void ?,reduced mud clasts
300W	C	7/16/96	9:52	ST_I	3	>4	>4	1	1.4	16.49	17.46	0.96	16.98	231.5	17.31	16.93	0	0	0	10.352	0.05	4.11	1.59	No	4	BIOGENIC	NO	DGP;sulfidic,light leak/processing error

Appendix D

Appendix D

REMOTS® Data from the WLIS D Mound

Station	Replicate	Date	Time	Successional Stage	Grain Size (phi)				Mud Clasts		Camera Penetration				Dredged Material Thickness				Redox Rebound Thickness				Apparent RPD Thickness			Methane	OSI	Surface Roughness	Low DO	Comments
					Min	Max	Maj. Mode		Count	Avg. Diam	Min	Max	Range	Mean	Area	Min	Max	Mean	Min	Max	Mean	Area	Min	Max	Mean					
D200S	A	7/17/96	12:19	ST_I_ON_III	3	>4	>4		0	0	15.73	15.99	0.25	15.86	212.41	6.19	18.09	15.55	0	0	0	49.501	1.32	4.31	3.61	No	10	BIOGENIC	NO	DGP,forams
D200S	B	7/17/96	12:20	ST_I	3	>4	>4		0	0	13.4	14.46	1.07	13.93	189.9	11.32	14.46	13.88	0	0	0	6.033	0.05	1.73	0.4	No	-2	BIOGENIC	YES	DGP,sulfidic to surface,shallow RPD;S/M,forams
D200S	C	7/17/96	12:21	ST_I	3	>4	>4		0	0	14.97	15.07	0.1	15.02	203.51	7.82	15.28	15.02	0	0	0	18.64	0.73	2.02	1.29	No	-1	INDET	YES	DGP,smearing over RPD ?
D300S	B	7/17/96	12:25	ST_I	3	>4	>4		0	0	14.31	14.57	0.25	14.44	192.64	14.06	14.52	14.28	6.4	9.85	8.12	21.136	1	3	1.5	No	3	BIOGENIC	NO	DGP,S/M
D300S	C	7/17/96	12:25	ST_I_ON_III	3	>4	>4		3	1.05	15.83	17.56	1.73	16.7	229.48	15.94	17.56	16.95	0	0	0	25.363	0.71	3.68	1.85	No	8	PHYSICAL	NO	DGP,large worm,clasts on surface
D300S	D	7/18/96	10:01	ST_I_ON_III	3	>4	>4		0	0	14.06	15.68	1.62	14.87	178.02	3.65	15.68	13.63	0	0	0	62.883	2.79	6.45	4.87	No	11	BIOGENIC	NO	DGP,large macrofaunal burrow,S/M,old Dm?

