INTERIM RECORD OF DECISION

TERRY CREEK DREDGE SPOIL AREAS/HERCULES OUTFALL

EPA ID: GAD982112658
OPERABLE UNIT 1 (OU1) – OUTFALL DITCH

BRUNSWICK, GLYNN COUNTY, GEORGIA

Prepared By:
U.S. Environmental Protection Agency
Region 4
Atlanta, Georgia

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ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order by Consent
ARAR	applicable or relevant and appropriate requirement
BERA	Baseline Ecological Risk Assessment
BMP	best management practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
cfs	cubic feet per second
COC	chemical(s) of concern
COPEC	chemical(s) of potential ecological concern
COPC	chemical(s) of potential concern
CSM	conceptual site model
EPA	United States Environmental Protection Agency
EPC	exposure point concentration(s)
EPD	Georgia Department of Natural Resources, Environmental Protection Division
ERA	ecological risk assessment
ESD	Explanation of Significant Differences
ESV	Ecological Screening Value(s)
FS	feasibility study
ft	feet
ft/s	feet per second
GAC	granular activated carbon
HHRA	human health risk assessment
HHSL	human health screening level
HI	hazard index
HQ	hazard quotient
IC	institutional control(s)
lb/ft^2	pound per square foot
IROD	Interim Record of Decision
MCL	maximum contaminant level
MDL	method detection limit
MGD	million gallons per day
mg/kg	milligrams per kilogram
NCP	National Contingency Plan
NFA	no further action
NOAA	National Oceanographic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	operation and maintenance
OCGA	Official Code of Georgia Annotated
OCP	organochlorine pesticide(s)
OU	operable unit
PAH	polynuclear aromatic hydrocarbon(s)

ACRONYMS AND ABBREVIATIONS (continued)

PCB	polychlorinated biphenyl(s)
POTW	publicly-owned treatment works
ppm	parts per million
ppt	parts per trillion
PRP	potentially responsible party
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
RL	reporting limit
ROD	Record of Decision
RSL	Regional Screening Level(s)
SAA	Superfund Alternative Approach
SARA	Superfund Amendments and Reauthorization Act of 1986
Site	Terry Creek Site
SLERA	Screening Level Ecological Risk Assessment
SMDP	scientific management decision point
SVOC	semi-volatile organic compounds
SWMU	solid waste management unit
TOC	total organic carbon
TMDL	total maximum daily load
TSS	total suspended solids
µg/L	microgram per liter
USACE	U. S. Army Corps of Engineers
VOC	volatile organic compound(s)

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PART 1: DECLARATION

1.0 Site Name and Location

The Terry Creek Dredge Spoil Areas/Hercules Outfall Site (Site) is located in Brunswick, Glynn County, Georgia. The EPA identification number as recorded in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) database is GAD982112658. The Site was proposed to the National Priorities List (NPL) in 1997; however, the Site was never finalized on the NPL. The United States Environmental Protection Agency (EPA) plans to utilize the Superfund Alternative Approach (SAA) at the Site in cleanup settlement agreements with potentially responsible parties (PRPs) for remedial action work. The SAA is an alternative to listing a site on the NPL before securing a cleanup agreement at the site. The EPA may enter into cleanup agreements at sites not on the NPL if there is a willing PRP, the site scores high enough to be listed on the NPL, and a remedial action is required. The SAA uses the same process and standards for investigation, cleanup, and community involvement as sites on the NPL. Pursuant to the September 28, 2012 *Updated Superfund Response and Settlement Approach for Sites Using the Superfund Alternative Approach (SAA Guidance)* (OSWER Dir. No. 9200.2-125), SAA remedial action agreements with PRPs should include, but are not limited to, provisions for the PRP(s) to agree to 1. provide adequate performance guarantee instrument(s) that are sufficiently liquid for use in the event that the EPA must complete part or all of the remedial work, including operation and maintenance (O&M) costs; 2. not to challenge the listing of the site based on changed site conditions due to partial cleanup; 3. fund and sometimes administer, with oversight from the EPA, technical assistance to the local community; and 4. inclusion of language in the settlement agreement that actions for Natural Resource Damages (NRD) claims must be commenced within 3 years after completion of the remedial action. This interim decision pertains to Operable Unit (OU) 1 of the Site: Outfall Ditch, which is a discharge ditch that formerly conveyed untreated wastewater containing toxaphene from the former Hercules Brunswick pesticide plant to Dupree Creek.

2.0 Statement of Basis and Purpose

This decision document presents the selected interim remedy for OU1 of the Site, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 United States Code Section 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulation (CFR) Part 300, as amended.

This decision is based on the Administrative Record for OU1, which has been developed in accordance with Section 113(k) of CERCLA, 42 United State Code Section 9613(k). The Administrative Record file is available for review at the Brunswick/Glynn County Regional Library in Brunswick, Georgia and at the EPA Region 4 Records Center in Atlanta, Georgia. The State of Georgia, as represented by the Georgia Department of Natural Resources, Environmental Protection Division (EPD), concurs with the selected interim remedy.

3.0 Assessment of the Site

Actual or threatened releases of hazardous substances from OU1, if not addressed by implementing the interim response action selected in this Interim Record of Decision (IROD), may present an imminent and substantial endangerment to the public health, welfare, or the environment.

4.0 Description of the Selected Interim Remedy

The primary components of the selected interim remedy include:

- Re-routing the existing stormwater ditch into a newly constructed concrete-lined ditch.
- Excavation and offsite disposal of impacted sediment near Glynn Avenue to construct the new ditch.
- Removal of the existing weir across the Outfall Ditch.
- Placement of geo-textile fabric over existing sediment in the Outfall Ditch.
- Backfilling the Outfall Ditch with compacted clean soil over the fabric.
- Armoring the backfill slope at the confluence with Dupree Creek.
- Seeding and stabilization of disturbed areas.
- Periodic inspections, maintenance, and sediment removal in the newly constructed ditch.
- Development and implementation of a long term monitoring plan to ensure the effectiveness of the interim remedy.
- Implementation of institutional controls such as an environmental covenant prescribing land use and activity restrictions to prevent unauthorized disturbance of the soil cover and other interim remedy components.

5.0 Statutory Determinations

This interim action is protective of human health and the environment, complies with (or waives) Federal and State applicable or relevant and appropriate requirements for this limited-scope action, and is cost-effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize containment to reduce the mobility of contamination and thus is in furtherance of that statutory mandate. Principal threat wastes contained in sediment in the Outfall Ditch pertaining to technical toxaphene were removed in 1999 and 2000. This interim action utilizes containment to reduce the mobility of sediment contamination from the Outfall Ditch and eliminate exposure to sediment contamination in OU1. At the present time, a toxicity value for weathered toxaphene has not been developed by the EPA and therefore the EPA is selecting an interim remedy. When an EPA toxicity value for weathered toxaphene is developed, the EPA will assess the potential risks associated within the Outfall Ditch to determine if further actions are needed and thereafter select a final action for OU1. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action ROD, review of this site and of this remedy will be ongoing as EPA continues to develop final remedial alternatives for OU1.

The principal threat wastes pertaining to technical toxaphene at OU1 were removed in 1999-2000. Physical removal of sediment by dredging commenced on or about August 11, 1999 and finished on or about April 12, 2000. During that removal action, approximately 35,000 cubic yards of contaminated sediment were removed from the Outfall Ditch and portions of Dupree and Terry Creeks. The removal action resulted in an approximate 80%-85% reduction of contaminant mass of technical toxaphene. The Focused Remedial Investigation and Feasibility Study (RI/FS) for OU1 identified the primary driver of risk in OU1 to be concentrations of technical toxaphene remaining in the Outfall Ditch sediments and this remaining contamination is considered to be a low-level threat waste because the toxaphene in sediments is relatively immobile to leaching, has a low volatility, is relatively immobile, and poses only a low risk of exposure.

Unlike most organic environmental pollutants, toxaphene is not a single organic compound. As manufactured, the original toxaphene pesticide is a mixture of more than 200 closely related chlorinated organic compounds. This original toxaphene pesticide mixture is commonly known as "technical" toxaphene. Technical toxaphene consists mainly of polychlorinated bornanes with between six to nine chlorines attached. The term, congener, is used to refer to a single, structurally-unique constituent of the mixture. In other words, at least 200 individual toxaphene congeners make up the original toxaphene pesticide mixture. Individual congeners are often given their own names, such as Hx-Sed, Hp-Sed, p26, or p50. When the original toxaphene is released to the environment, it naturally breaks down or degrades. These breakdown products are a different mixture than the original toxaphene mixture, so it appears different to the testing instruments. EPA may refer to this as degraded toxaphene, weathered toxaphene, or breakdown products. There is no single absolute definition for weathered or degraded toxaphene. The terms weathered and degraded are used interchangeably to refer to toxaphene whose chromatographic pattern no longer matches analytical laboratory standards for technical toxaphene due to alterations by environmental processes. Unless otherwise specified in this IROD, references to toxaphene are intended to refer to the original technical toxaphene.

EPA has the ability to collect samples and analyze for both technical toxaphene and select long-lived congeners of weathered or degraded toxaphene. Upon receiving this data, EPA has toxicity values for technical toxaphene which are widely supported by scientific literature. At the present time, a toxicity value for weathered toxaphene has not been developed. EPA Region 4 is working with the EPA Superfund Technical Support Center under the National Center for Environmental Assessment (NCEA) to develop toxicity information for the breakdown products of toxaphene. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed.

6.0 Data Certification Checklist

The following information is included in the Decision Summary (Part 2) of this IROD, while additional information can be found in the Administrative Record file for OU1:

a. Contaminants of Potential Concern (COCs) and their respective concentrations (see Section 8.1.2 and Tables 2-4);

b. Baseline risk represented by the COCs (see Section 8.2.5 – Risk Management);

c. Cleanup levels established for the COCs and the basis for the goals (see Section 9.1 – Cleanup Levels);

d. How source materials constituting principal threats are addressed (see Sections 12.0 – Principal Threat Wastes and 14.5 – Preference for Treatment as a Principal Element);

e. Current and reasonably anticipated current and future land use assumptions used in the human health risk assessment and this IROD (see Section 7.0 – Current and Potential Future Land and Water Uses);

f. Potential land use that will be available at OU1 as a result of the selected interim remedy (see Sections 7.0 – Current and Potential Future Land and Water Uses, and 13.3 – Expected Outcome of the Selected Interim Remedy);

g. Estimated capital, lifetime operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the interim remedy cost estimates are projected (see Section 13.2 – Selected Interim Remedy Cost); and

h. Key factors that led to selecting the interim remedy (see Section 13.1 – Rationale for the Selected Interim Remedy).

7.0 Authorizing Signature

This IROD documents the selected interim remedy to address the contaminated sediment in OU1, the Outfall Ditch, at the Site. Additional remedial investigations, feasibility studies, and remedy decisions will be made under a separate action for OU2, the Dredge Spoils and Upland Soils, and OU3, Terry and Dupree Creeks. A final ROD for OU1 will be prepared at a later date. This interim remedy was selected by the EPA with the concurrence of EPD. The Director of the Superfund Division in EPA, Region 4 has been delegated the authority to approve and sign this IROD.

By: Franklin E. Hill Date: 6/19/2017

Franklin E. Hill, Director
Superfund Division

PART 2: DECISION SUMMARY

This Decision Summary provides a description of the specific factors and analyses that led to the selection of the interim remedy for Operable Unit 1 (OU1), the Outfall Ditch, at the Terry Creek Dredge Spoil Areas/Hercules Outfall Site (Site). It includes background information about OU1, the nature and extent of contamination found at OU1, the assessment of human health and environmental risks posed by the contaminants at OU1, the identification and evaluation of remedial action alternatives for OU1, and the selection of an interim remedy that will address risks posed by the sediment contamination at OU1.

This interim action is protective of human health and the environment, complies with (or waives) Federal and State applicable or relevant and appropriate requirements for this limited-scope action, and is cost-effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize containment to reduce the mobility of contamination and thus is in furtherance of that statutory mandate. Principal threat wastes contained in sediment in the Outfall Ditch pertaining to technical toxaphene were removed in 1999 and 2000. This interim action utilizes containment to reduce the mobility of sediment contamination from the Outfall Ditch and eliminate exposure to sediment contamination in OU1. At the present time, a toxicity value for weathered toxaphene has not been developed by the EPA and therefore the EPA is selecting an interim remedy. When an EPA toxicity value for weathered toxaphene is developed, the EPA will assess the potential risks associated within the Outfall Ditch to determine if further actions are needed and thereafter select a final action for OU1. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action ROD, review of this site and of this remedy will be ongoing as EPA continues to develop final remedial alternatives for OU1.

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The nature and extent of OU1 related contamination was characterized during a Focused RI/FS. As a result of previous investigations and the Focused RI/FS, EPA determined that sediment in OU1 is contaminated with toxaphene, arsenic, and total chromium. Technical toxaphene is the primary driver of unacceptable risk. At present, an EPA toxicity value does not exist for weathered toxaphene. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed. Thereafter, a final remedy decision for OU1 will be made. Additional remedial investigations and remedy decisions will be made under a separate action for OU2, the Dredge Spoils and Upland Soils, and OU3, Terry and Dupree Creeks.

1.0 Site Name, Location, and Description

The Terry Creek Dredge Spoil Areas/Hercules Outfall Site consists of a salt water tidal creek and marsh system located on the Atlantic coast directly east of the City of Brunswick in Glynn County, Georgia (**Figure 1**). The Site is located near the confluence of Terry Creek, Dupree Creek, and the Back River north of the Torras Causeway and east of U.S. Highway 17. The Site is comprised of the Outfall Ditch from the former Hercules Pesticide Plant (OU1), approximately 2.5 acres (located at approximately latitude 31.166083/longitude-81.472483), Operable Unit 2 (OU2) is comprised of multiple areas including portions of the former Hercules Pesticide Plant east of Highway 17 known as the Marsh Wood Storage Yard, approximately 25 acres, (located at approximately latitude 31.165193/longitude-81.473273), Main Dredge Spoil Area, approximately 72 acres, (located at approximately latitude 31.167132/longitude-81467574), Riverside Dredge Spoil Area, approximately 48 acres (latitude 31.170862/longitude -81.459265), and Carter's Island, approximately 3.5 acres (located at approximately latitude 31.165105/longitude -81.450373), and Terry and Dupree Creeks (OU3), approximately 65 acres.

Figure 2 and Figure 3 show the location of OU1 relative to the other OUs at the Site. **Figure 4** shows the approximate boundary of OU1. The Outfall Ditch was constructed as a conveyance system by Hercules Incorporated, now known as Hercules LLC (Hercules), and used until 1972 to discharge untreated wastewater containing toxaphene from its pesticide plant. After 1972, process wastewater was treated prior to discharge and toxaphene concentrations in the discharge significantly decreased. In the 1980s, the facility began to discharge the pretreated process wastewater to the Academy Creek Publicly-Owned Treatment Works (POTW). Currently, pretreated wastewater and stormwater runoff from the plant and surrounding neighborhoods are discharged under a National Pollutant Discharge Elimination System (NPDES) permit through the Outfall Ditch. An under/overflow weir, which was built in 1976 to prevent floating discharge, is located at the approximate mid-point of the Outfall Ditch and divides the Outfall Ditch into "pre-weir" and "post-weir" sections. The Outfall Ditch is approximately 900 feet (ft) long and ranges from 40 ft wide at the inlet to 150 ft wide at its confluence with Dupree Creek.

The EPA identification number for the Site as recorded in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) database is GAD982112658. The Site was proposed for the NPL in April 1997 based on observed concentrations of toxaphene in the ecosystem of Dupree Creek, Terry Creek, the Back River, and St. Simons Sound, which is a recreational fishery and habitat for several threatened and endangered species. However, the Site was not listed on the NPL. EPA plans to utilize the SAA at the Site in cleanup settlement agreements with PRPs for remedial action work. The SAA is an alternative to listing a site on the NPL before securing a cleanup agreement at the site. The EPA may enter into cleanup agreements at sites not on the NPL if there is a willing PRP, the site scores high enough to be listed on the NPL, and a remedial action is required. The SAA uses the same process and standards for investigation, cleanup, and community involvement as sites on the NPL.

Pursuant to an Administrative Order by Consent (AOC) for Remedial Investigation/Feasibility Study entered into by Hercules and the EPA on September 30, 1999, Hercules is conducting the RI/FS for each operable unit at the Site, with oversight from EPA and EPD. EPA is the lead agency for the Site and EPD is the support agency.

2.0 Site History and Enforcement Activities

The plant became operational in 1911. It is believed that the Outfall Ditch was constructed at this time. Between 1948 and 1980, Hercules produced toxaphene, a chlorinated pesticide, at its Brunswick Plant. Untreated wastewater from the production of toxaphene was discharged through the Outfall Ditch into Dupree Creek until 1972. A wastewater treatment plant was installed in 1972, and the amount of toxaphene in the permitted discharge was significantly reduced after that time until toxaphene production ceased in 1980. Portions of Terry Creek and Dupree Creek have been dredged by United States Army Corps of Engineers (USACE) beginning with the enactment of the Rivers and Harbors Act of 1938 (Terry Creek Project), authorizing dredging of a navigational channel. The Terry Creek project was completed by the USACE in 1939; and subsequently, maintenance dredging occurred in 1940, 1941, 1942, and 1946, prior to production of toxaphene. Some dredge spoils from these dredging activities were disposed in an area located adjacent to the Torras Causeway beside Terry Creek, which is currently known as the Trailer Park Dredge Spoil Area.

Dredging of Terry Creek and Dupree Creek resumed in 1971 with subsequent dredging in 1972, 1978, 1983, 1987, 1988 and 1989. In 1972, the US Fish and Wildlife Services, the State of Georgia, and the USACE chose an area on the north side of Terry Creek at the confluence of Terry and Dupree Creeks for placement of dredge spoils. This area (Main Dredge Spoil Area) served as the primary disposal area for dredge spoils until dredging was discontinued in 1989. Some dredge spoils were also disposed at the Riverside Dredge Spoil Area and, prior to 1972, on Carter's Island.

The Site was proposed by EPA for listing on the NPL in April 1997, however never finalized. An AOC was executed between Hercules and EPA on December 12, 1997 and amended on November 2, 1998, to perform removal actions on certain sediments in the Outfall Ditch and Terry and Dupree Creeks. Physical removal of sediment by dredging commenced on or about August 11, 1999, and finished on or about April 12, 2000. Pursuant to an AOC for Remedial Investigation/Feasibility Study entered into by Hercules and the EPA on September 30, 1999, Hercules is conducting the RI/FS for each operable unit at the Site, with oversight from EPA and EPD. EPA is the lead agency for the Site and EPD is the support agency. On January 28, 2010, Hercules sold the Brunswick Plant Resins business and a portion of the property to Pinova, Incorporated. Pinova Holdings, Inc., the parent company of Pinova, was purchased by Symprise AG in 2015. In December 2016, DRT purchased the Brunswick Plant from Symrise. The facility is still operating under the name of Pinova. Hercules continues to own the property east of Highway 17 that contains the Outfall Ditch and the Marsh Wood Storage Yard. On November 13, 2008, Ashland Inc. acquired Hercules Incorporated as a wholly owned subsidiary. On August 17, 2016, Hercules Incorporated converted from a corporation to a limited liability company.

3.0 Previous Environmental Investigations and Removal Actions

Site investigations prior to the OU1 Focused RI/FS spanned the period between 1994 and 2006. In 1994, the National Oceanographic and Atmospheric Administration (NOAA) obtained sediment samples from Terry Creek and the Back River and analyzed them for acute toxicity to the marine amphipod *Ampelisca abdita*. Results indicated that sediments from Terry Creek exhibited sediment toxicity to *A. abdita* that was not observed in sediments from other parts of the Brunswick/St. Simon's estuary.

In 1995, the EPA conducted an Expanded Site Inspection (ESI) at the Site. A total of 45 groundwater, surface water, soil, and sediment samples were collected from Terry Creek, Dupree Creek, the Back River, and dredge spoil areas at the Site, and analyzed for toxaphene. Soil and sediment samples collected from the dredge spoil areas, Dupree Creek, and Terry Creek contained detectable levels of toxaphene at concentrations up to 430 parts per million (ppm). EPA also collected samples of killifish from the confluence of Terry and Dupree Creeks during the spring and summer of 1996. Results from whole fish analyses of these samples indicated that toxaphene concentrations were estimated at 19 ppm and 27 ppm.

EPA conducted an Ecological Screening Evaluation (ESE) for the vicinity of Terry and Dupree Creeks in the spring of 1997. During the ESE, sediment and surface water samples were collected as well as various species of forage fish, consumer fish, and shellfish. Results from analyses for toxaphene indicated that the presence of toxaphene was not confirmed in any fish or shellfish samples. Toxaphene was detected at concentrations up to 230 ppm in sediment samples collected from Terry and Dupree Creeks.

Hercules conducted a Site Status Investigation (SSI) from November 1997 to July 1998. A total of 375 soil, sediment and groundwater samples were collected sitewide during the SSI and analyzed for toxaphene. Sediments in the Outfall Ditch had toxaphene concentrations generally in excess of 100 ppm to a depth of 5 ft. Deeper samples (5-8.5 ft) exhibited similar concentrations in the center, but low and non-detect concentrations along the margins of the ditch. Surficial sediments in Dupree Creek were generally less than 10 ppm with some exceptions. In Terry Creek, toxaphene concentrations were in the range of 20-50 ppm near the confluence with Dupree Creek, but generally less than 10 ppm elsewhere. Toxaphene concentrations in soils in the dredge spoil areas varied considerably depending on location but frequently had concentrations between 10 and 50 ppm with a few sample locations greater than 100 ppm. Toxaphene was not detected in groundwater samples.

Hercules implemented a removal action at the Site from August 1999 to April 2000, with oversight from the EPA, to remove sediment containing the highest concentrations of toxaphene, including the pre-weir and post-weir sections of the Outfall Ditch, the mouth of the Outfall Ditch, the confluence area of Terry and Dupree Creeks, and north Dupree Creek. **Figure 5** shows the areas included in the removal action. Physical removal of sediment by dredging commenced on or about August 11, 1999, and finished on or about April 12, 2000. The objective of the removal action was a 90 percent mass removal of toxaphene. Per the terms of the 1998 amended removal AOC, the removal action included excavations in the pre-weir area of 1 to 8 ft and 1 to 5 ft in the post-weir area. Although some difficulties were encountered due to debris in the sediments and sloughing of excavations areas, the removal action was largely successful at meeting the mass removal objectives by achieving 80 to 85 percent removal of toxaphene. A total of approximately 16,800 cubic yards (yd^3) of sediment was dredged/excavated from the Outfall Ditch during the removal action. Approximately 10,000 yd^3 were removed from the mouth of the Outfall Ditch. Post-removal sediment samples were collected from multiple cores at one-foot depth intervals within the sediment bed down to 12 ft below the sediment/water interface. Toxaphene concentrations in post-removal samples ranged from not detected to 2,200 ppm in the 0-1 ft sediment depth interval. Toxaphene was detected in 33 of 38 samples analyzed in this interval. In the 1-2 ft depth interval, toxaphene was detected in 20 of 21 samples, with the highest concentration of 2,100 ppm in the post-weir area. Similarly, a high concentration of 2,100 ppm was detected in the 2-3 ft sediment depth interval; toxaphene was detected in 14 of 21 samples analyzed in this depth interval. Concentrations generally decreased with depth, and within the pre-weir section, toxaphene was not detected deeper than 4 ft below the sediment/water interface. Toxaphene was detected to a depth of 12 ft in one post-weir sample.

The release of toxaphene to the surrounding marsh via the Outfall Ditch has resulted in detectable concentrations of toxaphene and chlorinated camphenes (weathered toxaphene) in the tissues of aquatic organisms living in Terry and Dupree Creeks. A 1973 study conducted by The University of Georgia, "Effects of Toxaphene Contamination on Estuarine Ecology" (Reimold, Adams, Durant), indicated that the body burden of fish species were in the part per million range. Prior to the removal action, EPD conducted a study in 1997, which, at first, indicated that fish and shellfish did not contain detectable concentrations of toxaphene. However, re-analysis of these samples using more sophisticated analytical methods indicated that toxaphene residues were present at detectable concentrations. As a result of that study, EPD implemented fish consumption guidelines that limited consumption of certain fish species in the area.

Another fish tissue evaluation was conducted by EPD in 2001, after the sediment removal action. Due to changes in the study design and collection areas, a somewhat different group of consumer fish species and areas were evaluated. However, when broadly comparing the 1997 data to the 2001 data, an over four-fold reduction in the concentration of toxaphene residues was reported. Both the 1997 and 2001 studies exhibited a statistically significant concentration gradient with fish collected closer to the Outfall Ditch having greater body burdens of toxaphene residues than fish collected at greater distances from the ditch. The results of this study were used to ease the fish consumption guidelines that EPD had previously put in place for the area. Hercules repeated the 2001 study, with EPA oversight, in 2005, 2007, 2009, 2011, 2013 and 2015 using the same geographic boundaries and the same target species. However, no additional substantial reductions in toxaphene body burdens have been documented beyond the initial decline observed between the 1997 and 2001 studies.

Shallow soil samples were collected from the Marsh Wood Storage Yard in October 2006 during a Resource Conservation and Recovery Act (RCRA) Facility Investigation. The highest reported concentrations of toxaphene in soil were found at locations just north and south of the Outfall Ditch, along the stretch adjacent to the pre-weir section. Concentrations of toxaphene in soil generally decreased with depth and distance from the Outfall Ditch, and were higher in samples directly adjacent to the pre-weir Outfall Ditch and lower or not detected in samples directly adjacent to the post-weir Outfall Ditch. See Figure 1-3 of the OU1 Focused RI/FS.

4.0 Community Participation

EPA has been actively engaged with the affected community and has strived to maintain a collaborative relationship with those interested residents during the interim remedy selection process. In August 1995, EPA in cooperation with EPD, launched a special project called the Brunswick/Glynn County Community Based Environmental Protection Project (Brunswick CBEP). The CBEP project was part of a new EPA approach to long-term environmental protection, an approach that emphasizes community involvement in the protection of natural resources. From the beginning, community members contributed to the goals and direction of the project. Stakeholders, include but are not limited to area citizens, the City of Brunswick, Glynn County, Glynn County Health Department, Glynn Environmental Coalition, Save the People Association, Inc., EPA, EPD, U.S. Fish & Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA), and the Agency for Toxic Substances and Disease Registry (ATSDR). On August 10, 1995, a public meeting was held for the Brunswick CBEP to obtain comments from the community and government agencies. The meeting discussed the three NPL sites located in Brunswick: LCP Chemicals Plant, Brunswick (Escambia) Wood Preserving, and Hercules 009 Landfill. The Terry Creek Dredge Spoils Site, while not final on the NPL, was also discussed.

In December 1997, ATSDR advertised public availability sessions to be held on January 20 and 21, 1998, to obtain community input relating to the Terry Creek Dredge Spoils/Hercules Outfall Site. ATSDR obtained health and environmental concerns from 63 residents living near the Terry Creek Dredge Spoils/Hercules Outfall Site.

As an additional effort to inform the Brunswick community, the EPA began to mail out the Brunswick Environmental Cleanup Newsletter in 2008. This newsletter contains information relating to all of the Superfund sites in Brunswick and has been mailed approximately 12 times since 2008. Additional updates will continue to be mailed to the Brunswick community as site conditions are updated.

In 1998, the EPA awarded a technical assistance grant (TAG) to the Glynn Environmental Coalition (GEC) for the Terry Creek Dredge Spoil Areas/Hercules Outfall site. The purpose of the TAG is to help communities participate in Superfund cleanup decision making by providing funding to community groups to allow them to hire their own independent technical advisor to interpret and explain technical reports, site conditions, and the EPA's proposed clean-up plans and decisions to the community. EPA continues to fund the TAG and it has been renewed several times to the GEC since it was first awarded in 1998.

On June 26, 2015, the notice of availability of the Site documents along with the OU1 Proposed Plan meeting notice was published in the *Brunswick News*. Approximately 340 copies of the Proposed Plan were mailed to community members. The EPA hosted a public meeting on July 30, 2015, at Brunswick/Glynn County Library in Brunswick, Georgia. At this meeting, the EPA presented the Focused RI and FS results and the Proposed Plan for OU1. EPA and EPD were pleased to discuss the Site with the approximately 50 attendees and answer questions. A court reporter transcribed the meeting and the transcript is included in Appendix A of this IROD and in the Administrative Record file. A public comment period on the Proposed Plan was held from June 29, 2015, to September 11, 2015, for a total of 75 days. EPA's responses to the questions asked at the public meeting and comments received during the public comment period are included in the Responsiveness Summary, which is Part 3 of this IROD.

The purpose of the local Site repository is to provide the community a convenient location to review information about the Site. The address for the local repository is:

Brunswick/Glynn County Regional Library
208 Gloucester Street
Brunswick, GA 31520
Telephone: (912) 279-3740

On December 8, 2015, representatives from EPA and EPD met with officials from the City of Brunswick and Glynn County, and held a public availability session in Historic City Hall which was attended by approximately 60 people. The purpose of the meetings and public availability session was to provide the community with additional information relating to the preferred alternative and answer any questions presented.

5.0 Scope and Role of the Interim Response Action

The selected interim remedy will address OU1, the Outfall Ditch, which formerly conveyed untreated wastewater containing toxaphene from the former Hercules Brunswick pesticide plant to Dupree Creek. Significant excavation occurred from 1999-2000 which removed approximately 80% to 85% of the toxaphene contaminant mass. Physical removal of sediment by dredging commenced on or about August 11, 1999 and finished on or about April 12, 2000. This interim action is expected to eliminate, or reduce, the potential for exposure to any remaining sediment contamination by rerouting stormwater flow and sealing off the current ditch. After the ditch is sealed off and filled, material that is currently at the bottom of the ditch will be viewed as saturated soil (below the water table) as opposed to sediment and is not expected to contribute to downstream contamination. This interim action for the Outfall Ditch should complement the dredging previously performed with the overall goal of achieving further reductions in fish tissue concentrations of toxaphene. A long term monitoring plan will be implemented to evaluate the effectiveness of the interim action. An EPA toxicity value for weathered toxaphene does not currently exist. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed. Thereafter, this IROD will be followed by a final ROD for OU1 in the future. Additional remedial investigations and remedy decisions will be made under separate actions for OU2, the Dredge Spoils and Upland Soils, and OU3, Terry and Dupree Creeks.

6.0 Site Characteristics

Hercules, with oversight from the EPA and EPD, conducted field work to support a Focused RI/FS for OU1 between February and August 2012. The overall objective of the OU1 Focused RI/FS was to assess the nature of the contaminants in the Outfall Ditch sediments and to collect data to support the development and evaluation of remedial alternatives. The Focused RI/FS Report, dated December 2014, presents the results of the OU1 Focused RI/FS. The information presented here is a summary of the information provided in more detail in the full report, which is part of the Administrative Record.

6.1 General Site Setting

Glynn County is located in coastal Georgia in the Sea Island section of the Atlantic Coastal Plain Physiographic Province. Topography in Glynn County consists of relatively flat land, 0 to 15 ft above mean sea level (msl), surrounded by tidal marshes, creeks, and rivers. The Site is located on the eastern side of the Brunswick peninsula. In general terms, the Site area is bounded to the north, south, and east by a tidal marsh which is periodically submerged, and on the west by the Hercules Outfall Ditch and the west bank of Dupree Creek.

6.2 Geology

The sections below present a summary of the regional and the Site-specific geologic conditions.

