

GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)** **ProjectID:** 04-09

Last Updated: 04/06/02

City: Brunswick

County: Glynn

State: GA

Country: USA

Bodies of Water: Terry Creek; Dupree Creek; Back River

US EPA Region: IV

Status (Active, Complete, or Monitoring Only): Complete

Date On NPL: N/A

ROD/ESD Date: N/A

Operable Unit: N/A

Areas of Concern (length or acres): Three areas were addressed by the removal action: 1) the Outfall Ditch, 2) the North Dupree Creek area comprising three distinct removal areas, namely Creek Zones 1 and 2 and the Outfall Ditch mouth, and 3) the Confluence Area comprising Creek Zones 3-6.

The Outfall Ditch is 900 feet long and varies in width from 40 to 150 ft. and is separated into two areas: 1) a Pre-Weir Area (~0.5 acre) and 2) a Post-Weir Area (~1.6 acres). The Outfall Ditch mouth covers 0.8 acre and the six creek hot spot areas cover 2.2 acres combined. Creek Zones 1 and 2 are located in Dupree Creek upstream (north) of the outfall channel mouth; Creek Zones 3 and 4 are located in Dupree Creek at its confluence with Terry Creek and adjacent to the Hercules loading dock; Creek Zone 5 is located in Terry Creek just upstream from its confluence with Dupree Creek and Creek Zone 6 is located in Terry Creek downstream of its confluence with Dupree Creek.

Other Characteristics of Water Body: The topography of the area surrounding the site consists of relatively flat land, 0 to 15 feet above mean sea level, interspersed with tidal marshes, creeks, and rivers. The entire area is tidally influenced, with the average tidal range being about 7.5 feet.

Three island-like dredge spoil sites, collectively referred to as the Terry Creek Dredge Spoil Area, border portions of both Dupree and Terry Creeks. The US Army Corps of Engineers periodically dredged Terry Creek from 1940 to 1979, depositing dredged slurry material contaminated with toxaphene directly into the three disposal areas. The spoil areas are considered a primary source of toxaphene to both creeks as a result of surface runoff and are being addressed under a separate remedial action.

Contaminants of Concern: toxaphene

Source of Contamination: Historical discharges of an estimated 250-300 pounds per day of toxaphene from the Hercules, Inc. pesticide formulation facility from 1948 to 1980. In addition, a spill of an unknown quantity of toxaphene to Terry Creek was reported by Hercules in 1972. Toxaphene may also be entering both Dupree and Terry Creeks as a result of contaminated runoff from the Terry Creek Dredge Spoil Area.

Contaminated Area Physical Characteristics: Approximately 290 sediment samples were collected for characterization within the areas being addressed by this removal action. Maximum toxaphene levels measured in the Outfall Ditch were 2,600 ppm (Pre-Weir Area) and 30,000 ppm (Post-Weir Area; 2,100 ppm to a depth of 4 to 5 feet). Maximum toxaphene levels measured in creek sediments were 290 ppm in the North Dupree Creek Area and 110 ppm in the Confluence Area. In addition, sediments historically

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disposed of in the Terry Creek Dredge Spoil Area contained toxaphene levels up to 430 ppm.

Type of Regulatory Action: Voluntary Removal Action. Interim. PRP-Lead.

Overall Status Summary: The site is located near the confluence of Terry Creek, Dupree Creek and the Back River near Brunswick, Georgia and includes an Outfall Ditch, areas of Dupree Creek (the receiving stream), Terry Creek (which Dupree Creek flows into after 0.4 miles), and three areas that historically received contaminated material from the dredging of Terry Creek. Terry Creek flows 1.3 miles into the Back River. The site is contaminated with toxaphene that originated from an adjacent pesticide formulation facility operated by Hercules. The facility produced toxaphene from 1948 until 1980 when use of toxaphene in the United States was officially banned. Wastewater from the facility discharged through a culvert to the Outfall Ditch which empties to Dupree Creek. During periods of peak production prior to 1972, Hercules reportedly discharged approximately 250-300 pounds per day of toxaphene to the Outfall ditch. In addition, Hercules reported a toxaphene spill of unknown quantity into Terry Creek in 1972. Periodic sampling of these areas has shown maximum toxaphene concentrations of 30,000 ppm in the Outfall Ditch, 290 ppm in Dupree Creek, and 110 ppm in Terry Creek. In addition, from 1939 to 1989 the Army Corps periodically dredged Terry Creek, depositing the dredge material primarily into three dredge spoil areas. These areas have been shown to contain elevated levels of toxaphene (a maximum concentration of 430 ppm). An ecological screening evaluation was performed in February 1997 that included the collection of surface water, sediment, blue crab, and forage and consumer fish. Sediment collected from the confluence of the Dupree and Terry Creeks and from the mouths of small streams that drain the dredge spoil areas all contained elevated levels of toxaphene. Fish sample results also indicated the potential existence of elevated levels of toxaphene-like compounds.

In December 1997, the USEPA and Hercules (voluntarily) signed an AOC to remove sediment from the Outfall Ditch and perform additional water and sediment sampling in Dupree and Terry Creeks. Additional sampling in both creeks identified localized areas of sediment containing elevated levels of toxaphene. In November 1998, the original AOC was amended to further delineate the removal in the Outfall Ditch and to include remediation of six hot spots located in the creeks. The removal action targeted sediments in three separate areas: 1) the Outfall Ditch (Pre- and Post-Weir Areas), 2) the North Dupree Creek Area consisting of three removal areas (Creek Zones 1 and 2, and the Outfall Ditch mouth), and 3) the Confluence Area comprising Creek Zones 3-6.

The removal work began on August 11, 1999 and was originally targeted for completion by November 1999; actual project completion was on April 12, 2000. Heritage Environmental Consultants performed the removal using Cable Arm environmental clamshell buckets and long-reach excavators. The project goal was mass removal with a target removal depth of 1-8 feet in the Outfall Ditch and one foot for the six Creek Zones. Removed sediment was deposited in drain beds located adjacent to the Outfall Ditch and remained there for about six months to dewater and dry prior to disposal in a commercial Subtitle D landfill. The original estimated volume of sediment to be removed was 26,000 cy. The actual volume removed was 35,148 cy, at a total cost of about \$3 million.