Appendix E

Appendix E

REMOTS® Data from the WLIS Reference Areas

Station	Replicate	Date	Time	Successional Stage	Grain Size (phi)				Mud Clasts		Camera Penetration				Dredged Material Thickness				Redox Rebound Thickness				Apparent RPD Thickness			Methane	OSI	Surface Roughness	Low DO	Comments
					Min	Max	Maj	Mode	Count	Avg. Diam	Min	Max	Range	Mean	Area	Min	Max	Mean	Min	Max	Mean	Area	Min	Max	Mean					
2000W																														
STA1	C	7/17/96	14:38	ST_I	3	>4	>4		2	1.18	18.84	18.99	0.15	18.91	999	18.84	18.99	18.91	0	0	0	21.326	1.5	5	2.02	No	4	BIOGENIC	NO	clasts of DM,smearing of RPD by wiper,DGP
STA1	D	7/16/96	7:26	ST_I_ON_III	3	>4	>4		0	0	18.08	18.08	0	18.08	0	0	0	0	0	0	0	35.163	0.91	4.19	2.83	No	9	BIOGENIC	NO	feeding void at depth;mulinia?,ambient or older DM
STA1	E	7/16/96	7:27	AZOIC	4	>4	>4		0	0	12.07	20.05	7.98	16.06	252.2	3.71	20.32	17.76	0	0	0	0	0	0	0	No	-6	PHYSICAL	YES	large reduced Dm clast
STA2	B	7/17/96	14:40	ST_I	3	>4	>4		0	0	16.08	18.28	2.22	17.17	10.13	16.06	18.28	17.17	0	0	0	40.659	2	4.14	2.89	No	5	INDET	NO	reduced wiper clasts of DM in RPD
STA2	C	7/17/96	14:41	ST_I	3	>4	>4		0	0	19.19	19.95	0.76	19.57	17.11	19.19	19.95	19.57	5.76	8.64	7.2	38.121	1.87	3.74	2.86	No	5	PHYSICAL	NO	reduced wiper clasts of DM,possible relic void
STA3	B	7/17/96	14:47	INDET	3	>4	>4		0	0	20.05	20.2	0.15	20.13	9999	20.05	20.2	20.13	0	0	0	NA	NA	NA	NA	No	99	INDET	NO	overpen,IND RPD;surface conditions;some shell,dgp
STA3	C	7/17/96	14:48	ST_I	3	>4	>4		5	0.76	19.49	20.15	0.66	19.82	999	19.49	20.15	19.82	0	0	0	35.332	0.61	5.4	2.59	No	5	INDET	NO	clasts of reduced Dm in RPD,possible relic voids at depth,slight OP,dgp
STA4	A	7/17/96	14:28	ST_I_ON_III	3	>4	>4		0	0	19.55	20.1	0.56	19.82	0	0	0	0	0	0	0	30.857	0.56	3.33	2.25	Yes	6	INDET	NO	slight OP,feeding void with air bubble;possible traces DM
STA4	B	7/17/96	14:29	INDET	3	>4	>4		1	1.29	7.53	14.24	6.71	10.89	0	0	0	0	0	0	0	8.457	0.21	1.3	0.51	No	-2	PHYSICAL	YES	bottom physically disturbed,some evidence of patchy RPD
STA4	C	7/17/96	14:29	AZOIC	4	>4	>4		0	0	12.32	20.1	7.78	16.21	215.26	10.11	20.27	15.88	0	0	0	0	0	0	0	No	-10	PHYSICAL	YES	large reduced DM clasts
SOUTH																														
STA5	A	7/17/96	12:34	ST_I	3	4	>4		3	0	12.76	13.93	1.17	13.34	0	0	0	0	3.22	4.7	3.98	43.685	1.02	4.44	3.11	No	6	PHYSICAL	NO	clats of reduced Dm in RPD,worm mid depth
STA5	B	7/17/96	12:35	ST_I	3	>4	>4		2	0.79	8.52	9.18	0.66	8.85	0	0	0	0	0	0	0	NA	NA	NA	NA	No	99	PHYSICAL	NO	wiper clasts in RPD,relocated anemone
STA5	C	7/17/96	12:35	ST_I	3	>4	>4		1	1.16	12.99	13.95	0.96	13.47	0	0	0	0	2.54	4.31	4.5	24.987	0.91	2.84	1.9	No	4	INDET	NO	large clast on surface,S/M
STA6	D	7/18/96	8:12	ST_I	3	>4	4 to 3		3	0.41	8.64	9.6	0.76	9.22	0	0	0	0	0	4	3.75	15.626	0.35	2.42	1.21	No	3	INDET	NO	some shell hash,reduced clast probable camera artifact,S/M
STA6	E	7/18/96	8:13	ST_I	3	>4	>4		0	0	10.61	11.82	1.01	11.31	0	0	0	0	0	0	0	27.714	0.35	2.83	2.01	No	4	INDET	NO	some shell,S/M
STA6	F	7/18/96	8:13	ST_I	3	>4	>4		0	0	9.39	10.1	0.71	9.75	0	0	0	0	0	0	0	NA	NA	NA	NA	No	99	INDET	NO	some shell,S/M,wiper smearing
STA7	A	7/17/96	12:44	ST_I	3	>4	4 to 3		0	0	6.36	8.33	1.97	7.35	0	0	0	0	0	0	0	65.323	2.98	7.53	4.99	No	7	PHYSICAL	NO	S/M,rippled
STA7	B	7/17/96	12:45	ST_I_ON_III	3	>4	>4		0	0	8.33	8.54	0.2	8.43	0	0	0	0	0	0	4.5	20.341	0.68	2.55	1.4	No	7	PHYSICAL	NO	active feeding voids at depth;gastropods;S/M
STA7	C	7/17/96	12:45	ST_I	3	>4	>4		0	0	6.82	7.02	0.2	6.92	0	0	0	0	0	0	0	10.359	0.15	1.16	0.73	No	-2	PHYSICAL	YES	shallow RPD,mercenaria shell,gastropod
STA8	A	7/17/96	13:11	ST_I_ON_III	3	>4	>4		0	0	13.89	14.24	0.35	14.07	0	0	0	0	0	0	0	35.991	0.05	4.19	2.66	No	9	BIOGENIC	NO	S/M
STA8	B	7/17/96	13:12	ST_I	3	>4	>4		4	0.63	13.43	13.84	0.4	13.64	0	0	0	0	0	0	0	NA	NA	NA	NA	No	99	PHYSICAL	NO	reduced wiper clasts at surface;some shell hash
STA8	C	7/17/96	13:12	ST_I	3	>4	>4		0	0	13.69	15.46	1.77	14.57	10.07	0.15	1.11	0.77	0	0	0	NA	NA	NA	NA	No	99	PHYSICAL	NO	large reduced wiper clasts DM,possible feeding void
SWREF																														
STA9	B	7/17/96	13:54	ST_I_ON_III	3	>4	4 to 3		1	0.64	11.16	11.51	0.35	11.34	0	0	0	0	0	0	0	47.159	1.16	4.14	3.47	No	10	INDET	NO	worm middepth;stage I tubes;S/M
STA9	C	7/17/96	13:54	ST_I_ON_III	3	>4	4 to 3		2	0.38	7.88	8.38	0.51	8.13	0	0	0	0	0	0	0	53.894	1.26	4.29	3.91	No	11	BIOGENIC	NO	worm at depth;smearing over RPD,S/M
STA9	D	7/18/96	7:42	ST_I_ON_III	3	>4	4 to 3		0	0	9.75	10.25	0.51	10	0	0	0	0	0	0	0	56.295	2.27	5.86	4.3	No	11	BIOGENIC	NO	active feeding void,worm;S/M
STA10	B	7/17/96	13:54	ST_I_ON_III	3	>4	>4		1	0.64	11.16	11.51	0.35	11.34	0	0	0	0	0	0	0	47.159	1.16	4.14	3.47	No	10	INDET	NO	worm middepth;stage I tubes;S/M
STA10	C	7/17/96	13:44	ST_I	3	>4	4 to 3		0	0	9.44	10.25	0.81	9.85	0	0	0	0	0	0	0	40.666	1.87	5.15	3.15	No	6	BIOGENIC	NO	S/M;gastropods;smearing over RPD,S/M
STA10	D	7/18/96	7:47	ST_I_ON_III	3	>4	4 to 3		0	0	9.85	10.05	0.2	9.95	0	0	0	0	0	0	0	35.191	1.52	4.39	2.74	No	5	PHYSICAL	NO	worm at mid depth;dense stage I,gastropods,S/M,erosion(stranded tubes)
STA10	E	7/18/96	7:48	ST_I	3	>4	4 to 3		0	0	8.43	9.04	0.61	8.74	0	0	0	0	0	0	0	42.251	1.87	4.55	3.05	No	6	PHYSICAL	NO	stage I tubes;gastropods;S/M,erosional;wiper smear
STA11	C	7/17/96	13:49	ST_I	3	>4	4 to 3		0	0	8.38	10.05	1.67	9.22	0	0	0	0	0	0	0	49.162	2.07	5.66	3.81	No	7	PHYSICAL	NO	s/m;some shell; S/M,erosional
STA12	D	7/18/96	7:56	ST_I_ON_III	3	>4	>4		0	0	11.46	11.87	0.4	11.67	0	0	0	0	3.43	5.05	4.24	51.697	1	4	2	No	8	BIOGENIC	NO	S/M,active feeding voids;dense stage I tube mat,S/M
STA12	E	7/18/96	7:57	ST_III	3	>4	>4		0	0	10.1	10.76	0.66	10.43	0	0	0	0	0	0	0	41.21	0.05	4.9	3.61	No	10	INDET	NO	S/M,feeding voids;clast of reduced clay background?
STA12	F	7/18/96	7:58	ST_I_ON_III	3	>4	>4		3	1.04	11.26	12.73	1.46	11.99	0	0	0	0	3.13	4.39	3.76	40.682	0.1	6.72	3.96	No	11	INDET	NO	S/M,macrofaunal burrow,active feeding voids,wiper clasts
STA13	A	7/17/96	14:13	ST_I	3	>4	>4		0	0	2.58	5.51	2.93	4.04	0	0	0	0	0	0	0	14.096	0.56	3.79	1.75	No	4	PHYSICAL	NO	Shallow RPD,macrofaunal burrow
STA13	B	7/17/96	14:14	ST_I	3	>4	>4		0	0	3.54	4.65	1.11	4.09	0	0	0	0	0	0	0	24.113	0.05	3.13	2.04	No	4	BIOGENIC	NO	stage I tubes; burrow,mercenaria shell,S/M
STA13	C	7/17/96	14:15	ST_I	3	>4	>4		0	0	5.05	6.26	1.21	5.68	0	0	0	0	0	0	0	24.552	0.05	4.04	1.8	No	4	PHYSICAL	NO	S/M,wiper smear over RPD,tubes