6.2.1 Regional Geology

Glynn County lies in the Atlantic Coastal Plain Physiographic Province and is underlain by more than 4,000 ft of sedimentary rocks. The uppermost soils are Pleistocene to recent (Holocene) age soils composed of sandy beach and dune deposits in the upland areas and organic-rich silty clays in the tidal marshes. These soils are referred to as the Satilla and Cypresshead Formations, and range in thickness from about 50 ft to 180 ft. Miocene sediments lie beneath the Satilla and Cypresshead Formations and consist of a thick sequence of silt, clay, phosphatic sand, and limestone of the Hawthorne Group, which extends to a depth of approximately 500 ft. The Hawthorne Group is underlain by the Suwanee Limestone and the Ocala Group. The Ocala Group limestone is extremely porous and is from 500 ft to 700 ft thick in the Brunswick area. This unit is underlain by at least another 1,000 ft of carbonate rocks ranging from Middle Eocene to Cretaceous in age.

6.2.2 Regional and Site Hydrogeology

Multiple aquifers have been identified in the Brunswick area. In descending order, they are the surficial aquifer, the Brunswick aquifer, and the upper Floridan aquifer. The surficial aquifer consists of shallow water-bearing sands under water-table or unconfined conditions. The Brunswick Aquifer is comprised of two confined water-bearing zones within the Hawthorne Group. The most prolific aquifer in the Brunswick area is the upper Floridan aquifer. The aquifer is found at a depth of approximately 500 ft below land surface and extends to a depth of over 1,500 ft. Groundwater circulation is rapid through vuggy, fossiliferous zones of high primary porosity. The water-bearing zones are enhanced further by dissolution features.

Groundwater at the Site is encountered approximately 2 ft to 5 ft below ground surface and flows from west to east toward the Outfall Ditch and Dupree Creek. Groundwater likely discharges into the Outfall Ditch and Dupree Creek with hydraulic gradients that are tidally influenced.

6.3 Site Topography and Drainage

The land area immediately adjacent to the Outfall Ditch is an upland area referred to as the Marsh Wood Storage Yard. The Outfall Ditch divides this upland area into a northern and southern section. The Marsh Wood Storage Yard area is a flat open area with an elevation of approximately 5 ft to 9 ft above msl. The Outfall Ditch itself has relatively steep banks sloping down to the intertidal zone. At high tide, the banks are full nearly to the upland area. At low tide, the volume of water in the ditch is greatly reduced into a narrow thalweg (~20 ft wide) and an expansive mudflat (50-100 ft) is exposed on either side.

In addition to the semi-diurnal rise and fall of the tide, the Outfall Ditch receives water input from a conveyance system originating at the former Hercules plant known as the N-Street Ditch. Surface drainage at the plant is directed to this ditch, as well as non-contact cooling water from the plant and stormwater runoff from residential areas surrounding the plant. The drainage area for the N-Street Ditch is over 400 acres. The N-Street Ditch discharges approximately 6 million gallons per day (MGD) to the Outfall Ditch under a NPDES permit. The Outfall Ditch also receives direct overland runoff from the Marsh Wood Storage Yard.

The Outfall Ditch empties into Dupree Creek, which, after flowing approximately 800 ft, merges with Terry Creek. Terry Creek flows about 6,000 ft and empties into the Back River which, in turn flows just under 2 miles into the St. Simons Sound. At a point approximately 6.5 stream-miles from the Site, St. Simons Sound empties into the Atlantic Ocean. Terry and Dupree Creeks experience a tidal stage variation of approximately 7 ft.

6.4 OU1 Focused Remedial Investigation/Feasibility Study

The OU1 Focused RI/FS was performed by Geosyntec Consultants, a Hercules' contractor, in accordance with the Site Management Plan dated July 2009, the RI/FS Work Plan, Field Sampling Plan (FSP), and Quality Assurance Project Plan (QAPP) dated January 2012. Due to the relatively small size of OU1 and the known existing elevated toxaphene concentrations present in the OU1 sediments following the removal action, EPA and EPD allowed Hercules to perform a Focused RI/FS to allow for expedited selection of a remedy at OU1 that is not further delayed by development of weathered toxaphene analytical methodology or toxicity reference values. The approach for OU1 was to develop remedial action objectives and cleanup goals for OU1 as a narrative performance-based goals (i.e., protectiveness achieved via pathway elimination) rather than numerical risk-based concentrations for toxaphene since an EPA toxicity value for weathered toxaphene does not presently exist. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed.

The field investigation for the OU1 Focused RI/FS was conducted between February and August 2012, and included collection of sediment and surface water samples, measuring bathymetry data for the Outfall Ditch, collecting pore water samples, evaluating groundwater/surface water interaction, investigating Outfall Ditch hydrologic and hydraulic properties, and conducting a geotechnical investigation. The Focused RI/FS activities performed at OU1 were used in conjunction with previous Site data to identify the types and concentrations of hazardous constituents in environmental media at OU1, and to evaluate the rate, direction, and distance of hazardous constituent migration. Data were also collected to support selection of a remedy to eliminate, reduce, or control risks to human health and the environment. The final OU1 Focused RI/FS report was submitted to EPA in December 2014.

6.4.1 Nature and Extent of Sediment Contamination

The nature and extent of sediment contamination was evaluated by collecting and analyzing sediment samples from 17 locations within the Outfall Ditch. Samples were collected from multiple depths at each location, with sample depths ranging from zero to 10 ft below the surface water/sediment interface.

Figure 6 depicts a sketch detail of the Outfall Ditch along with the location and concentration ranges of toxaphene in the sediment cores. Each color band at the location of each core sample represents the concentration ranges at that location and depth. The lowest concentrations (<1 mg/kg) are shown in blue and the highest concentrations are shown in red (>50 mg/kg). The figure indicates that much of the toxaphene contamination is found at depth with the exception of the culvert locations. The higher toxaphene concentrations are within the depth intervals between 2- and 8-ft, with the 4 to 6-ft interval exhibiting the highest concentrations.

Surface sediment concentrations of toxaphene measured in 2012 are substantially lower compared to the levels measured during the post-excavation investigation of the 1999-2000 removal action. **Figure 7** shows the toxaphene concentrations in surface sediments as measured in 2000 along with the data collected during the OU1 Focused RI. It can be readily observed that nearly all samples in 2000 exceeded 50 mg/kg. During the March 2012 sampling, only a single surficial sample exceeded this concentration. This reduction in exposure potential is likely due to the deposition of recent sediments over previously more impacted surface sediments.

Table 2 summarizes the detections for the additional compounds analyzed. The sediment samples were collected between February 28 and March 1, 2012. Most other compounds detected in sediment were detected at estimated concentrations between the respective method detection limits (MDL) and the reporting limits (RL). These concentrations are not quantifiable, but confirm that a given compound is present. These low-level detections included metals, pesticides, polyaromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs). Dioxins were also measured and detected in two sediment samples.

6.4.2 Nature and Extent of Surface Water Contamination

Toxaphene was not detected in any of the surface water samples. Detected compounds included various metals, semi-volatile organic compounds (SVOCs), and VOCs. These compounds were detected at low concentrations, with organic constituents being mainly detected at estimated concentrations between the MDL and the RL, indicating that they were present, but not at quantifiable concentrations. The discharge from the operating facility is currently monitored for toxaphene, carbon tetrachloride, total organic carbon (TOC), pH, solids, and chronic toxicity pursuant to the requirements of its NPDES permit. Carbon tetrachloride was measured at 9 ug/L in the surface water sample collected on the ebb tide (i.e., discharging), which is attributed to Plant surface water discharges.

In general, culvert samples exhibited higher concentrations of metallic constituents and lower concentrations of organics during the flood tide as compared to the ebb tide, while samples collected at the mouth of the Outfall Ditch did not exhibit a consistent trend. Furthermore, wet weather samples collected at the culvert location during the ebb tide also indicated higher metals concentrations than samples collected during the ebb tide under dry weather conditions. No consistent trend was observed for the samples collected at the mouth of the Outfall Ditch. In contrast, concentrations of organic constituents (other than toxaphene, which was non-detect in all samples and under all tested conditions) were generally lower during wet weather conditions in the culvert samples, suggesting dilution during high flows originating from upland areas. Overall, these trends appear to indicate that flood tide entering the Outfall Ditch has the most noticeable impact on metals concentrations at the culvert location, which are mainly naturally occurring constituents in seawater, while diluting already low concentrations of organics at this location.

6.5 Conceptual Site Model

A Conceptual Site Model (CSM) describes the contaminant source(s), the contaminant release and transport mechanisms, the exposure media, the exposure routes, and the potentially exposed human populations. The primary objective of the CSM is to identify the complete and incomplete exposure pathways. A complete pathway has all of the components listed above, whereas an incomplete pathway is missing one or more of the components.

The Brunswick Plant has been in continuous operation from 1911 to the present, producing a variety of rosin-based resins from wood resins. Between 1948 and 1980, Hercules produced toxaphene, a chlorinated pesticide, and the primary contaminant of concern at the Terry Creek Site. During the period of production from 1948 to 1972, untreated wastewater was discharged through the Outfall Ditch, a constructed conveyance system, into Dupree Creek. These discharges are believed to be the primary source of toxaphene at OU1. The operator of the plant is presently permitted by EPD to discharge stormwater runoff and non-contact cooling water from the facility.

In January 2010, the implementation of a RCRA Corrective Action Plan was completed for Solid Waste Management Unit (SWMU) 5 at the Plant (i.e., the former toxaphene plant), as well as for SWMU 29 (i.e., the N-Street Ditch). These corrective actions, and other improvements at the Plant, have addressed upstream sources of contamination to the Outfall Ditch. However, historical operations at the Plant, i.e., incidental releases (e.g., spills, leaks) of chemicals used in and produced during the operations, have potentially impacted soil and subsequently groundwater (via leaching) at the Plant. Thus, soil at the Brunswick Plant may also be a potential source of contaminants in the Outfall Ditch via particulates in stormwater runoff through the N-Street Ditch. Best management practices (BMPs) were implemented in the 1990s to control the erosion and runoff of toxaphene-contaminated soils to keep them from discharging into the N-Street Ditch and subsequently, the Outfall Ditch. Releases from neighborhoods and facilities adjacent to the Brunswick Plant or along Terry and Dupree Creeks may also be sources of contaminants or other stressors to the Outfall Ditch. Potential transport mechanisms include particulate-laden stormwater runoff and tidal influx.

Contaminants that have reached the Outfall Ditch, the primary exposure point, may have undergone a variety of partitioning and deposition mechanisms between sediment and surface water/pore water. Thus, ecological receptors at OU1 may have direct contact with site-related contaminants in sediment and surface water/pore water.

Chemicals present in abiotic media (i.e., sediment and surface water/pore water) in the Outfall Ditch may also be transported through the food chain via bioaccumulation. Thus, ecological receptors at OU1 may also have contact with site-related contaminants through the consumption of food/prey items.

The Outfall Ditch empties into Dupree Creek, which, after running approximately 800 ft, flows into Terry Creek. Contaminants in the Outfall Ditch may be transported downstream by a variety of transport mechanisms including sediment re-suspension and deposition. Historic dredging operations and wastewater discharges prior to 1972 are believed to be the primary source of contaminants beyond the Outfall Ditch. (Note: media outside of the Outfall Ditch will be evaluated separately as part of OU2 and OU3.)

Climate Change

When implementing a remedy at a Superfund site, pursuant to the Office of Solid Waste and Emergency Response (OSWER) Climate Change Adaptation Implementation Plan dated June 2014, the EPA should take into consideration the effects of climate change. Since the Terry Creek Site is located on the coast of Georgia, possible effects of climate change could include rising sea levels, storm surges, and strong hurricanes. The OU1 Focused RI/FS included a conceptual model to understand the sources of flows to the Outfall Ditch evaluating the simulated discharge flows for various extreme precipitation events ranging from a 2 year to a 100 year, 24 hour storm event, as described in Section 4.3 and Appendix D of the OU1 Focused RI/FS, to be utilized to evaluate the feasibility for hydraulic technologies, such as pipe or channel sizing and energy dissipation features, that were incorporated in the remedial alternatives.

Table 1: Simulated 24-hour Stormwater Discharge Flows

24-hour Storm Event	Triple Box Culvert Discharge Rate (cfs)	Triple Box Culvert Discharge Velocity (ft/s)	Triple Box Culvert Peak Shear Stress (lb/ft^2)
2-Year	683	13.2	0.62
25-Year	1,011	14.5	0.72
50-Year	1,161	14.9	0.75
100-Year	1,286	15.3	0.78

7.0 Current and Potential Future Land and Water Uses

The Terry Creek Site consists of a salt water tidal creek and marsh system located on the Atlantic coast directly east of the City of Brunswick in Glynn County, Georgia (see **Figure 1**). The Site is located near the confluence of Terry Creek, Dupree Creek, and the Back River north of the Torras Causeway and east of U.S. Highway 17. The Outfall Ditch is a Hercules constructed conveyance system that was used until 1972 to discharge untreated wastewater containing toxaphene from the former Hercules pesticide plant. According to the City of Brunswick's 2008 Community Agenda/Comprehensive Plan for its 2030 Vision, OU1 is located in the US Highway 17 Commercial Corridor and continued use as an industrial/commercial area is anticipated.

8.0 Summary of Site Risks

The response action selected in this interim ROD is necessary to protect public health or welfare, or the environment from actual or threatened releases of pollutants and hazardous substances into the environment. The human health and ecological risk summaries are presented in the sections below.

8.1 Human Health Risk Assessment

Preparation of a Human Health Risk Assessment (HHRA) is required by the NCP, which states that the lead agency for a Superfund Site shall conduct a Site-specific HHRA as part of the RI process (40 CFR §300.430). The data collected during the OU1 RI satisfied the data quality objectives of the project and were determined to be of adequate quality for use in the risk assessment.

The risk assessment estimates what risks the Site poses if no action were taken at the Site. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The OU1-specific HHRA was conducted to estimate the cancer risks and non-cancer health hazards to human health associated with the current and future exposures to contaminants at OU1.

This focused human health risk evaluation qualitatively evaluates hypothetical human exposure scenarios for OU1 environmental media. The objectives of this evaluation are as follows:

- identify potentially complete exposure pathways;
- evaluate whether site-related constituents in environmental media pose unacceptable risks to potential current and future human receptors; and
- provide information to support decisions concerning the need for further evaluation of action based upon current and reasonably anticipated (or hypothetical) exposure scenarios.

The focused risk evaluation includes: (i) data evaluation and selection of constituents of potential concern (COPCs); (ii) exposure assessment; (iii) toxicity assessment; and (iv) risk characterization. Risk management comprises a separate step in which the results of the risk evaluation are evaluated in the context of the larger site investigation, potential ecological risks, and the feasibility and efficacy of remedial actions.

8.1.1 Data Evaluation and COPC Selection

OU1 is defined as the aquatic habitat (sediment and surface water) within the Outfall Ditch. The nearly continuous presence of surface water in the Outfall Ditch, coupled with other barriers to access, support that direct exposure to OU1 media is an insignificant, if not incomplete, exposure pathway for most receptors.

Nonetheless, to provide a point-of-departure for informing risk management decision and to focus the remaining human health discussions, surficial sediment (0-0.5 ft bgs) and surface water data from OU1 were compared to human health screening levels (HHSLs). Specifically, sediment HHSLs are the EPA Regional Screening Levels (RSLs) for residential soil. Surface water HHSLs are the Federal Maximum Contaminant Levels (MCLs) for drinking water or, if an MCL is not available, the RSL for tapwater. Selected soil and tapwater RSLs correspond to a cancer risk of 1E-6 or a non-cancer hazard quotient (HQ) of 1. If the maximum detected constituent concentration is less than the HHSL, there is a high degree of confidence that the constituent will not contribute significantly to overall direct contact risks. Conversely, HHSL exceedances, particularly in this application (i.e., applying soil values to sediment and applying drinking water values to estuarine surface water), do not in and of themselves indicate unacceptable risks exist.

For surficial sediment (Table 3), maximum detected concentrations for the majority of detected constituents are below HHSLs. Exceptions are arsenic, total chromium (assuming 100% hexavalent chromium), and toxaphene. For these three constituents, both maximum and mean concentrations exceed HHSLs. Therefore, these three constituents in sediment are retained as human health COPCs. It should be noted, however, that arsenic and total chromium concentrations are similar to background.

For surface water (Table 4), maximum detected concentrations for the majority of detected constituents are below HHSLs. Exceptions are naphthalene and carbon tetrachloride. In both cases, mean concentrations are below HHSLs and maximum concentrations exceed HHSLs by less than two-fold. In consideration of these concentrations relative to HHSLs, the reduced exposure frequency and duration of OU1 receptors relative to domestic (tapwater) users, and the increased dispersion of vapors associated with ambient air, chemical concentrations in the Outfall Ditch, surface water does not pose an unacceptable risk to human receptors at OU1. Therefore, no constituents in surface water are retained as human health COPCs.

8.1.2 Exposure Assessment and Human Health CSM

The exposure assessment consists of characterizing the exposure setting and identifying potentially complete exposure pathways such that the level of human exposure to constituents in the environment can be described.

The Outfall Ditch is a stormwater conveyance system and will remain as such for the foreseeable future. To the north, west, and south, the Outfall Ditch is surrounded by the upland portions of OU2 referred to as the Marsh Wood Storage Yard. OU3, which is defined as Terry and Dupree Creeks, is located immediately east (downstream) of OU1. Based on current and reasonably foreseeable conditions, receptors potentially present in the immediate vicinity of the Outfall Ditch are limited to trespassers and recreationalists; the likelihood for these receptors to have access to OU1 sediment and surface water is discussed below.

- Trespassers. Although signage generally precludes access by most receptors, trespassers could theoretically access OU1. However, OU1 could only be accessed via boating/OU3 or via Highway 17/OU2. These barriers coupled with the lack of attractive nuisances, are expected to greatly reduce the likelihood for trespasser access. Such an event, if occurring, would likely be infrequent. In the event trespassers access OU1, they are potentially exposed to sediment and surface water. However, given that primary COPCs in the Outfall Ditch are metals and toxaphene, which tend to bind to sediment, sediment is considered the primary exposure media. Further, the preliminary data evaluation for surface water supports that potentially site-related constituents are not present in OU1 surface water at levels likely to result in adverse effects to human health. Thus, potential risks from surface water are considered de minimis and do not warrant further consideration. For sediment, potential exposure routes are incidental ingestion and dermal contact. Because OU1 remains saturated or inundated with surface water, there is limited potential for release of particulates and/or vapors to the breathing zone.

- Recreationalists. Recreational activities, including swimming, boating, and fishing, may occur within OU3. However, such activities are not permitted and have not been observed within OU1. In addition to signage, the weirs and tidal flux of the creek likely reduce the attractiveness of the ditch for swimming and boating. These physical features also limit game fish species from accessing OU1; given the lack of game fish and fish consumption advisories, recreational anglers are not anticipated to be present at OU1. Thus, recreational exposure to OU1 media represents an incomplete exposure pathway. OU3 recreationalists have the potential to be exposed to potential OU1-related constituents that have been transported downstream. The primary exposure route for OU3 recreationalists is via indirect exposure to bioaccumulated constituents (e.g., toxaphene) in tissue; however, direct exposure to sediment and surface water via incidental ingestion and dermal contact may also occur.

Thus, potentially complete direct exposure pathways for OU1 are: OU1 trespasser exposure to COPCs in sediment and OU3 recreationalist exposure to COPCs in fish tissue, sediment, and surface water.

8.1.3 Toxicity Assessment

The toxicity assessment provides a description of the relationship between a dose of a chemical and the potential likelihood of an adverse health effect. In the context of the regulatory risk assessment process, potential effects of chemicals are separated into two categories: carcinogenic and non-carcinogenic effects. EPA generally makes the conservative assumption that carcinogenic chemicals do not exhibit a response threshold, while non-carcinogenic effects are universally recognized as threshold phenomena. However, chemicals that are believed to be carcinogenic may also be capable of producing non-cancer health effects.

Based on currently available toxicological information for OU1 COPCs (arsenic, chromium, and toxaphene), cancer is the primary health endpoint of concern. Toxicity data for quantifying non-cancer health effects from arsenic and chromium are also available. It should also be noted that there are considerable uncertainties associated with evaluating toxaphene risks as technical toxaphene is comprised of over 670 congeners, which are quickly transformed in the environment, such that the mix of congeners and the concentrations of the congeners are not the same as a laboratory standard. Information related to the toxicity of these congeners, or breakdown products, is not available to date. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within
OU1.

8.1.4 Risk Characterization

Arsenic, chromium, and toxaphene were identified as potential direct contact COPCs for OU1 based on exceedances of residential RSLs. In consideration of the basis of these RSLs (i.e., a cancer risk of 1E-6 based on a lifetime of exposure) and the fact that trespasser exposures are likely to be a small fraction of the residential exposure assumptions used to derive the residential RSLs used to identify COPCs, the direct contact risks to trespassers from exposure to OU1 media are considered to be negligible.

Evaluating the potential for adverse health effects associated with indirect exposure scenarios (e.g., fish consumption) for OU3 recreationalists is less certain due to the complex nature of constituent bioaccumulation, uncertainties regarding toxaphene congener composition, and variability/uncertainty in consumer habits (e.g., food preparation, species preference, and consumption rates). The fish body burden studies conducted in 1997 identified toxaphene residues in fish collected from Terry and Dupree Creeks and prompted EPD to issue fish consumption guidelines that recommended limiting consumption of certain fish species in the area. A second study conducted in 2001, generally revealed lower concentrations of toxaphene in fish tissues and resulted in the relaxation of the fish consumption guidelines. The body burden data from both studies exhibited a statistically significant concentration gradient with fish collected closer to the Outfall Ditch having higher body burdens of toxaphene residues than fish collected at greater distances from the discharge.

The 2001 study was repeated in 2005, 2007, 2009, 2011, 2013 and 2015 using the same geographic boundaries and the same target species. EPD has relied upon these data to routinely evaluate and update the fish consumption guidelines as necessary for the area. However, no additional substantial reductions in toxaphene body burdens have been documented beyond the initial decline observed between the 1997 study and the 2001 study.

The fish consumption guidelines illustrate that there are potential risks associated with consumption of fish and other seafood from these areas. The elevated concentrations of toxaphene residues in OU1 sediments likely contribute to the body burdens of toxaphene in these species. Based on these considerations, a performance-based interim remedy that eliminates the transport of contaminants to Dupree Creek and other downstream locations should result in a further reduction of the potential risks associated with seafood consumption by recreationalists.

8.2 Ecological Risk Assessment

8.2.1 Introduction

The purpose of an ecological risk assessment (ERA) is to evaluate the likelihood that adverse ecological effects are occurring or may potentially occur as a result of the site-specific constituent concentrations in environmental media. The potential for adverse effects is assessed through a sequential series of activities that increase in complexity and site-specificity depending on the results of previous evaluations. The EPA Ecological Risk Assessment Guidance for Superfund describes an eight-step process for conducting ERAs. Components of the ERA process include the following:

<u>Screening Level Ecological Risk Assessment (SLERA)</u>

Step 1 - Screening Level Problem Formulation;

Step 2 - Screening Level Exposure Estimate and Risk Calculation;

<u>Baseline Ecological Risk Assessment (BERA)</u>

Step 3 - Baseline Problem Formulation;

Step 4 - Study Design and Data Quality Objective Process;

Step 5 - Verification of Field Sampling Design;

Step 6 - Site Investigation and Data Analysis;

Step 7 - Risk Characterization; and

Step 8 - Risk Management.

This section documents the completion of the SLERA phase of the EPA eight-step process (Steps 1 and 2). The objectives of the Focused SLERA were to:

- Evaluate whether there is a potential for ecological receptors to be exposed to constituents in OU1 (e.g., identify potentially complete exposure pathways in the Outfall Ditch); and
- Evaluate whether site-related constituents are present in OU1 media (sediment, surface water, and pore water) at concentrations that have the potential to result in adverse ecological effects.

Under EPA guidance, ERAs are conducted using a tiered approach and are punctuated with Scientific Management Decision Points (SMDPs). SMDPs represent points in the ERA process where the risk assessor, risk manager, and interested parties reach concurrence on conclusions, actions, or methodologies that are needed such that the ERA process can continue (or terminate) in a technically defensible manner.

Based on the magnitude of the screening-level risk estimates for toxaphene developed in the SLERA and the recognition that a more comprehensive ecological investigation of OU1 in a BERA (Steps 3 through 7) is also likely to identify potential risks to ecological receptors, this SLERA concludes with a SMDP recommending no further ecological investigation for the Outfall Ditch. An EPA toxicity value for weathered toxaphene does not currently exist. The ERA proceeded directly to Step 8, *Risk Management*, which considered the potential ecological risk reduction provided by performance-based remedial actions that focus on eliminating direct exposure to all contaminants in the Outfall Ditch and eliminating the potential transport of contaminants to Dupree Creek and other downstream locations. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential ecological risks associated within OU1 to determine if further actions are needed.

8.2.2 Screening Level Problem Formulation (Step 1)

Problem formulation establishes the goals, scope, and focus of the ERA. Its primary objective is to collect sufficient information concerning the Site to develop a preliminary ecological conceptual site model (CSM), which considers the Site setting and environment, nature and extent of contamination, potential fate and transport processes, and ecological characteristics of the Site (see Figure 8).

8.2.2.1 Primary Sources, Transport Mechanisms, Exposure Media

Between 1948 and 1980, Hercules produced toxaphene at its Brunswick plant. Toxaphene is a chlorinated pesticide and the primary contaminant of interest at OU1. Incidental releases (e.g., spills, leaks) of chemicals used in and produced during the operations have potentially impacted soil and subsequently groundwater (via leaching) at the former Hercules pesticide plant. Thus, soil and groundwater at the former Hercules pesticide plant are also a potential source of contaminants in the Outfall Ditch. Soil is potentially transported to the Outfall Ditch as particulates in stormwater runoff. Discharge of groundwater to surface water, if occurring, may transport dissolved contaminants to the Outfall Ditch. Releases from neighborhoods and facilities adjacent to the former Hercules plant or overland runoff along Terry and Dupree Creeks may also be sources of contaminants/stressors to the Outfall Ditch. Potential transport mechanisms include stormwater runoff and tidal influx.

Once contaminants reach the Outfall Ditch, the primary exposure point, they may undergo a variety of partitioning and deposition mechanisms between sediment and surface water/pore water. Thus, the primary exposure media for ecological receptors to Site related contaminants at OU1 are sediment and surface water/pore water.

8.2.2.2 Secondary Transport Mechanisms, Exposure Media

Chemicals present in abiotic media (i.e., sediment and surface water/pore water) in the Outfall Ditch may also be transported through the food chain via bioaccumulation/ bioconcentration. Toxaphene has the ability to bioconcentrate. Thus, ecological receptors at OU1 may also have contact with site-related contaminants through the consumption of food/prey items.

The Outfall Ditch empties into Dupree Creek which, after running approximately 800 ft, flows into Terry Creek. Contaminants in the Outfall Ditch may migrate offsite by a variety of transport mechanisms including runoff/deposition. Contaminants partitioned to surface water in the Outfall Ditch may also migrate to groundwater via percolation/infiltration. However, direct exposure to groundwater is considered an incomplete exposure pathway for ecological receptors at OU1.

8.2.2.3 Potential Ecological Receptors and Exposure Routes

Specific species were not evaluated in the SLERA. However, general receptor categories are identified to allow evaluation of potentially complete exposure pathways. Based on previous investigations, benthic, aquatic, and wildlife species are considered appropriate preliminary ecological receptors for the Outfall Ditch. Thus, potentially complete ecological exposure pathways evaluated at OU1 are:

- Exposure of aquatic/semi-aquatic plants to site-related constituents in sediment, surface water, and pore water in the Outfall Ditch;
- Exposure of benthic receptors to site-related constituents in sediment and pore water in the Outfall Ditch;
- Exposure of aquatic (fish) receptors to site-related constituents in surface water of the Outfall Ditch; and
- Exposure of wildlife receptors to site-related constituents in sediment, surface water, and food/prey items.

The vast majority of exposure to contaminants in the Outfall Ditch is assumed to be in surficial rather than deeper sediment. For ecological receptors, surficial sediment in the biologically active zone (0 to 0.5 ft below the sediment/water interface) is considered the point-of-exposure for most sediment-dwelling or sediment-foraging receptors.

Potential direct exposure routes for ecological receptors include dermal contact/absorption, direct ingestion, and inhalation. In addition to these direct uptake mechanisms, ecological receptors may be exposed via consumption of food/prey items that have bioaccumulated/bioconcentrated constituents. Of these exposure routes, plants are primarily expected to be exposed via direct contact with substrate; benthic macroinvertebrates and aquatic (fish) receptors are primarily expected to be exposed via direct/ingestion contact with substrate; and wildlife receptors are primarily expected to be exposed via dietary ingestion and, to a lesser extent, incidental ingestion of sediment.

8.2.2.4 Preliminary Assessment Endpoints

Assessment endpoints for OU1 were selected based on three principal criteria: (i) ecological relevance, (ii) susceptibility to potential stressors, and (iii) representation of management goals. General ecological assessment endpoints identified for complete exposure pathways at the Outfall Ditch are:

- Protection of aquatic/semi-aquatic plants from direct exposure to contaminated sediment, surface water, and pore water in the Outfall Ditch;
- Protection of benthic receptors from direct exposure/ingestion of contaminated sediment and pore water in the Outfall Ditch;
- Protection of aquatic (fish) receptors from direct exposure to contaminated surface water in the Outfall Ditch; and
- Protection of wildlife receptors to bioaccumulated/bioconcentrated constituents in food/prey items.

8.2.2.5 Ecological Effects Evaluation

The final component of Step 1 is the screening level ecological effects evaluation, which identifies threshold exposure concentrations for chemicals of interest below which adverse effects in potentially exposed receptors will not occur. These are conservative values that are unlikely to result in ecological effects in even the most sensitive ecological receptors. Priority was given to Region 4 Ecological Screening Values (ESV) and marine-specific values. Sediment ESVs were obtained from various guidance documents.

8.2.3 Exposure Estimate and Risk Calculations (Step 2)

The primary objective of Step 2 is to identify constituents of potential ecological concern (COPECs) and provide a conservative evaluation of the potential for adverse ecological effects related to constituent concentrations in environmental media at the Site. This step combines ecological exposure estimates with effects thresholds described in Step 1 to yield an estimate of potential ecological risks at the Site.

8.2.3.1 Screening Level Exposure Estimates

Screening level exposure point concentrations (EPCs) are assumed to be maximum concentrations of constituents detected in environmental media. The following conservative assumptions are inherent to the SLERA EPCs:

- Ecological receptors spend 100 percent of their time exposed to constituents at the Site;
- Ecological receptors are exposed to maximum constituent concentrations 100 percent of the time;
- Constituents are 100 percent bioavailable for ecological exposure; and
- There is a potential for adverse effects at constituent concentrations greater than the ESV.

Each of these assumptions is associated with a level of uncertainty, and overestimation of risk is likely under these assumptions.

8.2.3.2 Screening Level Risk Calculations

Screening level ecological risks are evaluated using a hazard quotient (HQ) approach. This approach compares exposure levels (EPCs) to conservative ESVs, which are identified in Step 1, to calculate an HQ as follows:

$$HQ=\frac{EPC}{ESV}$$

The EPA HQ threshold value of 1 was used to identify COPECs; an HQ of approximately 1 is generally regarded as indicating a low probability adverse ecological effects. When a constituent has an HQ greater than 1, it is present at levels above its threshold concentration; however, this does not imply that adverse effects will occur, only that the potential for adverse effects exists. Bioaccumulative compounds detected in the Outfall Ditch were identified as COPECs regardless of the calculated HQ. Bioaccumulative compounds were identified using EPA guidance. Detected constituents for which an ESV is not identified are also identified as COPECs (see References Section of the Focused Remedial

Investigation/Feasibility Study Report Operable Unit (OU1): Outfall Ditch dated December 2014). Geochemical parameters and essential nutrients measured in environmental media were excluded from quantitative evaluation in the SLERA; these are: TOC, TSS, calcium, magnesium, potassium, and sodium.

Sediment

The results of screening level evaluation are described below by constituent group. Table 5 presents summary statistics, ESVs, and calculated HQs for constituents detected in Outfall Ditch surficial sediment.