Water samples collected from outside the silt curtains during dredging were below the site-specific turbidity action levels and non-detect for toxaphene. Confirmation samples collected from the dredged areas were considered satisfactory by the USEPA and Hercules (no target level was selected for comparison; simply a case-by-case evaluation was used to determine if additional removal passes were warranted). Final toxaphene residual concentrations in sediment were defined by 209 post-excavation confirmation samples. The 209 samples exhibited

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a median of 4.5 ppm toxaphene and a maximum of 2,700 ppm. A close-out report describing the removal action was issued in June 2001 (Reference A-790).

In addition to the emergency removal action, Hercules is continuing development of an RI/FS for the Terry Creek Dredge Spoil Areas. Completion of the RI/FS is targeted for 2002.

Remedial Action Planned: ☒

Risk Assessment: ☒

Remedial Action Implemented: ☒

Status of Dredging ☐

PRPs: ☒

Contacts: ☒

References: ☒

Modeling: ☐

Fishing Advisory: ☒

Key Conditions: commercial landfill, dredging, specialty dredge equipment, tidal fluctuations

REMEDIAL ACTION PLANNED

Project Name	<u>TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)</u>	ProjectID: 04-09
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Target Sediment Cleanup Standards (TSCS):	None established; mass removal only for 90% of toxaphene mass contained within the site boundaries using a depth target of 1-8 feet in the Outfall Ditch and one foot in the six Creek Zones.	
How TSCS Established:	N/A	
Target Bank and Floodplain Cleanup Levels (if applicable):	N/A	
Other Target:	90% of toxaphene mass contained within the site boundaries using a depth target of 1-8 feet in the Outfall Ditch and 1 foot in the 6 Creek Zones.	
Environmental Sample Data References:	<ul style="list-style-type: none">• Sediment: A-560• Water: A-560• Fish: A-560	
Estimated Target Volume:	26,000 cy combined total from: 1) the Outfall Ditch, 2) North Dupree Creek, and 3) the Confluence Area (Dupree and Terry Creeks).	
Planned Disposal Method:	Sediments are to be staged in on-site drain beds for approximately 6 months to allow gravity dewatering and further drying. The sediment will then be transported using haul trucks to an off-site commercial landfill to be selected by Hercules. The on-site draining beds are to be located adjacent to the north and south sides of the Outfall Ditch on soil found previously to be contaminated with toxaphene.	
Estimated Calendar Time to Implement Remedy:	July to end of October 1999	
Estimated Time to Implement Remedy:	4 months	
Estimated Cost to Implement Remedy:	\$ 2.6 million	
Stated Remedial Action Objectives (and Source):	(Source: Reference A-524) "The objective of this removal action is mass removal of sediment containing toxaphene. When completed it is estimated that approximately 90 percent by mass of the toxaphene will be removed from Terry Creek/Dupree Creek/Outfall Channel areas which lie within the site boundaries."	
Measures of Success to be Used:	None specified	
Planned Monitoring and Restoration:	<ul style="list-style-type: none">• Construction progress/post-excavation core samples are to be collected following removal of the sediment to prescribed depth targets and analyzed for toxaphene levels in an on-site mobile laboratory. Twenty percent of the samples are to be sent to an off-site laboratory for confirmation analysis. Cores are to be collected to a depth of 3 feet, partitioned into three one-foot segments, and the top segment analyzed for use in determining the need for further removal, which will be decided jointly by Hercules and USEPA.	

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(Source: Reference A-524)

"Creek monitoring (water sampling and turbidity monitoring) will consist of: (i) water sampling and turbidity monitoring at monitoring points located immediately outside the turbidity curtain at the sediment removal areas; (ii) water sampling and turbidity monitoring at three monitoring stations; and (iii) turbidity monitoring at one reference station. A correlation evaluation was established for action levels of turbidity to be utilized in monitoring sediment removal operations. A two-tiered action level approach has been designed. A turbidity value representing the method practical quantitation limit (PQL; 5 micrograms per liter) is proposed as a tier one action level (i.e., 155 NTUs for Outfall Ditch and 334 NTUs for tidal creeks). Tier one action will include triggering additional turbidity monitoring with possible temporary suspension of sediment removal activities. If problems persist, construction methods will be re-evaluated to identify measures to reduce turbidity. A second tier is proposed for immediate suspension of sediment removal activities; it is proposed that the tier two action level be established at two times the detection limit (i.e., 300 NTUs for Outfall Ditch and 600 NTUs for tidal creeks)."

- Sampling of drying bed effluent to determine quality prior to discharge to the Outfall Ditch.
- Sampling of stockpiled sediments at the rate of one composite sample every 1,000 cubic yards.
- Air monitoring for particulates along the southern end of the site (the prevailing wind direction is north-northeast); an estimated 130 samples will be collected and analyzed for toxaphene and another 100 samples will be collected for total dust analysis.

Agency Position on Sediment Removal (and Source):

(Source: Reference A-520)

- "The conditions described in the Findings of Fact constitute an actual or threatened "release of a hazardous substance from the Site;"
- "The conditions present at the Site constitute an imminent and substantial endangerment to public health, welfare, or the environment;"
- "The actual or threatened release of hazardous substances at or from the Site may present an imminent and substantial endangerment to the public health, welfare, or the environment;" and
- "The removal actions required by this Order are necessary to protect the public health, welfare, or the environment, and are not inconsistent with the NCP or CERCLA."

RISK ASSESSMENT

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<i>RA Type:</i>	Human Health	
<i>RA Status:</i>	Complete	
<i>RA Objectives:</i>	To evaluate the public health significance of the Terry Creek Dredge Spoil Areas/Hercules Outfall site.	
<i>Company Performing RA:</i>	Agency for Toxic Substances and Disease Registry	
<i>RA Reference Report:</i>	Reference M-200, dated March 31, 1998	
<i>RA Summary and Conclusions:</i>	(Source: Reference M-200) "ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS"	

"Surface Water: Terry Creek flows east for 1.3 miles and merges with the Back River. The Back River flows south for approximately 1.8 miles and empties into St. Simons Sound and the Atlantic Ocean. Historical data from 1972 indicates that toxaphene in surface water was approximately 1.4 ppb. Surface water samples were collected in 1997 but did not contain toxaphene above the detection level of 5 ppb. However, at a detection level of 5 ppb, indication of toxaphene is not anticipated based on historical records. Toxaphene is readily absorbed through skin contact and can cause problems for swimmers but, because toxaphene is absorbed by soil and sediment, its present concentrations in surface water should be low. Historically, it could have posed a hazard for swimmers, particularly when effluent discharge concentrations of toxaphene from Hercules were highest (around 1970). The surface water of local creeks is not being used as a drinking water source."