Appendix F

Disposal Logs

Appendix F, Table 1

permittee	project	disparea	dispdate	wtd	xtd	ytd	ztd	latdeg	latmin	longdeg	longmin	cyvol
VILLAGE CREEK HOMEOWNERS ASSOC	VILLAGE CREEK CHANNEL, CT	WLIS	15-Apr-96	0	26826.5	43973.5	0	40	59.256	73	28.755	970
VILLAGE CREEK HOMEOWNERS ASSOC	VILLAGE CREEK CHANNEL, CT	WLIS	17-Apr-96	0	26826.3	43973.2	0	40	59.225	73	28.742	923
VILLAGE CREEK HOMEOWNERS ASSOC	VILLAGE CREEK CHANNEL, CT	WLIS	18-Apr-96	0	26826.1	43973.3	0	40	59.242	73	28.713	885
MR & MRS ALBERT ZESIGNER	WILSON COVE DARIEN, CT	WLIS	18-Apr-96	0	26826.4	43973.3	0	40	59.235	73	28.75	700
VILLAGE CREEK HOMEOWNERS ASSOC	VILLAGE CREEK CHANNEL, CT	WLIS	19-Apr-96	0	26826.3	43973.5	0	40	59.261	73	28.73	948
MR & MRS ALBERT ZESIGNER	WILSON COVE DARIEN, CT	WLIS	19-Apr-96	0	26826.4	43973.3	0	40	59.235	73	28.75	700
VILLAGE CREEK HOMEOWNERS ASSOC	VILLAGE CREEK CHANNEL, CT	WLIS	20-Apr-96	0	26826.3	43973.3	0	40	59.237	73	28.738	914
MR & MRS ALBERT ZESIGNER	WILSON COVE DARIEN, CT	WLIS	20-Apr-96	0	26826.3	43973.3	0	40	59.237	73	28.738	450
MR & MRS ALBERT ZESIGNER	WILSON COVE DARIEN, CT	WLIS	21-Apr-96	0	26826.4	43973.3	0	40	59.235	73	28.75	650
VILLAGE CREEK HOMEOWNERS ASSOC	VILLAGE CREEK CHANNEL, CT	WLIS	22-Apr-96	0	26826.3	43973.5	0	40	59.261	73	28.73	969
MR & MRS ALBERT ZESIGNER	WILSON COVE DARIEN, CT	WLIS	23-Apr-96	0	26826.3	43973.3	0	40	59.237	73	28.738	450
VILLAGE CREEK HOMEOWNERS ASSOC	VILLAGE CREEK CHANNEL, CT	WLIS	25-Apr-96	0	26826.2	43973.4	0	40	59.251	73	28.721	800
TOM'S POINT MARINA	MANHASSET BAY VILLAGE OF MANORHAVEN, NY	WLIS	26-Apr-96	0	26826.3	43973.3	0	40	59.237	73	28.738	450
TOM'S POINT MARINA	MANHASSET BAY VILLAGE OF MANORHAVEN, NY	WLIS	27-Apr-96	0	26826.4	43973.3	0	40	59.235	73	28.75	450
TOM'S POINT MARINA	MANHASSET BAY VILLAGE OF MANORHAVEN, NY	WLIS	28-Apr-96	0	26826.4	43973.3	0	40	59.235	73	28.75	450
TOM'S POINT MARINA	MANHASSET BAY VILLAGE OF MANORHAVEN, NY	WLIS	29-Apr-96	0	26826.3	43973.3	0	40	59.237	73	28.738	450
TOM'S POINT MARINA	MANHASSET BAY VILLAGE OF MANORHAVEN, NY	WLIS	01-May-96	0	26826.4	43973.3	0	40	59.235	73	28.75	350
MANHASSET BAY MARINA	MANHASSET BAY, NY	WLIS	02-May-96	0	26826.3	43973.3	0	40	59.237	73	28.738	800
MANHASSET BAY MARINA	MANHASSET BAY, NY	WLIS	03-May-96	0	26826.4	43973.3	0	40	59.235	73	28.75	550
MANHASSET BAY MARINA	MANHASSET BAY, NY	WLIS	04-May-96	0	26826.3	43973.3	0	40	59.237	73	28.738	850
MANHASSET BAY MARINA	MANHASSET BAY, NY	WLIS	05-May-96	0	26826.4	43973.3	0	40	59.235	73	28.75	750
MANHASSET BAY MARINA	MANHASSET BAY, NY	WLIS	06-May-96	0	26826.5	43973.3	0	40	59.233	73	28.763	700
MANHASSET BAY MARINA	MANHASSET BAY, NY	WLIS	07-May-96	0	26826.3	43973.3	0	40	59.237	73	28.738	750
MANHASSET BAY MARINA	MANHASSET BAY, NY	WLIS	08-May-96	0	26826.3	43973.3	0	40	59.237	73	28.738	300
STAMFORD YACHT CLUB	STAMFORD HARBOR, CT	WLIS	09-May-96	0	26826.4	43973.3	0	40	59.235	73	28.75	800
STAMFORD YACHT CLUB	STAMFORD HARBOR, CT	WLIS	10-May-96	0	26826.5	43973.3	0	40	59.233	73	28.763	600
STAMFORD YACHT CLUB	STAMFORD HARBOR, CT	WLIS	11-May-96	0	26826.4	43973.3	0	40	59.235	73	28.75	350
PETER WARD	PRATT'S COVE, CT	WLIS	25-May-96	0	0	0	0	40	59.228	73	28.732	500
PETER WARD	PRATT'S COVE, CT	WLIS	26-May-96	0	0	0	0	40	59.228	73	28.732	450
PETER WARD	PRATT'S COVE, CT	WLIS	29-May-96	0	0	0	0	40	59.228	73	28.732	550
PETER WARD	PRATT'S COVE, CT	WLIS	29-May-96	0	0	0	0	40	59.228	73	28.732	550
											WLIS H Mound	
											Total YD³	20009
											Total m³	15299

