

AD-A152 347

ENVIRONMENTAL ASSESSMENT MAINTENANCE DREDGING OF
VILLAGE CREEK BEAUFORT COUNTY SOUTH CAROLINA(U) CORPS
OF ENGINEERS CHARLESTON SC CHARLESTON DISTRICT DEC 77

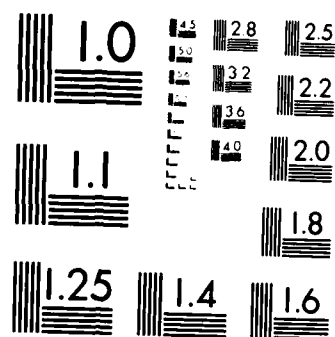
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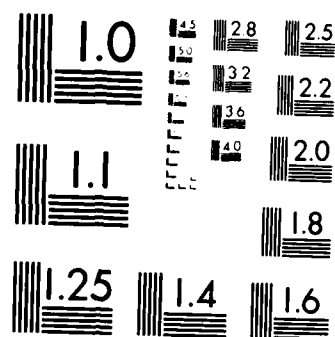
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NATIONAL BUREAU OF STANDARDS 1963 A



MICROCOPY RESOLUTION TEST CHART
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U. S. ARMY ENGINEER DISTRICT, CHARLESTON, SOUTH CAROLINA

DECEMBER 1977

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ENVIRONMENTAL ASSESSMENT
MAINTENANCE DREDGING OF VILLAGE CREEK
BEAUFORT COUNTY, SOUTH CAROLINA

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Despite unconformities associated with the past tectonics of this region, the sedimentary deposits have been named in successively younger sequence: Tuscaloosa, Black Creek, PeeDee, Black Mingo, and Warley Hill Marl Formations; Santee, Castle Hayne, and Ocala Limestones. All of these strata are obscured by unconsolidated sands and clays of the surface terraces which were deposited during fluctuations in sea level since the early Miocene (Reference 5).

2.04 Soils. There are six major soil associations in Beaufort County. These associations are as follows:

Weston-Bladen-Eulonia Association. These soils are nearly level to gently sloping, moderately well to poorly drained soils. They are made up of loamy sand surface soils and sandy clay loam to clay subsoils.

Edisto-Weston-Stono Association. These are nearly level somewhat poorly to very poorly drained moderately deep soils. They are made up of loamy sand surface soils and sandy loam to sandy clay subsoils.

Kiawah-Wando-Seabrook Association. These are nearly level, somewhat poorly to well drained soils made of loamy fine sand surface soils and subsoils.

Ona-St. Johns Association. These are nearly level, poorly to somewhat poorly drained sands with organic stained layers or weakly cemented organic hardpans.

Tidal Marsh Association. This association is made up of firm to soft tidal marsh and is the major association adjacent to the project channel.

Swamp Association. This association is made up of nearly level very poorly drained soils on flood plains.

2.05 Water quality. The surface waters of the Village Creek project area, based on data available on Port Royal Sound and a lack of any major sources of pollution along the Morgan River, appear to be of excellent quality. As a result, waters of the Morgan River are designated as Class SA: waters suitable for shellfishing for market purposes, and suitable for uses requiring water of lesser quality. Chemical analysis of sediments and elutriate tests did not reveal the presence of any toxic or harmful substances. The results of these analyses are attached as Appendix A.

2.06 Biological resources. To facilitate a discussion of biological resources, the project area will be classified as follows: (1) Open water, (2) Marsh, (3) Oak-pine forest, (4) Agricultural land, and (5) Man-influenced land.

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2.07 Open water. The open water biotic community is exclusively salt water in the Village Creek project area. Plants in the open water community are restricted to phytoplankton and marine seaweeds which grow attached to various objects or may drift ashore with the tide. Enteromorpha, generally observed during the winter, occurs conspicuously in dense ribbons or thread-like growths on pier pilings, and sea lettuce, Ulva sp., may be abundant in the drift along shorelines.

2.08 The most important groups of animals in the open water communities are the planktonic organisms, benthic invertebrates, and fish. Food webs of this community demonstrate the basic interdependence of open water systems and surrounding terrestrial communities, particularly the marsh communities. For instance, many of the benthic organisms and fish at various stages of their life cycle depend directly on the marshes for food. Exchange of nutrients between aquatic, semi-aquatic, and terrestrial ecosystems, and distribution and diversity of species within them, are dependent on the energy provided by tidal action in estuaries.

2.09 Benthic invertebrates are detrital feeders and rely on the release of foods in the form of dead organic material (detritus) from marsh systems as their primary source of food. The population levels and species diversity of these forms are good indicators of the quality of estuarine ecosystems and, therefore, the presence (or absence) of pollution. Benthic phyla which may be represented are Mollusca, Arthropoda, Coelenterata, Echinodermata, Platyhelminthes, Nemertea, and Annelida. These phyla are found either as burrowers or attached to the substrate. Invertebrates of direct economic importance which are estuarine dependant are blue crabs, oysters, and shrimp.

2.10 Fish species utilizing open water areas as nursery areas are: black drum, sheepshead, Spanish mackerel, striped mullet, flounders, seatrout, weakfish, spot, and Atlantic croaker. Predator fish species include red drum, silver perch, ladyfish, and sea trout. All of these are economically important to both sport and commercial fishing industries.

2.11 Many birds, including the double-crested cormorant, the brown pelican, several species of gulls, and several species of ducks use the open water community for feeding and resting.

2.12 Marsh. The many acres of marsh in the Village Creek project area may be divided into low and high marsh communities.

2.13 The low marsh community is the largest in extent, least diverse in species composition, most uniform in plant height and community stratification, and the most productive of all the major communities in the area. The single species which typifies this community is smooth cordgrass. Occasionally, high marsh species will also be present in the low marsh community but such pioneers as glasswort, sea blite, or sea ox-eye never form extensive patches in the low

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marsh as they usually do in the high marsh community (Reference 6). Because of its tolerance to flooding and high saline conditions, smooth cordgrass thrives in an environment which is relatively free of competition from other species. Only in the zone where flooding is occasional or not a limiting factor at all is smooth cordgrass replaced as a result of competition by other species.

2.14 The high marsh is a narrow fringe community in the project area and is found along the upper elevational limits of the low marsh, along sandy embankments, and near the high water zone around the margin of wooded islands. It may consist entirely of grasses, succulent herbs and low shrubs. For example, a sandy berm may have a high marsh association of salt meadow cordgrass, sea ox-eye, and glasswort. In contrast, the high marsh might be composed predominantly of woody plants such as tamarisk, silverling, sea ox-eye, marsh elder, and wax myrtle.

2.15 The marsh communities support a large number and variety of animal life. Terrestrial animals such as raccoons, opossums, and mink visit this community while foraging for food. The low marsh also provides habitat upon which many shore and wading birds are dependent for food throughout the year. These birds include clapper rails, sandpipers, plovers, oystercatchers, ibis, egrets, and herons. Migratory game birds, such as ducks, are found feeding and loafing along and in the small creeks, embayments, and open water. Birds of prey, such as the osprey and marsh hawk are found along and over this community.

2.16 The marsh community is the interface between the upland communities and the open water. Detritus from these systems enters the marine environment, creating a highly productive area for larval and juvenile stages of aquatic fauna.