"Low concentrations of chloroform, carbon tetrachloride, and methyl isobutyl ketone were detected at a surface water sampling location in Terry Creek,. However, their concentrations did not exceed ATSDR comparison values for drinking water. Therefore, they were not evaluated further."

"Sediment: Elevated concentrations of toxaphene have been found in the sediments of Terry and Dupree Creeks and adjacent wetlands. In September 1995, about 14 sediment samples from the creeks and adjacent wetlands were analyzed for toxaphene. Toxaphene was present in most sediment samples at concentrations ranging from 0.16 to 2.4 ppm. However, higher concentrations (8.5 to 60 ppm) were found south of Torras Causeway on Terry Creek, in Dupree Creek northwest of Area 1, at the Hercules outfall drainage ditch leading to Dupree Creek, and in wetland sediment up-gradient of the site on Dupree Creek. In 1997, toxaphene concentrations in sediment of Dupree and Terry Creeks ranged from approximately 7.9 to 230 ppm. The highest concentration was found near the Hercules dock in Dupree Creek."

"Fish and other Seafood: Dupree Creek, Terry Creek, and the Back River are known fisheries and habitats for several federally-endangered species such as the West Indian Manatee, Wood Stork, Loggerhead Sea Turtle, and Ridley Sea Turtle. The creeks provide fishing as well as blue crab collection sites for the general public. Fish species caught in nearby coastal areas include striped mullet, spotted sea trout, longnose gar, blue angelfish, sheepshead, gizzard shad and others. Fish species caught recently in Terry and Dupree Creeks include yellowtail, spot, mullet, spotted sea trout, croaker, red drum, flounder, and whiting. Shellfish recently caught in these creeks include shrimp and blue crab. Approximately 16% of the residents of the Riverside Development and Terry Creek Mobile Home Park who live on, or near, the contaminated areas of the Terry Creek site indicated that they do some fishing there. Human exposure to toxaphene through consumption of fish and other seafood is a likely exposure pathway at the Terry Creek site."

- "Historical data (1970s): Toxaphene concentrations in effluent from Hercules were highest in the early

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1970s prior to construction of a waste water treatment plant in 1972. Hercules released large volumes of waste water containing toxaphene (reportedly approximately 200-300 pounds of toxaphene per day) from a waste water discharge point at the confluence of Dupree and Terry Creeks until 1972."

"Toxaphene contamination in seafood was not limited to the Terry Creek area but extended to St. Simons Sound. Data from the early 1970s indicate toxaphene contamination of forage fish and seafood (anchovy, shrimp, oysters, and finfish) in the Terry Creek area. Some data on toxaphene in mummichogs/killifishes is also available. Averages for toxaphene in forage fish between 1970 and 1972 were around 50 ppm. In 1972 toxaphene in anchovy usually averaged around 10 ppm, but the maximum concentration reported was 236 ppm in 1970. Eight samples taken in 1973 and 1974 revealed anchovy in the Terry Creek area having an average toxaphene concentration of 2 ppm; whereas shrimp samples from the same time period showed less than 2 ppm. The toxaphene concentration in white shrimp in Terry Creek was usually around 10 ppm or below in the 1970s. Oysters taken from Terry Creek between 1967 and 1970 contained approximately 13 ppm toxaphene. In 1971 oysters in the Back River at Torras Causeway contained an average of approximately 2.6 ppm toxaphene but, in 1972 the concentration dropped to 1.3 ppm."

- "Recent data (1990s): The focus of recent data has been on finfish and shellfish, but no data are available for recent toxaphene levels in oysters. Presently, oysters are not harvestable/edible near the Terry Creek site because of bacteria and the lack of information resulting from their omission from the sample collections. Oysters, clams, and mussels are not harvestable and are under a shellfish ban as established by the National Shellfish Sanitation Program. This ban extends to area sounds such as St. Simons Sound."

"In October 1995, Hercules conducted an assessment to determine if toxaphene discharges were affecting the edibility of fish and crabs in Terry and Dupree Creeks, adjacent to their facility. Composite tissue samples were collected at one station for spotted sea trout and four stations for blue crab. Toxaphene was not detected in fish fillets or crab meat of any of these samples. The detection limit was 50 ppb for blue crab and 250 ppb for spotted sea trout; US EPA guideline is a 100 ppb screening level for no further action."

"US EPA and the Georgia Environmental Protection Division (GA EPD) collected seafood samples from Terry and Dupree Creeks in February and March 1997 as part of the environmental sampling effort to support a clean-up decision. There was some indication that organic constituents similar to those found in toxaphene were detected in fish. This offers a presumptive indication of the presence of toxaphene, but is not sufficient proof of its presence. The estimated concentrations of potential toxaphene constituents ranged from 1.9 to 27 ppm in forage fish tissue samples (primarily a nonedible fish) and 1.6 to 3.9 ppm in consumer fish samples. No substantial signs of metals were detected in fish. Values for potential toxaphene constituents were highest in fish at the Hercules effluent channel. Analyses of blue crab tissue (meat) indicated no substantial signs of organic or metals contamination."

"In April 1997, the GA EPD collected 59 composites of seafood (38 finfish such as mullet, sea trout, drum and 21 shellfish, crab and shrimp) from four areas in Terry/Dupree Creeks. They analyzed for metals, mercury, PCBS, and toxaphene. GA EPD stated that toxaphene was not detected and qualitatively described the toxaphene concentrations as below various detection limits ranging from 0.1 to 1.0 ppm. No quantitative estimates of the total toxaphene levels were made. Approximately 70 % of the fish composites in the April 1997 data set contained PCB 1268 in low concentrations (0.04 to 0.18 ppm). PCBs were not detected in shellfish (crabs and shrimps), but oysters were not sampled. Approximately 30% of the fish samples contained mercury ranging from 0.11 to 0.31 ppm. Arsenic in shellfish was about 3 to 5 ppm. The State has requested some speciation of the arsenic to determine if a toxic form is present."

"In February 1998, ATSDR requested expert assistance in estimating the total toxaphene concentrations in

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recent seafood samples (April 1997 data). In addition to the complex composition of technical grade toxaphene, the toxaphene compositions in fish differ from that of the reference standards. The method used to calculate total toxaphene from chromatograms also affects the estimated concentrations. ATSDR will continue to evaluate toxaphene monitoring data as it becomes available, hopefully with more advanced methodology."