Toxaphene. Toxaphene was detected in each of the 22 surficial sediment samples evaluated in the SLERA. Due to the high HQ and lateral extent of distribution, toxaphene appears to be the primary risk driver for sediment.

Metals. Sixteen metals were detected in surficial sediment. Maximum HQs exceed 1 for 13 of the 16 detected metals. Maximum HQs are generally low in magnitude (i.e., less than 10), with the exception of mercury. The highest concentrations were reported in the pre-weir section of the Outfall Ditch.

PCBs. No PCBs were detected in surficial sediment.

Organochlorine Pesticides (OCPs). Maximum detected HQs are greater than 1 for three detected OCPs (DDD, DDE, and gamma-BHC); however, OCPs were detected at a relatively low frequency. The highest concentrations were reported in sediments collected near the Outfall Ditch culvert.

PAHs. Five PAHs were detected in surficial sediment: acenaphthylene, fluoranthene, naphthalene, phenanthrene, and pyrene. Concentrations of these five PAHs were summed (assuming one-half the detection limit for non-detect results) and evaluated as 'total PAHs' in the SLERA. Maximum detected concentration of total PAHs results in an HQ of 2. The highest concentrations were reported in sediments from the pre-weir section of the Outfall Ditch.

SVOCs. Six SVOCs (other than PAHs) were detected in surficial sediment; maximum HQs for four phenolic compounds exceed 1 (1,1-biphenyl, 2-methyphenol, 3&4-methylphenol, and phenol).

VOCs. Four VOCs were detected in surficial sediment; maximum HQs for three detected VOCs exceed 1 (1,1-biphenyl, 2-methyphenol, 3&4-methylphenol, and phenol). HQs for carbon disulfide and 2-butanone are of low magnitude.

Dioxins and furans were not specifically included in the SLERA because they were not evaluated in surface intervals used in the SLERA. Toxic equivalency concentrations for detected dioxins and furans in sediment collected from the 0.5-2 ft interval are below the Region 4 criterion of 2.5 parts per trillion, indicating a limited potential for adverse ecological effects; the fish, mammal, and avian Polychlorinated dibenzo-p-dioxin and Polychlorinated dibenzofuran (PCDD/PCDF) toxic equivalency concentrations are 0.13, 1.8, and 0.86 ppt, respectively.

Based on ESV comparisons, which is the SLERA metric for predicting potential ecological risk, 24 constituents/constituent groups are identified as sediment COPECs. Four additional constituents are identified as COPECs due to a lack of ESVs. **See Table 5.**

Surface Water

Table 6 presents summary statistics, ESVs, and calculated HQs for constituents detected in Outfall Ditch surface water.

Toxaphene. Toxaphene was not detected in surface water.

Metals. Maximum HQs exceed 1 for cobalt, cyanide, iron, and manganese. Nine other metals that are identified as potentially bioaccumulative and are also identified as COPECs.

PCBs. No PCBs were detected in surface water.

OCPs. No OCPs were detected in surface water.

PAHs. No PAHs are identified as OU1 COPECs in surface water.

SVOCs. The maximum HQ for diethyl phthalate is less than 1. Three additional SVOCs are identified as COPECs due to a lack of ESVs.

VOCs. Maximum HQs for detected VOCs are less than 1. One additional VOC is identified as COPECs due to a lack of ESV.

Based on ESV comparisons, which is the SLERA metric for predicting potential ecological risk, four metals are identified as surface water COPECs. One metal, three SVOCs, and one VOC are identified as COPECs due to a lack of ESVs. Nine additional metals are identified as COPECs based on their potential to bioaccumulate. **See Table 6.**

Pore Water

Table 7 presents summary statistics, ESVs, and calculated HQs for constituents detected in Outfall Ditch pore water.

Toxaphene. Toxaphene was detected and HQ exceeds 1 for one filtered pore water sample collected in the post-weir section of the Outfall Ditch.

Metals. Maximum HQs exceed 1 for cobalt, copper, iron, and manganese. Five other metals that were as potentially bioaccumulative and are also identified as COPECs. One additional metal is identified as COPECs due to a lack of ESV.

PCBs. No PCBs were detected in pore water.

OCPs. No OCPs were detected in pore water.

PAHs. No PAHs are identified as OU1 COPECs in pore water.

SVOCs. Maximum HQs for detected SVOCs are less than 1. One additional SVOC is identified as COPECs due to a lack of ESV.

VOCs. No VOCs are identified as OU1 COPECs in pore water.

Based on ESV comparisons, which is the SLERA metric for predicting potential ecological risk, toxaphene and four metals are identified as pore water COPECs. One additional metal and one SVOC are identified as COPECs due to a lack of ESVs. Five metals are identified as COPECs based on their potential to bioaccumulate. **See Table 7.**

8.2.4 SLERA Summary and SMDP

The results of the screening level exposure estimate and risk calculation (Step 2) indicate that concentrations of several constituents exceed ESVs, which is the SLERA metric for predicting potential adverse ecological effects. Maximum HQs for the majority of constituents detected in sediment exceed the EPA threshold value of 1 and, in the case of toxaphene, the maximum concentration exceeds potential ESVs by several orders of magnitude. Although concentrations of toxaphene vary spatially in the Outfall Ditch, with the highest concentrations occurring near the culvert and outfall, HQs exceed 1 in each of the 22 surficial samples evaluated in the SLERA.

Given the magnitude of HQs for toxaphene, it is unlikely that the potential for ecological risk can be attributed to the conservative assumptions or uncertainties of the SLERA. The BERA will not provide significant refinement of potential risks predicted by the SLERA approach or contribute useful information for remedial actions at the Outfall Ditch. Therefore, the ERA proceeded directly to Step 8, *Risk Management*.

8.2.5 Step 8 – Risk Management

Risk management considers predicted risks as well as potential short-term and long-term effects of various remedial alternatives. The SLERA predicted a potential for unacceptable risks to ecological receptors from direct contact with constituents detected in OU1 media, primarily toxaphene. There are uncertainties associated with the quantitative metrics of the SLERA. However, notwithstanding the presence of toxaphene (or other COCs), OU1 inherently represents a disturbed habitat as it is a man-made structure that is actively used for stormwater management.

Given its small size, disturbed nature, and current and future use, OU1 habitat is of limited ecological value. Conversely, the surrounding larger creek system supports numerous species of fish, invertebrates, mammals, and birds. Thus, while it is acknowledged that remedial actions will have short-term adverse effects on ecological receptors that are resident to OU1, these effects are offset by the long-term reduction in downstream transport, which is expected to have a substantial net benefit to the overall health of the ecological community of the larger creek system. This long-term net benefit is also expected to off-set any incidental mobilization and subsequent downstream transport of contaminated media that occurs during remedy implementation.

Risk-based numeric cleanup goals cannot be developed at this time because toxicity reference values for weathered toxaphene congeners have not been developed. As a result, defined goals for remedy success (i.e., risk-based cleanup goals) currently cannot be developed and the volume of sediment to be removed under a dredging/removal scenario cannot be quantified. Therefore, a performance-based remedial goal that focuses on eliminating direct exposure to contaminants in the Outfall Ditch and eliminating the transport of contaminants to Dupree Creek and other downstream locations is recommended. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed.

9.0 Interim Remedial Action Objectives

Remedial action objectives (RAOs) provide a general description of what the interim remedial action will accomplish. Developing RAOs requires an understanding of the contaminants in their respective media and is based upon the evaluation of risk to human health and the environment, protection of groundwater, federal and state Applicable or Relevant and Appropriate Requirements (ARARs), and expected land use. RAOs provide the basis for the development of the remedial alternatives.

The RAOs were developed with the objective of protecting the public from potential current and future health risks, as well as to protect the environment. The following RAOs have been developed for OU1:

1. Eliminate or minimize direct exposure to potential ecological receptors to elevated concentrations of toxaphene and other COPECs present in OU1 sediments, surface water, and pore water; and
2. Eliminate or minimize transport of sediments contaminated with toxaphene and other COPECs to downstream locations.

9.1 Cleanup Levels

Cleanup levels are concentrations of contaminants in environmental media that, when attained, are protective and achieve RAOs. In general, cleanup levels are established with consideration of the following:

- Protection of human receptors from adverse health effects.
- Protection of the environment from detrimental impacts from Site-related contamination.
- Compliance with federal and state ARARs.

ARARs are those substantive standards or environmental protection requirements, criteria, or limitations, promulgated under federal environmental or state environmental or facility siting laws and regulations which are either:

- Directly "Applicable" to the contaminants, proposed remedial action, location, or other circumstances found at a particular CERCLA site, or;
- Are "Relevant and Appropriate" for use at a CERCLA site because they address problems or situations sufficiently similar to those encountered at the Site such that their use is well suited to the Site.

The NCP identifies three categories of ARARS: chemical-specific, location-specific, and action-specific. The federal and state ARARs identified for the Site in each of these three categories are presented in Section 11.

Risk-based numeric cleanup goals cannot be developed because toxicity reference values for weathered toxaphene congeners have not been developed. As a result, defined goals for remedy success (i.e., risk-based cleanup goals) cannot be developed. Therefore, a performance-based remedial goal that focuses on eliminating direct exposure to contaminants in the Outfall Ditch and eliminating the transport of contaminants to Dupree Creek and other downstream locations will be implemented. Once the interim remedy has been constructed the Outfall Ditch will be back filled with clean material and the pathway of exposure should be eliminated and remedial action objectives achieved.

EPA Region 4 has requested assistance from the National Center for Environmental Assessment (NCEA) to develop toxicity information relating to the breakdown products of toxaphene so that cleanup numbers can be developed. At this time, that information is unavailable and it is uncertain when this information will become available. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed.

10.0 Description of Alternatives

As a part of the OU1 Focused FS, a variety of cleanup technologies were first screened by the methods described in the NCP at 40 CFR §300.430(e)(7) for their implementability and effectiveness in abating the identified risks at this Site. Technologies which most effectively address the contaminants were considered in the development of remedial action alternatives. An outgrowth of this screening step was the development of remedial alternatives to address Site-related contamination. The goal in developing the remedial action alternatives was to provide a range of cleanup options together with sufficient information to adequately compare alternatives against each other.

A description of each alternative, along with estimated costs for capital (see Table 8), operation and maintenance (O&M), and total net present worth are provided below.

10.1 Alternative 1: No Action

Estimated Capital Cost:	*$0*
Estimated O&M Cost:	*$0*
Estimated Present Worth Cost:	*$0*
Estimated Construction Time:	*N/A*
Estimated Time to Achieve RAOs:	*N/A*

This alternative is required by the NCP as a baseline for comparison to other alternatives. No Further Action (NFA) includes site monitoring and general maintenance (i.e., erosion control, maintenance of fencing, etc.), but no further active remediation within OU1 and/or additional "limited" action alternatives such as deed restrictions would be implemented. This alternative is carried through consistent with the requirements of the NCP. This alternative would not be protective of human health and the environment, and would not meet ARARs.

10.2 Alternative 2: Sediment Removal Within Existing Channel

Estimated Capital Cost:	*$6,902,000*
Estimated Annual O&M Cost:	*$118,740 (30 years)*
Estimated Present Worth Cost of O&M at 3%:	*$2,397,000*
Estimated Present Worth Cost of O&M at 7%:	*$1,473,450*
Estimated Construction Time:	*34 Weeks*
Estimated Time to Achieve RAOs:	*34 Weeks*

Alternative 2 includes sediment removal by dredging the existing Outfall Ditch. Several possible means of sediment removal are available however, it is assumed under this alternative that a hydraulic dredging process would be utilized, although mechanical dredging can yield equivalent results. It should be noted that the Outfall Ditch was previously dredged in 1999-2000 using mechanical dredging methods. Physical removal of sediment by dredging commenced on or about August 11, 1999 and finished on or about April 12, 2000. During that removal action, approximately 35,000 cubic yards of contaminated sediment were removed from the Outfall Ditch and portions of Dupree and Terry Creeks. This represents a removal of approximately 80%-85% of the toxaphene contaminant mass. However, residual contamination remained.

Hydraulic dredging would consist of a floating barge equipped with a cutter head, suction hose, and pump mobilized into position to systematically dredge the sediment, beginning at the downstream end of the Outfall Ditch and progressing upstream. The sediment would be pumped through a floating discharge hose to a central upland location for dewatering and drying. Hydraulic dredging of this type typically yields a discharge made up of approximately five percent solids and 95 percent liquid. Given the volume of sediment to be removed under this alternative (approximately 36,000 cubic yards) and the highly liquid content, it is anticipated that a series of Geotubes® would be used to expedite the dewatering, drying, and sediment disposal process. It is assumed that the effluent from the dewatering process would be filtered and allowed to gravity drain back into the Outfall Ditch.

10.3 Alternative 3: Sheet Pile Channel Re-Routed with Limited Sediment Removal

Estimated Capital Cost:	*$4,817,000*
Estimated Annual O&M Cost:	*$118,740 (30 years)*
Estimated Present Worth Cost of O&M at 3%:	*$2,397,000*
Estimated Present Worth Cost of O&M at 7%:	*$1,473,450*
Estimated Construction Time:	*23 Weeks*
Estimated Time to Achieve RAOs:	*23 Weeks*

Alternative 3 includes re-routing the discharge into a newly constructed conveyance channel along an alignment parallel to the Outfall Ditch, excavation and offsite disposal of sediment within the Highway 17 triple box culvert and the area in the existing Outfall Ditch used as the transition zone between the new conveyance channel and the triple box culvert, removal of the weir, and backfilling the Outfall Ditch with compacted soil and armoring the backfill slope into Dupree Creek with riprap. There are several significant advantages to re-routing the existing Outfall Ditch, including:

- Surface water management during construction;
- Balancing of earthwork (cut and fill quantities); and
- Avoiding soft subsurface/subgrade conditions within the Outfall Ditch during construction.

Under this alternative, the re-routed channel would consist of steel sheet pile driven to form the channel sides and excavating the soil in between the sheet pile walls to form the channel. Material excavated during construction of the re-routed channel would be temporarily stockpiled for future use in backfilling the Outfall Ditch. The re-routed channel dimensions are 30 feet wide by approximately 10 feet deep, as necessary, to maintain the required channel profile and convey plant discharges and stormwater flows generated from the drainage basin upstream of the triple box culvert. The re-routed channel bottom would be concrete-lined to facilitate future maintenance and periodic sediment removal.

During construction of the re-routed channel, surface water flow would be maintained within the existing Outfall Ditch. A temporary coffer dam and by-pass pump would be required for a short duration to convey flow across a segment of the active construction site as the re-routed channel is connected to the downstream side of the existing Highway 17 triple box culvert. This alternative also includes excavation and offsite disposal of approximately 1,200 cubic yards of contaminated sediment within the Highway 17 triple box culvert and in the Outfall Ditch transition zone where the new channel connects to the triple box culvert.

Surface water flows would be directed to the re-routed channel once it is constructed and functional. A riprap coffer dam would be constructed at the discharge end of the existing Outfall Ditch adjacent to Dupree Creek to control surface water flow (tidal flow) into the Outfall Ditch. The existing weir would be mechanically removed, at a minimum, to below the backfill grade elevation. A layer of geotextile fabric would be installed over the existing sediment within the Outfall Ditch, followed by placement and grading of fill over the fabric. Fill material from the re-routed channel excavation would be used to the extent possible with additional material imported from off-site.

Following placement of fill and grading as described above, the stream bank along Dupree Creek would be further armored to protect the bank from erosion and to contain the newly-placed fill in position (also restricting the potential for migration of the capped sediment into Dupree Creek). The final graded and restored site, including all areas disturbed during construction, would be seeded and stabilized. A monitoring and maintenance plan would be established to observe conditions and possible displacement of the riprap armoring (especially following sediment removal activities in Dupree Creek), and corrective measures taken should the riprap be disturbed or modified from its designed placement and function.

Additionally, an environmental covenant would be placed on the property in accordance with the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.* This Environmental Covenant will subject the Property to following activity and/or use limitations:

- The Property shall be used only for non-residential uses, as defined in and allowed under Glynn County's zoning regulations as of the date of the Environmental Covenant. Further, activity on the Property that may result in the release or exposure to the regulated substances that were contained as part of the Remedy (corrective action), or create a new exposure pathway, is prohibited, with the exception of work necessary for the maintenance, repair, or replacement of engineering controls.

- The use or extraction of groundwater beneath the Property for drinking water or for any other non-remedial purposes shall also be prohibited.

- (See Section 15 "Documentation of Significant Changes" for revisions to the environmental covenant requirement discussed in the OU1 Focused FS and above based on public comments received from community members and elected officials.)

10.4 Alternative 3A: Sheet Pile Channel Within Existing Channel with Limited Sediment Removal

Estimated Capital Cost:	*$5,382,000*
Estimated Annual O&M Cost:	*$118,740 (30 years)*
Estimated Present Worth Cost of O&M at 3%:	*$2,397,000*
Estimated Present Worth Cost of O&M at 7%:	*$1,473,450*
Estimated Construction Time:	*30 Weeks*
Estimated Time to Achieve RAOs:	*30 Weeks*

With Alternative 3A, steel sheet pile would be driven to create a channel similar to the channel presented under Alternative 3, but the channel would be constructed within the existing Outfall Ditch. Alternative 3A also includes excavation and offsite disposal of sediments within the triple box culvert and in the bottom of the Outfall Ditch within the sheet pile walls to obtain the profile needed to convey the discharge water, removal of the weir, and backfilling the portions of the Outfall Ditch outside the sheet pile walls.

Due to the anticipated construction sequencing to manage surface water flows, the new channel would likely be located either on the north or south side of the Outfall Ditch. During construction, a sufficiently wide portion of the existing Outfall Ditch would be filled with imported fill to create a stable working platform for construction of the sheet pile channel. Surface water would gravity flow (i.e. no pumping systems) on the other side of the Outfall Ditch. Then, within the backfilled portion of the Outfall Ditch, the sheet pile would be driven/installed and the soil/sediment within the sheet pile walls would be excavated to the appropriate depths to create the new channel. Temporary coffer dams and by-pass pumps may be required at times to convey flow across segments of active construction areas and while the new sheet pile channel is connected to the existing Highway 17 triple box culvert.

The soil excavated from within the sheet pile channel would be stockpiled and utilized to backfill the north side of the Outfall Ditch once the new sheet pile channel is functional. The channel dimensions would be 30 feet wide by approximately 10 feet deep, as necessary to maintain the required channel profile and convey plant discharges and stormwater flows generated from the drainage basin upstream of the Highway 17 triple box culvert. Within the sheet pile walls, sufficient soil/sediment would be removed to install appropriate foundation materials to concrete-line the channel, which will facilitate easier inspections, maintenance and periodic sediment removal. Additionally, the existing weir would be mechanically removed to allow construction of the new channel within the existing Outfall Ditch.

The sediment from the transition zone (connecting the sheet pile channel to the triple box culvert) and the excavated sediment within the new sheet pile channel would be disposed offsite. It is estimated that approximately 7,900 cubic yards of sediment would be solidified and managed as environmentally impacted waste materials.

Once the sheet pile channel is functional, additional imported fill material would be used to bring the north side of the Outfall Ditch to final grade. Following placement of fill, the stream bank along Dupree Creek would be further armored to protect the bank from erosion and to contain the newly-placed fill in position (also restricting the potential for migration of the capped sediment into Dupree Creek). The final graded and restored site, including all areas disturbed during construction, would be seeded and stabilized. A monitoring and maintenance plan would be established to observe conditions and possible displacement of the riprap armoring (especially following sediment removal activities in Dupree Creek), and corrective measures taken should the riprap be disturbed or modified from its designed placement and function.

Additionally, an Environmental Covenant would be placed on the property in accordance with the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.* This Environmental Covenant will subject the Property to following activity and/or use limitations:

- The Property shall be used only for non-residential uses, as defined in and allowed under Glynn County's zoning regulations as of the date of the Environmental Covenant. Further, activity on the Property that may result in the release or exposure to the regulated substances that were contained as part of the Remedy (corrective action), or create a new exposure pathway, is prohibited, with the exception of work necessary for the maintenance, repair, or replacement of engineering controls.

- The use or extraction of groundwater beneath the Property for drinking water or for any other non-remedial purposes shall also be prohibited.

- (See Section 15 "Documentation of Significant Changes" for revisions to the environmental covenant requirement discussed in the OU1 Focused FS and above based on public comments received from community members and elected officials.)

10.5 Alternative 4: Concrete-Lined Channel Re-Routed with Limited Sediment Removal

Estimated Capital Cost:	*$3,015,000*
Estimated Annual O&M Cost:	*$118,740 (30 years)*
Estimated Present Worth Cost of O&M at 3%:	*$2,397,000*
Estimated Present Worth Cost of O&M at 7%:	*$1,473,450*
Estimated Construction Time:	*25 Weeks*
Estimated Time to Achieve RAOs:	*25 Weeks*

Alternative 4 includes re-routing the discharge into a newly constructed concrete lined conveyance channel along an alignment parallel to the Outfall Ditch, excavation and offsite disposal of sediment within the Highway 17 triple box culvert and the area in the existing Outfall Ditch used as the transition zone between the new conveyance channel and the triple box culvert, removal of the weir, backfilling the Outfall Ditch with compacted soil, and armoring the backfill slope into Dupree Creek with riprap. The configuration of this alternative is just south of the Outfall Ditch, but an alternative alignment north of the Outfall Ditch is also possible. This alternative will remove the sediment exposure pathway entirely. Clean soils will be used as backfill to bring the Outfall Ditch elevation up to grade with the surrounding uplands in the Marsh Wood Storage Yard. With the sediment encapsulated approximately 5 to 10 feet beneath the ground surface and the ground surface armored with riprap, it will not be susceptible to storm surges or high tides.

The re-routed channel would consist of a trapezoidal cross section. The existing Outfall Ditch would be utilized for conveyance of surface water during construction, but then backfilled, graded, and stabilized. The advantages of constructing a re-routed channel to replace the existing Outfall Ditch are similar to those previously described in Alternative 3.

Under this alternative, the re-routed channel would be excavated and a concrete liner would be installed in the trapezoidal channel. Material excavated during construction of the re-routed channel would be temporarily stockpiled for later use in backfilling the Outfall Ditch. The re-routed channel dimensions include a 5-foot wide flat bottom and 3:1 (horizontal to vertical) side slopes. The Highway 17 triple box culvert would be cleaned of existing sediment during construction. The resulting average channel depth ranges from 8 to 10 feet, as necessary, to maintain the required channel profile and convey plant discharges and stormwater flows generated from the drainage basin upstream of the triple box culvert. The concrete-lined channel bottom would facilitate future inspections, maintenance and periodic sediment removal.

Surface water flow would be maintained within the existing Outfall Ditch during construction of the re-routed channel. A temporary coffer dam and by-pass pump would be required for a short duration to convey flow across a segment of the active construction site as the re-routed channel is connected to the downstream side of the existing Highway 17 triple box culvert. This alternative also includes excavation and offsite disposal of approximately 1,200 cubic yards of contaminated sediment within the Highway 17 triple box culvert and in the Outfall Ditch transition zone where the new channel connects to the triple box culvert.

Surface water flows would be directed to the re-routed channel once it is constructed and functional. A riprap coffer dam would be constructed at the discharge end of the existing Outfall Ditch adjacent to Dupree Creek to control surface water flow into the Outfall Ditch. The existing weir would be mechanically removed, at a minimum, to below the backfill grade elevation. A layer of geotextile fabric would be installed over the existing sediment within the Outfall Ditch, followed by placement and grading of fill over the fabric. Fill material from the re-routed channel excavation would be used to the extent possible to backfill the Outfall Ditch with additional material imported from off-site.

Following placement of fill and grading as described above, the stream bank along Dupree Creek would be further armored to protect the bank from erosion and to contain the newly-placed fill in position (also restricting the potential for migration of the contained sediment into Dupree Creek). The final graded and restored site, including all areas disturbed during construction, would be seeded and stabilized. A monitoring and maintenance plan would be established to observe conditions and possible displacement of the riprap armoring (especially following sediment removal activities in Dupree Creek), and corrective measures taken should the riprap be disturbed or modified from its designed placement and function.

Additionally, an Environmental Covenant would be placed on the property in accordance with the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.* This Environmental Covenant will subject the Property to following activity and/or use limitations:

- The Property shall be used only for non-residential uses, as defined in and allowed under Glynn County's zoning regulations as of the date of the Environmental Covenant. Further, activity on the Property that may result in the release or exposure to the regulated substances that were contained as part of the Remedy (corrective action), or create a new exposure pathway, is prohibited, with the exception of work necessary for the maintenance, repair, or replacement of engineering controls.

- The use or extraction of groundwater beneath the Property for drinking water or for any other non-remedial purposes shall also be prohibited.

- (See Section 15 "Documentation of Significant Changes" for revisions to the environmental covenant requirement discussed in the OU1 Focused FS and above based on public comments received from community members and elected officials.)

10.6 Alternative 4A: Concrete-Lined Channel Within Existing Channel with Limited Sediment Removal

Estimated Capital Cost:	*$4,277,000*
Estimated Annual O&M Cost:	*$118,740 (30 years)*
Estimated Present Worth Cost of O&M at 3%:	*$2,397,000*
Estimated Present Worth Cost of O&M at 7%:	*$1,473,450*
Estimated Construction Time:	*32 Weeks*
Estimated Time to Achieve RAOs:	*32 Weeks*

Alternative 4A includes construction of a concrete-lined channel within the existing Outfall Ditch. The concrete-lined channel would be trapezoidal in shape, matching the cross-sectional dimensions of the re-routed concrete-lined channel described in Alternative 4. This alternative also includes excavation and offsite disposal of sediments within the triple box culvert and in the bottom of the Outfall Ditch to obtain the profile needed to convey the discharge water, and removal of the weir.

This alternative would be constructed similar to the sheet pile channel alternative, except that the new channel would be a concrete lined channel. During construction, surface water discharges would be rerouted to the north side of the Outfall Ditch by excavation of a channel. A portion of the south side of the existing Outfall Ditch would be filled with imported fill to create a stable working platform for construction of the new concrete lined channel. Doing so will mitigate the amount of active dewatering necessary during the construction. The proposed channel would initially be excavated to the required cross section and concrete liner materials used to reinforce the channel shape.

During construction, surface water flow would gravity flow along the north side of the Outfall Ditch. Temporary coffer dams and by-pass pumps may be required at times to convey flow across segments of active construction areas, and while the new channel is connected to the downstream side of the existing Highway 17 triple box culvert. Furthermore, the existing weir would be mechanically removed to allow construction of the new channel within the existing Outfall Ditch.

This alternative also includes excavation and offsite disposal of approximately 12,800 cubic yards of contaminated sediments within the Highway 17 triple box culvert, the Outfall Ditch transition zone where the new channel connects to the triple box culvert, as well as sediments from within the existing Outfall Ditch to maintain the required channel profile and convey plant discharges and stormwater flows generated from the drainage basin upstream of the triple box culvert.

Soil excavated from the backfilled platform to construct the new concrete-lined channel would be used as backfill for the north side of the existing Outfall Ditch. Existing sediment, encountered in the lower horizons of the new channel construction would be solidified and managed as environmentally impacted waste materials. A layer of geotextile fabric would be installed over the existing sediment within the Outfall Ditch prior to placement of imported fill. Imported fill material would be used to bring the site to final grade.

Following placement of fill and grading described above, the stream bank along Dupree Creek would be further armored to protect the bank from erosion and to contain the newly-placed fill in position (also restricting the potential for migration of the contained sediment into Dupree Creek). The final graded and restored site, including all areas disturbed during construction, would be seeded and stabilized. A monitoring and maintenance plan would be established to observe conditions and possible displacement of the riprap armoring (especially following sediment removal activities in Dupree Creek), and corrective measures taken should the riprap be disturbed or modified from its designed placement and function.

Additionally, an Environmental Covenant would be placed on the property in accordance with the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.* This Environmental Covenant will subject the Property to following activity and/or use limitations:

- The Property shall be used only for non-residential uses, as defined in and allowed under Glynn County's zoning regulations as of the date of the Environmental Covenant. Further, activity on the Property that may result in the release or exposure to the regulated substances that were contained as part of the Remedy (corrective action), or create a new exposure pathway, is prohibited, with the exception of work necessary for the maintenance, repair, or replacement of engineering controls.

- The use or extraction of groundwater beneath the Property for drinking water or for any other non-remedial purposes shall also be prohibited.

- (See Section 15 "Documentation of Significant Changes" for revisions to the environmental covenant requirement discussed in the OU1 Focused FS and above based on public comments received from community members and elected officials.)

10.7 Alternative 5: Box Culvert Re-Routed with Limited Sediment Removal

Estimated Capital Cost:	*$5,119,000*
Estimated Annual O&M Cost:	*$118,740 (30 years)*
Estimated Present Worth Cost of O&M at 3%:	*$2,397,000*
Estimated Present Worth Cost of O&M at 7%:	*$1,473,450*
Estimated Construction Time:	*28 Weeks*
Estimated Time to Achieve RAOs:	*28 Weeks*

Alternative 5 includes re-routing the discharge into a newly constructed culvert conveyance system along an alignment parallel to the Outfall Ditch, excavation and offsite disposal of sediment within the Highway 17 triple box culvert and the area in the existing Outfall Ditch used as the transition zone between the new conveyance structure and the triple box culvert, removal of the weir, and backfilling the existing Outfall Ditch with compacted soil and armoring the backfill slope into Dupree Creek with riprap.

This alternative includes the installation of a quadruple 8-foot by 6-foot concrete box culvert. The existing Outfall Ditch would be utilized for conveyance of surface water during construction. Following completion of the re-routed culvert system, the existing Outfall Ditch would be backfilled, graded, and stabilized as indicated on the conceptual drawings and described further below. The advantages to constructing a re-routed channel (or box culvert) to replace the existing Outfall Ditch are similar to those previously described in Alternative 3.

Under this alternative, material excavated during construction of the box culvert would be temporarily stockpiled for later use in backfilling the Outfall Ditch. The culvert profile and dimensions are appropriate to maintain the required channel profile (matching the invert of the Highway 17 triple box culvert) and convey plant discharges and stormwater flows generated from the drainage basin upstream of the triple box culvert. With the culvert being a closed conveyance system, maintenance of the box culvert and periodic removal of accumulated sediment would require points of access and specialized equipment to loosen and pump sediment from the culvert system.

Surface water flow would be maintained within the existing Outfall Ditch during construction of the re-routed channel/box culvert. A temporary coffer dam and by-pass pump may be required for short durations to convey flow across a segment of the active construction site as the new box culvert is connected to the downstream side of the existing Highway 17 triple box culvert. This alternative also includes excavation and offsite disposal of approximately 1,200 cubic yards of contaminated sediment within the Highway 17 triple box culvert and in the Outfall Ditch transition zone where the new box culvert connects to the triple box culvert.

Surface water flows would be directed to the re-routed channel once it is constructed and functional. A riprap coffer dam would be constructed at the discharge end of the existing Outfall Ditch adjacent to Dupree Creek to control surface water flow into the Outfall Ditch. The existing weir would be mechanically removed, at a minimum, to below the backfill grade elevation. A layer of geotextile fabric would be installed over the existing sediment within the Outfall Ditch, followed by placement and grading of fill over the fabric. Fill material from the re-routed channel excavation would be used to the extent possible with additional material imported from off-site.

Following placement of fill and grading as described above, the stream bank along Dupree Creek would be further armored to protect the bank from erosion and to contain the newly-placed fill in position (also restricting the potential for migration of the contained sediment into Dupree Creek). The final graded and restored site, including all areas disturbed during construction, would be seeded and stabilized. A monitoring and maintenance plan would be established to observe conditions and possible displacement of the riprap armoring (especially following sediment removal activities in Dupree Creek), and corrective measures taken should the riprap be disturbed or modified from its designed placement and function.