2.17 Oak-pine forest. The higher islands and sandy uplands which have not been cleared for agriculture are usually vegetated with a live oak-pine-cabbage palm forest. The oak-pine forest presents a tropical appearance because of the conspicuous cabbage palms around the edges. The trees in this community are mostly evergreen species which form a dense canopy that reaches a height of about 40 feet. On Pine Island, located at the mouth of Village Creek, the dominant trees are live oak, cabbage palm, magnolia, loblolly pine, longleaf pine, red bay, wild olive, and wild black cherry. Understory species consist of small trees or tall shrubs such as wax myrtle, sassafras, yaupon, buckthorn, devil's-walking stick, chinaberry, winged sumac, and laurel cherry. Ground cover, although sparse, is floristically diverse. Thorny or spiny plants, such as Spanish bayonet, cactus, dewberry, blackberry, and catbrier, are frequently encountered under the low shrubs. Other notable small shrubs and herbs include coral beans, rattan vine, bedstraw, and American beauty berry. The epiphytes Spanish moss and resurrection fern are plentiful in the tops of the live oaks.

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2.16 The oak-pine forest found in this area is generally bordered by marsh or agricultural communities. The size of the oak-pine community and absence of dense understory and shrub cover limits the larger animals requiring extensive habitat area, such as white-tail deer. Predators such as bobcats, and foxes may be found within this area, but only as transients. The main inhabitants of this community are small mammals such as the gray squirrel, cotton rat, and mice, small birds, and several species of reptiles and amphibians.

2.17 Agricultural land. Truck farming and beef cattle production are the two main agricultural activities in the Village Creek area. Green beans, tomatoes, squash, cucumbers, Irish potatoes, corn, cabbage, pepper, and soybeans are produced in this area. With the planting season beginning about the last week in February, it is possible to grow more than one crop per season, although the greatest potential production is in the early spring. During the remainder of the year, after the fields are harvested, the fields are covered by a dense growth of weeds. Fields that are left fallow after harvest provide habitat for small mammals, birds, reptiles and amphibians, and nesting grounds for birds of prey. The cotton rat, house mouse, and opossum, for instance, are permanent residents, while the common night-hawk, great horned owl and white-throated sparrow are temporary foragers.

2.18 Man-influenced land. At certain sites within the Village Creek area, biotic communities have been drastically altered by human activities. There are four unconfined dredged material disposal sites situated in the low marsh on either side of Village Creek. These sites are covered by a veneer of thin mud and sand deposited earlier and the reestablishment of marsh plants on these sites has not been significant. Another man-influenced area occurs next to a small wooded island on the east side of Village Creek. An embankment was built adjacent to the island and the resulting impoundment of rain water has caused the area to become vegetated with brackish marsh vegetation, notably cattail and silverling. Highways, home sites, boat docks, and two seafood companies make up still another man-influenced area. Accommodation of these facilities has destroyed most of the biota associated with the original communities.

2.21 These man-influenced communities provide habitat for animals that adapt to man's presence such as the gray squirrel, flying squirrel, opossum, many birds, black rat, Norway rat, and house mouse. Reptiles and amphibians also utilize the relatively small habitats of both natural and introduced vegetation.

2.22 Endangered and threatened species. Endangered species (reference 7) can be defined as those species in danger of extinction throughout all or a significant portion of their range. Their peril may result from one or more causes--loss of habitat or change in habitat, over-exploitation, predation, competition or disease. Endangered and threatened species which occur or possibly occur in the project area are:

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<u>Fish</u>		<u>Status</u>
Shortnose sturgeon	<u>Acipenser brevirostrum</u>	Endangered
<u>Reptiles and Amphibians</u>		
American alligator	<u>Alligator mississippiensis</u>	Threatened
<u>Birds</u>		
American brown pelican	<u>Pelecanus occidentalis carolinensis</u>	Endangered
Bald eagle	<u>Haliaeetus l. leucocephalus</u>	"
Peregrine falcon	<u>Falco peregrinus</u>	"
Bachman's warbler	<u>Vermivora bachmanii</u>	"
Kirtland's warbler	<u>Dendroica kirtlandii</u>	"
Fskimo curlew	<u>Numenius borealis</u>	"
Red-cockaded woodpecker	<u>Dendrocopus borealis</u>	"

The shortnose sturgeon was a resident of Atlantic seaboard rivers from New Brunswick to Florida, however, most recent records are from the Savannah River. The alligator is commonly observed in freshwater rivers and lakes. The brown pelican is a commonly observed resident of coastal South Carolina. The bald eagle, a permanent resident of the state, has been sighted near Victoria Bluff (Reference 8). The peregrine falcon, Kirtland's warbler and the Fskimo curlew are transient species. According to the U. S. Fish and Wildlife Service, Bachman's warbler, one of the rarest of our small birds, has been observed in the I'on Swamp near Charleston. The red-cockaded woodpecker is a resident of the old-age pine woodlands.

2.13 Historical and archeological sites. The latest edition of the National Register of Historic Places lists 21 sites in Beaufort County. None of these sites are located within the area of project influence.

2.24 Land use. Of the approximately 575 square miles which make up Beaufort County, almost 100 square miles are made up of tide-lands. Approximately 150 square miles of Beaufort County are classified as farmlands, but only about 30 square miles are utilized. Cattle grazing constitutes a major use of this utilized land and the remainder is used for raising tomatoes, cucumbers, and other crops on a commercial basis. About 20 square miles are classified as urbanized land. These lands include the cities of Beaufort and Port Royal, the military centers at Parris Island and Laurel Bay Marine Air Station, and the resort-retirement developments on Hilton Head and Fripp Islands.

2.25 Economic Development.

2.26 Employment. The civilian labor force in Beaufort County in 1977 amounted to 12,230 persons, as compared with 12,050

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of the high sand and silt content of shoal materials, there will not be enough organic materials to significantly alter water quality.

Primary Production. Research conducted in similar areas indicates that the effect of dredging on the primary production of phytoplankton is initially inhibitory due to increased turbidity. Recovery normally takes place shortly after dredging is completed.

Survival of Fish. Research conducted on the survival of fish indicates that regulations may be reduced during actual dredging operations, but the area affected would be comparatively small and effects would decrease rapidly with distance from the dredging operation.

Benthic Invertebrates. Benthic invertebrate communities, which are characterized by a general lack of mobility would likely be adversely affected to some extent by the proposed project. As discussed previously, the majority of project channels would be accomplished by the use of hopper dredges. Some benthic invertebrates in the path of the dredge would be destroyed. This gross effect has been well documented and is expected to occur to some extent during the maintenance of the flood gate channel.

Although the highest concentrations of benthic invertebrates in the area are located in the shallower areas in and around the flood gate, the hopper dredged areas. Although some minor effects may occur in other areas, the area of greatest impact would be the immediate vicinity of the dredge. Although the short-term effects on the benthic environment may be locally severe, the overall effects on the area would be insignificant as repopulation from adjacent areas would occur rapidly after dredging is completed.

Fish Populations. Available data indicate that fish populations, unlike benthic invertebrates which are relatively immobile and may undergo significant reductions that may be locally severe, are less likely to be significantly affected by dredging operations. In some areas, dredging operations are believed to be beneficial to certain species of fish, especially the white perch on the larger benthic organisms. As a dredge maintains a navigable channel, benthic animals which would normally be buried in the sediments are dislodged and become susceptible to predation. The increased availability of food quite often results in higher concentrations of fishes near the dredge. A similar situation exists in the area adjacent to disposal areas.