Appendix F, Table 2

permittee	project	disparea	dispdate	wtd	xtd	ytd	ztd	latdeg	latmin	longdeg	longmin	cyvol
ANNE C. CAMBELL	DARIEN RIVER	WLIS	19-Jan-95	0	26828.8	43973.2	0	40	59.171	73	29.056	725
ANNE C. CAMBELL	DARIEN RIVER	WLIS	21-Jan-95	0	26828.4	43973.2	0	40	59.179	73	29.006	550
ANNE C. CAMPBELL	NORWALK COVE MARINA	WLIS	20-Apr-95	0	26828.8	43973.3	0	40	59.182	73	29.052	400
TOWN OF GREENWICH	GREENWICH HARBOR	WLIS	03-Jan-95	0	26828.7	43973.4	0	40	59.196	73	29.036	750
TOWN OF GREENWICH	GREENWICH BOAT & YACHT CLUB	WLIS	04-Jan-95	0	26828.5	43973.5	0	40	59.213	73	29.006	675
TOWN OF GREENWICH	GREENWICH BOAT & YACHT CLUB	WLIS	05-Jan-95	0	26828.9	43973.4	0	40	59.192	73	29.061	700
TOWN OF GREENWICH	GREENWICH BOAT & YACHT CLUB	WLIS	06-Jan-95	0	26828.8	43973.5	0	40	59.206	73	29.044	700
TOWN OF GREENWICH	GREENWICH BOAT & YACHT CLUB	WLIS	07-Jan-95	0	26828.8	43973.3	0	40	59.182	73	29.052	800
TOWN OF GREENWICH	GREENWICH BOAT & YACHT CLUB	WLIS	09-Jan-95	0	26828.7	43973.4	0	40	59.196	73	29.036	525
TOWN OF GREENWICH	GREENWICH BOAT & YACHT CLUB	WLIS	10-Jan-95	0	26828.7	43973.3	0	40	59.185	73	29.04	650
TOWN OF GREENWICH	GREENWICH HARBOR	WLIS	11-Jan-95	0	26828.6	43973.5	0	40	59.21	73	29.019	650
TOWN OF GREENWICH	GREENWICH HARBOR	WLIS	12-Jan-95	0	26828.7	43973.3	0	40	59.185	73	29.04	700
TOWN OF GREENWICH	GREENWICH HARBOR	WLIS	13-Jan-95	0	26828.8	43973.4	0	40	59.194	73	29.048	675
TOWN OF GREENWICH	GREENWICH HARBOR	WLIS	16-Jan-95	0	26828.7	43973.1	0	40	59.161	73	29.048	675
TOWN OF GREENWICH	GREENWICH HARBOR	WLIS	17-Jan-95	0	26828.7	43973.3	0	40	59.185	73	29.04	350
J ARTHUR URCIUOLI	GREENWICH COVE	WLIS	26-Jan-95	0	26828.7	43972.8	0	40	59.126	73	29.06	400
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	25-Jan-95	0	26828.3	43973.1	0	40	59.17	73	28.997	850
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	27-Jan-95	0	26828.1	43973	0	40	59.163	73	28.976	850
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	28-Jan-95	0	26828.4	43973	0	40	59.156	73	29.014	930
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	30-Jan-95	0	26828.4	43973.3	0	40	59.191	73	29.002	500
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	31-Jan-95	0	26828.3	43973.4	0	40	59.205	73	28.985	925
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	01-Feb-95	0	26828.3	43973.1	0	40	59.17	73	28.997	855
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	02-Feb-95	0	26828.4	43973	0	40	59.156	73	29.014	850
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	03-Feb-95	0	26828.4	43973.2	0	40	59.179	73	29.006	800
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	07-Feb-95	0	26828.3	43973.2	0	40	59.182	73	28.993	850
J ARTHUR URCIUOLI	GREENWICH COVE	WLIS	07-Feb-95	0	26828	43973	0	40	59.165	73	28.964	250
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	08-Feb-95	0	26828.3	43973	0	40	59.158	73	29.001	900
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	09-Feb-95	0	26828.2	43973.3	0	40	59.196	73	28.977	900
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	10-Feb-95	0	26828.3	43973.3	0	40	59.193	73	28.989	925
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	10-Feb-95	0	26828.3	43973.3	0	40	59.193	73	28.989	650
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	11-Feb-95	0	26828.3	43973.2	0	40	59.182	73	28.993	875
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	13-Feb-95	0	26828.3	43973.2	0	40	59.182	73	28.993	750
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	14-Feb-95	0	26828.5	43973.3	0	40	59.189	73	29.014	750
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	15-Feb-95	0	26828.5	43973.4	0	40	59.201	73	29.01	875
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	16-Feb-95	0	26828.4	43973.2	0	40	59.179	73	29.006	850
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	17-Feb-95	0	26828.4	43973.2	0	40	59.179	73	29.006	825
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	18-Feb-95	0	26828.4	43973.3	0	40	59.191	73	29.002	500
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	20-Feb-95	0	26828.4	43973.3	0	40	59.191	73	29.002	825
TOWN OF WESTPORT	LONG ISLAND SOUND	WLIS	22-Feb-95	0	26828.7	43973.4	0	40	59.196	73	29.036	850
J ARTHUR URCIUOLI	GREENWICH COVE	WLIS	22-Feb-95	0	26828.4	43973.1	0	40	59.168	73	29.01	425
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	23-Feb-95	0	26828.6	43973.4	0	40	59.199	73	29.023	600
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	25-Feb-95	0	26828.5	43973.4	0	40	59.201	73	29.01	600
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	28-Feb-95	0	26828.4	43973.3	0	40	59.191	73	29.002	500
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	01-Mar-95	0	26828.5	43973.3	0	40	59.189	73	29.014	800
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	02-Mar-95	0	26828.5	43973.1	0	40	59.166	73	29.022	800
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	03-Mar-95	0	26828.4	43973.3	0	40	59.191	73	29.002	750
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	04-Mar-95	0	26828.5	43973.4	0	40	59.201	73	29.01	825
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	04-Mar-95	0	26828.4	43973.3	0	40	59.191	73	29.002	750
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	05-Mar-95	0	26828.6	43973.4	0	40	59.199	73	29.023	850
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	06-Mar-95	0	26828.2	43972.5	0	40	59.102	73	29.009	875
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	06-Mar-95	0	26828.6	43972.9	0	40	59.14	73	29.043	750