Additionally, an Environmental Covenant would be placed on the property in accordance with the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.* This Environmental Covenant will subject the Property to following activity and/or use limitations:

- The Property shall be used only for non-residential uses, as defined in and allowed under Glynn County's zoning regulations as of the date of the Environmental Covenant. Further, activity on the Property that may result in the release or exposure to the regulated substances that were contained as part of the Remedy (corrective action), or create a new exposure pathway, is prohibited, with the exception of work necessary for the maintenance, repair, or replacement of engineering controls.

- The use or extraction of groundwater beneath the Property for drinking water or for any other non-remedial purposes shall also be prohibited.

- (See Section 15 "Documentation of Significant Changes" for revisions to the environmental covenant requirement discussed in the OU1 Focused FS and above based on public comments received from community members and elected officials.)

10.8 Alternative 5A: Box Culvert Within Existing Outfall Ditch with Limited Sediment Removal

Estimated Capital Cost:	*$5,802,000*
Estimated Annual O&M Cost:	*$118,740 (30 years)*
Estimated Present Worth Cost of O&M at 3%:	*$2,397,000*
Estimated Present Worth Cost of O&M at 7%:	*$1,473,450*
Estimated Construction Time:	*35 Weeks*
Estimated Time to Achieve RAOs:	*35 Weeks*

Alternative 5A includes installation of a quadruple 8-foot by 6-foot concrete box culvert within the existing Outfall Ditch. This alternative also includes excavation and offsite disposal of sediments within the Highway 17 triple box culvert and in the bottom of the Outfall Ditch to obtain the profile needed to convey the discharge water, and removal of the weir.

This alternative would be constructed similar to the previously described "in-channel" alternatives. During construction, surface water discharges would be rerouted to the north side of the Outfall Ditch. A portion of the south side of the existing Outfall Ditch would be filled with imported fill to create a stable working platform for construction of the culvert system. The box culvert profile was designed to maintain the profile matching the invert of the Highway 17 triple box culvert and with dimensions to convey plant discharges and stormwater flows generated from the drainage basin upstream of the triple box culvert.

With the culvert being a closed conveyance system, maintenance of the box culvert and periodic removal of accumulated sediment would require points of access and specialized equipment to loosen and pump sediment from the new culvert.

During construction, surface water flow would be directed to the north side of the existing Outfall Ditch. Temporary coffer dams and by-pass pumps may be required at times to convey flow across segments of active construction areas, and while the new box culvert channel is connected to the downstream side of the existing Highway 17 triple box culvert. Furthermore, the existing weir would be mechanically removed to allow construction of the new channel within the existing Outfall Ditch.

This alternative also includes excavation and offsite disposal of approximately 9,800 cubic yards of contaminated sediments within the Highway 17 triple box culvert, the Outfall Ditch transition zone where the new box culvert channel connects to the triple box culvert, as well as sediments from within the existing Outfall Ditch to maintain the required channel profile and convey plant discharges and stormwater flows generated from the drainage basin upstream of the triple box culvert.

Originally imported and placed material excavated from the upper horizons of the working platform construction would be used as backfill for the north side of the Outfall Ditch. Existing sediment, encountered in the lower horizons of the new channel construction and from the transition zone tie-in of the new box culvert to the existing box culvert would be solidified and managed as environmentally impacted waste materials. A layer of geotextile fabric would be installed over the existing sediment within the Outfall Ditch prior to placement of imported fill. Imported fill material would be used to bring the site to final grade.

Following placement of fill and grading described above, the stream bank along Dupree Creek would be further armored to protect the bank from erosion and to contain the newly-placed fill in position (also restricting the potential for migration of the contained sediment into Dupree Creek). The final graded and restored site, including all areas disturbed during construction, would be seeded and stabilized. A monitoring and maintenance plan would be established to observe conditions and possible displacement of the riprap armoring (especially following sediment removal activities in Dupree Creek), and corrective measures taken should the riprap be disturbed or modified from its designed placement and function.

Additionally, an Environmental Covenant would be placed on the property in accordance with the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.* This Environmental Covenant will subject the Property to following activity and/or use limitations:

- The Property shall be used only for non-residential uses, as defined in and allowed under Glynn County's zoning regulations as of the date of the Environmental Covenant. Further, activity on the Property that may result in the release or exposure to the regulated substances that were contained as part of the Remedy (corrective action), or create a new exposure pathway, is prohibited, with the exception of work necessary for the maintenance, repair, or replacement of engineering controls.

- The use or extraction of groundwater beneath the Property for drinking water or for any other non-remedial purposes shall also be prohibited.

- (See Section 15 "Documentation of Significant Changes" for revisions to the environmental covenant requirement discussed in the OU1 Focused FS and above based on public comments received from community members and elected officials.)

10.9 Alternative 6: Aqua Blok™-Lined Channel with Limited Sediment Removal

Estimated Capital Cost:	*$5,843,000*
Estimated Annual O&M Cost:	*$118,740 (30 years)*
Estimated Present Worth Cost of O&M at 3%:	*$2,397,000*
Estimated Present Worth Cost of O&M at 7%:	*$1,473,450*
Estimated Construction Time:	*34 Weeks*
Estimated Time to Achieve RAOs:	*34 Weeks*

Alternative 6 includes construction of an Aqua Blok™ (or similar) and rip-rap armored channel within the existing Outfall Ditch. This alternative also includes excavation and offsite disposal of sediments within the triple box culvert and in the bottom of the Outfall Ditch to obtain the profile needed to convey the discharge water, and removal of the weir.

Aqua Blok™ is a product which creates a bentonite barrier between overlying materials and underlying sediment. Aqua Block™ would be placed at a thickness of approximately four inches on compacted clean fill and armored with a 24-inch thick layer of riprap. The channel would be trapezoidal in shape, similar to the cross sectional dimensions of the concrete-lined channel described in Alternatives 3 and 3A.

This alternative would be constructed similar to the previously described "in-channel" alternatives. During construction, surface water discharges would be routed to the north side of the Outfall Ditch. A portion of the south side of the existing Outfall Ditch would be filled with imported fill to create a stable working platform for construction of the new channel. Doing so will mitigate the amount of active dewatering necessary during the construction.

Temporary coffer dams and by-pass pumps may be required at times to convey flow across segments of active construction areas, and while the new channel is connected to the downstream side of the existing Highway 17 triple box culvert. Furthermore, the existing weir would be mechanically removed to allow construction of the new channel within the existing Outfall Ditch.

Aqua Blok™ would be installed along the channel side and bottom to an approximate thickness of 4-inches using a "telebelt" handler or similar. Following installation of the Aqua Blok™, riprap will be placed over the Aqua Blok™ to form the final channel shape and provide protection from erosion.

This alternative also includes excavation and offsite disposal of approximately 12,800 cubic yards of impacted sediments. The sediments will be excavated from within the Highway 17 triple box culvert, the Outfall Ditch transition zone where the new Aqua Blok™-lined channel connects to the triple box culvert, as well as sediments from within the existing Outfall Ditch excavated to maintain the required channel profile and convey plant discharges and stormwater flows generated from the drainage basin upstream of the triple box culvert.

Once the new channel is functional, originally imported and placed material excavated from the upper horizons of the working platform construction would be used as backfill for the north side of the Outfall Ditch. Existing sediment, encountered in the lower horizons of the new channel construction would be solidified and managed as environmentally impacted waste materials. A layer of geotextile fabric would be installed over the existing sediment within the Outfall Ditch prior to placement of imported fill. Imported fill material would be used to bring the site to final grade.

Following placement of fill and grading described above, the stream bank along Dupree Creek would be further armored to protect the bank from erosion and to contain the newly-placed fill in position (also restricting the potential for migration of the capped sediment into Dupree Creek). The final graded and restored site, including all areas disturbed during construction, would be seeded and stabilized. A monitoring and maintenance plan would be established to observe conditions and possible displacement of the riprap armoring (especially following sediment removal activities in Dupree Creek), and corrective measures taken should the riprap be disturbed or modified from its designed placement and function.

Additionally, an Environmental Covenant would be placed on the property in accordance with the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.* This Environmental Covenant will subject the Property to following activity and/or use limitations:

- The Property shall be used only for non-residential uses, as defined in and allowed under Glynn County's zoning regulations as of the date of the Environmental Covenant. Further, activity on the Property that may result in the release or exposure to the regulated substances that were contained as part of the Remedy (corrective action), or create a new exposure pathway, is prohibited, with the exception of work necessary for the maintenance, repair, or replacement of engineering controls.

- The use or extraction of groundwater beneath the Property for drinking water or for any other non-remedial purposes shall also be prohibited.

- (See Section 15 "Documentation of Significant Changes" for revisions to the environmental covenant requirement discussed in the OU1 Focused FS and above based on public comments received from community members and elected officials.)

10.10 Alternative 6A: Carbon-Amended Sand Cap Channel with Limited Sediment Removal

Estimated Capital Cost:	*$5,854,000*
Estimated Annual O&M Cost:	*$118,740 (30 years)*
Estimated Present Worth Cost of O&M at 3%:	*$2,397,000*
Estimated Present Worth Cost of O&M at 7%:	*$1,473,450*
Estimated Construction Time:	*34 Weeks*
Estimated Time to Achieve RAOs:	*34 Weeks*

Alternative 6A includes construction of a sand cap amended with granular activated carbon with rip-rap armoring channel within the existing Outfall Ditch. This alternative also includes excavation and offsite disposal of sediments within the triple box culvert and in the bottom of the Outfall Ditch to obtain the profile needed to convey the discharge water, and removal of the weir.

The sand cap creates a barrier between overlying materials and underlying sediment. The addition of granular activated carbon (GAC) is intended to promote the sorption and permanent in situ sequestration of hydrophobic organic contaminants, such as toxaphene. GAC is derived from carbonaceous materials which are physically "activated" at high temperatures through the creation of porous structures characterized by very high surface areas. The sand cap (composed of a manufactured sand) mixed with 5-10 percent GAC to a depth of approximately 1-foot and armored with a 24-inch thick layer of riprap. Treatability studies would be performed to determine the appropriate application rate for GAC. The channel would be trapezoidal in shape, similar to the cross sectional dimensions of the concrete-lined channel described in Alternatives 3 and 3A.

This alternative would be constructed similar to the previously described "in-channel" alternatives. During construction, surface water discharges would be routed to the north side of the Outfall Ditch. A portion of the south side of the existing Outfall Ditch would be filled with imported fill to create a stable working platform for construction of the new channel. Doing so will mitigate the amount of active dewatering necessary during the construction.

Temporary coffer dams and by-pass pumps may be required at times to convey flow across segments of active construction areas, and while the new channel is connected to the downstream side of the existing Highway 17 triple box culvert. Furthermore, the existing weir would be mechanically removed to allow construction of the new channel within the existing Outfall Ditch.

Sand and granular activated carbon would be mixed at a ratio of up to 10% GAC and installed along the channel side and bottom to an approximate thickness of 12-inches using a "telebelt" handler or similar. Following installation of the sand/GAC mixture, riprap will be placed over the sand cap to form the final channel shape and provide protection from erosion.

This alternative also includes excavation and offsite disposal of approximately 12,800 cubic yards of impacted sediments. The sediments will be excavated from within the Highway 17 triple box culvert, the Outfall Ditch transition zone where the new sand capped channel connects to the triple box culvert, as well as sediments from within the existing Outfall Ditch excavated to maintain the required channel profile and convey plant discharges and stormwater flows generated from the drainage basin upstream of the triple box culvert.

Once the new channel is functional, originally imported and placed material excavated from the upper horizons of the working platform construction would be used as backfill for the north side of the Outfall Ditch. Existing sediment, encountered in the lower horizons of the new channel construction would be solidified and managed as environmentally impacted waste materials. A layer of geotextile fabric would be installed over the existing sediment within the Outfall Ditch prior to placement of imported fill. Imported fill material would be used to bring the site to final grade.

Following placement of fill and grading described above, the stream bank along Dupree Creek would be further armored to protect the bank from erosion and to contain the newly-placed fill in position (also restricting the potential for migration of the capped sediment into Dupree Creek). The final graded and restored site, including all areas disturbed during construction, would be seeded and stabilized. A monitoring and maintenance plan would be established to observe conditions and possible displacement of the riprap armoring (especially following sediment removal activities in Dupree Creek), and corrective measures taken should the riprap be disturbed or modified from its designed placement and function.

Additionally, an Environmental Covenant would be placed on the property in accordance with the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.* This Environmental Covenant will subject the Property to following activity and/or use limitations:

- The Property shall be used only for non-residential uses, as defined in and allowed under Glynn County's zoning regulations as of the date of the Environmental Covenant. Further, activity on the Property that may result in the release or exposure to the regulated substances that were contained as part of the Remedy (corrective action), or create a new exposure pathway, is prohibited, with the exception of work necessary for the maintenance, repair, or replacement of engineering controls.

- The use or extraction of groundwater beneath the Property for drinking water or for any other non-remedial purposes shall also be prohibited.

- (See Section 15 "Documentation of Significant Changes" for revisions to the environmental covenant requirement discussed in the OU1 Focused FS and above based on public comments received from community members and elected officials.)

10.11 Alternative 7: Riprap-Armored Channel With Limited Sediment Removal

Estimated Capital Cost:	*$4,705,000*
Estimated Annual O&M Cost:	*$118,740 (30 years)*
Estimated Present Worth Cost of O&M at 3%:	*$2,397,000*
Estimated Present Worth Cost of O&M at 7%:	*$1,473,450*
Estimated Construction Time:	*34 Weeks*
Estimated Time to Achieve RAOs:	*34 Weeks*

Alternative 7 includes construction of a new channel with a traditional sand cap (or compacted clean fill) and riprap armoring within the existing Outfall Ditch. The channel would be trapezoidal in shape, similar to the cross sectional dimensions of the concrete-lined channel described in Alternatives 3 and 3A. This alternative also includes excavation and offsite disposal of sediments within the triple box culvert and in the bottom of the Outfall Ditch to obtain the profile needed to convey the discharge water, and removal of the weir.

This alternative would be constructed similar to the previously described "in-channel" alternatives. During construction, surface water discharges would be routed to the north side of the Outfall Ditch. A portion of the south side of the existing Outfall Ditch would be filled with imported fill to create a stable working platform for construction of the new channel. Doing so will mitigate the amount of active dewatering necessary during the construction. During construction, surface water flow would be directed around the filled portions of the existing Outfall Ditch. Sand (or compacted fill) armored with riprap would be placed over the prepared earthen channel sides and bottom to form the final channel shape and provide protection from erosion.

Temporary coffer dams and by-pass pumps may be required at times to convey flow across segments of active construction areas, and while the new channel is connected to the downstream side of the existing Highway 17 triple box culvert. Furthermore, the existing weir would be mechanically removed to allow construction of the new channel within the existing Outfall Ditch.

This alternative also includes excavation and offsite disposal of approximately 12,800 cubic yards of impacted sediments. The sediments will be excavated from within the Highway 17 triple box culvert, the Outfall Ditch transition zone where the new channel connects to the triple box culvert, as well as sediments from within the existing Outfall Ditch to maintain the required channel profile and convey plant discharges and stormwater flows generated from the drainage basin upstream of the triple box culvert.

Originally imported and placed material excavated from the upper horizons of the working platform construction would be used as backfill in the remaining portions of the existing Outfall Ditch. Existing sediment, encountered in the lower horizons of the new channel construction would be solidified and managed as environmentally impacted waste materials. A layer of geotextile fabric would be installed over the existing sediment within the Outfall Ditch prior to placement of imported fill. Imported fill material would be used to bring the site to final grade.

Following placement of fill and grading described above, the stream bank along Dupree Creek would be further armored to protect the bank from erosion and to contain the newly-placed fill in position (also restricting the potential for migration of the capped sediment into Dupree Creek). The final graded and restored site, including all areas disturbed during construction, would be seeded and stabilized. A monitoring and maintenance plan would be established to observe conditions and possible displacement of the riprap armoring (especially following sediment removal activities in Dupree Creek), and corrective measures taken should the riprap be disturbed or modified from its designed placement and function.

Additionally, an Environmental Covenant would be placed on the property in accordance with the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.* This Environmental Covenant will subject the Property to following activity and/or use limitations:

- The Property shall be used only for non-residential uses, as defined in and allowed under Glynn County's zoning regulations as of the date of the Environmental Covenant. Further, activity on the Property that may result in the release or exposure to the regulated substances that were contained as part of the Remedy (corrective action), or create a new exposure pathway, is prohibited, with the exception of work necessary for the maintenance, repair, or replacement of engineering controls.

- The use or extraction of groundwater beneath the Property for drinking water or for any other non-remedial purposes shall also be prohibited.
- (See Section 15 "Documentation of Significant Changes" for revisions to the environmental covenant requirement discussed in the OU1 Focused FS and above based on public comments received from community members and elected officials.)

11.0 Summary of the Comparative Analysis of Alternatives

As required by the NCP at 40 CFR §300.430(e)(9)(ii), the OU1 Focused FS used a comparative analysis to assess the relative performance of each alternative in relation to nine specific evaluation criteria (excluding the two modifying criteria, state acceptance and community acceptance). The purpose of this analysis was to identify the advantages and disadvantages of each alternative relative to the other alternatives. The nine criteria are divided into three categories: two threshold criteria (Overall Protection of Human Health and the Environment and Compliance with ARARs); five primary balancing criteria (Long-term Effectiveness and Permanence; Reduction of Toxicity, Mobility, and Volume through Treatment; Short-term Effectiveness; Implementability; and Cost); and two modifying criteria (State and Community Acceptance). Below is a summary of the detailed comparative analysis of alternatives against the nine criteria, which is also presented in Table 8-5 of the FS report.

11.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether the alternative provides adequate protection of human health and the environment, and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or ICs.

All alternatives except Alternative 1 (No Action) would provide adequate protection of human health and the environment. Alternative 2 reduces the volume of contamination through dredging to remove sediments. Dredging may leave residual contamination in place and has the potential to release sediment downstream during implementation of the remedial action. The use of dredging would require the construction of a temporary containment berm, site preparation and construction dewatering and drying facilities. Short term and long term bank stability is a concern following disturbance within the Outfall Ditch as the exposed channel banks would be subject to sloughing caused by high flows and tidal influence. While additional dredging would remove contaminated sediments and further reduce contaminant mass, it is possible that complete removal of contaminants is not achievable with this technology and that residual contamination would still be left behind. Due to the lack of toxicity information relating to toxaphene breakdown products an acceptable residual toxaphene concentration in sediments following excavation cannot be determined, making the effectiveness of this remedy uncertain.

Alternatives 3A, 4A, and 5A implement containment remedies within the existing channel of the Outfall Ditch to reduce the mobility of contaminated sediment. The technologies in these alternatives are implementable, but do present some significant challenges to construct. Construction of these alternatives would require the construction of a bypass ditch within the confines of the existing Outfall Ditch in order to re-route wastewater away from the construction area. Additionally, the existing Outfall Ditch would have to be partially backfilled to allow construction on a stable working surface. Construction of the major components of these alternatives within the existing Outfall Ditch is significantly complex and would require management of multiple issues associated with worker health and safety, water management (tidal, storm and plant discharges), work with environmentally impacted sediments, and construction over poor foundation materials that would not be encountered with the re-routed channel alternatives. Alternatives 6, 6A, and 7 utilize capping options within the existing Outfall Ditch. Construction issues with these alternatives are similar to the other remedies within the existing Outfall Ditch. Maintenance of the caps would be required to ensure long term effectiveness and permanence. Alternatives 3, 4, and 5 construct a new outfall channel and backfill the existing Outfall Ditch to contain contaminated sediment. These alternatives provide a long-term remedy with a high degree of permanence. Alternative 5 limits access to the interior of the box culverts and makes removal of accumulated sediments more difficult than in Alternatives 3 and 4. Alternative 4 provides additional protection because the newly constructed conveyance structure is concrete which limits any interaction between groundwater and surface water. Additionally, the open structure provides ease of access for maintenance and removal of accumulated sediment.

11.2 Compliance with ARARs

Section 121(d) of CERCLA and the NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA §121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes or provides a basis for invoking a waiver.

Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable or relevant and appropriate. In accordance with 40 CFR §300.400(g), Georgia and EPA have identified specific ARARs for the selected interim remedy. In addition, per 40 CFR §300.405(g)(3), other advisories, criteria, or guidance may be considered in determining remedies (known as TBC). The federal and state ARARs identified for the Site are presented in Table 9.

All alternatives except Alternative 1 (No Action) are expected to comply with federal and State ARARs. Alternative 2 includes hydraulic dredging of the sediments (approximately 36,000 yd^3) in the existing channel of the Outfall Ditch and would generate a significant volume of potentially contaminated water during dewatering and drying of dredged sediments. The remaining Alternatives involve limited sediment removal (within the Hwy 17 triple box culvert and in the Outfall Ditch transition zone connecting the re-routed or modified channel to the triple box), and varying methods of contained or capped sediments remaining within the existing Outfall Ditch channel. Under all Alternatives, generation of primary wastes (e.g., excavated contaminated sediments) and secondary wastes (e.g. wastewaters generated during dewatering activities) will comply with CWA requirements and RCRA waste characterization, storage and disposal requirements. Capping or containment will eliminate a source of impacted sediment transport to the estuary, potentially reduce fish tissue sample concentrations and aid in achieving Total Maximum Daily Loads (TMDLs) established for the creek system that is protective of aquatic life. Excavation and capping activities for all Alternatives will comply with Action-specific ARAR requirements for land-disturbing activities during construction (e.g., erosion and sediment control, fugitive dust emissions) and Location-Specific ARARs which establish requirements for how activities will be conducted because they are in special locations (*e.g.*, coastal wetlands, floodplains, critical habitats, streams).

11.3 Long-term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time until the cleanup levels are met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls.

All alternatives except Alternative 1 (No Action) are expected to comply with the intent of the NCP for long-term effectiveness and permanence. Alternatives 2, 3, 3A, 4, 4A, and 5, because of removal and capping or containing ditch sediments, should provide a long-term effective remedy with a high degree of permanence at protection from further contamination exposure. Alternatives 5A, 6, 6A, and 7 will also provide a long-term effective remedy with a moderate degree of permanence dependent on various levels of operation and maintenance involved with these alternatives.

11.4 Reduction in Toxicity, Mobility, and Volume

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternative 1 does not reduce the toxicity, mobility or volume of contaminants due to the lack of implementing any additional remedial actions. Alternative 2, by removing the ditch sediments offsite to a secure disposal facility, provides for reduction of volume at the site however, does have the potential to mobilize contamination during dredging. Alternatives 3, 3A, 4A, 5, 5A, 6, 6A, and 7 all reduce or eliminate the mobility of sediments, provides for some reduction in volume but not reducing sediment toxicity. Alternative 4 reduces or eliminates the mobility of sediments, provides some reduction of volume, and reduces/eliminates the exposure pathways.

11.5 Short-term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternative 1 does not provide any short-term effectiveness. The implementation of dredging in Alternative 2 may result in potential risk of worker physical injury and exposure to impacted material. Excavation and grading work within the existing channel poses a risk for disturbance of and unintended releases of sediments from the area during the work, particularly during storm events or other high water discharge events. Alternative 3 has minimal short -term risk since re-routing the channel away from existing contaminated sediments precludes disturbing and potentially releasing impacted material. Alternative 3A, 4A, and 5A have short-term risks during installation of sheet pile or concrete structures within the existing ditch and potential disturbance of contaminated sediments. Alternative 4 of a concrete-lined re-routed ditch provides good short-term effectiveness since work is completed in non-impacted areas. Since Alternatives 4A and 5A have concrete structures being installed within the existing ditch, the base soil will require improvement. Alternative 5, by using a re-routed 4 channel box culvert would provide short-term effectiveness. Alternatives 6, 6A, and 7 all have minimal short-term effectiveness since work will be performed within the existing ditch, thus requiring sediment removal, water management and soil base improvements, all tasks extending the construction schedule compared to the other Alternatives.

11.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other government entities are also considered.

Alternatives 1, 3, 4, and 5 are the most implementable with available technologies, materials, and traditional construction equipment where applicable. Alternative 2 requires somewhat specialized equipment and other challenges with water management and waste disposal. Alternative 3A involving work within the existing ditch and use of sheet pile driving equipment presents some challenges but is overall implementable. Alternatives 4A, 5A, 6, 6A, and 7 all require more complex tasks like water management, working with contaminated sediments and poor base materials, all making these alternatives less implementable.

11.7 Costs

Cost estimates for all remedial alternatives were developed during the OU1 Focused FS and are summarized below. It should be noted that present worth costs discussed in the OU1 Focused FS are based on an effective discount rate of 3 percent (%) and O&M was estimated to last for 30 years. The OU1 Focused FS and Proposed Plan presented the Estimated Present Worth costs utilizing a 3% discount rate. The EPA guidance document "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", dated July 2000, EPA 540-R-00-002, recommends presenting Estimated Present Worth costs utilizing a 7% discount rate. Those costs are presented below.

Table 8: Estimated Present Worth for Remedial Alternatives

Remedial Alternative	Estimated Capital Cost	Estimated Annual O&M Costs	Estimated Present Worth of O&M at 3%	Estimated Present Worth of O&M at 7%	Total Estimated Present Worth at 3%	Total Estimated Present Worth at 7%
1	$0	$0	$0	$0	$0	$0
2	$6,902,000	$118,740	$2,397,000	$1,473,450	$9,299,000	$8,375,450
3	$4,817,000	$118,740	$2,397,000	$1,473,450	$7,214,000	$6,290,450
3A	$5,382,000	$118,740	$2,397,000	$1,473,450	$7,779,000	$6,855,450
4	$3,015,000	$118,740	$2,397,000	$1,473,450	$5,412,000	$4,488,450
4A	$4,277,000	$118,740	$2,397,000	$1,473,450	$6,674,000	$5,750,450
5	$5,119,000	$118,740	$2,397,000	$1,473,450	$7,516,000	$6,592,450
5A	$5,802,000	$118,740	$2,397,000	$1,473,450	$8,199,000	$7,275,450
6	$5,843,000	$118,740	$2,397,000	$1,473,450	$8,240,000	$7,316,450
6A	$5,854,000	$118,740	$2,397,000	$1,473,450	$8,251,000	$7,327,450
7	$4,705,000	$118,740	$2,397,000	$1,473,450	$7,102,000	$6,178,450

11.8 State Acceptance

On June 13, 2017, the State of Georgia concurred with the selection of an Interim Record of Decision for OU1: Outfall Ditch.

11.9 Community Acceptance

EPA has been actively engaged with the affected community and has strived to maintain a collaborative relationship with those interested residents during the interim remedy selection process. In August 1995, EPA in cooperation with EPD, launched a special project called the Brunswick/Glynn County Community Based Environmental Protection Project (Brunswick CBEP). The CBEP project was part of a new EPA approach to long-term environmental protection, an approach that emphasizes community involvement in the protection of natural resources. From the beginning, community members contributed to the goals and direction of the project. Stakeholders, include but are not limited to area citizens, the City of Brunswick, Glynn County, Glynn County Health Department, Glynn Environmental Coalition, Save the People Association, Inc., EPA, EPD, USFWS, NOAA, and ATSDR. On August 10, 1995, a public meeting was held for the Brunswick CBEP to obtain comments from the community and government agencies. The meeting discussed the three NPL sites located in Brunswick: LCP Chemicals Plant, Brunswick (Escambia) Wood Preserving, and Hercules 009 Landfill. The Terry Creek Dredge Spoils Site, while not final on the NPL, was also discussed.

In December 1997, ATSDR advertised public availability sessions to be held on January 20 and 21, 1998 to obtain community input relating to the Terry Creek Dredge Spoils/Hercules Outfall Site. ATSDR obtained health and environmental concerns from 63 residents living near the Terry Creek Dredge Spoils/Hercules Outfall Site.

As an additional effort to inform the Brunswick community, the EPA began to mail out the Brunswick Environmental Cleanup Newsletter in 2008. This newsletter contains information relating to all of the superfund sites in Brunswick and has been mailed approximately 12 times since 2008. Additional updates will continue to be mailed to the Brunswick community as site conditions are updated.

In 1998, the EPA awarded a technical assistance grant (TAG) to the Glynn Environmental Coalition (GEC) for the Terry Creek Dredge Spoil Areas/Hercules Outfall Site. The purpose of the TAG is to help communities participate in Superfund cleanup decision making by providing funding to community groups to allow them to hire their own independent technical advisor to interpret and explain technical reports, site conditions, and the EPA's proposed clean-up plans and decisions to the community. The TAG has been renewed several times to GEC since it was first awarded in 1998.

On June 26, 2015, the notice of availability of the Site documents along with the OU1 Proposed Plan meeting notice was published in the *Brunswick News*. Approximately 340 copies of the Proposed Plan were mailed to community members. The EPA hosted a public meeting on July 30, 2015, at Brunswick/Glynn County Library in Brunswick, Georgia. At this meeting, the EPA presented the Focused RI and FS results and the Proposed Plan for OU1. EPA and EPD were pleased to discuss the Site with the approximately 50 attendees and answer questions. A court reporter transcribed the meeting and the transcript is included in Appendix A of this IROD and in the Administrative Record file. A public comment period on the Proposed Plan was held from June 29, 2015, to September 11, 2015, for a total of 75 days. EPA's responses to the questions asked at the public meeting and comments received during the public comment period are included in the Responsiveness Summary, which is Part 3 of this ROD.

The purpose of the local Site repository is to provide the community a convenient location to review information about the Site. The address for the local repository is:

> Brunswick/Glynn County Regional Library
> 208 Gloucester Street
> Brunswick, GA 31520
> Telephone: (912) 279-3740

On December 8, 2015, representatives from EPA and EPD met with officials from the City of Brunswick and Glynn County, and held a public availability session in Historic City Hall which was attended by approximately 60 people. The purpose of the meetings and public availability session was to provide the community with additional information relating to the preferred alternative and answer any questions presented.

12.0 Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (40 CFR §300.430(a)(1)(iii)(A)). Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied.

The principal threat wastes at OU1, the Outfall Ditch, were removed in 1999-2000. During that removal action, approximately 35,000 cubic yards of contaminated sediment were removed from the Outfall Ditch and portions of Dupree and Terry Creeks. Physical removal of sediment by dredging commenced on or about August 11, 1999 and finished on or about April 12, 2000. The removal action resulted in an approximate 80%-85% of reduction of contaminant mass of technical toxaphene. The Focused RI/FS for OU1 identified low concentrations of technical toxaphene remaining in the Outfall Ditch sediments and this remaining contamination is considered to be a low-level threat waste because the toxaphene in sediments is relatively immobile to leaching, has a low volatility, is relatively immobile, and poses only a low risk of exposure.

13.0 Summary of Selected Interim Remedy

Alternative 4 (Concrete-Lined Channel Re-Routed with Limited Sediment Removal) is EPA's preferred interim remedial alternative. Alternative 4 consists of the following components:

- Re-routing the existing stormwater ditch into a newly constructed concrete-lined ditch.
- Excavation and offsite disposal of impacted sediment in the area near Glynn Avenue to construct the new ditch.
- Removal of the weir.
- Placement of geo-textile fabric over existing sediment in the Outfall Ditch.
- Backfilling the Outfall Ditch with compacted clean soil over fabric.
- Armoring the backfill slope.
- Seeding and stabilization of disturbed areas.
- Implementation of institutional controls such as an environmental covenant prescribing land use and activity restrictions to prevent unauthorized disturbance of the soil cover and other remedy components.
- Periodic inspections, maintenance, and sediment removal in the newly constructed ditch.
- Development and implementation of a long term monitoring plan to ensure the effectiveness of the interim remedy.