As stated previously, shoal materials are mainly composed of sand and silt. Removal of these materials could create short-term effects on the fisheries which could become locally severe. Fish species which have the highest probability of being affected are white perch, bluefish, herring, and shad) and juvenile bluefish. The relative abundance of these species in the area

in 1974 (Reference 8). The rate of unemployment in 1974 was 5.2 percent and the ratio of unemployment in 1974 was over one-half a percentage point lower than that for the State. Less than seven percent of the nonagricultural employment in Beaufort County was in manufacturing, whereas more than 23 percent of the nonagricultural employment was in services.

1.2.2 Income. Per capita income in Beaufort County in 1974 was \$3,810 compared to \$4,610 for the State of South Carolina and the U.S. average of \$4,450 (Reference 9).

1.2.3 Industry. The principal industry in the immediate project area is commercial fishing. Because of the proximity of trawling activity to the south of St. Helena Sound, a fleet of 35-40 shrimp trawlers are based out of Village Creek. These boats land their catch at a processing plant, which is located adjacent to the creek.

1.3 The Probable Impact of the Proposed Action on the Environment

1.3.1 General. Material dredged from the creek in the past was deposited in unlined disposal areas located on former low marsh. The location of the disposal areas has not yet been determined but the probable disposal areas of using any of the three most likely areas are shown on the following parts of this section. These three areas are: disposal on land, diking and re-use of disposal areas in a marsh area, and open water disposal in a deepwater portion of the project area. The major adverse effects expected to result from the use of any one of these disposal alternatives relate to effects on water quality and on the ecosystems in the disposal areas, channel erosion, and other areas which might be disturbed by maintenance activities.

1.3.2 Dredging.

1.3.2.1 Water quality. Dredging would not result in any long-term or significant adverse impacts on the water quality of the Village Creek, St. Helena Sound and estuarine system. As is characteristic of any dredging or diking operation, water turbidity in the vicinity of the dredging activity would increase as a result of the mechanical action of the dredge. Turbidity in the water would also increase in the vicinity of selected disposal areas. Sediment analyses (see Appendix A) indicate that most of the sediment is composed of silt and fine sand. As a result, short-term effects on water quality will be locally severe. Long-term effects, however, are expected to be insignificant and should not adversely affect the water quality of the Village Creek and estuarine system. As discussed in Appendix A, the analysis of sediments in shoal areas did not indicate the presence of toxic or harmful substances in amounts that would be expected to affect water life. However, the disturbance of any sediment in the water column by anaerobic decomposition could cause a localized increase in hydrogen sulfide levels in the immediate vicinity

It is recognized, however, that it is not practical to attempt a complete eradication of the project or these species. In a further attempt to reduce the possibility of level fishes could be destroyed and caught in the dredge cutterhead. However, the effects of the existing practices in other areas indicate that the effects of the proposed dredging would be of a similar nature and would not significantly affect the fish populations of the Morgan River-St. Helena Sound estuarine system. If the dredging is limited to periods of low biological productivity, the effects would be reduced during periods of low biological productivity.

Open water disposal of dredged material in Morgan River-St. Helena Sound is one of the more desirable disposal alternatives. It is recognized, however, that the diking of productive marsh areas could result in long-term or significant adverse impacts on the estuarine system.

The effects expected to result from open water disposal of dredged material on water quality and ecosystems in the dike area are expected to be of a local nature in the immediate vicinity of the disposal site. The material released into the water column, including suspended solids and organic material, these increases in turbidity and organic content could have a short-term adverse effect on the local ecosystem. These effects would be similar to those produced by the disposal of 3.00, 3.00, 3.00, and 3.00 tons of dredged material to be removed. It is unlikely that the effects would be significant enough to adversely affect shellfish harvesting in the area.

The effects of open water disposal could be smothered as dredged material is deposited on the bottom. Although losses could be locally severe, the effects should be suitable for recolonization by the adjacent areas. As a result, open water disposal would not result in any long-term or significant adverse impacts on the benthic population in the Morgan River or St. Helena Sound estuarine system.

The effects of diking existing marsh disposal site. Because of the high productivity of marshes, it is considered unlikely that new disposal areas in the marsh zone would be acquired by the project sponsor. The effects of diking the existing marsh disposal site, which has been severely altered by previous diking, would be of a much lesser nature than those associated with disposal in unaltered marsh areas.

The effects of disposal areas become progressively elevated as the ground elevation exceeds the height reached by spring tides. The disposal area is no longer subject to tidal overflow and the disposal of dredged material, the disposal area becomes an upland area. Plants are

of the high sand and silt content of shoal materials, there will not be enough organic materials to significantly alter water quality.

Primary Production. Research conducted in similar areas indicates that the effect of dredging on the primary production of phytoplankton is initially inhibitory due to increased turbidity. Recovery normally takes place shortly after dredging is completed.

Survival of Fish. Research conducted on the survival of fish indicates that regulations may be reduced during actual dredging operations, but the area affected would be comparatively small and effects would decrease rapidly with distance from the dredging operation.

Benthic Invertebrates. Benthic invertebrate communities, which are characterized by a general lack of mobility would likely be adversely affected to some extent by the proposed project. As discussed previously, the majority of project channels would be accomplished by the use of hopper dredges. Some benthic invertebrates in the path of the dredge would be destroyed. This gross effect has been well documented and is expected to occur to some extent during the maintenance of the flood gate channel.

Although the highest concentrations of benthic invertebrates in the area are located in the shallower areas in and around the flood gate, the deeper channelized areas. Although some minor effects may be noted in certain areas, the area of greatest impact would be the immediate vicinity of the dredge. Although the short-term effects on the benthic environment may be locally severe, the overall effects on the area would be insignificant as repopulation from adjacent areas would occur rapidly after dredging is completed.

Fish Populations. Available data indicate that fish populations, unlike benthic invertebrates which are relatively immobile and may undergo local extirpations that may be locally severe, are less likely to be significantly affected by dredging operations. In some areas, dredging operations are believed to be beneficial to certain species of fish, especially in the area prox to the larger benthic organisms. As a dredge operates in forming a channel, benthic animals which would normally be buried in the sediments are dislodged and become susceptible to predation. The availability of food quite often results in higher concentrations of fishes near the dredge. A similar situation exists in the area adjacent to disposal areas.

As stated previously, shoal materials are mainly composed of sand and silt. Removal of these materials could create short-term effects on the fisheries which could become locally severe. Fish species which have the highest probability of being affected are juvenile white perch, blue crabs, herring, and shad) and juvenile bay anchovy. The relative abundance of these species in the area

as smooth cordgrass, black needle rush, and big cordgrass are eventually replaced by other grasses, poke berry, silverling, marsh elder, and wax myrtle. This conversion to an upland environment represents a permanent loss of the marsh involved in the disposal operation.

3.15 The loss of marsh also represents a reduction in the habitat available to marine forms and wildlife. Some species of fish, such as the speckled trout, spend their entire lives in estuaries. Others, including white and brown shrimp, blue crabs, croakers, spot, and red drum spend part of their juvenile life in marshes and adjacent water areas. Birds and mammals frequenting the marsh would be disturbed or displaced during disposal operations. As an area is converted to upland, mammals such as the raccoon, opossum, marsh rabbit and various rodents would continue to use the area although its habitat value may be reduced. After scrubs and trees become established, birds such as plovers, red-winged blackbirds, grackles, and marsh hawks and small mammals would return.