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	07-Mar-95	0	26828.3	43973.1	0	40	59.17	73	28.997	875
J. ARTHUR URCIVOLI	GREENWICH COVE	WLIS	07-Mar-95	0	26828.3	43973.3	0	40	59.193	73	28.989	400
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	08-Mar-95	0	26828.1	43972.5	0	40	59.104	73	28.996	875
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	08-Mar-95	0	26828.6	43973.4	0	40	59.199	73	29.023	825
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	09-Mar-95	0	26828.3	43972.4	0	40	59.088	73	29.025	825
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	09-Mar-95	0	26828.6	43973.1	0	40	59.163	73	29.035	500
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	10-Mar-95	0	26828.4	43973.1	0	40	59.168	73	29.01	500
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	11-Mar-95	0	26828.2	43973.4	0	40	59.207	73	28.973	825
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	11-Mar-95	0	26828.3	43972.6	0	40	59.111	73	29.017	825
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	12-Mar-95	0	26828.4	43972.1	0	40	59.05	73	29.05	850
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	13-Mar-95	0	26828.4	43972.3	0	40	59.074	73	29.042	875
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	14-Mar-95	0	26828.1	43972.6	0	40	59.116	73	28.992	800
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	14-Mar-95	0	26828.2	43972.8	0	40	59.137	73	28.997	800
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	15-Mar-95	0	26828.2	43972.4	0	40	59.09	73	29.013	800
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	15-Mar-95	0	26828.3	43972.6	0	40	59.111	73	29.017	850
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	16-Mar-95	0	26828.1	43972.5	0	40	59.104	73	28.996	725
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	16-Mar-95	0	26828.3	43972.6	0	40	59.111	73	29.017	900
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	17-Mar-95	0	26828.1	43972.4	0	40	59.092	73	29	800
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	17-Mar-95	0	26828.3	43972.3	0	40	59.076	73	29.029	750
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	18-Mar-95	0	26828.3	43973.2	0	40	59.182	73	28.993	700
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	18-Mar-95	0	26828.5	43973.1	0	40	59.166	73	29.022	750
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	20-Mar-95	0	26828.5	43973.3	0	40	59.189	73	29.014	900
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	20-Mar-95	0	26828.5	43973.4	0	40	59.201	73	29.01	700
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	21-Mar-95	0	26828.3	43972.1	0	40	59.052	73	29.037	700
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	21-Mar-95	0	26828.5	43973.1	0	40	59.166	73	29.022	700
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	22-Mar-95	0	26828.1	43973.4	0	40	59.21	73	28.96	850
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	22-Mar-95	0	26828.5	43973.3	0	40	59.189	73	29.014	600
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	23-Mar-95	0	26828.4	43972.7	0	40	59.121	73	29.026	500
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	23-Mar-95	0	26828.7	43973.3	0	40	59.185	73	29.04	700
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	25-Mar-95	0	26828.3	43973.2	0	40	59.182	73	28.993	400
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	27-Mar-95	0	26828.5	43973.3	0	40	59.189	73	29.014	800
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	28-Mar-95	0	26828.4	43973.1	0	40	59.168	73	29.01	750
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	29-Mar-95	0	26828.6	43973.3	0	40	59.187	73	29.027	700
TOWN OF WESTPORT	NORWALK COVE MARINA	WLIS	31-Mar-95	0	26828.4	43973.1	0	40	59.168	73	29.01	500
TOM'S POINT MARINA	MANHASSET BAY/VILLAGE OF MANORHAVEN, NY	WLIS	22-Apr-95	0	26828.8	43972.3	0	40	59.065	73	29.092	500
TOM'S POINT MARINA	MANHASSET BAY/VILLAGE OF MANORHAVEN, NY	WLIS	24-Apr-95	0	26828.2	43972.7	0	40	59.125	73	29.001	650
TOM'S POINT MARINA	MANHASSET BAY/VILLAGE OF MANORHAVEN, NY	WLIS	25-Apr-95	0	26828.9	43972.5	0	40	59.086	73	29.097	475
TOM'S POINT MARINA	MANHASSET BAY/VILLAGE OF MANORHAVEN, NY	WLIS	26-Apr-95	0	26836.4	43972.8	0	40	58.914	73	30.281	550
TOM'S POINT MARINA	MANHASSET BAY/VILLAGE OF MANORHAVEN, NY	WLIS	27-Apr-95	0	26828.9	43973.4	0	40	59.192	73	29.061	625
TOM'S POINT MARINA	MANHASSET BAY/VILLAGE OF MANORHAVEN, NY	WLIS	28-Apr-95	0	26828.6	43972.9	0	40	59.14	73	29.043	650
TOM'S POINT MARINA	MANHASSET BAY/VILLAGE OF MANORHAVEN, NY	WLIS	29-Apr-95	0	26828.4	43972.5	0	40	59.097	73	29.034	450
MILT COMPANY	LI SOUND - STAMFORD CT	WLIS	25-Apr-95	0	26828.5	43972.9	0	40	59.142	73	29.03	450
MILT COMPANY	LI SOUND - STAMFORD CT	WLIS	26-Apr-95	0	26828.5	43972.9	0	40	59.142	73	29.03	450
MILT COMPANY	LI SOUND - STAMFORD CT	WLIS	26-Apr-95	0	26828.5	43972.9	0	40	59.142	73	29.03	450
MILT COMPANY	LI SOUND - STAMFORD CT	WLIS	27-Apr-95	0	26828.5	43972.9	0	40	59.142	73	29.03	450
ROTON POINT ASSOC	SHEFFIELD ISLAND HARBOR AT NORWALK CT	WLIS	23-May-95	0	26828.5	43972.9	0	40	59.142	73	29.03	250
ROTON POINT ASSOC	SHEFFIELD ISLAND HARBOR AT NORWALK CT	WLIS	25-May-95	0	26828.5	43972.7	0	40	59.119	73	29.038	400
ROTON POINT ASSOC	SHEFFIELD ISLAND HARBOR AT NORWALK CT	WLIS	26-May-95	0	26828.6	43972.5	0	40	59.093	73	29.059	500
ROTON POINT ASSOC	SHEFFIELD ISLAND HARBOR AT NORWALK CT	WLIS	31-May-95	0	26828.4	43972.7	0	40	59.121	73	29.026	400