13.1 Rationale for the Selected Interim Remedy

EPA believes the interim remedy, while not intended to be final, provides the best balance of tradeoffs among the other alternatives with respect to pertinent criteria, given the limited scope of action. This interim action is protective of human health and the environment, complies with (or waives) Federal and State applicable or relevant and appropriate requirements for this limited-scope action, and is cost-effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize containment to reduce the mobility of contamination and thus is in furtherance of that statutory mandate. Principal threat wastes contained in sediment in the Outfall Ditch pertaining to technical toxaphene were removed in 1999 and 2000. This interim action utilizes containment to reduce the mobility of sediment contamination from the Outfall Ditch and eliminate exposure to sediment contamination in OU1. At the present time, a toxicity value for weathered toxaphene has not been developed by the EPA and therefore the EPA is selecting an interim remedy. When an EPA toxicity value for weathered toxaphene is developed, the EPA will assess the potential risks associated within the Outfall Ditch to determine if further actions are needed and thereafter select a final action for OU1. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action ROD, review of this site and of this remedy will be ongoing.

13.2 Selected Interim Remedy Cost

The estimated total net present worth cost for the selected interim remedy is $4.488 million using a 7% discount rate. The cost estimate is based on the available information regarding the anticipated scope of the interim remedial action. Changes in the cost elements are likely to occur as a result of new information and data collected during the remedial design phase. Major changes may be documented in the form of a memorandum to the Administrative Record file, an Explanation of Significant Differences (ESD), or a ROD amendment. This is an interim remedy and a final remedy for OU1 will be selected at a later date. The projected cost is based on an order-of-magnitude engineering cost estimate that is expected to be within +50 or -30 percent of the actual project cost.

13.3 Expected Outcome of the Selected Interim Remedy

The selected interim remedy will provide protection of human health and the environment by eliminating, reducing, or controlling risks at OU1 through removal of some sediments, rerouting the existing outfall ditch into a new concrete lined ditch, covering remaining sediments in the existing outfall ditch with a liner and clean, compacted soil after rerouting the ditch, and armoring the former outfall ditch with riprap at the confluence of Dupree Creek to prevent erosion and protect against storm surges, a process referred to as coastal hardening. These measures, in combination with monitoring, implementation of institutional controls, maintenance of the selected interim remedy, and ongoing five-year reviews account for possible effects of climate change in the remedy selection process and provide for regular reevaluations to ensure continued interim remedy protectiveness. Future land use of the OU1 property will likely continue as commercial/industrial. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed. Thereafter, a final ROD will be issued for OU1.

14.0 Statutory Determinations

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against offsite disposal of untreated wastes. The following sections discuss how the Selected Interim Remedy meets these statutory requirements.

14.1 Protection of Human Health and the Environment

The selected interim remedy will provide protection of human health and the environment by eliminating, reducing, or controlling risks at OU1 through the elimination of pathways that could result in exposure of human or ecological receptors to contaminated sediment and surface water in the Outfall Ditch. The use of regular maintenance and monitoring will protect human health and the environment by providing notice if complete exposure pathways are re-established. Implementation of ICs will also assist in preserving the integrity of the interim remedy and preventing human exposure to OU1 contaminants. The remedial design will include specifications for meeting proper health and safety precautions during implementation of all the components of the selected interim remedy. No adverse cross-media impacts are expected from the selected interim remedy.

14.2 Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and the NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA §121(d)(4). See also 40 C.F.R. § 300.430(f)(1)(ii)(B). ARARs include only federal and state environmental or facility siting laws or regulations and do not include occupational safety or worker protection requirements. Compliance with OSHA standards is required by 40 C.F.R. § 300.150 and therefore the CERCLA requirement for compliance with or wavier of ARARs does not apply to OSHA standards.

Under CERCLA Section 121(e)(1), federal, state, or local permits are not required for the portion of any removal or remedial action conducted entirely "on-site" as defined in 40 C.F.R. § 300.5. See also 40 C.F.R. §§ 300.400(e)(1) & (2). Also, CERCLA response actions must only comply with the "substantive requirements," not the administrative requirements of a regulation or law. Administrative requirements include permit applications, reporting, record keeping, inspections, and consultation with administrative bodies. Although consultation with state and federal agencies responsible for issuing permits is not required, it is often recommended for determining compliance with certain requirements such as those typically identified as Location-Specific ARARs. See EPA, OSWER Directives No. 9234.1-01 and 9234.1-02, CERCLA Compliance with Other Laws Manual: Parts 1 and Part II (August 1988 and 1989).

Applicable requirements, as defined in 40 C.F.R. § 300.5, are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Relevant and appropriate requirements, as defined in 40 C.F.R. § 300.5, are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site.

Per 40 C.F.R. § 300.400(g)(5), only those State standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable or relevant and appropriate. For purposes of identification and notification of promulgated state standards, the term promulgated means that the standards are of general applicability and are legally enforceable. State ARARs are considered more stringent where there is no corresponding federal ARAR, where the State ARAR provides a more stringent concentration of a contaminant, or the where a State ARAR is broader in scope than a federal requirement. See EPA, OSWER Pub. No. 9234.2-05/FS, CERCLA Compliance with State Requirements (December 1989).

In addition to ARARs, the lead and support agencies may, as appropriate, identify other advisories, criteria, or guidance to be considered for a particular release that may be useful in developing Superfund remedies. See 40 C.F.R. § 300.400(g)(3). The "to-be-considered" (TBC) category consists of advisories, criteria, or guidance that were developed by EPA, other federal agencies, or states that may assist in determining, for example health-based levels for a particular contaminant for which there are no ARARs or the appropriate method for conducting an action. TBCs are not considered legally enforceable and, therefore, are not considered to be applicable for a site but typically are evaluated along with Chemical-specific ARARs as part of the risk assessment to determine protective cleanup levels. See EPA, OSWER Directives No. 9234.1-01 and 9234.1-02, CERCLA Compliance with Other Laws Manual: Parts 1 and Part II (August 1988 and 1989), Section 1.4.

In accordance with 40 CFR §300.400(g), EPD and EPA have identified specific ARARs for the selected interim remedy. In addition, per 40 CFR §300.400(g)(3), other advisories, criteria, or guidance may be considered in determining remedies (known as TBC).

For purposes of ease of identification, the EPA has created three categories of ARARs: Chemical-, Location- and Action-specific. The Selected Interim Remedy is expected to comply with all ARARs identified in Table 9.

14.2.1 Action-Specific ARARs/TBC Guidance

Action-specific ARARs are usually technology-based or activity-based requirements or limitations that control actions taken at hazardous waste sites. Action-specific requirements often include performance, design and controls, or restrictions on particular kinds of activities related to management of hazardous substances. Action-specific ARARs are also triggered by the types of remedial activities and types of wastes that are generated, stored, treated, disposed, emitted, discharged, or otherwise managed.

The Action-specific ARARs for the Selected Interim Remedy include, but are not limited to, RCRA waste characterization, storage and disposal requirements for excavated sediments and wastewaters generated during dewatering activities; EPD restrictions on discharge of pollutants into State waters; RCRA requirements for use and management of hazardous wastes in containers and operation and closure of waste staging piles; and EPD requirements for all land-disturbing activities during soil/sediment excavation and containment, e.g., requirements for controlling fugitive dust emissions, and stormwater management and runoff controls.

14.2.2 Chemical-Specific ARARs/TBC Guidance

Chemical-specific ARARs are usually health or risk based numerical values limiting the amount or concentration of a chemical that may be found in, or discharged to, the environment, e.g., the Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) at 40 C.F.R. Part 141 and the state or federal ambient water quality criteria established under Section 303 or 304 of the Clean Water

Act. See 40 C.F.R. §§ 300.430(e)(2)(i)(B), (C), & (E). The Chemical-specific ARARs for the Site are summarized in Table 9 and include Georgia criteria for the restoration and protection of coastal and marine/estuarine waters for protection of aquatic life and human health.

14.2.3 Location-Specific ARARs/TBC Guidance

Location-Specific requirements establish restrictions on permissible concentrations of hazardous substances or establish requirements for how activities will be conducted because they are in special locations (e.g., wetlands, floodplains, critical habitats, streams). The Location-Specific ARARs for the Site are summarized in Table 9 and include federal and state requirements for protection of wetlands, marshlands and floodplains; mitigation for losses of aquatic resources; restrictions on discharges into or alterations to locations encompassing aquatic ecosystems (e.g., general conditions in Nation Wide Permit (38)-Cleanup of Hazardous and Toxic Waste; Clean Water Act § 404(b)(1) Guidelines; Georgia Coastal Marshlands Protection Act OCGA §12-5-280 *et seq*). Location-specific ARARs also include federal requirements for the protection of threatened and endangered species, and migratory birds (e.g., Endangered Species Act, 16 U.S.C. §7(a)(2), Migratory Bird Treaty Act, 16 U.S.C. §703(a)).

14.2.4 Requirements Applicable to Off-Site Activities

Any remediation wastes that are generated (e.g., excavated soils or wastewaters) and subsequently transferred off-site or transported in commerce along public right-of-ways must meet any applicable requirements (including administrative portions) such as those for packaging, labeling, marking, manifesting, and placarding requirements for hazardous materials. In addition, CERCLA Section 121(d)(3) requires that the off-site transfer of any hazardous substance, pollutant, or contaminant generated during CERCLA response actions be sent to a treatment, storage, or disposal facility that is in compliance with applicable federal and state laws and has been approved by EPA for acceptance of CERCLA waste. See also 40 C.F.R. § 300.440 (so called "Off-Site Rule").

14.3 Cost Effectiveness

In EPA's judgment, the Selected Interim Remedy is cost effective. In making this determination, the following definition was used: A remedy shall be cost effective if its "costs are proportional to its overall effectiveness." (40 CFR §300.430(f)(1)(ii)(D)). EPA evaluated the overall effectiveness of those alternatives that satisfied the threshold criteria (were both protective of human health and the environment and ARAR-compliant) by assessing three (3) of the five (5) balancing criteria in combination. Those three criteria are long term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness. Overall effectiveness was then compared to costs to determine cost effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence this alternative represents a reasonable value for the money to be spent. The estimated present worth total cost of the Selected Interim Remedy is $4.488 million at a 7% discount rate and $5.412 million at a 3% discount rate.

14.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

This interim action is protective of human health and the environment, complies with (or waives) Federal and State applicable or relevant and appropriate requirements for this limited-scope action, and is cost-effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize containment to reduce the mobility of contamination and thus is in furtherance of that statutory mandate. Principal threat wastes contained in sediment in the Outfall Ditch pertaining to technical toxaphene were removed in 1999 and 2000. This interim action utilizes containment to reduce the mobility of sediment contamination from the Outfall Ditch and eliminate exposure to sediment contamination in OU1. At the present time, a toxicity value for weathered toxaphene has not been developed by the EPA and therefore the EPA is selecting an interim remedy. When an EPA toxicity value for weathered toxaphene is developed, the EPA will assess the potential risks associated within the Outfall Ditch to determine if further actions are needed and thereafter select a final action for OU1. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action ROD, review of this site and of this remedy will be ongoing as EPA continues to develop final remedial alternatives for OU1.

14.5 Preference for Treatment as a Principal Element

The selected interim remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), and is cost effective. This interim remedy utilizes containment to reduce the mobility of contamination. The remedy eliminates human and ecological exposure to toxaphene-contaminated sediment in the Outfall Ditch and controls the mobility of the contaminants.

The principal threat wastes at OU1, the Outfall Ditch, were removed in 1999-2000. During that removal action, approximately 35,000 cubic yards of contaminated sediment were removed from the Outfall Ditch and portions of Dupree and Terry Creeks. Physical removal of sediment by dredging commenced on or about August 11, 1999 and finished on or about April 12, 2000. This represents a removal of approximately 80%-85% of the contaminant mass of technical toxaphene, and satisfies the preference for treatment. The Focused RI/FS for OU1 identified low concentrations of technical toxaphene remaining in the Outfall Ditch sediments and this remaining contamination is considered to be a low-level threat waste because the toxaphene in sediments is relatively immobile to leaching, has a low volatility, is relatively immobile, and poses only a low risk of exposure.

14.6 Five-Year Review Requirements

Section 121(c) of CERCLA and the NCP §300.430(f)(5)(iii)(C) provide the statutory and legal basis for conducting five-year reviews. This interim remedy will result in hazardous substances, pollutants, or contaminants permanently remaining onsite above levels that allow for unlimited use and unrestricted exposure. Therefore, a statutory review will be conducted within five years of construction of the interim remedy for OU1, and every five years thereafter, to ensure that the remedy is, or will be, protective of human health and the environment.

15.0 Documentation of Significant Changes

To fulfill CERCLA §117(b) and NCP §300.430(f)(5)(iii)(B) and §300.430(f)(3)(ii)(A), the IROD must document and discuss the reasons for any significant changes made to the Selected Remedy from the time the Proposed Plan was released for public comment to the final selection of the remedy. The final interim remedy selected for OU1 in this IROD has been modified from the remedy presented in the

Proposed Plan based on comments received during the public comment period. The changes are described below.

Interim Remedy

The Proposed Plan released in June 2015 presented the preferred remedial alternative for OU1 as the final action for cleanup. Risk-based numeric cleanup goals cannot be developed for weathered toxaphene because toxicity reference values for weathered toxaphene congeners have not been developed. As a result, defined goals for remedy success (i.e., risk-based cleanup goals) cannot be developed for weathered toxaphene. Therefore, a performance-based remedial goal that focuses on eliminating direct exposure to contaminants in the Outfall Ditch and eliminating the transport of contaminants to Dupree Creek, Terry Creek, and other downstream locations will be implemented as an interim action instead of a final action.

EPA Region 4 has requested assistance from the National Center for Environmental Assessment (NCEA) to develop toxicity information relating to the breakdown products of toxaphene so that cleanup numbers can be developed. At this time, that information is unavailable and it is uncertain when this information will become available. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Additionally, as discussed below, a long term monitoring plan will be developed during the Remedial Design to evaluate the effectiveness of the interim action. Because this is an interim action ROD, review of this site and of this interim remedy will be ongoing as EPA continues to develop final remedial alternatives for OU1.

Environmental Covenant

The selected remedy as described in the Proposed Plan references establishment of an environmental covenant to limit future development. This covenant is described in the RI/FS as follows:

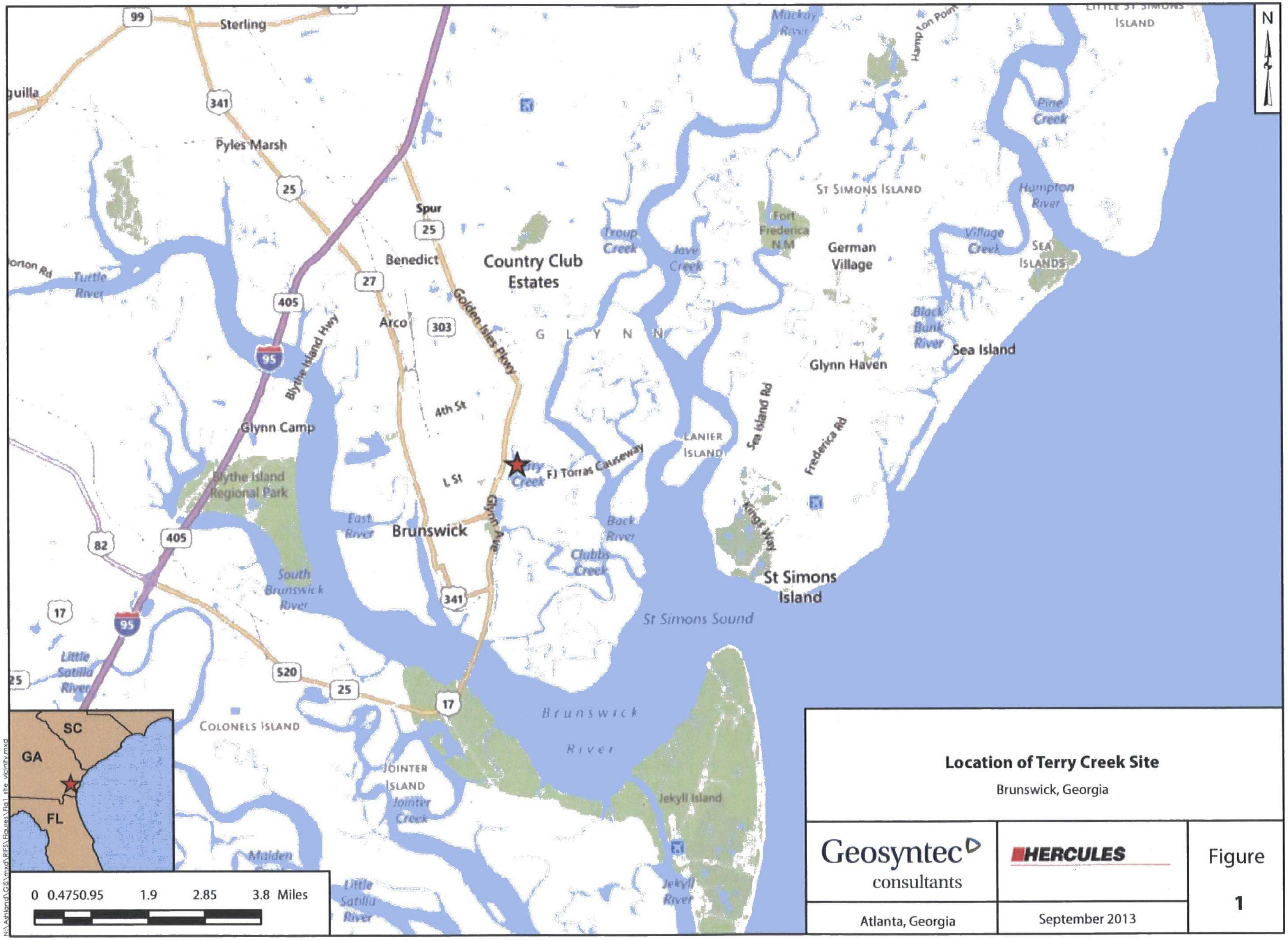
> "Additionally, an Environmental Covenant would be placed on the property in accordance with the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.* This Environmental Covenant will subject the Property to following activity and/or use limitations:
>
> - The Property shall be used only for non-residential uses, as defined in and allowed under Glynn County's zoning regulations as of the date of the Environmental Covenant. Further, activity on the Property that may result in the release or exposure to the regulated substances that were contained as part of the Remedy (corrective action), or create a new exposure pathway, is prohibited, with the exception of work necessary for the maintenance, repair, or replacement of engineering controls.
> - The use or extraction of groundwater beneath the Property for drinking water or for any other non-remedial purposes shall also be prohibited."

During the public comment period comments were submitted expressing concern that this environmental covenant was overly restrictive and unnecessarily limited future use of the Site. After evaluating the public comments, the EPA determined that institutional controls should be implemented at OU1, which shall include:

- An environmental covenant in accordance with the Georgia Uniform Environmental Covenants Act, OCGA § 44-16-1, *et seq.*, prescribing land use and activity restrictions to prevent unauthorized disturbance of the soil cover and other remedy components.

Long Term Monitoring Plan

During the public comment period, the State of Georgia commented that a long term monitoring plan should be developed to ensure that the remedy is performing as intended and remains protective. As part of the Remedial Design for OU1, a monitoring plan will be developed and implemented. Monitoring may include, but not limited to, sampling groundwater and pore water from the former Outfall Ditch at the confluence of Dupree Creek. Fish sampling has been conducted in 2001, 2005, 2007, 2009, 2011, 2013, and 2015. After the removal dredging operation in 2000, a noticeable decrease in fish tissue concentrations of toxaphene was observed. Fish tissue monitoring will continue into the future, and it is anticipated that another decrease in fish tissue concentrations will occur after implementing the interim remedy. Additional sampling of groundwater and sediments in Dupree and Terry Creeks will also occur as part of the remedial investigations for OU2 and OU3.



Location of Terry Creek Site

Brunswick, Georgia

Geosyntec consultants

HERCULES

Figure 1

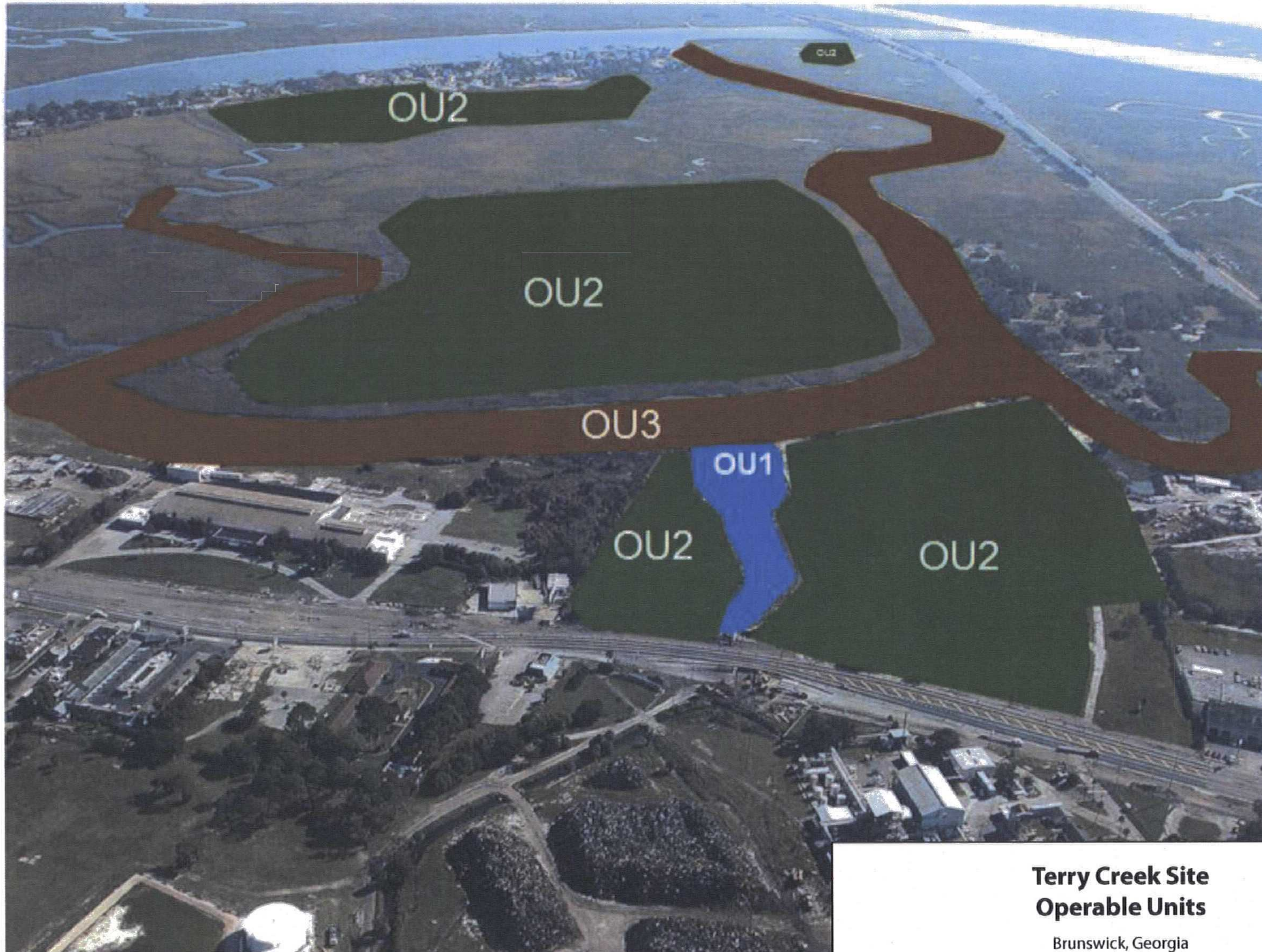
Atlanta, Georgia

September 2013

Terry Creek Site Operable Units

Brunswick, Georgia

Geosyntec consultants	HERCULES	Figure 2
Atlanta, Georgia	September 2013	



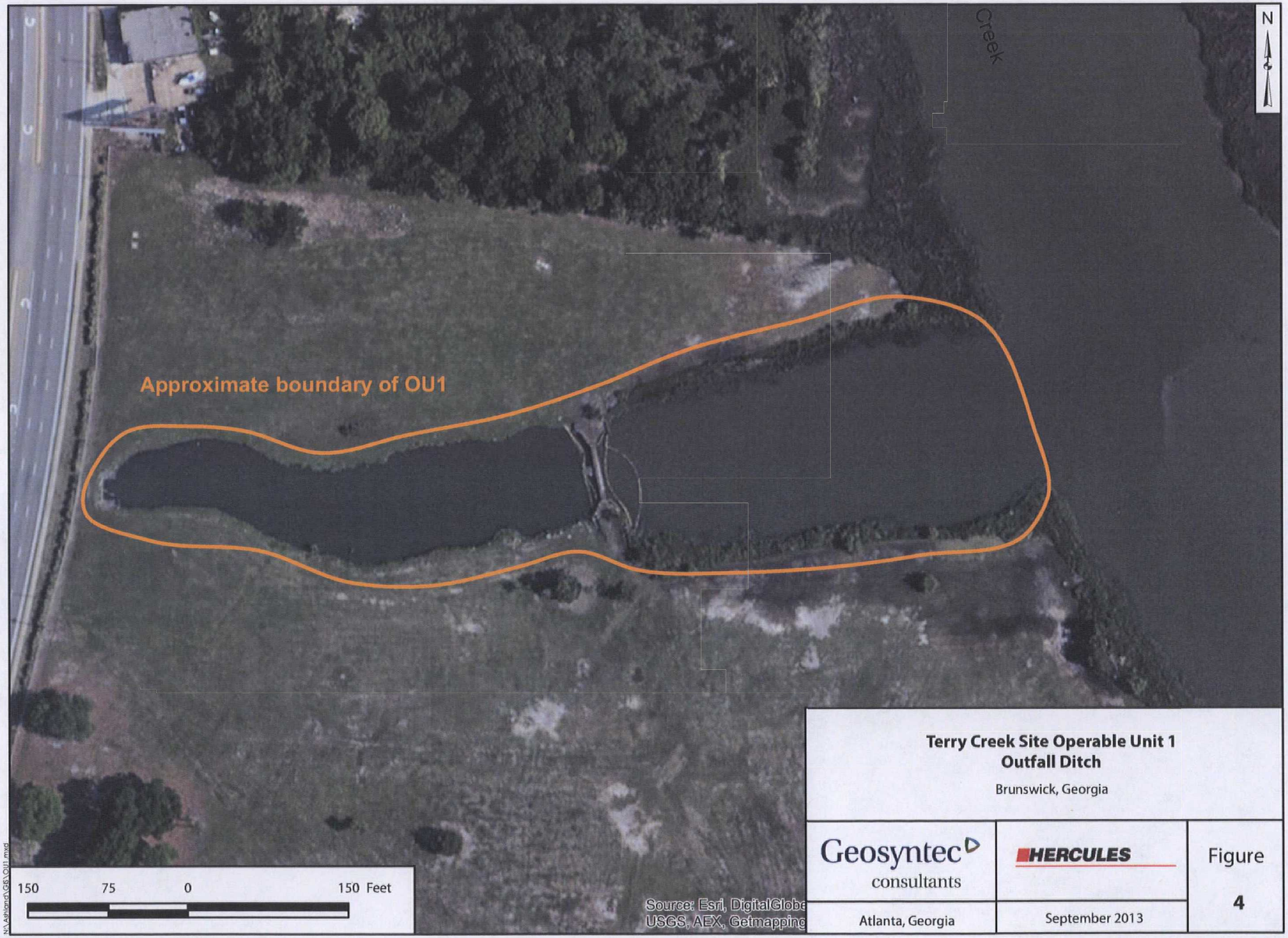
Terry Creek Site
Operable Units
Brunswick, Georgia

Geosyntec consultants
Atlanta, Georgia

HERCULES

Figure
3

Path:



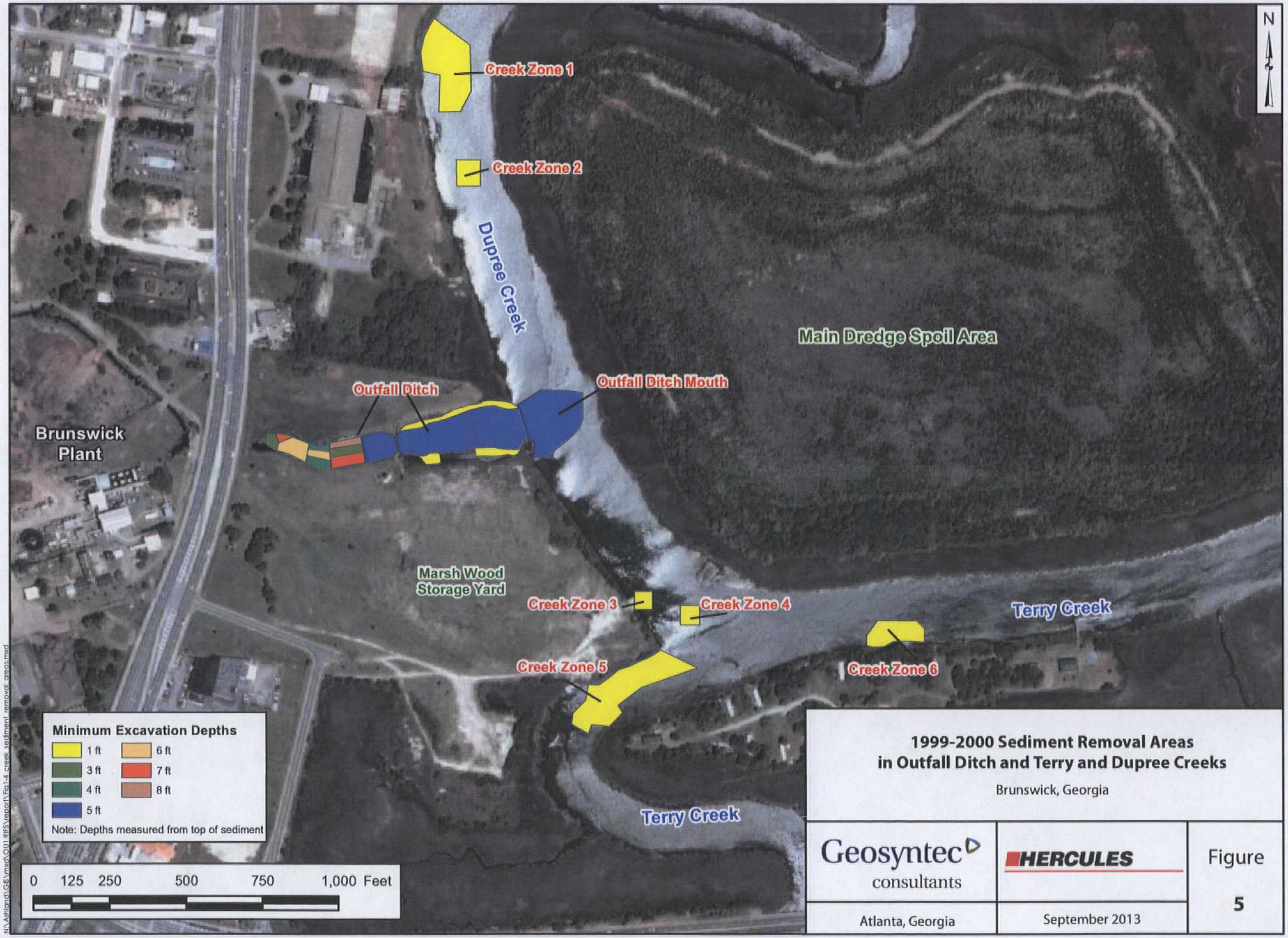
Terry Creek Site Operable Unit 1
Outfall Ditch