3.16 Use disposal areas on uplands. Since the rationale for preservation of individual tracts of marshland does not apply to upland areas such as woodlands and agricultural lands, use of these lands is considered a viable alternative.

3.17 Uplands are one of the most common environmental types found within the project area and are considered likely areas to be provided by the project sponsor. Prior to use of any wooded tract, the owner would probably remove merchantable timber. In any event, dense stands would be removed to permit a more even distribution throughout the disposal area of the hydraulically dredged material. Any trees not removed and all understory plants would be killed when their roots become covered to a sufficient depth. Vegetative regrowth would probably consist of poke berry, and other herbs and shrubs such as silverling and wax myrtle, and trees of most of the same species growing prior to disposal. Practically all significant animal life except for some small birds and mammals would be displaced during and shortly after use of a wooded disposal area. As vegetative regrowth occurs, foraging by species displaced during the preparation and clearing and subsequent use of the area would increase. Plant and animal life would fluctuate from a low during and shortly after deposition to a high just before each disposal operation. When capacity has been reached, a reversion to a wooded state by sweetgum, pines, hackberry, oaks, and other upland species will occur unless man's activities intervene through use of the area for cultivation or residential or other development.

3.18 Agricultural lands also appear to be likely areas to be provided by the project sponsor for disposal of dredged material. Agricultural lands are one of the least common environmental types, but some of the basic restrictions operating against the selection of marsh and woodlands do not apply. The impact on wildlife of using cultivated land for the disposal of dredged material depends on the length of time since the land may have been cultivated. Recently cultivated land usually has very little year round utility for wildlife because of the

It is recognized, however, that it is not practical to attempt a complete eradication of the project or these species. In a further, it is recognized that the lower level fishes could be destroyed and caught in the dredge cutterhead. However, the effects of the existing practices in other areas indicate that the effects from the proposed dredging would be of a similar nature and would not significantly affect the fish populations in the Morgan River-St. Helena Sound estuarine system. If the dredging is limited to periods of low biological productivity, the effects would be reduced during periods of low biological productivity.

It is recognized that open water disposal in Morgan River estuary is one of the more desirable disposal alternatives. It is recognized, however, that associated with the diking of productive marsh areas would be a long-term or significant adverse impact on the estuarine system.

It is recognized that effects expected to result from open water disposal would be an increase in water turbidity and ecosystems in the immediate vicinity of the disposal site. The release of the dredged material into the water column would increase the turbidity, these increases in turbidity would be a short-term adverse effect on the ecosystem. These effects would be similar to those produced by the dredging operations 3.00, 3.05, 3.00, and 3.05. Due to the high turbidity, it is unlikely that the dredged material to be removed, it is unlikely that the dredging would be significant enough to adversely affect shellfish populations in the Morgan River.

It is recognized that invertebrates could be smothered as dredged material is deposited on the bottom. Although losses could be locally severe, the position should be suitable for recolonization from adjacent areas. As a result, open water disposal would not result in any long-term or significant adverse impacts on the benthic population in the Morgan River or St. Helena Sound estuarine system.

It is recognized that existing marsh disposal site. Because of the high elevation of the marshes, it is considered unlikely that new disposal areas in the marsh zone would be acquired by the project sponsor. The elevation is being given to diking the existing marsh disposal area. This area has been severely altered by previous dredging operations and the effects associated with its use would be of a much lesser nature than those associated with disposal in unaltered marsh areas.

It is recognized that disposal areas become progressively elevated as the ground elevation exceeds the height reached by spring tides. The disposal area is no longer subject to tidal overflow and the disposal of dredged material, the disposal area becomes an upland area. Plants are

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common practice of clean farming, and the use of such an area would have little impact on wildlife. fields that are left fallow for some time provide habitat for a number of small animals. Most of these would be displaced during and shortly after the area dries. Poke berry and other

4.02 In addition, some benthic organisms may be destroyed by the dredge cutterhead or smothered in any open water disposal areas. Wildlife species inhabiting upland disposal sites would be displaced by the deposition of dredged materials. Although the grasses on upland disposal areas would be relatively unaffected by the dredged material, some of the woody vegetation could be killed. Regrowth usually begins soon after dredging is completed.

5.0 Alternatives to the Proposed Action

5.01 In addition to the disposal alternatives discussed in Section 3.0, consideration must also be given to discontinuing maintenance dredging of Village Creek. If this no action alternative were adopted, siltation would continue until the creek would become too shallow to accommodate the shrimp boats which now utilize it. Although this alternative would avoid the adverse affects associated with dredging and disposal operations, it would forego the economic benefits derived from the shrimp boats which are essential to the local economy. This alternative, therefore, appears unacceptable since the project's benefits are believed to greatly outweigh the adverse environmental impacts that would result from continued maintenance of the project.

of the county's mosquito control program if it is determined that a disposal area provides a mosquito breeding site. The Federal cost would be proportionate to the contribution of the disposal area to the mosquito problem. The most commonly used insecticide is Flit M.L.O., an oil larvicide which dissipates quickly and has no effect on other aquatic life. However, since Flit has no residual effect, a control program utilizing this larvicide requires frequent inspection and respraying.

3.23 Archeological and historical sites. The continued maintenance of Village Creek should have no impact on archeological or historical resources. The National Register of Historic Places lists no Register properties which would be adversely affected by the proposed work. In the event that the project is modified or a new upland disposal area is provided by the local sponsor, the new areas would be surveyed and the State Historic Preservation Officer would be contacted.

3.24 Aesthetics. Aside from the physical presence of the dredge and floating pipeline that will be in the creek during maintenance dredging, there will be little or no effect on aesthetics. Upland disposal sites might be aesthetically displeasing to users of adjacent land.

3.25 Air quality. There will be a very minor increase in air pollution as a result of operation of the dredge; however, the effects will be temporary as well as insignificant and probably not measurable.

3.26 Noise. Noise generated by the dredge while it is working at the upper end of the project may be somewhat displeasing but will be of relatively short duration. The remaining portion of the operation should not raise noise levels appreciably.

3.27 Economic impact. The continued maintenance of Village Creek would continue to have a favorable economic impact on the area. The shrimp boats now supplying the packing houses would continue to use the area.

4.0 Any Probable Adverse Environmental Effects Which Cannot Be Avoided

4.01 A detailed discussion of all environmental impacts expected to result from the project is contained in Section 3.0. Some of these impacts are considered unfavorable, but cannot be avoided by any practical means within the authority and scope of the proposed project. The principal adverse impacts relate to temporary changes in water quality and its effect on the creek and disposal area ecosystems. These effects include: increased turbidities and siltation in the vicinity of the dredge and disposal areas and a possible reduction in dissolved oxygen levels as a result of the dredge disturbing organic materials undergoing anaerobic decomposition.