"PUBLIC HEALTH IMPLICATIONS"

"Site-Related Contamination - Toxaphene: Toxaphene may reach area residents, especially subsistence fishermen, mainly through consumption of fish. Ingestion of contaminated surface soils and sediment is another way area residents may be exposed to toxaphene. Toxaphene can also enter the human body through skin contact."

"Historically, oysters containing up to 54 ppm of toxaphene have been reported, but the toxaphene levels were reduced to 1.3 ppm in 1972. Current toxaphene concentrations in oysters are unavailable but oysters are not harvested in this coastal area because of other sanitation problems. Killifishes, which are resident forage fishes, accumulated 50 ppm of toxaphene in the past and currently report up to 27 ppm. Migratory food fish revealed up to 35.6 ppm in past years, but few current quantitative estimations of toxaphene concentrations in food fish are available for this site. The current on-site concentrations are 3.9 ppm or less, based on semi-quantitative estimation on a limited number (four) of fish samples."

"The dose of toxaphene to a fisherman (weighing on average 70-kg or approximately 154 pounds) who eats 30 grams of fish (one meal a week or an average of about one ounce per day) is estimated to be 0.002 milligram per kilogram per day (mg/kg/day), assuming the fish fillet contained 3.9 ppm of toxaphene. However, this estimated dose could be 10 times higher if historical data are taken into account for the dose estimation. This fisherman is also expected to receive an estimated dose of 0.0003 mg/kg/day of toxaphene from surface soil if he ingests 100 mg of soil containing about 240 ppm of total toxaphene."

"From the estimated toxaphene dose of 0.002 mg/kg/day from soil and fish, the 70-kg fisherman is expected to receive a moderate increased risk of cancer (about 2 in 1,000) if he is exposed to this dose level for a lifetime. The estimated risk serves as a guide for risk management and it does not mean that cancer will occur because of many uncertainties, among them are:"

- "The compositions of the weathered toxaphene in fish differs from that in the technical-grade toxaphene, and the toxaphene adsorbed on soil may have different bioavailability than technical grade toxaphene."
- "The actual suite of toxaphene components in fish has not been tested yet for its toxicity in laboratory animals."
- "Almost all estimates of toxaphene are semiquantitative because very few reference standards are readily available to determine the relative response of individual congeners or to match the profiles detected in fish."
- "The estimated concentrations of toxaphene in fish varied with the procedure of calculation. The kinds of reference standards and the peaks selected to represent toxaphene affect the estimated concentrations of total toxaphene."

"CONCLUSIONS"

"The concentration of toxaphene in environmental samples, such as sediment and fish, has decreased

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dramatically since 1972 when toxaphene in effluent from the Hercules manufacturing plant was restricted. Generally, toxaphene in seafood has decreased from tens of ppm or below to less than 5 ppm (based on available data on estimated concentrations in some types of seafood)."

"The most likely pathway for human exposure at the Terry Creek Dredge Spoil Areas/Hercules Outfall site is through seafood. Consumption of contaminated seafood is a concern expressed by residents consuming fish caught in, or near, the Dupree and Terry Creek areas. More information on quantitative estimations of recent toxaphene residues in seafood from the Terry Creek area is needed as well as more information on the toxicologic meaning of such data. Based on these data gaps, ATSDR categorizes this site as an > indeterminate public health hazard <. There is limited potential for human exposure at levels that would be of health concern in the other pathways such as soil, sediment, produce from gardens, or water."

"RECOMMENDATIONS"

- "Based on data gaps such as uncertainty in the level of toxaphene in fish, ATSDR recommends limiting exposure to contaminated seafood from Dupree and Terry Creeks. It is further recommended that the Georgia Environmental Protection Division (GA EPD) continue evaluation of seafood consumption and determine whether or not further limits or restrictions are warranted. People eating fish from nearby areas can lower their risk of ingesting toxaphene and organics such as PCBs by removing fatty tissue before cooking as well as by eating small (younger) fish."
- "Due to interferences in the fish samples and the uncertainty they cause in the toxaphene estimates, the evaluation of toxaphene in fish (analytical methods and standards) should also be reevaluated. More sensitive and specific methods such as electron capture negative ion mass spectrometry (GC-ECNIMS) is recommended."
- "Additional seafood sampling is needed to help assure residents that fish caught in areas near the site are safe. In addition to further seafood samples from Terry and Dupree Creeks, additional sampling in the Back River, upstream of its confluence with Terry Creek (near Riverside Development) is recommended. The following contaminants should be analyzed in seafood: toxaphene; heavy metals, including mercury; and PCBs."
- "EPA should determine the extent and degree of sediment and soil contamination in, and near, Dupree and Terry Creeks, including the Back River and the stretch of Terry Creek leading to the Overlook Park area (also referred to as Lanier and Back Landing)."