Brunswick, Georgia

Atlanta, Georgia

September 2013

Figure 4



1999-2000 Sediment Removal Areas in Outfall Ditch and Terry and Dupree Creeks

Brunswick, Georgia

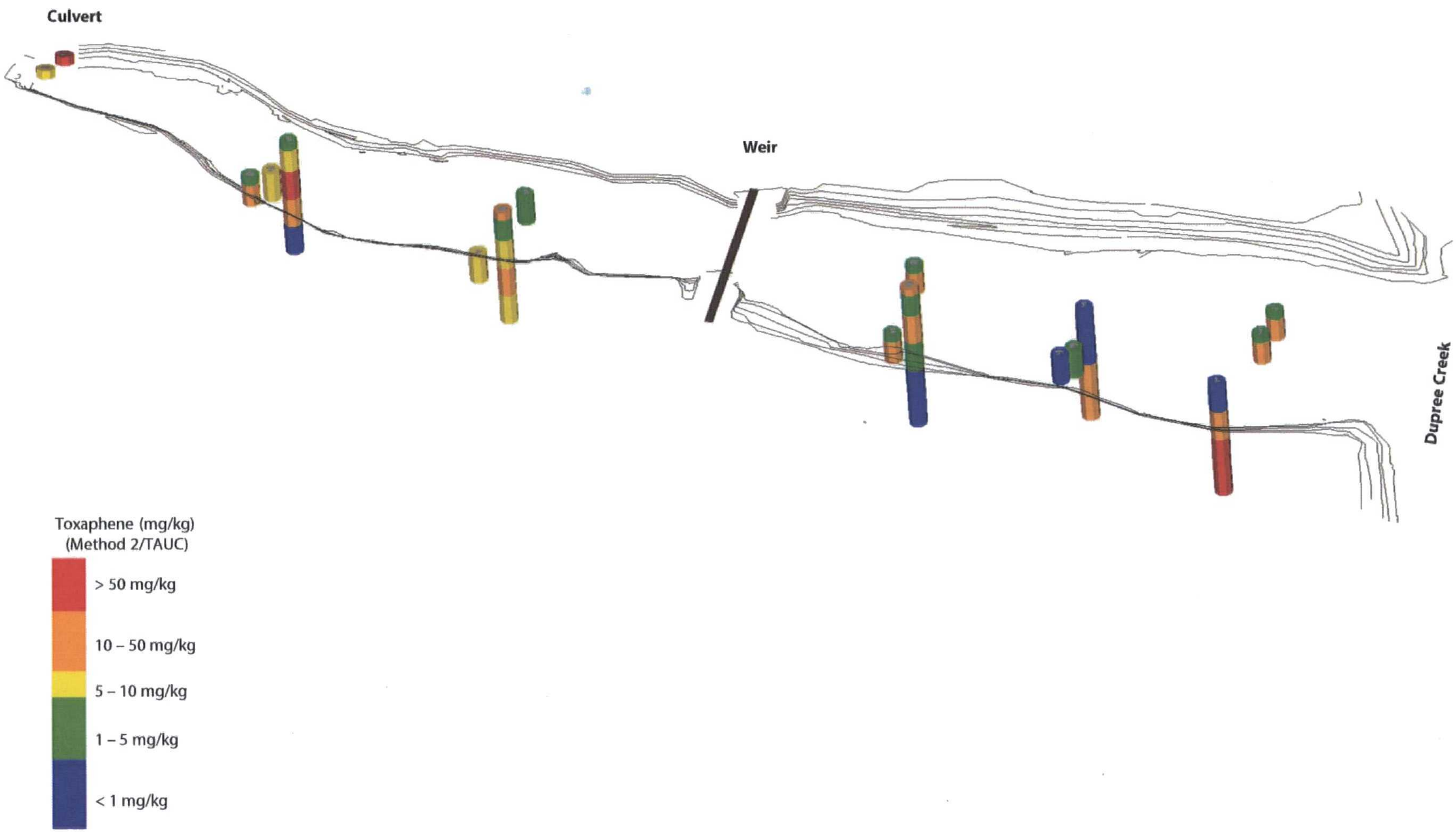
Geosyntec consultants

Atlanta, Georgia

HERCULES

September 2013

Figure 5



Toxaphene Concentrations in Core Samples

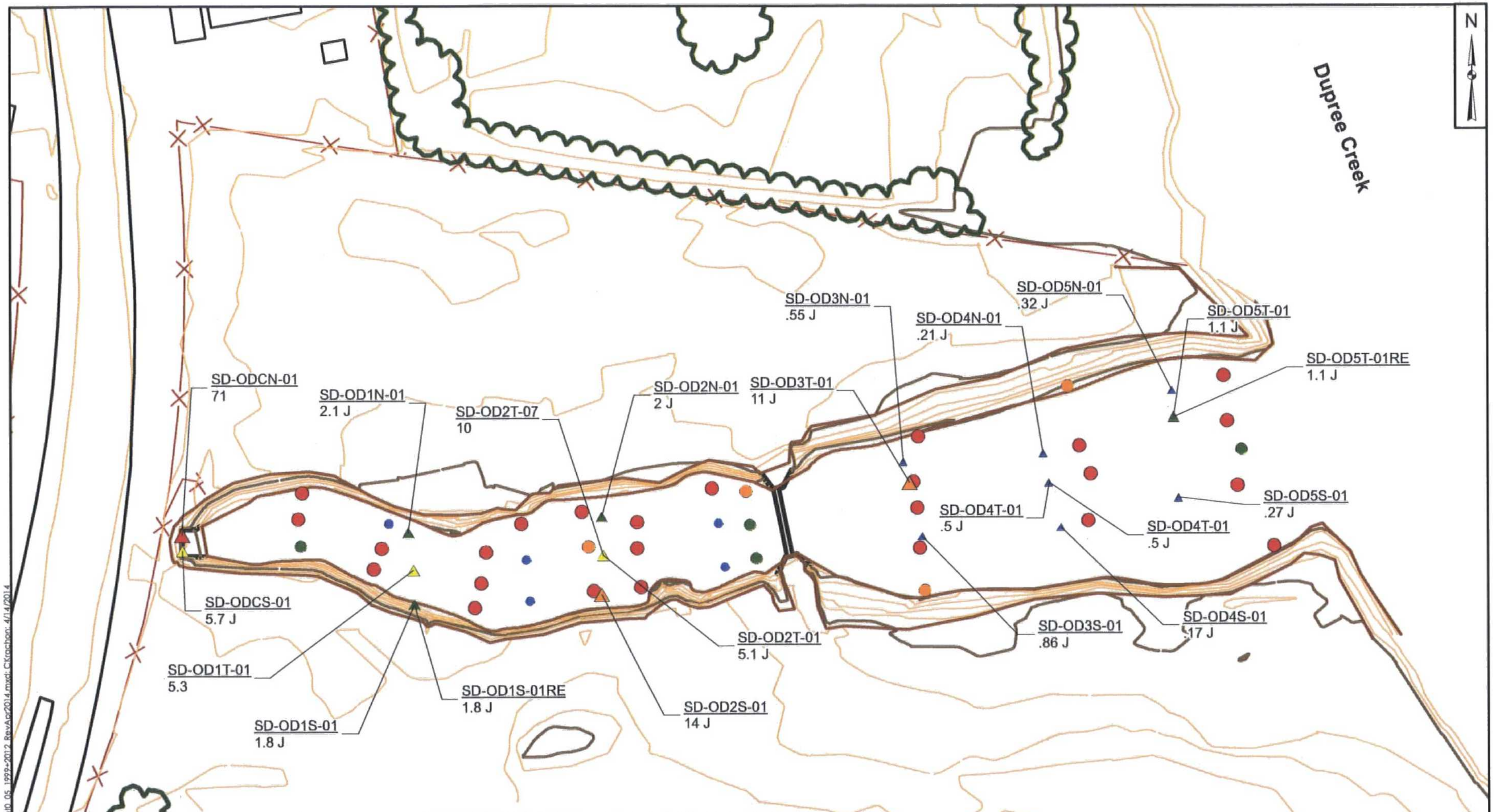
Terry Creek OU1 RI/FS
Brunswick, Georgia

Geosyntec consultants
Atlanta, Georgia

HERCULES

September 2013

Figure 6



Notes:
1. All toxaphene results are report in mg/kg.
2. Technical toxaphene refers to Method 1 or the Task Force Method
3. Sediment samples collected between 0 - 0.5 ft bgs.

Technical Toxaphene (mg/kg)

2012	1999-2000
< 1	< 1
1 - 5	1 - 5
5 - 10	5 - 10
10 - 50	10 - 50
> 50	> 50

0 50 100 200 Feet

Toxaphene in Surface Sediment 1999-2000 and 2012

Terry Creek OU1 RI/FS
Brunswick, Georgia

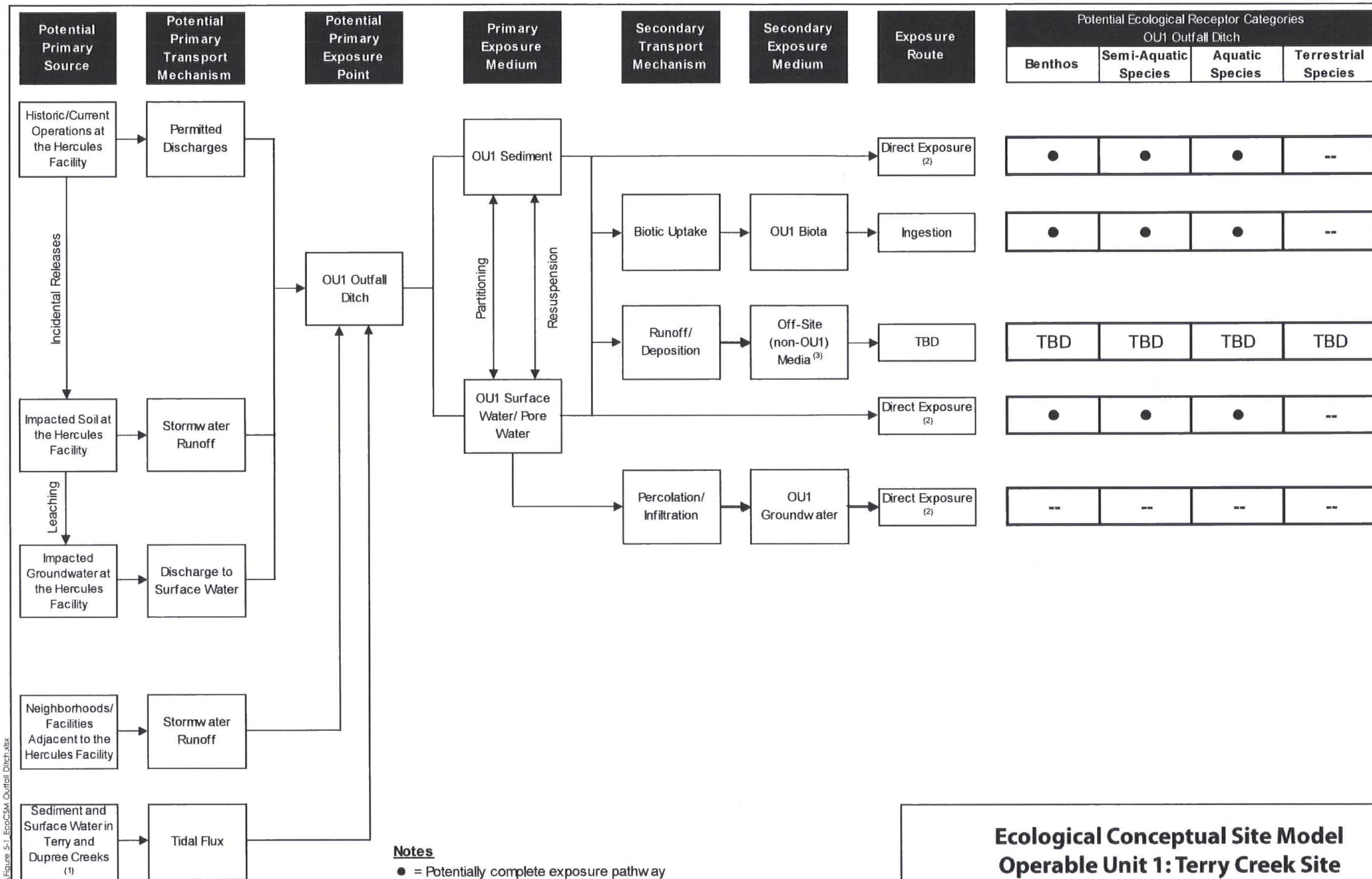
Geosyntec consultants

Kennesaw, Georgia

HERCULES

April 2014

Figure 7



Notes

● = Potentially complete exposure pathway

-- = Incomplete or insignificant exposure pathway

TBD = To be determined

(1) Several industrial facilities are present along Terry and Dupree Creeks which may potentially release contaminants.

(2) Direct exposure pathways include ingestion of, dermal contact with, and respiration of COPCs in affected media; however, it should be noted that not all direct exposure pathways will be quantitatively evaluated in the ecological risk

(3) Off-site (i.e., non-OU1) media will be evaluated separately (e.g., sediment and surface water of Terry and Dupree Creeks as part of OU2 and OU3 RI/FS).

Ecological Conceptual Site Model
Operable Unit 1: Terry Creek Site

Brunswick, Georgia

Geosyntec consultants

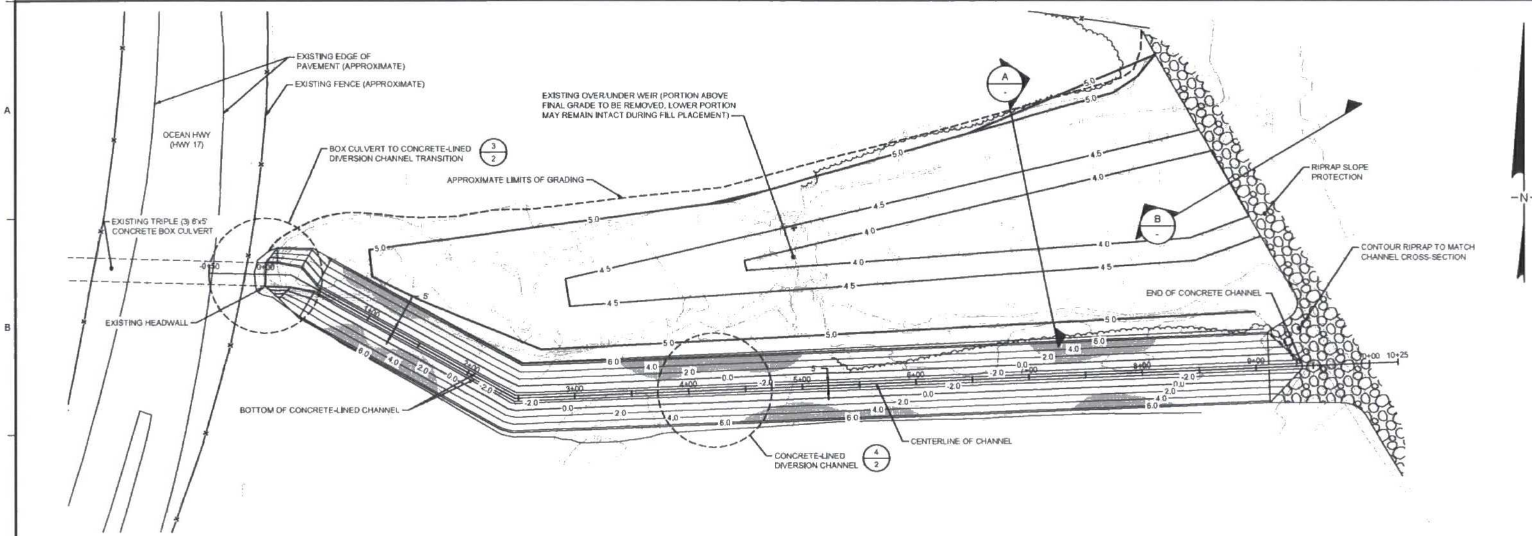
Atlanta, Georgia

HERCULES

September 2013

Figure 8

Path: N:\Ashland\OU1 RIFS Work Plan\Figures\Figure 5-1 EcoCSM Outfall Ditch.xlsx



LEGEND

- EXISTING GRADES
- PROPOSED GRADES
- FENCE
- LINE OF VEGETATION
- CONCRETE CHANNEL LINING
- RIPRAP

DETAIL NUMBER

DRAWING ON WHICH ABOVE DETAIL IS PRESENTED

DETAIL NUMBER — DETAIL

TITLE OF DETAIL

SCALE 1"=2'

DRAWING ON WHICH ABOVE DETAIL WAS FIRST REFERENCED

EXAMPLE: DETAIL NUMBER 4 PRESENTED ON DRAWING NO. 2 WAS REFERENCED FOR THE FIRST TIME ON DRAWING NO. 1

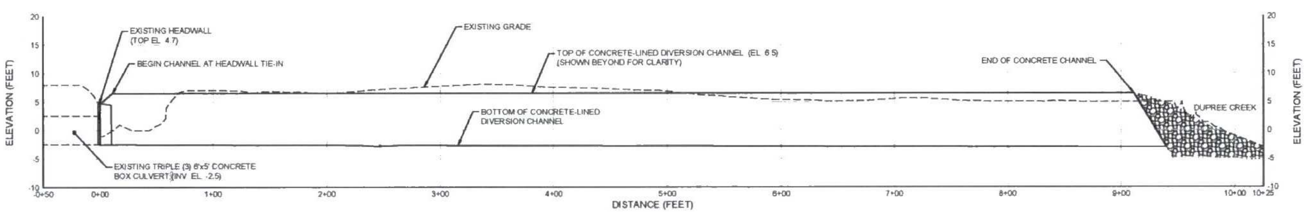
ABOVE SYSTEM ALSO APPLIES TO SECTION IDENTIFICATIONS

DETAIL IDENTIFICATION LEGEND

NOTES

1. THE BASE MAPPING USED FOR THIS DRAWING WAS PREPARED USING AVAILABLE AERIAL PHOTOGRAPHS, MAPPING PROVIDED BY HERCULES, RECENT SURVEYS, AND GIS DATABASE INFORMATION. NOT ALL STRUCTURES OR OTHER SITE FEATURES THAT MAY BE PRESENT ON THE SITE ARE SHOWN
2. TOPOGRAPHIC INFORMATION PROVIDED IS BASED ON A FIELD SURVEY COMPLETED BY ARC SURVEYING AND MAPPING, INC. ON 5 APRIL 2012
3. THE PROPOSED CHANNEL, ALIGNMENTS, AND DETAILS SHOWN HEREIN ARE CONCEPTUAL. ACTUAL ALIGNMENT, ELEVATIONS AND OTHER FEATURES ARE SUBJECT TO CHANGE DURING DESIGN

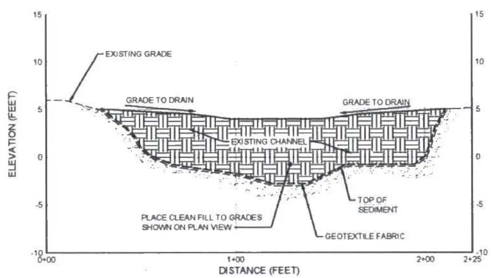
1 PLAN VIEW
CONCRETE-LINED DIVERSION CHANNEL
SCALE 1" = 50'



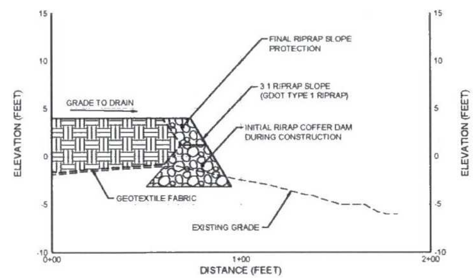
2 PROFILE VIEW
CONCRETE-LINED DIVERSION CHANNEL
SCALE 1"=50' (HORIZONTAL), 1"=10' (VERTICAL)

FIGURE 9

ALTERNATIVE 4
CONCRETE-LINED CHANNEL RE-ROUTED



A SECTION
EXISTING CHANNEL
SCALE 1"=30' (HORIZONTAL), 1"=6' (VERTICAL)



B SECTION
EXISTING CHANNEL OUTLET
SCALE 1"=30' (HORIZONTAL), 1"=6' (VERTICAL)

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

HERCULES

TITLE: CONCRETE-LINED CHANNEL RE-ROUTED

PROJECT: REMEDIAL ALTERNATIVE CONCEPTUAL DESIGN

SITE: TERRY CREEK OU1 RI/FS, BRUNSWICK, GA

DESIGN BY	TLF	DATE	AUG 2013
DRAWN BY	WWS	PROJECT NO.	GR4443A
CHECKED BY	TLF	FILE	4443A-F003-NG-1
REVIEWED BY	JAS	DRAWING NO.	
APPROVED BY	GR		1 of 2

PRELIMINARY
CONCEPTUAL DRAWING ONLY
NOT FOR CONSTRUCTION

Conceptual Drawing of Alternative 4: Concrete Channel Re-routed

Brunswick, Georgia

Geosyntec consultants

Atlanta, Georgia

HERCULES

Figure

10

Path:

Table 1: Simulated 24-hour Stormwater Discharge Flows

24-hour Storm Event	Triple Box Culvert Discharge Rate (cfs)	Triple Box Culvert Discharge Velocity (ft/s)	Triple Box Culvert Peak Shear Stress (lb/ft^2)
2-Year	683	13.2	0.62
25-Year	1,011	14.5	0.72
50-Year	1,161	14.9	0.75
100-Year	1,286	15.3	0.78

Table 2. Summary of Detected Compounds in Sediment, Terry Creek OU1 RI/FS

Compound Name	SD-OD1C-01	SD-OD1C-02	SD-OD2C-01	SD-OD2C-02	SD-OD3C-01	SD-OD3C-02	SD-OD4C-01	SD-OD4C-02	SD-OD5C-01	SD-OD5C-02
Depth (ft)	0 - 0.5	0.5 - 2	0 - 0.5	0.5 - 2	0 - 0.5	0.5 - 2	0 - 0.5	0.5 - 2	0 - 0.5	0.5 - 2
Toxaphene (µg/kg)										
Method 1 (Technical)	**5,400 J**	**8,200**	**21,000 J**	**14,000 J**	**630 J**	**7,900**	**190 J**	**660 J**	**360 J**	**8,500 J**
Method 2 (TAUC)	**10,000**	**12,000**	**19,000**	**12,000**	**1,500**	**12,000**	**610**	**1,600**	R	**21,000**
Pesticides (µg/kg)										
4,4-DDD	38 UJ	110 U	600 UJ	150 UJ	29 UJ	110 U	2.3 UJ	0.41 UJ	R	43 UJ
4,4-DDE	38 UJ	110 U	600 UJ	150 UJ	29 UJ	110 U	1.8 UJ	**5.8 J**	R	34 UJ
Aldrin	19 UJ	55 U	310 UJ	**44 J**	15 UJ	56 U	4.3 UJ	0.77 UJ	R	**320 J**
gamma-BHC (Lindane)	19 UJ	55 U	310 UJ	77 UJ	15 UJ	56 U	1 UJ	**0.52 J**	R	**40 J**
SVOCs (µg/kg)										
1,1-Biphenyl	1,500 UJ	850 U	3,000 UJ	3,000 UJ	1,400 UJ	1,100 U	280 UJ	250 UJ	370 UJ	**290 J**
2-Methylnaphthalene	310 UJ	170 U	610 UJ	620 UJ	290 UJ	220 U	130 UJ	110 UJ	170 UJ	120 UJ
2-Methylphenol	1,500 UJ	850 U	3,000 UJ	3,000 UJ	1,400 UJ	1,100 U	240 UJ	220 UJ	330 UJ	220 UJ
3 & 4 Methylphenol	1,500 UJ	**190 J**	**2,900 J**	**2,700 J**	1,400 UJ	1,100 U	280 UJ	250 UJ	380 UJ	260 UJ
Acenaphthene	310 UJ	170 U	610 UJ	620 UJ	290 UJ	220 U	130 UJ	110 UJ	170 UJ	120 UJ
Acenaphthylene	310 UJ	170 U	**510 J**	**510 J**	290 UJ	220 U	130 UJ	110 UJ	170 UJ	120 UJ
Acetophenone	1,500 UJ	850 U	3,000 UJ	3,000 UJ	1,400 UJ	1,100 U	260 UJ	230 UJ	350 UJ	240 UJ
Anthracene	310 UJ	170 U	610 UJ	620 UJ	290 UJ	220 U	130 UJ	110 UJ	170 UJ	120 UJ
Benzaldehyde	**490 J**	**290 J**	**2200 J**	**2300 J**	1,400 UJ	1,100 U	380 UJ	340 UJ	510 UJ	**580 J**
Benzo[a]anthracene	310 UJ	170 U	610 UJ	620 UJ	290 UJ	220 U	130 UJ	110 UJ	170 UJ	120 UJ
Benzo[a]pyrene	310 UJ	170 U	610 UJ	620 UJ	290 UJ	220 U	46 UJ	41 UJ	62 UJ	43 UJ
Benzo[b]fluoranthene	310 UJ	170 U	610 UJ	620 UJ	290 UJ	220 U	130 UJ	110 UJ	170 UJ	120 UJ
Benzo[g,h,i]perylene	310 UJ	170 U	610 UJ	620 UJ	290 UJ	220 U	130 UJ	110 UJ	170 UJ	120 UJ
Benzo[k]fluoranthene	310 UJ	170 U	610 UJ	620 UJ	290 UJ	220 U	77 UJ	69 UJ	100 UJ	71 UJ
Chrysene	310 UJ	170 U	610 UJ	620 UJ	290 UJ	220 U	130 UJ	110 UJ	170 UJ	120 UJ
Dibenzofuran	1,500 UJ	850 U	3,000 UJ	3,000 UJ	1,400 UJ	1,100 U	260 UJ	230 UJ	350 UJ	240 UJ
Di-n-butyl phthalate	7,800 UJ	4,400 U	16,000 UJ	16,000 UJ	7,400 UJ	5,600 U	650 UJ	580 UJ	880 UJ	610 UJ
Fluoranthene	**190 J**	**100 J**	**700 J**	**630 J**	290 UJ	**110 J**	130 UJ	110 UJ	170 UJ	120 UJ
Fluorene	310 UJ	170 U	610 UJ	620 UJ	290 UJ	220 U	130 UJ	110 UJ	170 UJ	120 UJ
Indeno[1,2,3-cd]pyrene	310 UJ	170 U	610 UJ	620 UJ	290 UJ	220 U	130 UJ	110 UJ	170 UJ	120 UJ
Naphthalene	**430 J**	**270**	**1400 J**	**1900 J**	**210 J**	**210 J**	130 UJ	**160 J**	**170 J**	240 UJ
Phenanthrene	**190 J**	**150 J**	**650 J**	**820 J**	290 UJ	**120 J**	92 UJ	82 UJ	120 UJ	86 UJ
Phenol	**430 J**	850 U	**1700 J**	**1200 J**	1,400 UJ	1,100 U	250 UJ	220 UJ	340 UJ	230 UJ
Pyrene	**180 J**	**130 J**	**320 J**	**700 J**	290 UJ	220 U	130 UJ	110 UJ	170 UJ	120 UJ
VOCs (µg/kg)										
2-Butanone	**49 J**	**31 J**	**110 J**	**440 J**	**42 J**	**34 J**	**40 J**	**24 J**	**72 J**	8.6 U
4-Methyl-2-pentanone	26 UJ	**16 J**	15 UJ	29 UJ	140 UJ	50 U	20 UJ	17 UJ	19 UJ	15 U
Acetone	**310 J**	170 U	**760 J**	**2100 J**	**150 J**	**160**	**150 J**	**130 J**	**240 J**	**180**
Benzene	4.5 UJ	2.5 U	2.6 UJ	5 UJ	27 UJ	10 U	3.5 UJ	3 UJ	3.3 UJ	2.6 U
Carbon disulfide	**8.5 J**	**5.5 J**	**13 J**	**26 J**	**31 J**	**12**	5.3 UJ	**32 J**	**22 J**	**7.4 J**
Chlorobenzene	5.9 UJ	3.4 U	3.4 UJ	6.6 UJ	27 UJ	10 U	4.6 UJ	3.9 UJ	4.3 UJ	3.5 U
Cyclohexane	8 UJ	**5.4 J**	4.6 UJ	9 UJ	55 UJ	20 U	6.3 UJ	5.3 UJ	5.9 UJ	4.7 U
Isopropylbenzene	12 UJ	6.6 U	**9.5 J**	**31 J**	27 UJ	10 U	9.2 UJ	7.7 UJ	8.6 UJ	**7.9 J**
Methyl acetate	31 UJ	17 U	18 UJ	35 UJ	55 UJ	20 U	24 UJ	20 UJ	23 UJ	18 U
Methylcyclohexane	5.3 UJ	3 U	3 UJ	5.9 UJ	55 UJ	20 U	4.2 UJ	3.5 UJ	3.9 UJ	3.1 U
Toluene	5.2 UJ	2.9 U	3 UJ	**6.1 J**	27 UJ	**1.9 J**	4.1 UJ	3.4 UJ	3.8 UJ	3 U

Table 2. continued

Compound Name	SD-OD1C-01	SD-OD1C-02	SD-OD2C-01	SD-OD2C-02	SD-OD3C-01	SD-OD3C-02	SD-OD4C-01	SD-OD4C-02	SD-OD5C-01	SD-OD5C-02
Depth (ft)	0 - 0.5	0.5 - 2	0 - 0.5	0.5 - 2	0 - 0.5	0.5 - 2	0 - 0.5	0.5 - 2	0 - 0.5	0.5 - 2
Metals (mg/kg)										
Aluminum	**15,000 J**	**8,900**	**34,000 J**	**46,000 J**	**33,000 J**	**26,000**	**22,000 J**	**34,000 J**	**38,000 J**	**26,000 J**
Arsenic	**9.4 J**	**7**	**17 J**	**33 J**	**13 J**	**12**	**15 J**	**14 J**	**17 J**	**14 J**
Barium	**66 J**	**59**	**160 J**	**290 J**	**39 J**	**35**	**25 J**	**36 J**	**43 J**	**31 J**
Beryllium	**0.5 J**	**0.31 J**	**1 J**	**1.5 J**	**1.4 J**	**1**	**1.4 J**	**1.6 J**	**1.8 J**	**1.4 J**
Cadmium	**0.55 J**	**0.41 J**	**1.3 J**	**1.8 J**	**0.49 J**	1.6 U	0.34 UJ	0.33 UJ	0.5 UJ	0.34 UJ
Calcium	**7,600 J**	**8,900**	**25,000 J**	**46,000 J**	**4,000 J**	**4,000**	**4,300 J**	**5,900 J**	**6,600 J**	**5,700 J**
Chromium	**43 J**	**23**	**83 J**	**110 J**	**53 J**	**46**	**43 J**	**52 J**	**64 J**	**48 J**
Cobalt	**3.1 J**	**2 J**	**6.2 J**	**9.1 J**	**6.2 J**	**5**	**5.5 J**	**6.6 J**	**7.4 J**	**5.6 J**
Copper	**86 J**	**71**	**160 J**	**240 J**	**51 J**	**30**	**18 J**	**24 J**	**27 J**	**37 J**
Iron	**13,000 J**	**7,900**	**28,000 J**	**38,000 J**	**27,000 J**	**25,000**	**25,000 J**	**29,000 J**	**34,000 J**	**27,000 J**
Lead	**72 J**	**47**	**93 J**	**160 J**	**32 J**	**30**	**25 J**	**28 J**	**31 J**	**29 J**
Magnesium	**5,200 J**	**2,800**	**14,000 J**	**18,000 J**	**8,800 J**	**7,300**	**8,400 J**	**9,100 J**	**11,000 J**	**7,000 J**
Manganese	**200 J**	**160**	**460 J**	**770 J**	**310 J**	**260**	**280 J**	**330 J**	**440 J**	**320 J**
Mercury	**0.75 J**	**0**	**1.5 J**	**2.3 J**	**0.21 J**	**0**	**0.14 J**	**0.16 J**	**0.15 J**	**0.23 J**
Nickel	**14 J**	**9 J**	**25 J**	**36 J**	**16 J**	**13**	**11 J**	**15 J**	**18 J**	**13 J**
Potassium	**2,600**	**1,400**	**8,000**	**10,000**	**4,900**	**4,000**	**4,400**	**4,800**	**6,000**	**4,200**
Silver	4.2 UJ	2.4 U	8.9 UJ	8.6 UJ	4 UJ	3.2 U	0.33 UJ	0.32 UJ	0.48 UJ	**0.42 J**
Sodium	**18,000 J**	**6,900**	**62,000 J**	**66,000 J**	**33,000 J**	**20,000**	**31,000 J**	**29,000 J**	**43,000 J**	**18,000 J**
Vanadium	**30 J**	**17**	**60 J**	**82 J**	**65 J**	**59**	**59 J**	**70 J**	**79 J**	**65 J**
Zinc	**340 J**	**280**	**580 J**	**860 J**	**140 J**	**120**	**81 J**	**110 J**	**110 J**	**97 J**
Other (mg/kg)										
Cyanide, Total	2.3 UJ	1.2 UJ	4.5 UJ	**3.4 J**	2.1 UJ	1.6 U	0.8 UJ	0.71 UJ	1.1 UJ	**0.96 J**
Total Organic Carbon	NA	NA	**510,000 J**	**320,000 J**	**53,000 J**	**48,000**	NA	NA	**60,000 J**	**55,000 J**