6

- U. S. Department of Commerce. 1976. Tide tables and low water predictions, West Coast of North and South America including Greenland. 219pp.
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- U. S. Department of the Interior. 1977. Coastal Plains of South Carolina. Part 1. Geology, land use, and mineral survey. Bull. 107.
- U. S. Department of the Interior. 1977. Wetlands and wetland complexes, Ancestral Savannahs of South Carolina, Columbia. 64pp.
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- U. S. Geological Survey, Ahles, and C. R. Bell. 1961. The geology of the coastal plain of the Carolinas. University of North Carolina. Bull. 11.
- U. S. Department of the Interior. 1977. Endangered and threatened species. Federal Register, Vol. 42, No. 148.
- U. S. Port of Commerce Commission. 1972. Port Royal Area Environment. Columbia, S.C. 555pp.
- U. S. Environmental Protection Agency, South Carolina's Environmental Quality. Research and Statistics Section, Columbia.

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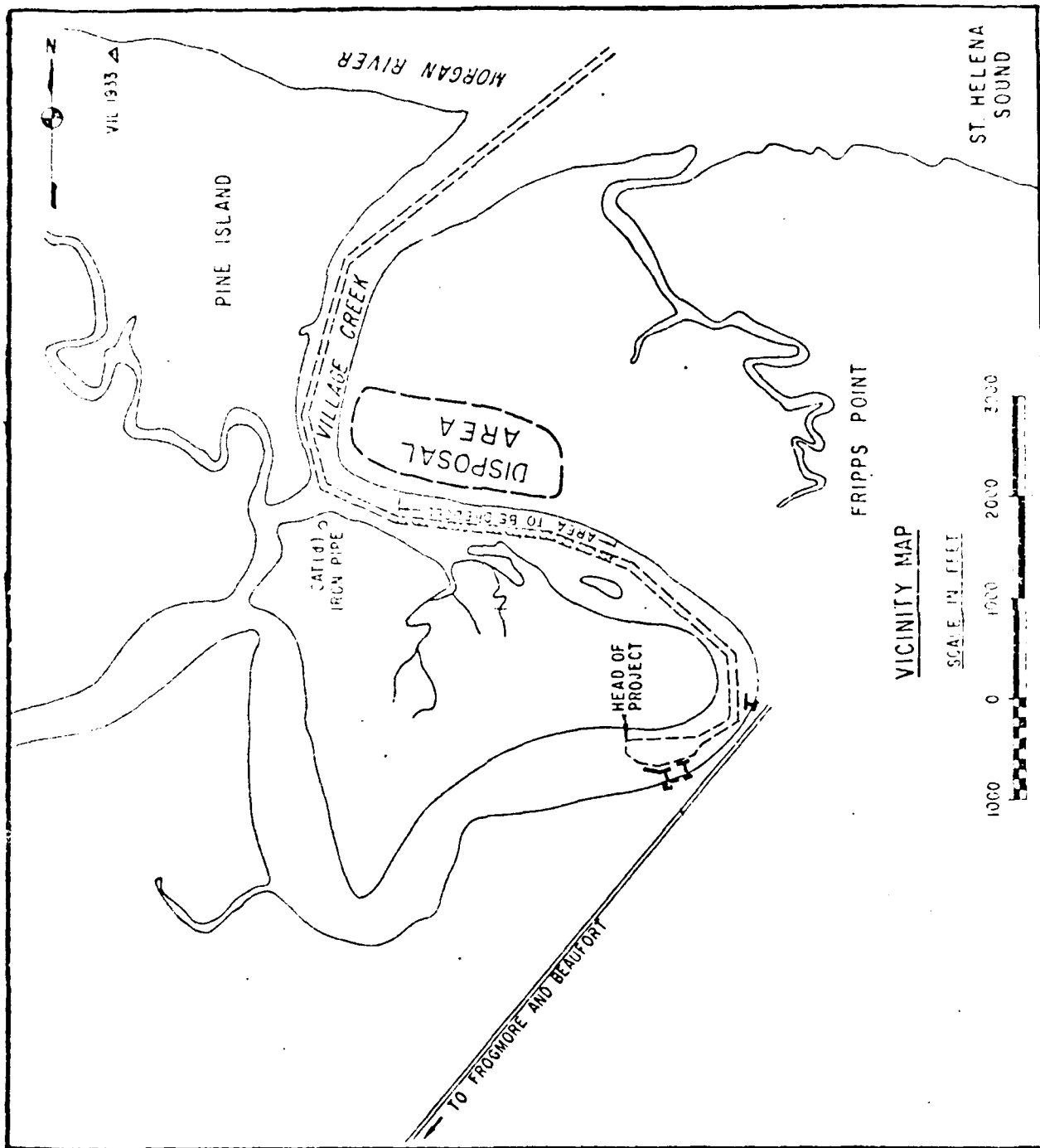