REMEDIAL ACTION IMPLEMENTED

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Physical Target:	Sediment in targeted areas contaminated with toxaphene.	
Goals:	Removal 90% by mass of toxaphene from the targeted areas.	
Primary Contractor:	Heritage Environmental Services, LLC	
Other Contractors:	GeoSyntec (Hercules oversight); Columbia Technologies (mobile lab); Savannah Laboratories (off-site water turbidity and toxaphene analysis)	
Generic Remediation Method:	Wet excavation; mechanical dredging	
Equipment:	<p>As described in the close-out report (Reference A-790):</p> <p>“Equipment utilized for the removal action consisted primarily of a barge-mounted crane outfitted with several clamshell buckets, long reach excavators and hopper barges . . . The contractor utilized two long reach hydraulic excavators (i.e., Link-Belt 3400 LS, and Hyundai 290 LRC) to excavate sediment from the Outfall Ditch, transfer material to the temporary containment areas (drain beds), and manage material within the drain beds.”</p> <p>“An American 150-ton crane mounted on a 40 ft. x 120 ft. barge was utilized for the majority of the removal action excavation. Several types and sizes of clamshell buckets were utilized for excavation of impacted sediment. A conventional clamshell bucket was utilized for the majority of the Post-Weir excavation and approximately half of the Outfall Mouth Area excavation. The conventional bucket was utilized in areas where debris (i.e., logs) was encountered and elsewhere where the contractor expressed concern regarding the functionality and adequacy of the environmental clamshell bucket. Two different Cable Arm environmental clamshell buckets were utilized during excavation activities. A Cable Arm environmental bucket with a 7 ft. x 12 ft. footprint was utilized for excavation within the east end of the Pre-Weir Area and within sections of the Post-Weir and Outfall Mouth Areas. A second Cable Arm environmental clamshell bucket with a 9 ft. x 12 ft. footprint was used exclusively within the six Creek Zone removal areas.”</p> <p>“Two 30 ft. x 100 ft. hopper barges capable of holding approximately 200 cubic yards of material were utilized for temporary storage and as a means of transporting the excavated material from the Post-Weir, Outfall Mouth and Creek Zone excavation areas to the unloading area located on the south bank of the Post-Weir Area.”</p> <p>“Several hydraulic excavators, front end loaders, dozers, trenching equipment, and an off-road dump truck were utilized over the course of the project for the construction of the drain beds, clearing brush, grading areas, unloading trucks, installing silt fence and transferring excavated material between the drain beds.”</p> <p>For the Outfall Mouth Area “a steel sheet pile dike was installed around the perimeter of the Outfall Mouth removal area to minimize run-in of adjacent creek sediment due to the required 5 ft. excavation and to aid in controlling migration of sediment outside of the removal area during excavation. The steel sheet piles were driven into the sediment utilizing a hydraulic vibratory hammer attached to the 150-ton crane. The steel sheet piles consisted of 25 and 50 ft. long PZ27 sheets. The 50 ft. piles were used as soldier piles with the shorter sheets driven between them. Gaps were left between sections of the dike to allow water to flow through the area.”</p>	
Material Handling:	Long-reach excavators deposited sediments from the Outfall Ditch directly to drain beds located adjacent to the Outfall Ditch; the crane equipped with the Cable Arm clamshell bucket placed the removed sediment into 200 cy hopper barges for transport to the Hercules loading dock (near Creek	

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	Zone 3), where the sediment was offloaded to dump trucks using long-stick excavators and transported to the drain beds. Sediments were retained on the drain beds for about 6 months to allow gravity dewatering and further drying.	
Volume Removed:	In an initial phase of removal in 1998, about 5,000 cy was mechanically excavated and disposed offsite - - by removing a uniform 3 feet across the entire Pre-Weir Area. The total volume of sediment removed for the project described herein was 35,148 cy. Removal volumes by area were as follows: Pre-Weir Area: 7,445 cy Post-Weir Area: 9,384 cy Outfall Mouth: 10,111 cy Six Creek Zones: 8,208 cy	
Calendar Time:	Wet excavation in the first area, the Pre-Weir Area, began August 11, 1999; all removal activities were completed on April 12, 2000.	
Time To Implement:	8 months (working 5 days/week; 10 hours/day)	
Total Cost:	\$3 million (\$85/cy)	
Dredging Cost:		
Disposal of Sediment:	The excavated material met requirements for disposal at a Subtitle D landfill, based on 22 samples analyzed for toxaphene and TCLP toxaphene; accordingly, the 35,148 cy (28,000 tons) were disposed at Superior Landfill in Savannah, GA.	
Volume of Water:	No monitoring was performed to determine water volumes. Water draining from sediment in the drain beds was allowed to discharge directly back to the Outfall Ditch after filtering.	
Method of Water Treatment:	Water from the drain beds was passed through silt fencing and a sand trench to filter solids; the water then passed to a collection drain that eventually discharged the water back to the Outfall Ditch Post-Weir Area. The discharge was periodically sampled and tested to monitor for toxaphene levels (all results were BDL).	
Water Discharge Limit:	None established	
Air Monitoring During Remediation:	Air monitoring was conducted for VOCs and particulates around the immediate work areas and along the Terry Creek site property boundaries. As described in Appendix F of the close-out report (Reference A-790): "Ambient air monitoring for VOCs and total particulates was performed at the Terry Creek site twice a day at each sampling station, in the morning after setting up the ambient air sampling pumps and in the afternoon before the collection of the ambient air samples at the end of the 8-hour sampling period. Ambient air monitoring was minimized to periodic checks after the initial results indicated that there were no VOC detected and total particulate concentrations were below the recommended action level of 150 micrograms per cubic meter (ug/m3)." "There were no VOCs detected during the excavation of the toxaphene-contaminated sediments or during drying, turning, stacking, and offsite disposal of the excavated sediments . . . Total dust particulates monitoring was performed at the same time and locations as VOC monitoring. Background total dust particulate concentrations ranged from 15 to 30 ug/m3. There were no significant dust emissions generated above the recommended action level of 150 ug/m3 during excavation, drying, turning, and stacking of the creek sediments. The total dust particulate recommended action level was exceeded several times during loading of the trucks used for offsite	

REMEDIAL ACTION IMPLEMENTED

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disposal of the dried sediments.”

Water Monitoring During Remediation: Monitoring consisted of collecting aliquots of water every 20 minutes from immediately outside the downstream sections of the silt curtains and having the samples analyzed for turbidity at an offsite laboratory; reportedly, no increased levels of turbidity were detected outside of the silt curtains. An increase in turbidity would have required additional water sampling at three downstream monitoring stations.

Outcome: A total volume of 35,148 cy of toxaphene-contaminated sediments were removed from nine targeted areas in an outfall ditch, North Dupree Creek, and Terry Creek and disposed at an offsite commercial Subtitle D landfill. As described in the close-out report (Reference A-790): “Post excavation samples were collected from the bottom of the sediment removal areas, once the excavation was completed to the required depths. Two different types of samples were collected, i.e., construction and post excavation samples. Construction samples were post excavation samples collected from the removal areas once excavation to target depths was achieved. Construction samples were analyzed for toxaphene at the onsite laboratory, which was capable of providing analytical results, generally within 24 hours of receipt of sample. A split sample was collected for each construction sample collected. The construction sample analytical results were reviewed and the potential need for additional excavation was evaluated by Hercules and USEPA during the dredging operations based on historical data and the construction sample data. When the onsite laboratory result was non-detect or low in concentration, the split sample was sent to the offsite contract laboratory (EnChem) for toxaphene analysis. The presence of elevated toxaphene concentrations in construction samples generally resulted in additional excavation. If additional excavation was required to remove an unacceptable construction sample, the split sample was discarded.”