Table 2. continued

Compound Name	SD-ODCC-02	SD-OD1N-05	SD-OD2T-05	SD-OD3T-06	SD-OD4N-05	SD-OD5S-01	SD-OD5S-05	SD-ODCN-01	SD-ODCS-01
Depth (ft)	0.5 - 2	6 - 8	6 - 8	8 - 10	6 - 8	0 - 0.5	6 - 8	0 - 0.5	0 - 0.5
Toxaphene (µg/kg)									
Method 1 (Technical)	**17,000**	110 U	**5,000**	46 U	**5,100**	**270 J**	**87,000**	**71,000**	**5,700 J**
Method 2 (TAUC)	**22,000**	37 U	**9,700**	46 U	**13,000**	**700**	**120,000**	**75,000**	**5,300**
Pesticides (µg/kg)									
4,4-DDD	470 U	2 U	90 U	0.18 U	7.2 U	**3.3 J**	150 U	120 U	27 UJ
4,4-DDE	470 U	2 U	90 U	0.15 U	5.7 U	0.42 UJ	120 U	**470**	**68 J**
Aldrin	**190 J**	1.1 U	**58**	0.35 U	13 U	0.99 UJ	**780 J**	60 U	14 UJ
gamma-BHC (Lindane)	**19 J**	1.1 U	**22 J**	0.085 U	**33 J**	0.24 UJ	67 U	**7.4 J**	14 UJ
SVOCs (µg/kg)									
1,1-Biphenyl	470 U	41 U	**620 J**	11 U	**320 J**	320 UJ	**460 J**	590 U	1,400 UJ
2-Methylnaphthalene	96 U	8.3 U	180 U	5.1 U	98 U	140 UJ	**85 J**	120 U	280 UJ
2-Methylphenol	470 U	41 U	900 U	9.7 U	190 U	280 UJ	150 U	590 U	**340 J**
3 & 4 Methylphenol	**560**	41 U	**2,200**	11 U	220 U	320 UJ	**330 J**	590 U	**2,200 J**
Acenaphthene	96 U	**5.1 J**	**140 J**	5.1 U	98 U	140 UJ	**240**	120 U	280 UJ
Acenaphthylene	**49 J**	8.3 U	**200**	5.1 U	98 U	140 UJ	81 U	120 U	**430 J**
Acetophenone	470 U	41 U	900 U	11 U	200 U	300 UJ	**450 J**	590 U	1,400 UJ
Anthracene	96 U	**4.8 J**	180 U	5.1 U	98 U	140 UJ	81 U	120 U	280 UJ
Benzaldehyde	**230 J**	41 U	**1,100**	15 U	**630 J**	430 UJ	**1,700**	590 U	**1,200 J**
Benzo[a]anthracene	**99**	**5.4 J**	**130 J**	5.1 U	98 U	140 UJ	81 U	120 U	280 UJ
Benzo[a]pyrene	**130**	8.3 U	180 U	1.9 U	36 U	53 UJ	29 U	120 U	280 UJ
Benzo[b]fluoranthene	**120**	**6.3 J**	180 U	5.1 U	98 U	140 UJ	81 U	120 U	280 UJ
Benzo[g,h,i]perylene	**75 J**	8.3 U	180 U	5.1 U	98 U	140 UJ	81 U	120 U	280 UJ
Benzo[k]fluoranthene	**110**	8.3 U	180 U	3.1 U	60 U	88 UJ	49 U	120 U	280 UJ
Chrysene	**130**	**7.2 J**	180 U	5.1 U	98 U	140 UJ	81 U	120 U	280 UJ
Dibenzofuran	470 U	41 U	900 U	10 U	200 U	290 UJ	**230 J**	590 U	1,400 UJ
Di-n-butyl phthalate	2,400 U	210 U	4,700 U	**96 J**	510 U	750 UJ	420 U	3,000 U	7,100 UJ
Fluoranthene	**250**	**16**	**190**	**9.5 J**	98 U	140 UJ	81 U	120 U	**150 J**
Fluorene	96 U	**4.3 J**	**98 J**	5.1 U	98 U	140 UJ	**280**	120 U	280 UJ
Indeno[1,2,3-cd]pyrene	**57 J**	8.3 U	180 U	5.1 U	98 U	140 UJ	81 U	120 U	280 UJ
Naphthalene	**160**	8.3 U	**400**	5.1 U	**110 J**	140 UJ	**460**	120 U	**1,300 J**
Phenanthrene	**130**	**5.1 J**	**270**	3.7 U	72 U	110 UJ	**260**	120 U	**280 J**
Phenol	**110 J**	41 U	**1,100**	51 U	190 U	290 UJ	**360 J**	590 U	**5,900 J**
Pyrene	**210**	**16**	**160 J**	**7.1 J**	98 U	140 UJ	81 U	**60 J**	280 UJ
VOCs (µg/kg)									
2-Butanone	**3.5 J**	23 U	**15 J**	**3 J**	**23 J**	NA	**460 J**	NA	NA
4-Methyl-2-pentanone	24 U	23 U	78 U	4.6 U	14 U	NA	750 U	NA	NA
Acetone	**35 J**	**18 J**	**230**	**15 J**	**130 J**	NA	**8,700 J**	NA	NA
Benzene	4.8 U	4.6 U	16 U	0.81 U	2.4 U	NA	**1,600**	NA	NA
Carbon disulfide	**5.5**	**2.3 J**	16 U	**2.2 J**	**13 J**	NA	**250 J**	NA	NA
Chlorobenzene	4.8 U	4.6 U	16 U	1.1 U	3.1 U	NA	**300 J**	NA	NA
Cyclohexane	9.6 U	9.2 U	31 U	1.4 U	4.2 U	NA	230 U	NA	NA
Isopropylbenzene	4.8 U	4.6 U	16 U	2.1 U	6.2 U	NA	**8,900**	NA	NA
Methyl acetate	9.6 U	9.2 U	31 U	5.5 U	16 U	NA	**2,200**	NA	NA
Methylcyclohexane	9.6 U	9.2 U	31 U	0.95 U	2.8 U	NA	**300 J**	NA	NA
Toluene	4.8 U	4.6 U	16 U	0.93 U	2.7 U	NA	**600 J**	NA	NA

Table 2. continued

Compound Name	SD-ODCC-02	SD-OD1N-05	SD-OD2T-05	SD-OD3T-06	SD-OD4N-05	SD-OD5S-01	SD-OD5S-05	SD-ODCN-01	SD-ODCS-01
Depth (ft)	0.5 - 2	6 - 8	6 - 8	8 - 10	6 - 8	0 - 0.5	6 - 8	0 - 0.5	0 - 0.5
Metals (mg/kg)									
Aluminum	**3,600**	**1,500**	**18,000**	**11,000**	**47,000**	NA	**32,000**	**1,700**	**12,000 J**
Arsenic	**1.6 J**	**3**	**3.6 J**	**8**	**15**	NA	**14**	**1 J**	**13 J**
Barium	**21**	**4**	**82**	**18**	**56**	NA	**36**	**7**	**84 J**
Beryllium	**0.12 J**	**0.21 J**	**0.43 J**	**1**	**2**	NA	**2**	**0.08 J**	**0.34 J**
Cadmium	**0.15 J**	0.57 U	**0.3 J**	0.15 U	0.29 U	NA	0.24 U	0.87 U	**0.71 J**
Calcium	**4,900**	**6,400**	**7,400**	**2,400**	**3,700**	NA	**6,500**	**23,000**	**12,000 J**
Chromium	**8**	**5**	**32**	**19**	**60**	NA	**47**	**4**	**45 J**
Cobalt	**0.76 J**	**0.49 J**	**2.1 J**	**3**	**9**	NA	**7**	**0.38 J**	**2.4 J**
Copper	**26**	2.8 U	**70**	**2.4 J**	**57**	NA	**70**	**3.8 J**	**68 J**
Iron	**3,600**	**2,400**	**12,000**	**12,000**	**36,000**	NA	**31,000**	**1,500**	**10,000 J**
Lead	**22**	**2**	**51**	**9**	**32**	NA	**31**	**5**	**45 J**
Magnesium	**1,800**	**400**	**3,700**	**1,500**	**6,400**	NA	**5,800**	**1,100**	**4,300 J**
Manganese	**45**	**23**	**120**	**71**	**460**	NA	**350**	**38**	**230 J**
Mercury	**1**	0.021 U	**1**	**0.024 J**	**0**	NA	**0**	**0.016 J**	**6.2 J**
Nickel	**3.9 J**	**0.89 J**	**14**	**4.2 J**	**20**	NA	**21**	**1.6 J**	**14 J**
Potassium	**720**	**160**	**1,400**	**870**	**3,600**	NA	**3,000**	**540**	**3,000**
Silver	1.3 U	1.1 U	2.7 U	0.14 U	0.28 U	NA	**9**	1.7 U	3.9 UJ
Sodium	**6,100**	**220 J**	**5,600**	**690**	**6,900**	NA	**3,100**	**3,000**	**16,000 J**
Vanadium	**9**	**5**	**28**	**28**	**85**	NA	**72**	**6**	**21 J**
Zinc	**140**	**4**	**190**	**15**	**82**	NA	**58**	**25**	**220 J**
Other (mg/kg)									
Cyanide, Total	0.71 U	0.6 U	**0.75 J**	0.31 U	0.6 U	NA	**1 J**	0.87 U	2 UJ
Total Organic Carbon	**38,000**	**1,500**	**270,000**	**5,400**	**72,000**	**35,000 J**	**77,000**	**4,000**	**110,000 J**

Dioxin data (pg/g)

Compound	SD-OD2T-04	SD-OD5C-02
Depth (ft)	4 - 6	0.5 - 2
1,2,3,4,6,7,8-HpCDD	**140**	**79 J**
1,2,3,4,6,7,8-HpCDF	**32**	**7.2 J**
1,2,3,4,7,8-HxCDF	**5.4 J**	2.8 UJ
1,2,3,6,7,8-HxCDD	**8**	4.2 UJ
1,2,3,7,8,9-HxCDD	ND	**6.1 J**
1,2,3,7,8-PeCDF	**11**	12 UJ
2,3,4,7,8-PeCDF	**11**	13 UJ
OCDD	**1,700**	**980 J**
OCDF	**78**	**12 J**
Dioxin TEQ sum	**7.2**	**1.8**

Notes:

U: not detected; J: estimated concentration; R: rejected; NA: not analyzed

Detected values are indicated in bold type.

Dioxin TEQ sum calculated using dioxin toxcity equivalency factors from WHO, 2005. Not detected compounds not included in the sum.

Table 3
OU1 Focused Human Health Risk Evaluation
Constituent Screening - Outfall Ditch Surficial Sediment
Terry Creek Superfund Site - Brunswick, Georgia

Class	Detected Constituents	CAS	Units	Average [1]	Minimum (Qualifier) [2]		Maximum (Qualifier) [2]		Location of Maximum	Detection Frequency	MDL Range [3]	Screening EPC [4]	Sediment SL (Source) [5]		Sediment SL (Source) [5]		Screening EPC > RSL Residential	EPC > SL
METAL	Aluminum	7429-90-5	mg/kg	21,957	1,700		36,000	J	SD-OD5C-01	7 / 7	n/a	36000	77,000	n	1,100,000	n	No	No
METAL	Arsenic	7440-38-2	mg/kg	12.2	1	J	17	J	SD-OD2C-01	7 / 7	n/a	17	0.67	c	3 0	c	Yes	Yes
METAL	Barium	7440-39-3	mg/kg	60.3	6.9		160	J	SD-OD2C-01	7 / 7	n/a	160	15,000	n	220,000	n	No	No
METAL	Beryllium	7440-41-7	mg/kg	0.910	0.08	J	1.65	J	SD-OD5C-01	7 / 7	n/a	1.65	160	n	2,300	n	No	No
METAL	Cadmium	7440-43-9	mg/kg	0.552	0.49	J	1.3	J	SD-OD2C-01	4 / 7	0.34 - 0.87	1.3	70	n	980	n	No	No
METAL	Chromium [6]	7440-47-3	mg/kg	47	3.9		83	J	SD-OD2C-01	7 / 7	n/a	83	0.3	c	6.3	c	Yes	Yes
METAL	Cobalt	7440-48-4	mg/kg	4.40	0.38	J	7	J	SD-OD5C-01	7 / 7	n/a	7	23	n	350	n	No	No
METAL	Copper	7440-50-8	mg/kg	61.4	3.8	J	160	J	SD-OD2C-01	7 / 7	n/a	160	3,100	n	47,000	n	No	No
METAL	Iron	7439-89-6	mg/kg	19,357	1500		31000	J	SD-OD5C-01	7 / 7	n/a	31000	55,000	n	820,000	n	No	No
METAL	Lead	7439-92-1	mg/kg	43.0	5.2		93	J	SD-OD2C-01	7 / 7	n/a	93	400	L	800	L	No	No
METAL	Manganese	7439-96-5	mg/kg	274	38		460	J	SD-OD2C-01	7 / 7	n/a	460	1,800	n	26,000	n	No	No
METAL	Mercury	7439-97-6	mg/kg	1.29	0.016	J	6.2	J	SD-ODCS-01	7 / 7	n/a	6.2	9.4	n	40	n	No	No
METAL	Nickel	7440-02-0	mg/kg	14.0	1.6	J	25	J	SD-OD2C-01	7 / 7	n/a	25	1,500	n	22,000	n	No	No
METAL	Silver	7440-22-4	mg/kg	1.8	0.9	J	0.9	J	SD-OD5C-01	1 / 7	0.33 - 8.9	0.9	390	n	5,800	n	No	No
METAL	Vanadium	7440-62-2	mg/kg	44.8	6.3		72.5	J	SD-OD5C-01	7 / 7	n/a	72.5	390	n	5,800	n	No	No
METAL	Zinc	7440-66-6	mg/kg	213	25		580	J	SD-OD2C-01	7 / 7	n/a	580	23,000	n	350,000	n	No	No
PEST	DDD	72-54-8	µg/kg	52.4	3.3	J	3.3	J	SD-OD5S-01	1 / 8	2.3 - 600	3.3	2,200	c	9,600	c	No	No
PEST	DDE	72-55-9	µg/kg	110	68	J	470		SD-ODCN-01	2 / 8	0.42 - 600	470	1,600	c	6,800	c	No	No
PEST	gamma-BHC (Lindane)	58-89-9	µg/kg	23.8	7.4	J	7.4	J	SD-ODCN-01	1 / 8	0.24 - 310	7.4	560	c	2,500	c	No	No
PAH	Acenaphthylene [6]	208-96-8	µg/kg	188	430	J	510	J	SD-OD2C-01	2 / 8	120 - 310	510	3,500,000	n	45,000,000	n	No	No
PAH	Fluoranthene	206-44-0	µg/kg	190	140	J	700	J	SD-OD2C-01	4 / 8	120 - 290	700	2,300,000	n	30,000,000	n	No	No
PAH	Naphthalene	91-20-3	µg/kg	465	185	J	1400	J	SD-OD2C-01	5 / 8	120 - 140	1400	3,800	c	17,000	c	No	No
PAH	Phenanthrene [6]	85-01-8	µg/kg	191	100	J	650	J	SD-OD2C-01	4 / 8	92 - 290	650	1,700,000	n	23,000,000	n	No	No
PAH	Pyrene	129-00-0	µg/kg	140	60	J	320	J	SD-OD2C-01	4 / 8	130 - 290	320	1,700,000	n	23,000,000	n	No	No
PEST	Toxaphene [6]	8001-35-2	µg/kg	6,743	170	J	71000		SD-ODCN-01	22 / 22	n/a	71000	480	c	2,100	c	Yes	Yes
SVOC	Acetophenone	98-86-2	µg/kg	566	300	J	300	J	SD-OD5C-01	1 / 8	260 - 3000	300	7,800,000	n	120,000,000	n	No	No
SVOC	Benzaldehyde	100-52-7	µg/kg	811	490	J	2200	J	SD-OD2C-01	4 / 8	380 - 1400	2200	7,800,000	n	120,000,000	n	No	No
SVOC	1,1-Biphenyl	92-52-4	µg/kg	609	630	J	630	J	SD-OD5C-01	1 / 8	280 - 3000	630	47,000	n	200,000	n	No	No
SVOC	2-Methylphenol	95-48-7	µg/kg	497.5	340	J	340	J	SD-ODCS-01	1 / 8	240 - 3000	340	3,100,000	n	41,000,000	n	No	No
SVOC	3 & 4 Methylphenol [6]	TTNUS042	µg/kg	913	2200	J	2900	J	SD-OD2C-01	2 / 8	280 - 1500	2900	6,200,000	n	82,000,000	n	No	No
SVOC	Phenol	108-95-2	µg/kg	1,211	390	J	5900	J	SD-ODCS-01	4 / 8	250 - 1400	5900	18,000,000	n	250,000,000	n	No	No
VOC	Acetone	67-64-1	µg/kg	322	150	J	760	J	SD-OD2C-01	5 / 5	n/a	760	61,000,000	n	670,000,000	n	No	No
VOC	Carbon disulfide	75-15-0	µg/kg	15.4	8.5	J	31	J	SD-OD3C-01	4 / 5	5.3 - 5.3	31	770,000	n	3,500,000	n	No	No
VOC	Isopropylbenzene	98-82-8	µg/kg	7.58	9.5	J	9.5	J	SD-OD2C-01	1 / 5	8.6 - 27	9.5	1,900,000	n	9,900,000	n	No	No
VOC	2-Butanone (MEK)	78-93-3	µg/kg	62.6	40	J	110	J	SD-OD2C-01	5 / 5	n/a	110	27,000,000	n	190,000,000	n	No	No

Notes:
(1) Arithmetic average calculated using one-half the method detection limit (MDL) for non-detect results.
(2) Minimum/maximum detected concentration. "J" indicates an estimated concentration.
(3) MDL range based on non-detect sample results.

(4) he screening-level exposure point concentration (EPC) is the maximum detected concentration.

(5) Human health screening values are the USEPA Regional Screening Levels (RSLs) for soil, updated May 2014. RSLs are based on cancer risk of 1E-6 ("c") or a non-cancer hazard quotient of 1.0 ("n").

(6) Surrogate RSLs were utilized as follows:

total chromium uses hexavalent chromium
acenaphthylene uses acenaphthene as a surrogate
phenanthrene uses pyrene as a surrogate
3&4-Methylphenol uses 4-Methylphenol as a surrogate

Definitions:

Shading = Screening Level EPC > Tapwater RSL
OU1 = Operable Unit 1 (Outfall Ditch)
HHRA = Human health risk assessment
mg/kg = milligram per kilogram
µg/kg = microgram per kilogram
CAS = chemical abstract number
PEST = pesticide
SVOC = semivolatile organic compound
PAH = polynuclear aromatic hydrocarbon
VOC = volatile organic compound

Table 4
OU1 Focused Human Health Risk Evaluation
Constituent Screening - Outfall Ditch Surface Water
Terry Creek Superfund Site - Brunswick, Georgia

Class	Detected Constituents [1]	CAS	Units	Average [2]	Minimum (Qualifier) [3]		Maximum (Qualifier) [3]		Location of Maximum [3]	Detection Frequency	MDL Range [4]	Screening Level EPC [5]	Groundwater SL (Source) [6]		EPC > SL
METAL	Aluminum	7429-90-5	µg/L	554	2.9		2000		DMEB-02	8 / 13	50 - 50	2000	20000	n	No
METAL	Arsenic	7440-38-2	µg/L	3.2	2.4	J	5.7		DCEB-04	13 / 13	n/a	5.7	10	m	No
METAL	Barium	7440-39-3	µg/L	39	16		88		DCEB-02	13 / 13	n/a	88	2000	m	No
METAL	Cadmium	7440-43-9w	µg/L	0.16	0.17	J	0.17	J	DMEB-01 F	1 / 13	0.13 - 0.65	0.17	5	m	No
METAL	Chromium	7440-47-3	µg/L	1.7	2.6	J	3.4	J	DMEB-02	2 / 13	2.5 - 5	3.4	100	m	No
METAL	Cobalt	7440-48-4	µg/L	0.97	0.75		1.5		DMEB-02	11 / 13	0.5 - 0.5	1.5	6.0	n	No
METAL	Copper	7440-50-8	µg/L	0.81	1.2	J	1.5	J	DCEB-04	3 / 13	1.1 - 2.2	1.5	1300	m	No
METAL	Cyanide Total	74-90-8	µg/L	5.1	6	J	13		DCFL-03	6 / 13	5 - 5	13	200	m	No
METAL	Iron	7439-89-6	µg/L	453	170		1300		DMEB-02	7 / 13	44 - 44	1300	14000	n	No
METAL	Lead	7439-92-1	µg/L	0.63	0.78	J	2.1		DCEB-01 F	3 / 13	0.5 - 1.5	2.1	15	m	No
METAL	Manganese	7439-96-5	µg/L	98	9.1		210		DCEB-04	13 / 13	n/a	210	430	n	No
METAL	Mercury	7439-97-6	µg/L	0.051	0.12	J	0.12	J	DMEB-04	1 / 13	0.091 - 0.091	0.12	2.0	m	No
METAL	Nickel	7440-02-0	µg/L	1.3	2.5	J	2.5	J	DMFL-02	1 / 13	2 - 4	2.5	390	n	No
METAL	Selenium	7782-49-2	µg/L	1.1	1.1	J	1.1	J	DCFL-03	1 / 13	1.1 - 4.4	1.1	50	m	No
METAL	Vanadium	7440-62-2	µg/L	5.4	3.9	J	8.3	J	DMEB-02	11 / 13	6.4 - 13	8.3	86	n	No
METAL	Zinc	7440-66-6	µg/L	14	9.9	J	25	J	DCEB-04	9 / 13	8.4 - 34	25	6000	n	No
PAH	Naphthalene	91-20-3	µg/L	0.068	0.3		0.3		DCEB-04	1 / 14	0.092 - 0.11	0.3	0.17	c	Yes
SVOC	Acetophenone	98-86-2	µg/L	0.25	0.11	J	0.39	J	DCEB-02	3 / 14	0.092 - 1.1	0.39	1900	n	No
SVOC	Benzaldehyde	100-52-7	µg/L	0.11	0.19	J	0.43	J	DCEB-04	3 / 14	0.092 - 0.11	0.43	1900	n	No
SVOC	Caprolactam	105-60-2	µg/L	1.8	0.15	J	24		DCEB-03	7 / 14	0.12 - 0.14	24	9900	n	No
SVOC	Diethylphthalate	84-66-2	µg/L	0.064	0.11	J	0.12	J	DCEB-01 F	2 / 14	0.1 - 0.12	0.12	15000	n	No
VOC	Acetone	67-64-1	µg/L	3.2	6.1	J	6.1	J	DCEB-02	1 / 5	5 - 5	6.1	14000	n	No
VOC	Benzene	71-43-2	µg/L	0.21	0.53	J	0.53	J	DCEB-02	1 / 5	0.25 - 0.25	0.53	5	m	No
VOC	Carbon tetrachloride	56-23-5	µg/L	2.1	0.66	J	9		DCEB-02	2 / 5	0.5 - 0.5	9	5	m	Yes
VOC	Chlorobenzene	108-90-7	µg/L	0.26	0.78	J	0.78	J	DCEB-02	1 / 5	0.25 - 0.25	0.78	100	m	No
VOC	Chloroform	67-66-3	µg/L	0.78	0.39	J	3.3		DCEB-02	2 / 5	0.14 - 0.14	3.3	80	m	No
VOC	Ethylbenzene	100-41-4	µg/L	0.57	0.4	J	2.3		DCEB-02	2 / 5	0.11 - 0.11	2.3	700	m	No
VOC	Isopropylbenzene	98-82-8	µg/L	0.24	0.16	J	0.91	J	DCEB-02	2 / 5	0.1 - 0.1	0.91	450	n	No
VOC	Tetrachloroethene	127-18-4	µg/L	0.10	0.2	J	0.2	J	DCEB-04	1 / 5	0.15 - 0.15	0.2	5	m	No
VOC	Toluene	108-88-3	µg/L	0.20	0.33	J	0.33	J	DCEB-02	1 / 5	0.33 - 0.33	0.33	1000	m	No
VOC	Xylene Total	1330-20-7	µg/L	3.8	0.2	J	16		DCEB-02	3 / 5	0.2 - 0.2	16	10000	m	No

Notes:

(1) Both unfiltered (total) and filtered (dissolved) surface water samples were analyzed for chemical constituents. Filtered and unfiltered results were generally comparable and, therefore, combined for screening purposes.

(2) Arithmetic average calculated using one-half the method detection limit (MDL) for non-detect results.

(3) Minimum/maximum detected concentration. "J" indicates an estimated concentration.

(4) MDL range based on non-detect results.

(5) The screening-level exposure point concentration (EPC) is the maximum detected concentration.
(6) Human health screening values are the Federal Maximum Contaminant Levels (MCLs, "m") or, if an MCL is not available, the USEPA Regional Screening Levels (RSLs) for tapwater, updated May 2014.
RSLs are based on cancer risk of 1E-6 ("c") or a non-cancer hazard quotient of 1.0 ("n").

Definitions:

Shading = Screening Level EPC > Tapwater RSL
OU1 = Operable Unit 1 (Outfall Ditch)
HHRA = Human health risk assessment
µg/L = microgram per liter
CAS = chemical abstract number
SVOC = semivolatile organic compound
PAH = polynuclear aromatic hydrocarbon
VOC = volatile organic compound

Table 5. Constituent Screening - Outfall Ditch Surficial Sediment

Terry Creek Superfund Site - Brunswick, Georgia

Class	Detected Constituents	CAS	Units	Average [1]	Minimum (Qualifier) [2]	Location of Minimum	Maximum (Qualifier) [2]	Location of Maximum	Detection Frequency	MDL Range [3]	SLERA EPC [4]	SLERA ESV [5] (Source)		Maximum SLERA HQ [6]	Average SLERA HQ [6]	PBC [7]	COPEC [8]	Rationale [8]
METAL	Aluminum	7429-90-5	mg/kg	21,957	1,700	SD-ODCN-01	36,000 J	SD-OD5C-01	7 / 7	n/a	36000	18000	(f)	2	1.2	-	Yes	ASV
METAL	Arsenic	7440-38-2	mg/kg	12.2	1 J	SD-ODCN-01	17 J	SD-OD2C-01	7 / 7	n/a	17	7.24	(a)	2.3	1.7	Yes	Yes	ASV
METAL	Barium	7440-39-3	mg/kg	60.3	6.9	SD-ODCN-01	160 J	SD-OD2C-01	7 / 7	n/a	160	130.1	(c)	1.2	0.46	-	Yes	ASV
METAL	Beryllium	7440-41-7	mg/kg	0.910	0.08 J	SD-ODCN-01	1.65 J	SD-OD5C-01	7 / 7	n/a	1.65	NSV	--	--	--	-	Yes	NSV
METAL	Cadmium	7440-43-9	mg/kg	0.552	0.49 J	SD-OD3C-01	1.3 J	SD-OD2C-01	4 / 7	0.34 - 0.87	1.3	0.676	(a)	1.9	0.82	Yes	Yes	ASV
METAL	Chromium	7440-47-3	mg/kg	47.0	3.9	SD-ODCN-01	83 J	SD-OD2C-01	7 / 7	n/a	83	52.3	(a)	1.6	0.9	Yes	Yes	ASV
METAL	Cobalt	7440-48-4	mg/kg	4.40	0.38 J	SD-ODCN-01	7 J	SD-OD5C-01	7 / 7	n/a	7	50	(e)	0.14	0.088	-	No	BSV
METAL	Copper	7440-50-8	mg/kg	61.4	3.8 J	SD-ODCN-01	160 J	SD-OD2C-01	7 / 7	n/a	160	18.7	(a)	8.6	3.3	Yes	Yes	ASV
METAL	Iron	7439-89-6	mg/kg	19,357	1500	SD-ODCN-01	31000 J	SD-OD5C-01	7 / 7	n/a	31000	220000	(f)	0.14	0.088	-	No	BSV
METAL	Lead	7439-92-1	mg/kg	43.0	5.2	SD-ODCN-01	93 J	SD-OD2C-01	7 / 7	n/a	93	30.2	(a)	3.1	1.4	Yes	Yes	ASV
METAL	Manganese	7439-96-5	mg/kg	274	38	SD-ODCN-01	460 J	SD-OD2C-01	7 / 7	n/a	460	260	(f)	1.8	1.1	-	Yes	ASV
METAL	Mercury	7439-97-6	mg/kg	1.29	0.016 J	SD-ODCN-01	6.2 J	SD-ODCS-01	7 / 7	n/a	6.2	0.13	(a)	48	9.9	Yes	Yes	ASV
METAL	Nickel	7440-02-0	mg/kg	14.0	1.6 J	SD-ODCN-01	25 J	SD-OD2C-01	7 / 7	n/a	25	15.9	(a)	1.6	0.88	Yes	Yes	ASV
METAL	Silver	7440-22-4	mg/kg	1.8	0.9 J	SD-OD5C-01	0.9 J	SD-OD5C-01	1 / 7	0.33 - 8.9	0.9	0.733	(a)	1.2	2.4	Yes	Yes	ASV
METAL	Vanadium	7440-62-2	mg/kg	44.8	6.3	SD-ODCN-01	72.5 J	SD-OD5C-01	7 / 7	n/a	72.5	57	(f)	1.3	0.79	-	Yes	ASV
METAL	Zinc	7440-66-6	mg/kg	213	25	SD-ODCN-01	580 J	SD-OD2C-01	7 / 7	n/a	580	124	(a)	4.7	1.7	Yes	Yes	ASV
PEST	DDD	72-54-8	µg/kg	52.4	3.3 J	SD-OD5S-01	3.3 J	SD-OD5S-01	1 / 8	2.3 - 600	3.3	1.22	(a)	2.7	43	Yes	Yes	ASV
PEST	DDE	72-55-9	µg/kg	109.8	68 J	SD-ODCS-01	470	SD-ODCN-01	2 / 8	0.42 - 600	470	2.07	(a)	230	53	Yes	Yes	ASV
PEST	Toxaphene [9]	8001-35-2	µg/kg	6,743	170 J	SD-OD4S-01	71000	SD-ODCN-01	22 / 22	n/a	71000	28	(b)	2500	240	Yes	Yes	ASV
PEST	gamma-BHC (Lindane)	58-89-9	µg/kg	23.8	7.4 J	SD-ODCN-01	7.4 J	SD-ODCN-01	1 / 8	0.24 - 310	7.4	0.32	(a)	23	74	Yes	Yes	ASV
HPAH	Pyrene	129-00-0	µg/kg	140	60 J	SD-ODCN-01	320 J	SD-OD2C-01	4 / 8	130 - 290	320							
LPAH	Acenaphthylene	208-96-8	µg/kg	188	430 J	SD-ODCS-01	510 J	SD-OD2C-01	2 / 8	120 - 310	510							
LPAH	Fluoranthene	206-44-0	µg/kg	190	140 J	SD-OD5C-01	700 J	SD-OD2C-01	4 / 8	120 - 290	700							
LPAH	Naphthalene	91-20-3	µg/kg	465	185 J	SD-OD5C-01	1400 J	SD-OD2C-01	5 / 8	120 - 140	1400							
LPAH	Phenanthrene	85-01-8	µg/kg	191	100 J	SD-OD5C-01	650 J	SD-OD2C-01	4 / 8	92 - 290	650							
PAH	Total PAHs [10]	PAH SUM	µg/kg	1,111	300 J	SD-ODCN-01	3580 J	SD-OD2C-01	6 / 8	92 - 310	3580	1684	(a)	2.1	0.66	Yes	Yes	ASV
SVOC	Acetophenone	98-86-2	µg/kg	566	300 J	SD-OD5C-01	300 J	SD-OD5C-01	1 / 8	260 - 3000	300	NSV	--	--	--	-	Yes	NSV
SVOC	Benzaldehyde	100-52-7	µg/kg	811	490 J	SD-OD1C-01	2200 J	SD-OD2C-01	4 / 8	380 - 1400	2200	NSV	--	--	--	-	Yes	NSV
SVOC	1,1-Biphenyl	92-52-4	µg/kg	609	630 J	SD-OD5C-01	630 J	SD-OD5C-01	1 / 8	280 - 3000	630	1100	(b)	0.57	0.55	-	No	BSV
SVOC	2-Methylphenol	95-48-7	µg/kg	497.5	340 J	SD-ODCS-01	340 J	SD-ODCS-01	1 / 8	240 - 3000	340	55.4	(e)	6.1	9.0	-	Yes	ASV
SVOC	3 & 4 Methylphenol [11]	TTNUS042	µg/kg	913	2200 J	SD-ODCS-01	2900 J	SD-OD2C-01	2 / 8	280 - 1500	2900	20.2	(e)	140	45	-	Yes	ASV
SVOC	Phenol	108-95-2	µg/kg	1,211	390 J	SD-OD5C-01	5900 J	SD-ODCS-01	4 / 8	250 - 1400	5900	49.1	(e)	120	25	-	Yes	ASV
VOC	Acetone	67-64-1	µg/kg	322	150 J	SD-OD3C-01	760 J	SD-OD2C-01	5 / 5	n/a	760	9.9	(e)	77	33	-	Yes	ASV
VOC	Carbon disulfide	75-15-0	µg/kg	15.4	8.5 J	SD-OD1C-01	31 J	SD-OD3C-01	4 / 5	5.3 - 5.3	31	23.9	(e)	1.3	0.65	-	Yes	ASV
VOC	Isopropylbenzene	98-82-8	µg/kg	7.58	9.5 J	SD-OD2C-01	9.5 J	SD-OD2C-01	1 / 5	8.6 - 27	9.5	NSV	--	--	--	-	Yes	NSV
VOC	2-Butanone (MEK)	78-93-3	µg/kg	62.6	40 J	SD-OD4C-01	110 J	SD-OD2C-01	5 / 5	n/a	110	42.4	(e)	2.6	1.5	-	Yes	ASV

See notes on following page.