PLATE 1

REFERENCES

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APPENDIX A

Standard Elutriate Tests and Sediment Analysis

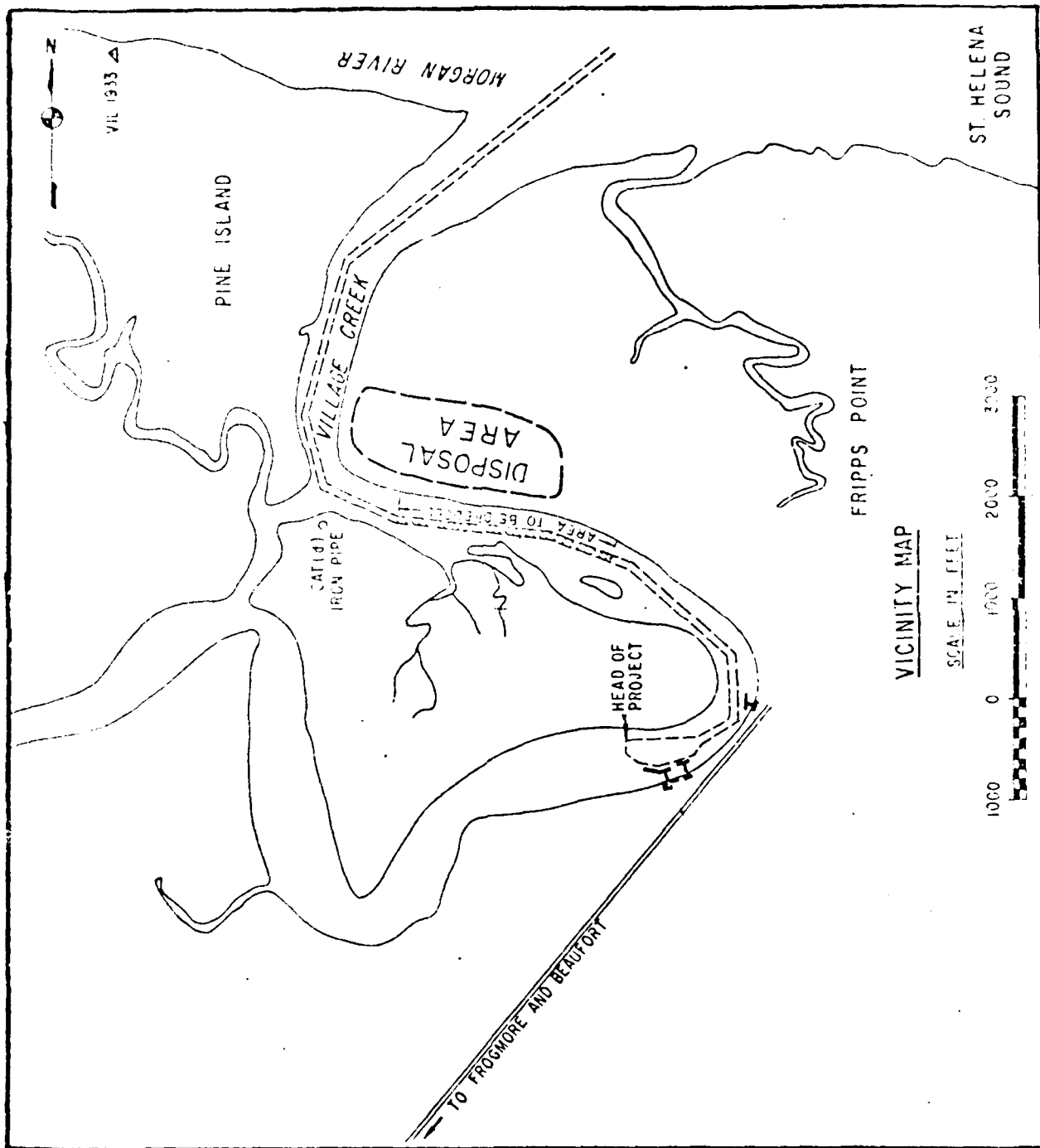


PLATE 1

U. S. ARMY ENGINEER DIVISION LABORATORY, SOUTH ATLANTIC CORPS OF ENGINEERS MARETTA, GEORGIA		DISTRICT Charleston																																																										
		PROJECT Village Creek																																																										
		CONTRACT NO. ---																																																										
GENERAL TEST REPORT (STANDARD ELUTRIATE TEST)		DATE REPORTED 1 April 1977																																																										
		WORK ORDER NO. 0520																																																										
DESCRIPTION Sediment and Water		REQM. NO. SACEC-77-28																																																										
SOURCE		BASE UNIT COST --																																																										
FOR USE AS:		DATE SAMPLE RECEIVED 3-17-77																																																										
TESTED FOR: Chemical Analysis (See Below)		LAB NO. See Below																																																										
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<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Lab. No.</th> <th style="width: 30%; text-align: center;">3E389*</th> <th style="width: 30%; text-align: center;">3E390*</th> </tr> <tr> <th style="text-align: left;">Field Sample No.</th> <th style="text-align: center;"><u>Receiving Water</u> <u>Disposal Site</u></th> <th style="text-align: center;"><u>Elutriate</u> <u>VCE-1</u></th> </tr> </thead> <tbody> <tr><td>Total Organic Carbon</td><td style="text-align: center;">4</td><td style="text-align: center;">11</td></tr> <tr><td>Nitrogen, Ammonia</td><td style="text-align: center;">0.18</td><td style="text-align: center;">0.96</td></tr> <tr><td>Nitrogen, Kjeldahl</td><td style="text-align: center;">0.38</td><td style="text-align: center;">2.56</td></tr> <tr><td>Oil and Grease</td><td style="text-align: center;"><1.0</td><td style="text-align: center;"><1.0</td></tr> <tr><td>Total Phosphorus as P</td><td style="text-align: center;">0.035</td><td style="text-align: center;">0.090</td></tr> <tr><td>Ortho Phosphorus as P</td><td style="text-align: center;">0.013</td><td style="text-align: center;">0.013</td></tr> <tr><td>Lead</td><td style="text-align: center;">5.0</td><td style="text-align: center;">4.5</td></tr> <tr><td>Zinc</td><td style="text-align: center;">10.</td><td style="text-align: center;">12.</td></tr> <tr><td>Mercury</td><td style="text-align: center;"><0.5</td><td style="text-align: center;"><0.5</td></tr> <tr><td>Iron</td><td style="text-align: center;">26</td><td style="text-align: center;">26</td></tr> <tr><td>Cadmium</td><td style="text-align: center;"><0.25</td><td style="text-align: center;">1.0</td></tr> <tr><td>Arsenic</td><td style="text-align: center;"><5</td><td style="text-align: center;"><5</td></tr> <tr><td>Chromium</td><td style="text-align: center;"><5</td><td style="text-align: center;"><5</td></tr> <tr><td>Nickel</td><td style="text-align: center;">4.0</td><td style="text-align: center;">4.5</td></tr> <tr><td>Copper</td><td style="text-align: center;">1.4</td><td style="text-align: center;">1.3</td></tr> <tr><td>Beryllium</td><td style="text-align: center;"><0.25</td><td style="text-align: center;"><0.25</td></tr> <tr><td>Selenium</td><td style="text-align: center;"><5</td><td style="text-align: center;"><5</td></tr> </tbody> </table>				Lab. No.	3E389*	3E390*	Field Sample No.	<u>Receiving Water</u> <u>Disposal Site</u>	<u>Elutriate</u> <u>VCE-1</u>	Total Organic Carbon	4	11	Nitrogen, Ammonia	0.18	0.96	Nitrogen, Kjeldahl	0.38	2.56	Oil and Grease	<1.0	<1.0	Total Phosphorus as P	0.035	0.090	Ortho Phosphorus as P	0.013	0.013	Lead	5.0	4.5	Zinc	10.	12.	Mercury	<0.5	<0.5	Iron	26	26	Cadmium	<0.25	1.0	Arsenic	<5	<5	Chromium	<5	<5	Nickel	4.0	4.5	Copper	1.4	1.3	Beryllium	<0.25	<0.25	Selenium	<5	<5
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REPORTED BY: _____ DATE: _____		TESTED BY KB, JN, DW SAMPLED BY _____																																																										
PHONE _____ WIRE _____		CHECKED BY DW																																																										

APPENDIX A

Standard Elutriate Tests and Sediment Analysis

U. S. ARMY ENGINEER DIVISION LABORATORY, SOUTH ATLANTIC CORPS OF ENGINEERS MARETTA, GEORGIA	DISTRICT Charleston
	PROJECT Village Creek
	CONTRACT NO. ---
GENERAL TEST REPORT (SEDIMENT)	DATE REPORTED 1 April 1977
	WORK ORDER NO. 0520
DESCRIPTION Sediment Samples	REQN. NO. SACEC-77-28
SOURCE	BASE UNIT COST ---
FOR USE AS:	DATE SAMPLE RECEIVED 3-17-77
TESTED FOR: Chemical Analysis (see below)	LAB NO. See Below



MEETS
SPECIFICATIONS



FAILS
SPECIFICATIONS (See below)

Percent by Weight (Dry Basis)

Lab. No.	3W391*	3S392*
Field Sample No.	VC-1	VS-2
Volatile Solids (Max 6.0)	7.44	8.93
T. V. S. Formula EC	7.68	9.17
Total Organic Carbon	1.80	2.55
C. O. D., (Max 5.0)	6.49	8.01
Nitrogen, Kjeldahl (Max 0.10)	0.167	0.208
Oil and Grease (Max 0.15)	0.043	0.073
Lead (Max 0.005)	0.0016	0.0017
Zinc (Max 0.005)	0.0034	0.0036
Mercury (Max 0.0001)	< 0.00002	< 0.00002
Total Phosphorus as PO ₄	0.44	0.36
Iron	1.6	1.7
Cadmium	< 0.00005	0.00005
Arsenic	0.00050	0.00040
Chromium	0.0024	0.0023
Nickel	0.0013	0.0013
Copper	0.0007	0.0007
Beryllium	0.00008	0.00010
Selenium	< 0.00001	< 0.00001
Vanadium	0.0028	0.0028