“Post excavation sediment samples were either collected from a boat temporarily anchored over the proposed sampling location, or from the bank with the aide of a long reach excavator. Sediment sampling was normally performed at low tide to minimize the length of the core sampler or auger rods needed.”

Final toxaphene residual concentrations in sediment were defined by 209 post-excavation confirmation samples. The 22 confirmation samples from the Creek Zones 1-3 and the Outfall Ditch mouth area exhibited a median toxaphene concentration of 2.5 ppm and a maximum of 110 ppm; the 20 confirmation samples from Creek Zones 4-6 exhibited a median toxaphene concentration of 3.2 ppm and a maximum of 11 ppm; the 96 confirmation samples from the Post-Weir Area exhibited a median toxaphene concentration of 5.6 ppm and a maximum of 2,700 ppm; and the 71 confirmation samples from the Pre-Weir Area exhibited a median toxaphene concentration of 23 ppm and a maximum of 1,100 ppm.

Restoration and Post-Monitoring: Restoration consisted of restoring impacted banks to the high water mark. Post-monitoring of the dredged areas or impacted waterways is not planned at this time; the issue of post-monitoring will most likely be addressed as part of the RI for the Terry Creek Dredge Spoils Area.

Site-Specific Difficulties:

- Large tidal swings (7.5 feet average) limited barge movement once loaded with sediment. This substantially impacted the project schedule.
- Previously undetected logs were encountered in the Pre-Weir Area and in Creek Zone 1 (North Dupree Creek area) that slowed sediment removal operations.
- As described in the close-out report (Reference A-790):
 - “The 150-ton crane positioned on a 40 by 120 ft. barge with the Cable Arm environmental clamshell bucket was initially utilized to excavate impacted sediment within the proposed 5 ft. deep

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Project Name: **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)** **ProjectID:** 04-09
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removal area. The contractor encountered difficulties with excavation near the weir due to the presence of debris (i.e., logs). A conventional clamshell bucket was utilized in this area and in other areas of the Post-Weir Area where the contractor expressed concern that the Cable Arm bucket would not adequately excavate the sediment. A long reach hydraulic excavator supported by wooden crane mats was utilized to excavate the proposed 1 ft. vegetated removal area along the banks of the Post-Weir Area. The 1 ft. cut material on the southern bank of the Post-Weir Area was placed directly into the Post-Weir drain bed. The material along the northern bank was excavated using a long reach excavator and placed in small stockpiles. The 150-ton crane with Cable Arm clamshell bucket was also utilized for this excavation and to pick up the stockpiles of excavated material and place the material in a hopper barge for transfer into the Post-Weir drain bed.”

- “Debris (logs) was encountered within the approximate center of the Creek Zone area and extended towards the western limit. Confirming the depth of excavation proved to be cumbersome due to the existing elevations of the sediment and draft requirements of the barges. At periods of low water, sufficient water was not present to float the barges, allowing them to rest directly on the creek bottom. The weight of the barges would compress and displace the sediment, resulting in a skewed sediment profile, which inaccurately represented the actual depth of material excavated. A real time method of confirming the depth of excavation was needed to prevent additional delays and cost overruns. Per agreement between USEPA and Hercules, a rope grid system and graduated story pole were utilized to determine the elevation of sediment prior to and after excavation.”

Monitoring Data

References:

- **Sediment**
- **Water:**
- **Fish:**

POTENTIALLY RESPONSIBLE PARTIES

Project Name TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)

ProjectID: 04-09

PRP Name: PRP INFORMATION NOT RELEASED

PRPID:

Street Address:

City:

State:

KEY CONTACTS

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Last Name: KEY CONTACT INFORMATION NOT RELEASED

Contact ID:

First Name:

Title:

Company:

Address:

City:

State:

Postal Code:

Work Phone # :

Other Phone #:

Fax # :

Email Address:

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: A

ReferenceID: 520

Title: **Administrative Order on Consent for Removal Action**

Location: AEM

Category: Legal

Prepared by/Author: US EPA Region IV

**Preparer/Author
Address:**

Prepared For: Hercules, Inc.

Date Published: December 12, 1997

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 521

Title: **Administrative Order on Consent for Removal Action Amendment**

Location: AEM

Category: Legal

Prepared by/Author: US EPA Region IV

**Preparer/Author
Address:**

Prepared For: Hercules, Inc.

Date Published: November 17, 1998

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 522

Title: **Final Expanded Site Inspection - Hercules Terry Creek Dredge
Spoil Area, Brunswick, Glynn County, Georgia EPA ID No. GAD
982112658**

Location: AEM

Category: Contaminated Sediments: Investigation/Delineation

Prepared by/Author: Black & Veatch Special Projects Corp.

**Preparer/Author
Address:** Atlanta, GA

Prepared For: US EPA Waste Management Division, Region IV

Date Published: January 15, 1997

**Key Words and
Phrases:**

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: A

ReferenceID: 523

Title: ***Amendment No. 1 to Consent Order No. EPD-WQ-3129 - Hercules, Inc.***

Location: AEM

Category: Legal

Prepared by/Author: Georgia Department of Natural Resources

Preparer/Author Address: 205 Butler Street, SE, Suite 1152 East Floyd Towers
Atlanta, Georgia 30334

Prepared For:

Date Published: January 27, 1997

Key Words and Phrases:

Reference Type: A

ReferenceID: 524

Title: ***Removal Action Plan in the Outfall Ditch, North Dupree Creek, and Confluence Area of Dupree and Terry Creek - Terry Creek Site, Brunswick, Georgia***

Location: AEM

Category: Remedial Action Plan/Work Plan

Prepared by/Author: GeoSyntec Consultants

Preparer/Author Address: 1100 Lake Hearn Drive, NE, Suite 200
Atlanta, Georgia 30342

Prepared For: Hercules Incorporated, Hercules Plaza, 1313 North Market Street, Wilmington, Delaware 19894-0001

Date Published: October 1999

Key Words and Phrases:

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: A

ReferenceID: 525

Title: ***Technical Memorandum - Summary of Toxaphene-Turbidity Correlation in Surface Water Samples - Hercules Terry Creek Site, Brunswick, Georgia***

Location: AEM

Category: Resuspension

Prepared by/Author: GeoSyntec Consultants

Preparer/Author Address: 1100 Lake Hearn Drive, NE, Suite 200
Atlanta, Georgia 30342