1994-95	WLIS G Mound	
	Total YD³	68685
	Total m³	52516.55

Appendix F, Table 3

permittee	project	disposal	dispdate	wtd	xtd	ytd	ztd	latdeg	latmin	longdeg	longmin	cyrol
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	11-Dec-91	0	26627.9	43973.1	0	40	59.179	73	28.947	650
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	12-Dec-91	0	26627.6	43973.2	0	40	59.193	73	28.93	800
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	13-Dec-91	0	26627.7	43973.2	0	40	59.195	73	28.918	800
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	16-Dec-91	0	26627.7	43973.2	0	40	59.195	73	28.918	700
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	17-Dec-91	0	26627.7	43973.3	0	40	59.207	73	28.914	750
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	18-Dec-91	0	26627.7	43973.2	0	40	59.195	73	28.918	750
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	19-Dec-91	0	26627.7	43973.3	0	40	59.207	73	28.914	600
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	20-Dec-91	0	26627.7	43973.2	0	40	59.195	73	28.918	700
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	21-Dec-91	0	26627.6	43973.2	0	40	59.197	73	28.905	500
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	23-Dec-91	0	26627.6	43973.2	0	40	59.197	73	28.905	500
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	27-Dec-91	0	26627.7	43973.3	0	40	59.207	73	28.914	500
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	30-Dec-91	0	26627.7	43973.2	0	40	59.195	73	28.918	650
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	06-Jan-92	0	26627.7	43973.2	0	40	59.195	73	28.918	600
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	07-Jan-92	0	26627.6	43973.2	0	40	59.197	73	28.905	550
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	08-Jan-92	0	26627.7	43973.2	0	40	59.195	73	28.918	450
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	09-Jan-92	0	26627.7	43973.3	0	40	59.207	73	28.914	400
TIDE MILL YACHT BASIN	TIDE MILL YACHT BASIN	WUIS	10-Jan-92	0	26627.6	43973.2	0	40	59.197	73	28.905	350
TRUST OF J. McMICHAEL	MAMARONECK	WUIS	15-Jan-92	0	26627.6	43973.2	0	40	59.197	73	28.905	475
TRUST OF J. McMICHAEL	MAMARONECK	WUIS	16-Jan-92	0	26627.7	43973.3	0	40	59.207	73	28.914	475
TRUST OF J. McMICHAEL	MAMARONECK	WUIS	22-Jan-92	0	26627.6	43973.2	0	40	59.193	73	28.93	350
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	25-Jan-92	0	26629.4	43979.2	0	40	59.853	73	28.892	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	31-Jan-92	0	26627.3	43973.1	0	40	59.192	73	28.871	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	31-Jan-92	0	26627.6	43973.2	0	40	59.197	73	28.905	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	01-Feb-92	0	26627.3	43973	0	40	59.18	73	28.875	450
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	01-Feb-92	0	26627.2	43973.4	0	40	59.229	73	28.847	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	03-Feb-92	0	26627.7	43973.1	0	40	59.183	73	28.922	450
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	03-Feb-92	0	26627.6	43973.1	0	40	59.185	73	28.909	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	04-Feb-92	0	26627.5	43973.7	0	40	59.258	73	28.873	200
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	04-Feb-92	0	26627.7	43973.7	0	40	59.254	73	28.898	600
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	05-Feb-92	0	26627.7	43973.1	0	40	59.183	73	28.922	50
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	05-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	06-Feb-92	0	26627.6	43973.1	0	40	59.185	73	28.909	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	06-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	400
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	07-Feb-92	0	26627.7	43973.1	0	40	59.183	73	28.922	400
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	10-Feb-92	0	26627.7	43973.1	0	40	59.183	73	28.922	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	11-Feb-92	0	26627.3	43973.1	0	40	59.192	73	28.871	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	11-Feb-92	0	26627.6	43973.2	0	40	59.197	73	28.905	250
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	12-Feb-92	0	26627.6	43973.3	0	40	59.209	73	28.901	375
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	12-Feb-92	0	26627.6	43973.1	0	40	59.185	73	28.909	500
TRUST OF J. McMICHAEL	MAMARONECK	WUIS	13-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	300
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	14-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
VILLAGE CREEK HOMEOWNERS ASSOC	NOR COVE	WUIS	14-Feb-92	0	26627.6	43973.2	0	40	59.197	73	28.905	376
TRUST OF J. McMICHAEL	MAMARONECK	WUIS	19-Feb-92	0	26627.6	43973.2	0	40	59.197	73	28.905	400
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	14-Feb-92	0	0	0	0	0	0	0	0	485
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	14-Feb-92	0	26627.7	43975.2	0	40	59.43	73	28.838	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	14-Feb-92	0	0	0	0	0	0	0	0	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	17-Feb-92	0	26627.6	43973.1	0	40	59.185	73	28.909	200
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	18-Feb-92	0	26627.5	43973	0	40	59.178	73	28.901	400
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	18-Feb-92	0	26627.6	43973.1	0	40	59.185	73	28.909	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	18-Feb-92	0	26627.1	43973.7	0	40	59.267	73	28.822	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	19-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	19-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	20-Feb-92	0	26627.2	43973.2	0	40	59.206	73	28.855	550
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	20-Feb-92	0	26627.2	43973.2	0	40	59.206	73	28.855	425
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	20-Feb-92	0	26627.2	43973.2	0	40	59.206	73	28.855	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	21-Feb-92	0	26627.6	43973.2	0	40	59.197	73	28.905	250
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	21-Feb-92	0	26627.6	43973.1	0	40	59.185	73	28.909	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	21-Feb-92	0	26677.8	43973.7	0	40	58.185	73	35.221	500
TRUST OF J. McMICHAEL	MAMARONECK	WUIS	21-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	300
TRUST OF J. McMICHAEL	MAMARONECK	WUIS	22-Feb-92	0	26627.7	43973.1	0	40	59.183	73	28.922	300
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	22-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	22-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	24-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	450
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	24-Feb-92	0	26627.5	43973	0	40	59.178	73	28.901	250
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	25-Feb-92	0	26627.7	43973.4	0	40	59.218	73	28.91	400
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	25-Feb-92	0	26627.7	43973.1	0	40	59.183	73	28.922	400
TRUST OF J. McMICHAEL	MAMARONECK	WUIS	25-Feb-92	0	26627.6	43973.2	0	40	59.197	73	28.905	350
TRUST OF J. McMICHAEL	MAMARONECK	WUIS	26-Feb-92	0	26627.6	43973.2	0	40	59.197	73	28.905	300
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	26-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	26-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	300
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	26-Feb-92	0	26627.7	43973.6	0	40	59.242	73	28.902	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	26-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	300
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	26-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	27-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	475
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	27-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	300
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	27-Feb-92	0	26627.7	43973.1	0	40	59.183	73	28.922	400
TRUST OF J. McMICHAEL	MAMARONECK	WUIS	27-Feb-92	0	26627.7	43973.1	0	40	59.183	73	28.922	300
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	28-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	475
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	28-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	28-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	300
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	28-Feb-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
TRUST OF J. McMICHAEL	MAMARONECK	WUIS	01-Mar-92	0	26627.7	43973.3	0	40	59.207	73	28.914	300
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	02-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	02-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	350
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	03-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	03-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	375
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	04-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	400
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	04-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	325
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	05-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	300
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	05-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	200
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	06-Mar-92	0	26627.7	43973.1	0	40	59.183	73	28.922	250
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	06-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	200
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	09-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	400
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	09-Mar-92	0	26627.7	43973.3	0	40	59.207	73	28.914	425
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	10-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	375
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	10-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	425
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	11-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	475
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	12-Mar-92	0	26627.7	43973.7	0	40	59.254	73	28.898	200
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	13-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	350
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	13-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	375
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	16-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	300
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	17-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	275
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	18-Mar-92	0	26627.6	43973.1	0	40	59.185	73	28.909	75
HARBOR VILLAGE LTD PARTNERSHIP	COS COB HARBOR	WUIS	27-Mar-92	0	26627.7	43973.2	0	40	59.195	73	28.918	500
TALLMADGE BROTHERS	SONO SEAFOOD	WUIS	04-Mar-92	0	26627.6	43973.2	0	40	59.197	73	28.905	850
TALLMADGE BROTHERS	SONO SEAFOOD	WUIS	14-Mar-92	0	26627.6	43973.2	0	40	59.197	73	28.905	850
L. SCOTT FRANTZ	GREEN C.	WUIS	06-Apr-92	0	26622.7	43973.1	0	40	59.293	73	28.293	200
L. SCOTT FRANTZ	GREEN C.	WUIS	07-Apr-92	0	26627.6	43973.2	0	40	59.197	73	28.905	200
L. SCOTT FRANTZ	GREEN C.	WUIS	08-Apr-92	0	26627.6	43973.1	0	40	59.185	73	28.909	175
L. SCOTT FRANTZ	GREEN C.	WUIS	09-Apr-92	0	26627.6	43973.2	0	40	59.197	73	28.905	175
L. SCOTT FRANTZ	GREEN C.	WUIS	10-Apr-92	0	26627.5	43973.2	0	40	59.199	73	28.893	150
L. SCOTT FRANTZ	GREEN C.	WUIS	15-Apr-92	0	26627.6	43973.2	0	40	59.197	73	28.905	150
L. SCOTT FRANTZ	GREEN C.	WUIS	15-Apr-92	0	26627.5	43973	0	40	59.176	73	28.901	75
L. SCOTT FRANTZ	GREEN C.	WUIS	17-Apr-92	0	26627.4	43973.2	0	40	59.201	73	28.88	50
PAUL HOFFMAN	LARCHMONT	WUIS	28-Apr-92	0	26627.6	43973.1	0	40	59.181	73	28.934	550
PAUL HOFFMAN	LARCHMONT	WUIS	29-Apr-92	0	26627.7	43973.2	0	40	59.195	73	28.918	400
ALLEN GREEN	LARCHMONT	WUIS	30-Apr-92	0	26727.7	43973.2	0	41	1.417	73	16.418	650
ALLEN GREEN	LARCHMONT	WUIS	01-May-92	0	26627.7	43973.1	0	40	59.183	73	28.922	650
ALLEN GREEN	LARCHMONT	WUIS	04-May-92	0	26627.7	43973.2	0	40	59.195	73	28.918	200