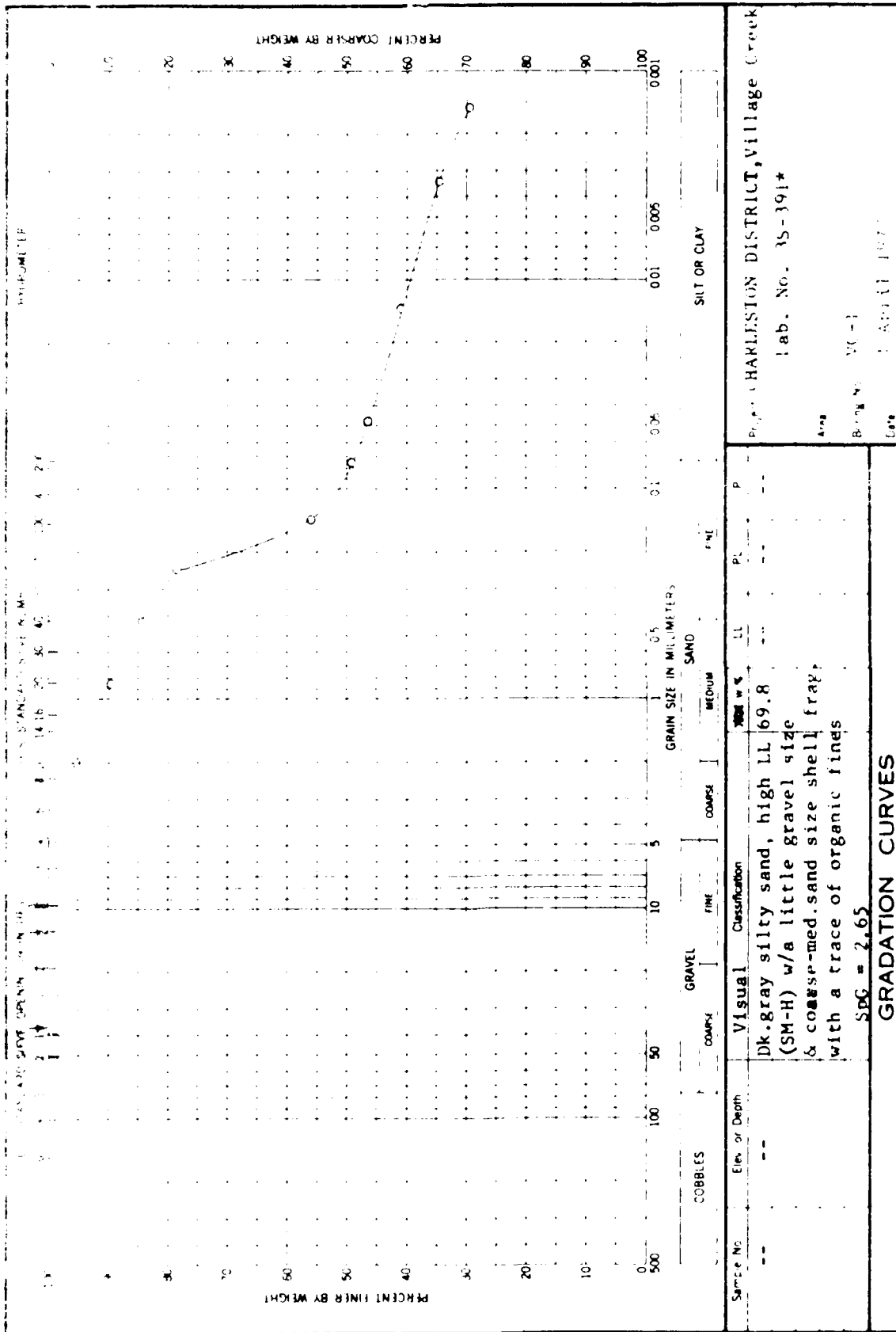
REMARKS:

- *Elutriate Test reported on SAD Form 158R.
- *Gradation Curves reported on ENG Form 2087.

REPORTED BY:	PHONE	WIRE	TESTED BY JL, JN, DW	CHECKED BY DW
DATE	SAMPLED BY			

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REPORTED BY: _____ PHONE _____ WIRE _____ DATE _____		TESTED BY KB, JN, DW CHECKED BY DW SAMPLED BY _____																																																										

DEPARTMENT OF THE ARMY SOUTH ATLANTIC DISTRICT ENGINEER OFFICE
CORPS OF ENGINEERS 301 SOUTH 10TH STREET WILMINGTON, DE 19804



ENG 2087

*Elutriate Test reported on SAP form 100

*Chemical Analysis of Sediment reported on SAP form 100

U. S. ARMY ENGINEER DIVISION LABORATORY, SOUTH ATLANTIC CORPS OF ENGINEERS MARETTA, GEORGIA	DISTRICT Charleston
	PROJECT Village Creek
	CONTRACT NO. ---
GENERAL TEST REPORT (SEDIMENT)	DATE REPORTED 1 April 1977
	WORK ORDER NO. 0520
DESCRIPTION Sediment Samples	REQM. NO. SACEC-77-28
SOURCE	BASE UNIT COST ---
FOR USE AS:	DATE SAMPLE RECEIVED 3-17-77
TESTED FOR: Chemical Analysis (see below)	LAB NO. See Below



MEETS
SPECIFICATIONS



FAILS
SPECIFICATIONS (See below)

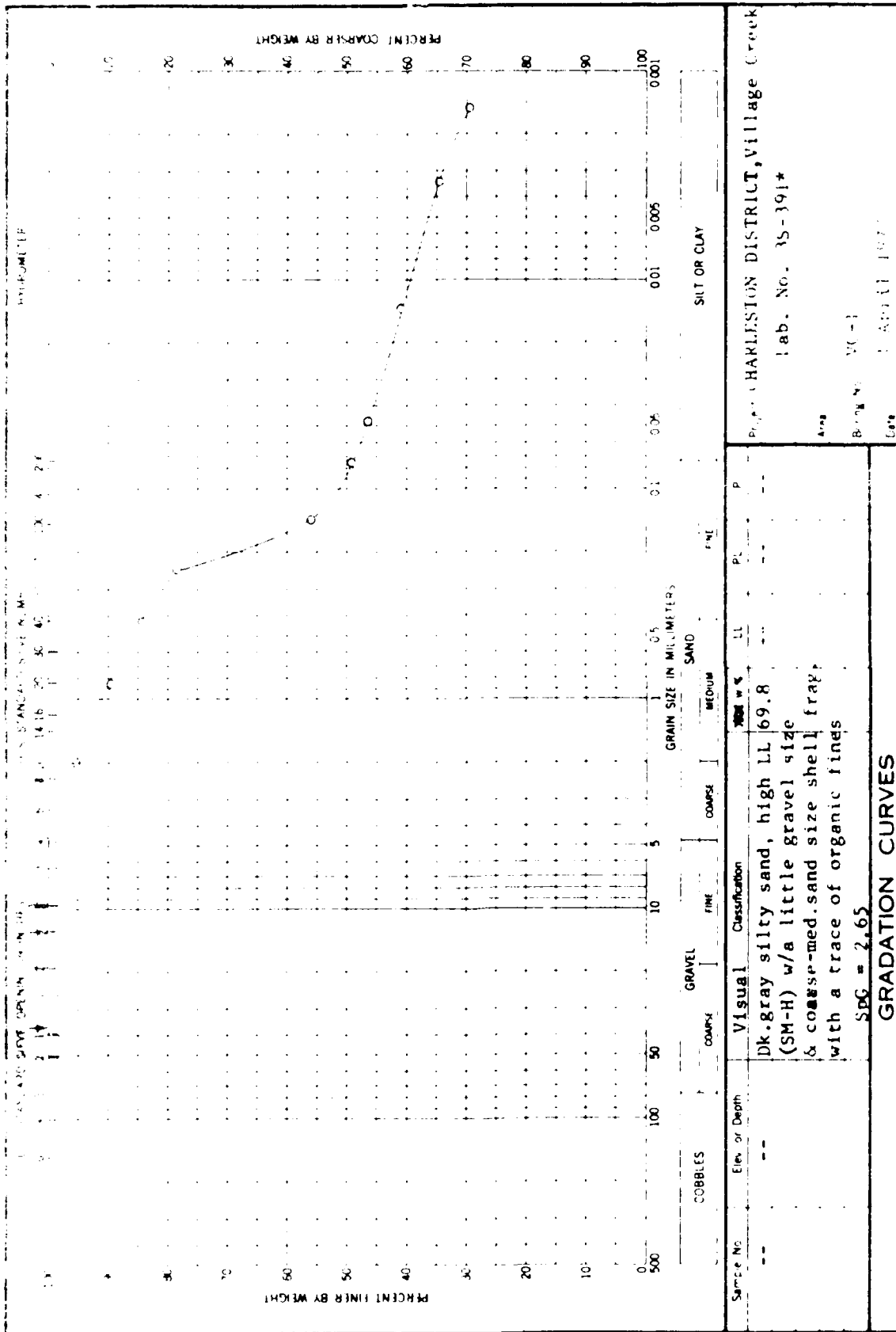
Percent by Weight (Dry Basis)