Prepared For: Hercules Incorporated, Hercules Plaza, 1313 North Market Street, Wilmington, Delaware 19894-0001

Date Published: December 1998

Key Words and Phrases:

Reference Type: A

ReferenceID: 526

Title: ***Consent Order No. EPD -WQ - 3129 - Hercules Incorporated***

Location: AEM

Category: Legal

Prepared by/Author: Georgia Department of Natural Resources

Preparer/Author Address: 205 Butler Street; SE, Suite 1152 East Floyd Tower
Atlanta, Georgia

Prepared For:

Date Published: May 24, 1995

Key Words and Phrases:

Reference Type: A

ReferenceID: 560

Title: ***Terry Creek Ecological Screening Evaluation, Brunswick, Georgia***

Location: AEM

Category: Contaminated Sediments: Investigation/Delineation

Prepared by/Author: US EPA SESD-Athens

Preparer/Author Address: Science and Ecosystem Support Division
Ecological Assessment Branch
Athens, GA

Prepared For: General Public

Date Published: July 1997

Key Words and Phrases:

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: A

ReferenceID: 609

Title: ***Study Plan for the Analyses of Seafood from Terry and Dupree Creeks, Brunswick, Georgia***

Location: AEM

Category: Monitoring Plan/Report

Prepared by/Author: Georgia DNR

Preparer/Author Address: Environmental Protection Division
Floyd Towers East
205 Butler Street, S.W.
Atlanta, GA 30334

Prepared For:

Date Published: February 1997

Key Words and Phrases:

Reference Type: A

ReferenceID: 790

Title: ***Close-Out Report: Sediment Removal Action - Volumes I and II***

Location: AEM

Category: Close-Out Report

Prepared by/Author: GeoSyntec Consultants

Preparer/Author Address: 1100 Lake Hearn Drive, NE, Suite 200
Atlanta, GA 30342

Prepared For: Hercules, Inc.
Hercules Plaza
1313 North Market Street
Wilmington, DE 19894

Date Published: June 2001

Key Words and Phrases:

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: B

ReferenceID: 308

Title: ***Letter re: Terry Creek Dredge Spoil Site, Brunswick, GA:
Sediment Removal - Notice of Award and Project Schedule***

Location: AEM

Category: Site Update

Prepared by/Author: Timothy D. Hassett

**Preparer/Author
Address:** Hercules, Inc.

Prepared For: Leo F. Francendese, US EPA Region IV

Date Published: June 18, 1999

**Key Words and
Phrases:**

Reference Type: B

ReferenceID: 309

Title: ***Terry Creek Dredge Spoil Site - Brunswick, GA Final Remedial
Action - Project Status Reports***

Location: AEM

Category: Site Update

Prepared by/Author: Hercules, Inc.

**Preparer/Author
Address:** Hercules Plaza, 1313 North Market Street
Wilmington, DE 19894-0001

Prepared For: US EPA Region IV

Date Published: August 1, 1998 to August 31, 1998

**Key Words and
Phrases:**

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: B

ReferenceID: 310

Title: ***Comments Received by US EPA Region 4 RE: 1) Removal Work Plan for Ecological Evaluation of Marine Environment and 2) Terrestrial Evaluation for Removal Action at Terry Creek Site in Brunswick, Georgia***

Location: AEM

Category: Fish/Biota

Prepared by/Author: (1) U.S. Army Corps of Engineers, (2) Greg R. Masson, (3) Tom Dillion, (4) Alan G. Auwarter, (5) M. H. Woodside, (6) Carol J. Monell, (7) Leo Francendese

Preparer/Author Address: (1) Savannah District
(2) U.S. Department of Interior
U.S. Fish and Wildlife Service
Georgia Ecological Services
(3) U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Office of Response and Restoration
Coastal Protection and Restoration Division
(4) US EPA Region IV
Science and Ecosystem Support Division
(5) Brunswick/Golden Isles Chamber of Commerce
(6) US EPA Region IV
Removal Management Section
100 Alabama Street, S.W.
Atlanta, GA 30304-3104
(7) US EPA Region IV
WMD/ERRB
Atlanta Federal Center
61 Forsyth Street, N.E.
Atlanta, GA 30303

Prepared For: US EPA Region IV

Date Published: April - May 1999

Key Words and Phrases:

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: B

ReferenceID: 311

Title: **Health & Safety Plan (Terry Creek Site) (Brunswick, GA)**

Location: AEM

Category: Miscellaneous

Prepared by/Author: Heritage Environmental Services, LLC

Preparer/Author Address: 7821 West Morris Street
Indianapolis, IN 46231

Prepared For: Hercules, Inc.

Date Published: August 3, 1999

Key Words and Phrases:

Reference Type: B

ReferenceID: 312

Title: **NPL Site Narrative - Terry Creek Dredge Spoil Areas/Hercules Outfall**

Location: AEM

Category: Site Update

Prepared by/Author: US EPA Region IV

Preparer/Author Address:

Prepared For: General Public

Date Published: April 1, 1997

Key Words and Phrases:

Reference Type: B

ReferenceID: 313

Title: **Terry Creek Dredge Spoil Area / Hercules Outfall Site, Brunswick, GA POLREP #9, September 27 - October 3, 1999**

Location: AEM

Category: Site Update

Prepared by/Author: US EPA Region IV

Preparer/Author Address:

Prepared For: General Public

Date Published: October 13, 1999

Key Words and Phrases:

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: B

ReferenceID: 433

Title: ***Request for Bid, Revision 0 - Sediment Removal Action, Hercules Terry Creek Site, Brunswick, GA***

Location: AEM

Category: Bid Package

Prepared by/Author: GeoSyntec Consultants

Preparer/Author Address: 1100 Lake Hearn Drive, NE, Suite 200
Atlanta, GA 30342

Prepared For: Hercules Incorporated, Hercules Plaza, 1313 North Market Street, Wilmington, DE 19894

Date Published: April 1999

Key Words and Phrases:

Reference Type: B

ReferenceID: 441

Title: ***Terry Creek Dredge Spoil Areas / Hercules Outfall Site, Brunswick, Glynn County, Georgia - POLREP No. 1***

Location: AEM

Category: Site Update

Prepared by/Author: Leo Francendese and Paul Peronard

Preparer/Author Address:

Prepared For: US EPA, Region IV

Date Published: December 22, 1997

Key Words and Phrases:

Reference Type: B

ReferenceID: 442

Title: ***Terry Creek Dredge Spoil Areas / Hercules Outfall Site, Brunswick, Glynn County, Georgia - POLREP No. 2***

Location: AEM

Category: Site Update

Prepared by/Author: Leo Francendese

Preparer/Author Address:

Prepared For: US EPA, Region IV

Date Published: April 16, 1998

Key Words and Phrases:

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: B

ReferenceID: 444

Title: ***Memo re: Surface Water Pathway Concerns for Terry Creek
Dredge Spoil Site in Brunswick, Glynn County, Georgia***

Location: AEM

Category: Contaminated Sediments: Investigation/Delineation

Prepared by/Author: John A. McKeown

**Preparer/Author
Address:** US EPA Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365

Prepared For: File

Date Published: May 8, 1996

**Key Words and
Phrases:**

Reference Type: C

ReferenceID: 605

Title: ***Complex Terry Creek RI/FS Bogs Down; EPA Predicts Two
Years to Complete***

Location: AEM

Category: Site Update

Prepared by/Author:

**Preparer/Author
Address:**

Prepared For: Superfund Week

Date Published: October 6, 2000

**Key Words and
Phrases:**

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: E

ReferenceID: 234

Title: ***The Cable Arm Clamshell: Development and Track Record for Environmental Dredging***

Location: AEM

Category: Dredging: Remedial (Contaminated Sediments)

Prepared by/Author: (1) R.E. Bergeron, (2) B.S. Cushing, (3) M.K. Hammaker

Preparer/Author Address: (1) Cable Arm, Inc.
Trenton, MI 48183
(2), (3) Applied Environmental Management
Malvern, PA 19355

Prepared For: WEDA XX Conference, Warwick, RI

Date Published: June 25-28, 2000

Key Words and Phrases:

Reference Type: G

ReferenceID: 57

Title: ***Selecting the best risk management option: A natural resource trustee perspective (for complete presentation see Reference G-41)***

Location: AEM

Category: Contaminated Sediments: Management Issues

Prepared by/Author: (1) Mary Baker Matta, (2) Don MacDonald, (3) Ron Gouguet, (4) Ken Finkelstein

Preparer/Author Address: (1), (2), (3), (4) NOAA
office of Response and Restoration

Prepared For: EPA Forum on Managing Contaminated Sediments at Hazardous Waste Sites

Date Published: May 30 - June 1, 2001

Key Words and Phrases:

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: L

ReferenceID: 140

Title: **Maximum Baseline Cancer Risks for Contaminated Sediment Sites**

Location: AEM

Category: Risk Assessment

Prepared by/Author: AEM, Inc.

**Preparer/Author
Address:**

Prepared For: Distribution

Date Published: October 22, 2001

**Key Words and
Phrases:**

Reference Type: M

ReferenceID: 200

Title: **Initial Release Public Health Assessment for Terry Creek Dredge Spoil Area, Brunswick, Glynn County, Georgia; CERCLIS No. GAD 982112658**

Location: AEM

Category: Risk Assessment

Prepared by/Author: Superfund Site Assessment Branch

**Preparer/Author
Address:** Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

Prepared For: US EPA

Date Published: March 31, 1998

**Key Words and
Phrases:**

Reference Type: M

ReferenceID: 201

Title: **Terrestrial Evaluation for Removal Action at Terry Creek Site in Brunswick, Georgia**

Location: AEM

Category: Fish/Biota

Prepared by/Author: CDR Environmental Specialists, Inc.

**Preparer/Author
Address:** 171 Cays Drive
Port of the Islands
Naples, Florida 34114

Prepared For: GeoSyntec Consultants, 1100 Lake Hearn Drive, NE, Suite 2007 Atlanta, Georgia 30342

Date Published: February 3, 1999

**Key Words and
Phrases:**

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: M

ReferenceID: 202

Title: ***Removal Work Plan for Ecological Evaluation -Marine Environment - Terry Creek site, Brunswick, Georgia***

Location: AEM

Category: Fish/Biota

Prepared by/Author: GeoSyntec Consultants

Preparer/Author Address: 1100 Lake Hearn Drive, NE, Suite 200
Atlanta, Georgia 30342

Prepared For: Hercules, Inc.

Date Published: March 1999

Key Words and Phrases:

Reference Type: M

ReferenceID: 428

Title: ***Public Health Assessment for Terry Creek Dredge Spoil Areas/Hercules Outfall Site Brunswick, Glynn County, Georgia; EPA Facility ID: GAD982112658 (Final Release)***

Location: AEM

Category: Risk Assessment

Prepared by/Author: Superfund Site Assessment Branch

Preparer/Author Address: Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

Prepared For: US EPA

Date Published: August 12, 2002

Key Words and Phrases:

Reference Type: O

ReferenceID: 13

Title: ***Heritage Environmental Services, LLC***

Location: AEM

Category: Miscellaneous

Prepared by/Author: Jamie Anderson

Preparer/Author Address:

Prepared For:

Date Published: 1999 circa

Key Words and Phrases:

REFERENCES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Reference Type: P

ReferenceID: 15

Title: **Laboratory Report - Terry Creek**

Location: AEM

Category: Analytical Data

Prepared by/Author: Georgia Department of Natural Resources, Environmental Protection Division

Preparer/Author Address: 455 14th Street NW
Atlanta, GA 30318-7900

Prepared For:

Date Published: January 1998

Key Words and Phrases:

Reference Type: P

ReferenceID: 25

Title: **None: Table of Confirmation Sample Results from Reference A-790, Sorted by Area**

Location: AEM

Category: Close-Out Report

Prepared by/Author: AEM, Inc.

Preparer/Author Address:

Prepared For: Internal file

Date Published: April 9, 2002

Key Words and Phrases:

FISH ADVISORIES

Project Name **TERRY CREEK - PROJECT 1 (Creek Hot Spots/Outfall Ditch)**

ProjectID: 04-09

Advisory: Terry and Dupree Creeks

AdvisoryID: 789

Extent: All of Dupree and Terry Creeks north of Torras Causeway to ½ mile west of confluence with the Back River

Pollutant: toxaphene

Species: all fish

Population: NCGP

Population Definition: No Consumption-General Population: Advise against consumption by the general population.

Advisory Type: River

Advisory Number: 4945

Status (Active or Rescinded): Active

Date Rescinded:

Contact Name: Dr. Randall O. Manning

Contact Number: 706-369-6376