1991-92 WUIS F Mound
Total Y 50611
Total m³ 38697.2

Appendix F, Table 4

permittee	project	disparea	dispdate	wtd	xtd	ytd	ztd	latdeg	latmin	longdeg	longmin	cyvol
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	15-Jan-93	0	26827.3	43972.8	0	40	59.157	73	28.883	500
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	16-Jan-93	0	26827.7	43973.1	0	40	59.183	73	28.922	500
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	18-Jan-93	0	26827.3	43973.3	0	40	59.215	73	28.864	500
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	19-Jan-93	0	26828	43973.1	0	40	59.176	73	28.96	500
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	20-Jan-93	0	26827.4	43972.9	0	40	59.166	73	28.892	450
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	21-Jan-93	0	26827.7	43973.1	0	40	59.183	73	28.922	725
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	23-Jan-93	0	26827.7	43973.1	0	40	59.183	73	28.922	775
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	23-Jan-93	0	26827.7	43973.1	0	40	59.183	73	28.922	700
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	25-Jan-93	0	26827.7	43973.1	0	40	59.183	73	28.922	450
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	26-Jan-93	0	26827.6	43973.2	0	40	59.197	73	28.905	700
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	27-Jan-93	0	26827.4	43972.9	0	40	59.166	73	28.892	750
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	28-Jan-93	0	26827.7	43973.1	0	40	59.183	73	28.922	600
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	30-Jan-93	0	26827.6	43973	0	40	59.173	73	28.913	550
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	02-Feb-93	0	26827.6	43973.1	0	40	59.185	73	28.909	600
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	03-Feb-93	0	26827.3	43973.2	0	40	59.204	73	28.867	750
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	04-Feb-93	0	26827.4	43973.1	0	40	59.19	73	28.884	600
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	04-Feb-93	0	26827.7	43973.1	0	40	59.183	73	28.922	500
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	05-Feb-93	0	26827.7	43973.1	0	40	59.183	73	28.922	600
TOWN OF GREENWICH	*BYRAM HARBOR*	*WLIS*	*06-Feb-93*	*0*	*26827.8*	*43973.1*	*0*	*40*	*59.181*	*73*	*28.934*	*500*
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	08-Feb-93	0	26827.4	43973	0	40	59.178	73	28.888	750
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	09-Feb-93	0	26827.8	43973.3	0	40	59.204	73	28.926	750
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	10-Feb-93	0	26827.3	43973.1	0	40	59.192	73	28.871	800
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	11-Feb-93	0	26827.7	43973.2	0	40	59.195	73	28.918	700
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	13-Feb-93	0	26827.8	43973.3	0	40	59.204	73	28.926	650
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	16-Feb-93	0	26827.3	43973.1	0	40	59.192	73	28.871	650
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	17-Feb-93	0	26827.4	43973	0	40	59.178	73	28.888	700
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	18-Feb-93	0	26827.7	43973.2	0	40	59.195	73	28.918	600
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	18-Feb-93	0	26827.6	43973	0	40	59.173	73	28.913	600
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	19-Feb-93	0	26827.3	43973.1	0	40	59.192	73	28.871	400
TOWN OF GREENWICH	*BYRAM HARBOR*	*WLIS*	*20-Feb-93*	*0*	*26827.7*	*43973.1*	*0*	*40*	*59.183*	*73*	*28.922*	*400*
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	22-Feb-93	0	26827.4	43973.1	0	40	59.19	73	28.884	300
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	23-Feb-93	0	26827.4	43973.3	0	40	59.213	73	28.876	300
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	24-Feb-93	0	26827.7	43973.1	0	40	59.183	73	28.922	250
TOWN OF GREENWICH	BYRAM HARBOR	WLIS	26-Feb-93	0	26827.6	43973.2	0	40	59.197	73	28.905	350
MR MRS GARY L. SWENSON	BYRAM HBR	WLIS	01-Mar-93	0	26827.6	43973.1	0	40	59.185	73	28.909	500
L. SCOTT FRANTZ	GREENWICH COVE	WLIS	07-Apr-93	0	26827.3	43973.1	0	40	59.192	73	28.871	50
PONINGO NECK APTS CORP	MILTON HBR, RYE NY	WLIS	07-Apr-93	0	26827.3	43973.1	0	40	59.192	73	28.871	885
PONINGO NECK APTS CORP	MILTON HBR, RYE NY	WLIS	08-Apr-93	0	26827.4	43973.1	0	40	59.19	73	28.884	920
PONINGO NECK APTS CORP	MILTON HBR, RYE NY	WLIS	09-Apr-93	0	26827.8	43973.3	0	40	59.204	73	28.926	900
PONINGO NECK APTS CORP	MILTON HBR, RYE NY	WLIS	10-Apr-93	0	26827.3	43972.9	0	40	59.168	73	28.879	900
PONINGO NECK APTS CORP	MILTON HBR, RYE NY	WLIS	12-Apr-93	0	26827	43972.8	0	40	59.163	73	28.846	940
PONINGO NECK APTS CORP	MILTON HBR, RYE NY	WLIS	14-Apr-93	0	26827.9	43973.2	0	40	59.19	73	28.943	950
PONINGO NECK APTS CORP	MILTON HBR, RYE NY	WLIS	15-Apr-93	0	26827.4	43973.1	0	40	59.19	73	28.884	940
PONINGO NECK APTS CORP	MILTON HBR, RYE NY	WLIS	16-Apr-93	0	26827.5	43973.1	0	40	59.187	73	28.897	700
PONINGO NECK APTS CORP	MILTON HBR, RYE NY	WLIS	29-Apr-93	0	26827.3	43973.2	0	40	59.204	73	28.867	900
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	06-Jun-93	0	26827.2	43973.1	0	40	59.194	73	28.859	225