Lab. No.	3W391*	3S392*
Field Sample No.	VC-1	VS-2
Volatile Solids (Max 6.0)	7.44	8.93
T. V. S. Formula EC	7.68	9.17
Total Organic Carbon	1.80	2.55
C. O. D., (Max 5.0)	6.49	8.01
Nitrogen, Kjeldahl (Max 0.10)	0.167	0.208
Oil and Grease (Max 0.15)	0.043	0.073
Lead (Max 0.005)	0.0016	0.0017
Zinc (Max 0.005)	0.0034	0.0036
Mercury (Max 0.0001)	< 0.00002	< 0.00002
Total Phosphorus as PO ₄	0.44	0.36
Iron	1.6	1.7
Cadmium	< 0.00005	0.00005
Arsenic	0.00050	0.00040
Chromium	0.0024	0.0023
Nickel	0.0013	0.0013
Copper	0.0007	0.0007
Beryllium	0.00008	0.00010
Selenium	< 0.00001	< 0.00001
Vanadium	0.0028	0.0028

REMARKS:

- *Elutriate Test reported on SAD Form 158R.
- *Gradation Curves reported on ENG Form 2087.

REPORTED BY:	PHONE	WIRE	TESTED BY JL, JN, DW	CHECKED BY DW
DATE	SAMPLED BY			



ENG 2087

*Elutriate Test reported on SAP form 100

*Chemical Analysis of Sediment reported on SAP form 100

END

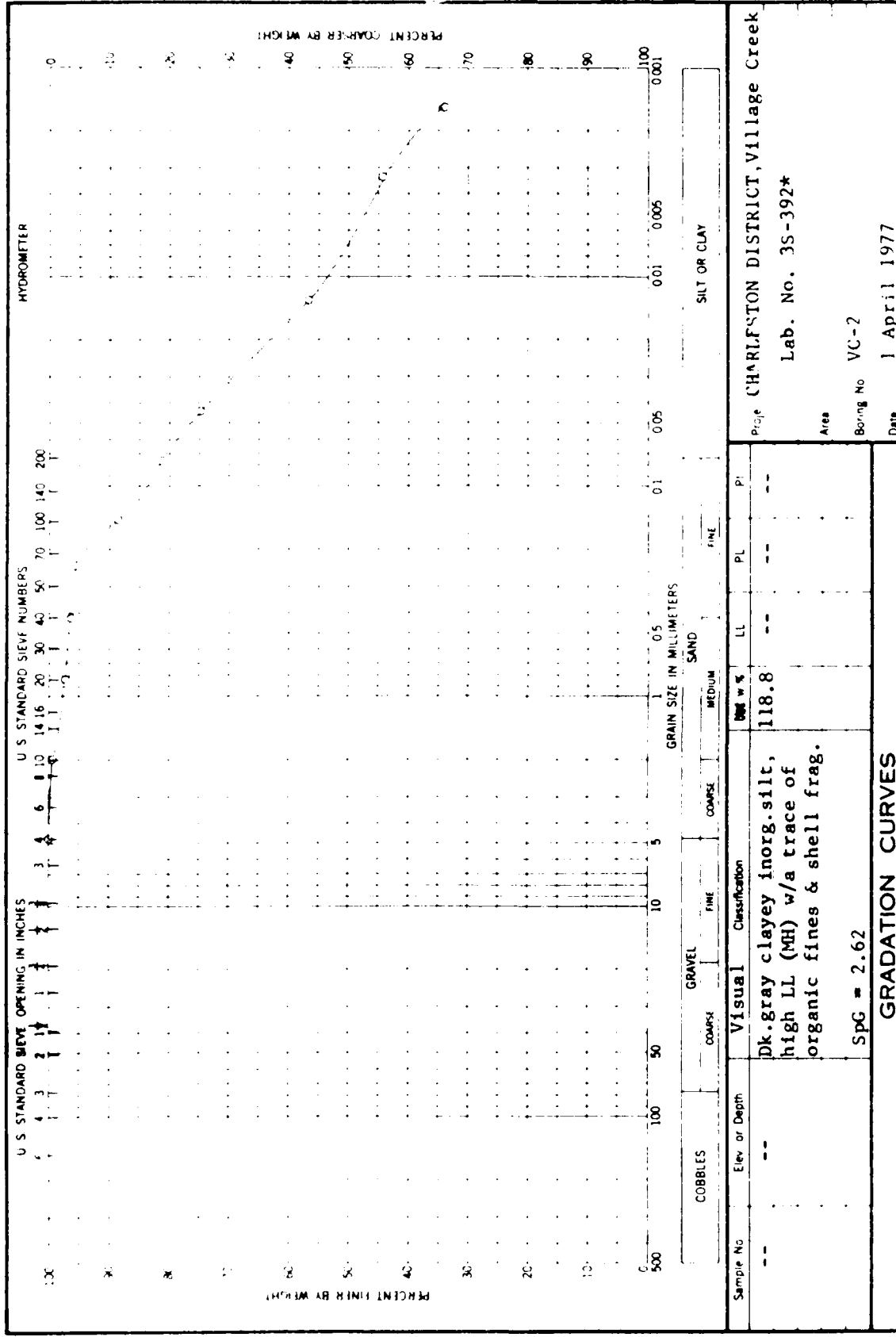
FILMED

5-85

DTIC

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA 30061

WORK ORDER NO. 0520
Re. NO SACEC-77-28



ENG 2087

*Elutriate Test reported on SAD Form 158R.

*Chemical Analysis of Sediment reported on SAD Form 158R.

END

FILMED

5-85

DTIC