1992-93 WLIS F Mound	
Total YD³	28260
Total m³	21607.6

Appendix F, Table 5

permittee	project	disparea	dispdate	wtd	xtd	ytd	ztd	latdeg	latmin	longdeg	longmin	cyvol
NORWALK BOAT CLUB	NORWALK RIVER, SO. NORWALK CT	WLIS	05-Jan-94	0	26827.2	43973.1	0	40	59.395	73	28.741	925
NORWALK BOAT CLUB	NORWALK RIVER, SO. NORWALK CT	WLIS	06-Jan-94	0	26827.2	43973.1	0	40	59.395	73	28.741	775
NORWALK BOAT CLUB	NORWALK RIVER, SO. NORWALK CT	WLIS	06-Jan-94	0	26827.1	43973.2	0	40	59.409	73	28.725	600
NORWALK BOAT CLUB	NORWALK RIVER, SO. NORWALK CT	WLIS	11-Jan-94	0	26824.3	43972.8	0	40	59.423	73	28.388	875
NORWALK BOAT CLUB	NORWALK RIVER, SO. NORWALK CT	WLIS	13-Jan-94	0	268270	43973	0	40	59.387	73	28.72	900
INDIAN COVE PROPERTY OWNERS	INDIAN COVE ASSOC	WLIS	15-Dec-93	0	26837.1	43972.9	0	40	58.954	73	30.113	850
INDIAN COVE PROPERTY OWNERS	INDIAN COVE ASSOC	WLIS	17-Dec-93	0	26827.2	43973.1	0	40	59.194	73	28.859	900
INDIAN COVE PROPERTY OWNERS	INDIAN COVE ASSOC	WLIS	17-Dec-93	0	26827.3	43973	0	40	59.18	73	28.875	800
INDIAN COVE PROPERTY OWNERS	INDIAN COVE ASSOC	WLIS	18-Dec-93	0	26827.2	43973.2	0	40	59.206	73	28.855	800
INDIAN COVE PROPERTY OWNERS	INDIAN COVE ASSOC	WLIS	20-Dec-93	0	26827.3	43973.1	0	40	59.192	73	28.871	700
DANIEL A SPERANDIO, JR	13 NAUTILUS PL, NEW ROCHELLE, NY	WLIS	11-Jan-94	0	26827.4	43973.1	0	40	59.19	73	28.884	400
DANIEL A SPERANDIO, JR	13 NAUTILUS PL, NEW ROCHELLE, NY	WLIS	13-Jan-94	0	26827.3	43973	0	40	59.18	73	28.875	400
DANIEL A SPERANDIO, JR	13 NAUTILUS PL, NEW ROCHELLE, NY	WLIS	14-Jan-94	0	26827.2	43972.9	0	40	59.17	73	28.867	400
DANIEL A SPERANDIO, JR	13 NAUTILUS PL, NEW ROCHELLE, NY	WLIS	29-Jan-94	0	26827.5	43973.2	0	40	59.199	73	28.893	400
DANIEL A SPERANDIO, JR	13 NAUTILUS PL, NEW ROCHELLE, NY	WLIS	02-Feb-94	0	29827.2	43972.9	0	40	59.17	73	28.867	400
DANIEL A SPERANDIO, JR	13 NAUTILUS PL, NEW ROCHELLE, NY	WLIS	07-Feb-94	0	26827.4	43973	0	40	59.178	73	28.888	400
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	01-Mar-94	0	26820.1	43973	0	40	59.338	73	27.97	350
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	02-Mar-94	0	26857.1	43972.9	0	40	58.519	73	32.635	350
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	05-Mar-94	0	26827.2	43972.8	0	40	59.159	73	28.871	275
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	06-Mar-94	0	26827.2	43972.9	0	40	59.371	73	28.749	825
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	07-Mar-94	0	26827.1	43972.5	0	40	59.326	73	28.752	850
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	08-Mar-94	0	26827	43972.9	0	40	59.376	73	28.724	825
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	08-Mar-94	0	26827.2	43973.1	0	40	59.194	73	28.859	300
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	11-Mar-94	0	26827.4	43973	0	40	59.379	73	28.77	750
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	12-Mar-94	0	26827.1	43972.8	0	40	59.362	73	28.74	850
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	12-Mar-94	0	26827.2	43972.9	0	40	59.17	73	28.867	275
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	13-Mar-94	0	26827.1	43972.9	0	40	59.173	73	28.854	275
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	14-Mar-94	0	26827.1	43972.9	0	40	59.173	73	28.854	275
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	15-Mar-94	0	26827.2	43972.9	0	40	59.17	73	28.867	300
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	15-Mar-94	0	26827.2	43972.9	0	40	59.371	73	28.749	825
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	18-Mar-94	0	26827.1	43972.9	0	40	59.173	73	28.854	250
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	21-Mar-94	0	26827.2	43973	0	40	59.182	73	28.863	275
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	21-Mar-94	0	26827.2	43973.1	0	40	59.194	73	28.859	275
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	21-Mar-94	0	26827.2	43972.9	0	40	59.371	73	28.749	800
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	22-Mar-94	0	26827.2	43973.1	0	40	59.194	73	28.859	275
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	23-Mar-94	0	26827.3	43972.9	0	40	59.369	73	28.762	600
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	24-Mar-94	0	26827.2	43973.1	0	40	59.194	73	28.859	300
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	24-Mar-94	0	268270	43972.9	0	40	59.376	73	28.724	450
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	25-Mar-94	0	26827.1	43972.8	0	40	59.362	73	28.74	575
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	26-Mar-94	0	26857.1	43972.9	0	40	58.719	73	32.517	600
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	28-Mar-94	0	268270	43973.1	0	40	59.399	73	28.716	300
SHORE AND COUNTRY CLUB	CHARLES CREEK, E. NORWALK, CT.	WLIS	29-Mar-94	0	26827.1	43972.9	0	40	59.373	73	28.736	600
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	30-Mar-94	0	26827.1	439721	0	40	59.279	73	28.768	300
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	31-Mar-94	0	26827.1	43972.9	0	40	59.373	73	28.736	300
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	01-Apr-94	0	26827.2	43973.1	0	40	59.395	73	28.741	300
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	04-Apr-94	0	26827.2	43972.9	0	40	59.17	73	28.867	300
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	05-Apr-94	0	26827.2	43973.1	0	40	59.194	73	28.859	250
BREWER MARINA, INC	GLEN COVE CREEK	WLIS	11-Apr-94	0	26827.2	43972.8	0	40	59.159	73	28.871	250
NOROTON YACHT CLUB	NOROTON YACHT CLUB	WLIS	14-Apr-94	0	26827.5	43973.2	0	40	59.199	73	28.893	450
BELLE HAVEN CLUB	BELLE HAVEN CLUB	WLIS	14-Apr-94	0	26827.4	43972.9	0	43	17.861	70	27.221	400
NOROTON YACHT CLUB	NOROTON YACHT CLUB	WLIS	15-Apr-94	0	26827.5	42673.1	0	38	48.182	74	8.793	450
BELLE HAVEN CLUB	BELLE HAVEN CLUB	WLIS	15-Apr-94	0	26827.4	43973.1	0	40	59.19	73	28.884	250
NOROTON YACHT CLUB	NOROTON YACHT CLUB	WLIS	18-Apr-94	0	26827.4	43973	0	40	59.178	73	28.888	450
NOROTON YACHT CLUB	NOROTON YACHT CLUB	WLIS	19-Apr-94	0	26827.5	43973.1	0	40	59.187	73	28.897	100
BELLE HAVEN CLUB	BELLE HAVEN CLUB	WLIS	19-Apr-94	0	26827.4	43973.1	0	40	59.19	73	28.884	400
BELLE HAVEN CLUB	BELLE HAVEN CLUB	WLIS	20-Apr-94	0	26827.4	43973.1	0	40	59.19	73	28.884	400
BELLE HAVEN CLUB	BELLE HAVEN CLUB	WLIS	21-Apr-94	0	26827.3	43973.1	0	40	59.192	73	28.871	400
BELLE HAVEN CLUB	BELLE HAVEN CLUB	WLIS	22-Apr-94	0	26827.5	43973.1	0	40	59.187	73	28.897	400
BELLE HAVEN CLUB	BELLE HAVEN CLUB	WLIS	25-Apr-94	0	26827.3	43972.9	0	40	59.168	73	28.879	300
BELLE HAVEN CLUB	BELLE HAVEN CLUB	WLIS	26-Apr-94	0	26827.4	43973.2	0	40	59.201	73	28.88	400
BELLE HAVEN CLUB	BELLE HAVEN CLUB	WLIS	27-Apr-94	0	26827.5	43972.9	0	40	59.164	73	28.905	300
BELLE HAVEN CLUB	BELLE HAVEN CLUB	WLIS	28-Apr-94	0	26827.5	43972.9	0	40	59.164	73	28.905	300
BELLE HAVEN CLUB	BELLE HAVEN MARINA	WLIS	06-May-94	0	26827.4	43973.1	0	39	59.19	73	28.884	400

1993-94 WLIS F Mound	
Total YD³	26175
Total m³	20013.4