Notes:

(1) Arithmetic average calculated using one-half the method detection limit (MDL) for non-detect results.

(2) Minimum/maximum detected concentration. "J" indicates an estimated concentration.

(3) MDL range based on non-detect sample results.

(4) SLERA exposure point concentration (EPC) is the maximum detected concentration.

(5) Ecological screening values (ESVs) were selected using the following hierarchy (see Attachment A in Appendix A, SLERA):

(a) USEPA Region IV ecological effects values, sediment

(b) USEPA EcoTox Thresholds (SQC/SQB) for marine sediment

(c) NOAA SQuiRTs for marine sediment (minimum of T_{20}, TEL, ERL, T_{50}, PEL, and ERM)

(d) USEPA Region III BTAG ecological screening benchmarks for marine sediment

(e) USEPA Region V ESLs for freshwater sediment

(f) Apparent effects threshold (NOAA)

(6) Screening level hazard quotient (HQ) calculated (to two significant figures) as follows: HQ = EPC/ESV.

(7) Bioaccumulation potential based on: USEPA. 2000. Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment, Status and Needs. Office of Water. EPA-823-R-00-001. February

(8) Rationale for COPEC selection/exclusion:

Selection	*Exclusion*
ASV = above ecological screening value	BSV = below ecological screening value
PBC = potentially bioaccumulative constituent	
NSV = no screening value	

(9) Per the Work Plan, the SLERA utilizes Method 1 toxaphene results. The SLERA HQ is based on the EPA EcoTox SQB.

(10) Detected PAHs were evaluated as "Total PAHs." Summed PAHs are acenaphthylene, fluoranthene, naphthalene, phenanthrene, and pyrene. Non-detect PAHs were excluded from the summations; otherwise, non-detect results were include as one-half the MDL. The MDL range presented in the table represents the lowest and highest MDL for these five PAHs

(11) Surrogate ESVs were utilized as follows:

3&4-Methylphenol uses 4-Methylphenol as a surrogate

Shading = Maximum HQ > 1

Definitions:

OU1 = Operable Unit 1 (Outfall Ditch)

SLERA = Screening Level Ecological Risk Assessment

mg/kg = milligram per kilogram

µg/kg = microgram per kilogram

CAS = chemical abstract number

TXP = toxaphene

PEST = pesticide

SVOC = semivolatile organic compound

PAH = polynuclear aromatic hydrocarbon

VOC = volatile organic compound

Table 6. SLERA Constituent Screening - Outfall Ditch Surface Water
Terry Creek Superfund Site - Brunswick, Georgia

Class	Detected Constituents [1]	CAS	Units	Average [2]	Minimum (Qualifier) [3]		Maximum (Qualifier) [3]		Location of Maximum [3]	Detection Frequency	MDL Range [4]	SLERA EPC [5]	SLERA ESV [6] (Source)		Maximum SLERA HQ [7]	PBC? [8]	COPEC [9]	Rationale [9]
METAL	Aluminum	7429-90-5	µg/L	554	2.9		2,000		DMEB-02	8 / 13	50 - 50	2,000	NSV		--	-	Yes	NSV
METAL	Arsenic	7440-38-2	µg/L	3.2	2.4	J	5.7		DCEB-04	13 / 13	n/a	5.7	36	(a)	0.16	Yes	Yes	PBC
METAL	Barium	7440-39-3	µg/L	39	16		88		DCEB-02	13 / 13	n/a	88	200	(d)	0.44	-	No	BSV
METAL	Cadmium	7440-43-9	µg/L	0.16	0.17	J	0.17	J	DMEB-01 F	1 / 13	0.13 - 0.65	0.17	8.8	(a)	0.019	Yes	Yes	PBC
METAL	Chromium [10]	7440-47-3	µg/L	1.7	2.6	J	3.4	J	DMEB-02	2 / 13	2.5 - 5	3.4	50.4	(a)	0.068	Yes	Yes	PBC
METAL	Cobalt	7440-48-4	µg/L	0.97	0.75		1.5		DMEB-02	11 / 13	0.5 - 0.5	1.5	1.0	(d)	1.5	-	Yes	ASV
METAL	Copper	7440-50-8	µg/L	0.81	1.2	J	1.5	J	DCEB-04	3 / 13	1.1 - 2.2	1.5	3.7	(a)	0.4	Yes	Yes	PBC
METAL	Cyanide Total	74-90-8	µg/L	5.1	6	J	13		DCFL-03	6 / 13	5 - 5	13	1	(a)	13	-	Yes	ASV
METAL	Iron	7439-89-6	µg/L	453	170		1,300		DMEB-02	7 / 13	44 - 44	1,300	50	(d)	26	-	Yes	ASV
METAL	Lead	7439-92-1	µg/L	0.63	0.78	J	2.1		DCEB-01 F	3 / 13	0.5 - 1.5	2.1	8.1	(a)	0.26	Yes	Yes	PBC
METAL	Manganese	7439-96-5	µg/L	98	9.1		210		DCEB-04	13 / 13	n/a	210	100	(d)	2.1	-	Yes	ASV
METAL	Mercury	7439-97-6	µg/L	0.051	0.12	J	0.12	J	DMEB-04	1 / 13	0.091 - 0.091	0.12	1.1	(a)	0.11	Yes	Yes	PBC
METAL	Nickel	7440-02-0	µg/L	1.3	2.5	J	2.5	J	DMFL-02	1 / 13	2 - 4	2.5	8.3	(a)	0.3	Yes	Yes	PBC
METAL	Selenium	7782-49-2	µg/L	1.1	1.1	J	1.1	J	DCFL-03	1 / 13	1.1 - 4.4	1.1	71	(a)	0.015	Yes	Yes	PBC
METAL	Vanadium	7440-62-2	µg/L	5.4	3.9	J	8.3	J	DMEB-02	11 / 13	6.4 - 13	8.3	50	(d)	0.17	-	No	BSV
METAL	Zinc	7440-66-6	µg/L	14	9.9	J	25	J	DCEB-04	9 / 13	8.4 - 34	25	86	(a)	0.29	Yes	Yes	PBC
PAH	Naphthalene	91-20-3	µg/L	0.068	0.3		0.3		DCEB-04	1 / 14	0.092 - 0.11	0.3	23.5	(b)	0.013	-	No	BSV
SVOC	Acetophenone	98-86-2	µg/L	0.25	0.11	J	0.39	J	DCEB-02	3 / 14	0.092 - 1.1	0.39	NSV		--	-	Yes	NSV
SVOC	Benzaldehyde	100-52-7	µg/L	0.11	0.19	J	0.43	J	DCEB-04	3 / 14	0.092 - 0.11	0.43	NSV		--	-	Yes	NSV
SVOC	Caprolactam	105-60-2	µg/L	1.8	0.15	J	24		DCEB-03	7 / 14	0.12 - 0.14	24	NSV		--	-	Yes	NSV
SVOC	Diethylphthalate	84-66-2	µg/L	0.064	0.11	J	0.12	J	DCEB-01 F	2 / 14	0.1 - 0.12	0.12	75.9	(b)	0.0016	-	No	BSV
VOC	Acetone	67-64-1	µg/L	3.2	6.1	J	6.1	J	DCEB-02	1 / 5	5 - 5	6.1	564,000	(e)	0.000011	-	No	BSV
VOC	Benzene	71-43-2	µg/L	0.21	0.53	J	0.53	J	DCEB-02	1 / 5	0.25 - 0.25	0.53	109	(b)	0.0049	-	No	BSV
VOC	Carbon tetrachloride	56-23-5	µg/L	2.1	0.66	J	9		DCEB-02	2 / 5	0.5 - 0.5	9	1,500	(b)	0.006	-	No	BSV
VOC	Chlorobenzene	108-90-7	µg/L	0.26	0.78	J	0.78	J	DCEB-02	1 / 5	0.25 - 0.25	0.78	105	(b)	0.0074	-	No	BSV
VOC	Chloroform	67-66-3	µg/L	0.78	0.39	J	3.3		DCEB-02	2 / 5	0.14 - 0.14	3.3	815	(b)	0.004	-	No	BSV
VOC	Ethylbenzene	100-41-4	µg/L	0.57	0.4	J	2.3		DCEB-02	2 / 5	0.11 - 0.11	2.3	4.3	(b)	0.53	-	No	BSV
VOC	Isopropylbenzene	98-82-8	µg/L	0.24	0.16	J	0.91	J	DCEB-02	2 / 5	0.1 - 0.1	0.91	NSV		--	-	Yes	NSV
VOC	Tetrachloroethene	127-18-4	µg/L	0.10	0.2	J	0.2	J	DCEB-04	1 / 5	0.15 - 0.15	0.2	45	(b)	0.0044	-	No	BSV
VOC	Toluene	108-88-3	µg/L	0.20	0.33	J	0.33	J	DCEB-02	1 / 5	0.33 - 0.33	0.33	37	(b)	0.0089	-	No	BSV
VOC	Xylene Total	1330-20-7	µg/L	3.8	0.2	J	16		DCEB-02	3 / 5	0.2 - 0.2	16	19	(e)	0.84	-	No	BSV

Notes:

(1) Both unfiltered (total) and filtered (dissolved) surface water samples were analyzed for chemical constituents. Filtered and unfiltered results were generally comparable and, therefore, combined for screening purposes. An "F" suffix in the location code indicates a filtered result (e.g., cadmium). For certain metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn), ESVs are specific to dissolved results; if the maximum detected concentration was from an unfiltered (total) sample, the ESV was divided by the appropriate conversion factor (see Attachment

(2) Arithmetic average calculated using one-half the method detection limit (MDL) for non-detect results.

(3) Minimum/maximum detected concentration. "J" indicates an estimated concentration.

(4) MDL range based on non-detect results.

(5) SLERA exposure point concentration (EPC) is the maximum detected concentration.

(6) Ecological screening levels (ESVs) were selected using the following hierarchy (see also Attachment A):

Definitions:

OU1 = Operable Unit 1 (Outfall Ditch)
SLERA = Screening Level Ecological Risk Assessment
CAS = chemical abstract number
µg/L = microgram per liter
PAH = polynuclear aromatic hydrocarbon
SVOC = semivolatile organic compound
VOC = volatile organic compound

(a) USEPA NRWQC for the protection of aquatic life, saltwater
(b) USEPA Region IV chronic ecological effects values, saltwater
(c) USEPA EcoTox Thresholds (SQC/SQB) for marine water
(d) NOAA SQuiRTs for marine water
(d) USEPA Region III BTAG ecological screening benchmarks for marine surface water
(e) USEPA Region V ESLs for freshwater

(7) Screening level hazard quotient (HQ) calculated (to two significant figures) as follows: HQ = EPC/ESV,

(8) Bioaccumulation potential based on: USEPA. 2000. Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment, Status and Needs. Office of Water. EPA-823-R-00-001. February.

(9) Rationale for COPEC selection/exclusion:

Selection	*Exclusion*
ASV = above ecological screening value	BSV = below ecological screening value
PBC = potentially bioaccumulative constituent	
NSV = no screening value	

(10) Surrogate ESVs were utilized as follows:
Chromium (total) uses hexavalent chromium as a surrogate

Shading = Maximum HQ > 1

Table 7. SLERA Detected Constituent Screening - Outfall Ditch Pore Water
Terry Creek Superfund Site - Brunswick, Georgia

Class	Detected Constituents [1]	CAS	Units	Average [2]	Minimum (Qualifier) [3]		Location of Minimum	Maximum (Qualifier) [3]		Location of Maximum [3]	Detection Frequency	MDL Range [4]	SLERA EPC [5]	SLERA ESV [6] (Source)				Maximum SLERA HQ [7]	Average SLERA HQ [7]	PBC? [8]	COPEC [9]	Rationale [9]
TXP	Toxaphene [10]	8001-35-2	µg/L	1.9	2.3	J	PW-ODPO-01 F	2.3	J	PW-ODPO-01 F	1 / 4	0.49 - 9.5	2.3	0.0002	--	0.0002	(a)	12000	9400	Yes	Yes	ASV
METAL	Aluminium	7429-90-5	µg/L	500	350		PW-ODPO-02	1600		PW-ODPR-02	2 / 4	50 - 50	1600	NSV	--	NSV		--	--	-	Yes	NSV
METAL	Arsenic	7440-38-2	µg/L	1.8	1.3	J	PW-ODPR-01 F	2.1	J	PW-ODPR-02	4 / 4	n/a	2.1	36	1	36	(a)	0.058	0.049	Yes	Yes	PBC
METAL	Barium	7440-39-3	µg/L	130	98		PW-ODPO-01 F	180		PW-ODPR-02	4 / 4	n/a	180	200	--	200	(d)	0.90	0.65	-	No	BSV
METAL	Chromium [11]	7440-47-3	µg/L	6.2	3.2	J	PW-ODPO-02	9.4		PW-ODPR-02	4 / 4	n/a	9.4	50	0.993	50.4	(a)	0.19	0.12	Yes	Yes	PBC
METAL	Cobalt	7440-48-4	µg/L	1.1	0.39	J	PW-ODPO-02	2.2		PW-ODPO-01 F	4 / 4	n/a	2.2	1	--	1	(d)	2.2	1.1	-	Yes	ASV
METAL	Copper	7440-50-8	µg/L	2.1	1.1	J	PW-ODPO-01 F	4.8	J	PW-ODPR-02	3 / 4	1.1 - 1.1	4.8	3.1	0.83	3.7	(a)	1.3	0.56	Yes	Yes	ASV
METAL	Iron	7439-89-6	µg/L	466	64	J	PW-ODPR-01 F	1300		PW-ODPR-02	4 / 4	n/a	1300	50	--	50	(d)	26	9.3	-	Yes	ASV
METAL	Lead	7439-92-1	µg/L	1.3	4.3		PW-ODPR-02	4.3		PW-ODPR-02	1 / 4	0.5 - 0.5	4.3	8.1	0.951	8.5	(a)	0.5	0.15	Yes	Yes	PBC
METAL	Manganese	7439-96-5	µg/L	313	87		PW-ODPR-01 F	580		PW-ODPO-02	4 / 4	n/a	580	100	--	100	(d)	5.8	3.1	-	Yes	ASV
METAL	Nickel	7440-02-0	µg/L	1.9	2.4	J	PW-ODPR-02	3.1	J	PW-ODPO-01 F	2 / 4	2 - 2	3.1	8.2	0.99	8.2	(a)	0.38	0.23	Yes	Yes	PBC
METAL	Vanadium	7440-62-2	µg/L	7.1	5.3	J	PW-ODPO-02	10		PW-ODPR-02	4 / 4	n/a	10	50	--	50	(d)	0.20	0.14	-	No	BSV
METAL	Zinc	7440-66-6	µg/L	11	31		PW-ODPR-02	31		PW-ODPR-02	1 / 4	8.4 - 8.4	31	81	0.946	86	(a)	0.36	0.13	Yes	Yes	PBC
PAH	Naphthalene	91-20-3	µg/L	0.079	0.16	J	PW-ODPR-02	0.16	J	PW-ODPR-02	1 / 4	0.1 - 0.11	0.16	23.5	--	23.5	(b)	0.0068	0.0034	-	No	BSV
SVOC	Benzaldehyde	100-52-7	µg/L	0.52	0.46	J	PW-ODPR-02	0.57	J	PW-ODPO-02	4 / 4	n/a	0.57	NSV	--	NSV		--	--	-	Yes	NSV
SVOC	Diethylphthalate	84-66-2	µg/L	0.16	0.21	J	PW-ODPR-01 F	0.31	J	PW-ODPR-02	2 / 4	0.11 - 0.12	0.31	75.9	--	75.9	(b)	0.0041	0.0021	-	No	BSV
SVOC	Phenol	108-95-2	µg/L	0.21	0.15	J	PW-ODPR-02	0.36	J	PW-ODPO-02	3 / 4	0.13 - 0.13	0.36	58	--	58	(b)	0.0062	0.0036	-	No	BSV
VOC	Acetone	67-64-1	µg/L	4.4	10	J	PW-ODPO-01 F	10	J	PW-ODPO-01 F	1 / 4	5 - 5	10	564000	--	564000	(e)	0.000018	0.0000078	-	No	BSV
VOC	Methyl tert-Butyl Ethe	1634-04-4	µg/L	0.85	1.5	J	PW-ODPR-01 F	1.7	J	PW-ODPR-02	2 / 4	0.2 - 0.2	1.7	5000	--	5000	(d)	0.00034	0.00017	-	No	BSV
VOC	Toluene	108-88-3	µg/L	0.37	0.33	J	PW-ODPO-01 F	0.63	J	PW-ODPR-02	3 / 4	0.33 - 0.33	0.63	37	--	37	(b)	0.017	0.01	-	No	BSV
TXP	Toxaphene (Unfiltered)	8001-35-2	µg/L	ND	ND			ND			0 / 2	0.49 - 9.5	ND	0.0002	--	0.0002	(a)	--	--	Yes	No	ND
TXP	Toxaphene (Filtered)	8001-35-2	µg/L	1.27	2.3	J	PW-ODPO-01 F	2.3	J	PW-ODPO-01 F	1 / 2	0.49 - 0.49	2.3	0.0002	--	0.0002	(a)	12000	6400	Yes	Yes	ASV
ING	Aluminium (Unfiltered)	7429-90-5	µg/L	975.00	350	0	PW-ODPO-02	1600	0	PW-ODPR-02	2 / 2	n/a	1600	NSV	--	NSV		--	--	-	Yes	NSV
ING	Aluminium (Filtered)	7429-90-5	µg/L	ND	ND			ND			0 / 2	50 - 50	ND	NSV	--	NSV		--	--	-	No	ND
ING	Arsenic (Unfiltered)	7440-38-2	µg/L	2.05	2	J	PW-ODPO-02	2.1	J	PW-ODPR-02	2 / 2	n/a	2.1	36	1	36	(a)	0.058	0.057	Yes	Yes	PBC
ING	Arsenic (Filtered)	7440-38-2	µg/L	1.45	1.3	J	PW-ODPR-01 F	1.6	J	PW-ODPO-01 F	2 / 2	n/a	1.6	36	1	36	(a)	0.044	0.04	Yes	Yes	PBC
ING	Barium (Unfiltered)	7440-39-3	µg/L	140.00	100	0	PW-ODPO-02	180	0	PW-ODPR-02	2 / 2	n/a	180	200	--	200	(d)	0.9	0.7	-	No	BSV
ING	Barium (Filtered)	7440-39-3	µg/L	119.00	98	0	PW-ODPO-01 F	140	0	PW-ODPR-01 F	2 / 2	n/a	140	200	--	200	(d)	0.7	0.6	-	No	BSV
ING	Chromium (Unfiltered)	7440-47-3	µg/L	6.30	3.2	J	PW-ODPO-02	9.4	0	PW-ODPR-02	2 / 2	n/a	9.4	50	0.993	50.35246727	(a)	0.19	0.13	Yes	Yes	PBC
ING	Chromium (Filtered)	7440-47-3	µg/L	6.10	4.5	J	PW-ODPR-01 F	7.7	0	PW-ODPO-01 F	2 / 2	n/a	7.7	50	0.993	50	(a)	0.15	0.12	Yes	Yes	PBC
ING	Cobalt (Unfiltered)	7440-48-4	µg/L	0.66	0.39	J	PW-ODPO-02	0.92	0	PW-ODPR-02	2 / 2	n/a	0.92	1	--	1.0	(d)	0.92	0.66	-	No	BSV
ING	Cobalt (Filtered)	7440-48-4	µg/L	1.56	0.92	0	PW-ODPR-01 F	2.2	0	PW-ODPO-01 F	2 / 2	n/a	2.2	1	--	1	(d)	2.2	1.6	-	Yes	ASV
ING	Copper (Unfiltered)	7440-50-8	µg/L	3.35	1.9	J	PW-ODPO-02	4.8	J	PW-ODPR-02	2 / 2	n/a	4.8	3.1	0.83	3.7	(a)	1.3	0.9	Yes	Yes	ASV
ING	Copper (Filtered)	7440-50-8	µg/L	0.83	1.1	J	PW-ODPO-01 F	1.1	J	PW-ODPO-01 F	1 / 2	1.1 - 1.1	1.1	3.1	0.83	3.1	(a)	0.35	0.27	Yes	Yes	PBC
ING	Iron (Unfiltered)	7439-89-6	µg/L	855.00	410	0	PW-ODPO-02	1300	0	PW-ODPR-02	2 / 2	n/a	1300	50	--	50	(d)	26	17	-	Yes	ASV
ING	Iron (Filtered)	7439-89-6	µg/L	77.50	64	J	PW-ODPR-01 F	91	J	PW-ODPO-01 F	2 / 2	n/a	91	50	--	50	(d)	1.8	1.6	-	Yes	ASV
ING	Lead (Unfiltered)	7439-92-1	µg/L	2.28	4.3	0	PW-ODPR-02	4.3	0	PW-ODPR-02	1 / 2	0.5 - 0.5	4.3	8.1	0.951	8.5	(a)	0.5	0.27	Yes	Yes	PBC
ING	Lead (Filtered)	7439-92-1	µg/L	ND	ND			ND			0 / 2	0.5 - 0.5	ND	8.1	0.951	8.5	(a)	--	--	Yes	No	ND
ING	Manganese (Unfiltered)	7439-96-5	µg/L	338.00	96	0	PW-ODPR-02	580	0	PW-ODPO-02	2 / 2	n/a	580	100	--	100	(d)	5.8	3.4	-	Yes	ASV
ING	Manganese (Filtered)	7439-96-5	µg/L	288.50	87	0	PW-ODPR-01 F	490	0	PW-ODPO-01 F	2 / 2	n/a	490	100	--	100	(d)	4.9	2.9	-	Yes	ASV
ING	Nickel (Unfiltered)	7440-02-0	µg/L	1.70	2.4	J	PW-ODPR-02	2.4	J	PW-ODPR-02	1 / 2	2 - 2	2.4	8.2	0.99	8.3	(a)	0.29	0.21	Yes	Yes	PBC
ING	Nickel (Filtered)	7440-02-0	µg/L	2.05	3.1	J	PW-ODPO-01 F	3.1	J	PW-ODPO-01 F	1 / 2	2 - 2	3.1	8.2	0.99	8.2	(a)	0.38	0.25	Yes	Yes	PBC
ING	Vanadium (Unfiltered)	7440-62-2	µg/L	7.65	5.3	J	PW-ODPO-02	10	0	PW-ODPR-02	2 / 2	n/a	10	50	--	50	(d)	0.2	0.15	-	No	BSV
ING	Vanadium (Filtered)	7440-62-2	µg/L	6.55	5.8	J	PW-ODPR-01 F	7.3	J	PW-ODPO-01 F	2 / 2	n/a	7.3	50	--	50	(d)	0.15	0.13	-	No	BSV
ING	Zinc (Unfiltered)	7440-66-6	µg/L	17.60	31	0	PW-ODPR-02	31	0	PW-ODPR-02	1 / 2	8.4 - 8.4	31	81	0.946	86	(a)	0.36	0.21	Yes	Yes	PBC
ING	Zinc (Filtered)	7440-66-6	µg/L	ND	ND			ND			0 / 2	8.4 - 8.4	ND	81	0.946	86	(a)	--	--	Yes	No	ND
SVOC	Benzaldehyde (Unfiltered)	100-52-7	µg/L	0.52	0.46	J	PW-ODPR-02	0.57	J	PW-ODPO-02	2 / 2	n/a	0.57	NSV	--	NSV		--	--	-	Yes	NSV
SVOC	Benzaldehyde (Filtered)	100-52-7	µg/L	0.53	0.52	J	PW-ODPO-01 F	0.54	J	PW-ODPR-01 F	2 / 2	n/a	0.54	NSV	--	NSV		--	--	-	Yes	NSV

Table 7. continued

Class	Detected Constituents [1]	CAS	Units	Average [2]	Minimum (Qualifier) [3]	Location of Minimum	Maximum (Qualifier) [3]	Location of Maximum [3]	Detection Frequency	MDL Range [4]	SLERA EPC [5]	SLERA ESV [6] (Source)				Maximum SLERA HQ [7]	Average SLERA HQ [7]	PBC? [8]	COPEC [9]	Rationale [9]
SVOC	Diethylphthalate (Unfiltered)	84-66-2	µg/L	0.19	0.31 J	PW-ODPR-02	0.31 J	PW-ODPR-02	1 / 2	0.12 - 0.12	0.31	75.9	--	75.9	(b)	0.0041	0.0024	-	No	BSV
SVOC	Diethylphthalate (Filtered)	84-66-2	µg/L	0.13	0.21 J	PW-ODPR-01 F	0.21 J	PW-ODPR-01 F	1 / 2	0.11 - 0.11	0.21	75.9	--	75.9	(b)	0.0028	0.0017	-	No	BSV
SVOC	Naphthalene (Unfiltered)	91-20-3	µg/L	0.11	0.16 J	PW-ODPR-02	0.16 J	PW-ODPR-02	1 / 2	0.11 - 0.11	0.16	23.5	--	23.5	(b)	0.0068	0.0046	-	No	BSV
SVOC	Naphthalene (Filtered)	91-20-3	µg/L	ND	ND		ND		0 / 2	0.1 - 0.1	ND	23.5	--	23.5	(b)	--	--	-	No	ND
SVOC	Phenol (Unfiltered)	108-95-2	µg/L	0.26	0.15 J	PW-ODPR-02	0.36 J	PW-ODPO-02	2 / 2	n/a	0.36	58	--	58	(b)	0.0062	0.0044	-	No	BSV
SVOC	Phenol (Filtered)	108-95-2	µg/L	0.16	0.25 J	PW-ODPO-01 F	0.25 J	PW-ODPO-01 F	1 / 2	0.13 - 0.13	0.25	58	--	58	(b)	0.0043	0.0027	-	No	BSV
VOC	Acetone (Unfiltered)	67-64-1	µg/L	ND	ND		ND		0 / 2	5 - 5	ND	564000	--	564000	(e)	--	--	-	No	ND
VOC	Acetone (Filtered)	67-64-1	µg/L	6.25	10 J	PW-ODPO-01 F	10 J	PW-ODPO-01 F	1 / 2	5 - 5	10	564000	--	564000	(e)	0.000018	0.000011	-	No	BSV
VOC	MTBE (Unfiltered)	1634-04-4	µg/L	0.90	1.7 J	PW-ODPR-02	1.7 J	PW-ODPR-02	1 / 2	0.2 - 0.2	1.7	5000	--	5000	(d)	0.00034	0.00018	-	No	BSV
VOC	MTBE (Filtered)	1634-04-4	µg/L	0.80	1.5 J	PW-ODPR-01 F	1.5 J	PW-ODPR-01 F	1 / 2	0.2 - 0.2	1.5	5000	--	5000	(d)	0.0003	0.00016	-	No	BSV
VOC	Toluene (Unfiltered)	108-88-3	µg/L	0.40	0.63 J	PW-ODPR-02	0.63 J	PW-ODPR-02	1 / 2	0.33 - 0.33	0.63	37	--	37	(b)	0.017	0.011	-	No	BSV
VOC	Toluene (Filtered)	108-88-3	µg/L	0.35	0.33 J	PW-ODPO-01 F	0.37 J	PW-ODPR-01 F	2 / 2	n/a	0.37	37	--	37	(b)	0.01	0.0095	-	No	BSV

Notes:

(1) Both unfiltered (total) and filtered (dissolved) surface water samples were analyzedfor chemical constituents (with the exception of VOCs which were only analyzed for in unfiltered samples). Filtered and unfiltered results were generally comparable and, therefore, combined for screening purposes. An "F" suffix in the location code indicates a filtered sampled (e.g., cadmium). For certain metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn), ESVs are specific to dissolved results; if the

(2) Arithmetic average calculated using one-half the method detection limit (MDL) for non-detect results.

(3) Minimum/maximum detected concentration. "J" indicates an estimated concentration.

(4) MDL range based on non-detect sample results.

(5) SLERA exposure point concentration (EPC) is the maximum detected concentration.

(6) Ecological screening values (ESVs) were selected using the following hierarchy (see also Appendix A, Attachment A):

- (a) USEPA NRWQC for the protection of aquatic life, saltwater
- (b) USEPA Region IV chronic ecological effects values, saltwater
- (c) USEPA EcoTox Thresholds (SQC/SQB) for marine water
- (d) NOAA SQuiRTs for marine water
- (d) USEPA Region III BTAG ecological screening benchmarks for marine surface water
- (e) USEPA Region V ESLs for freshwater

(7) Screening level hazard quotient (HQ) calculated (to two significant figures) as follows: HQ = EPC/ESV.

(8) Bioaccumulation potential based on: USEPA. 2000. Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment, Status and Needs. Office of Water. EPA-823-R-00-001. February.

(9) Rationale for COPEC selection/exclusion:

Selection	*Exclusion*
ASV = above ecological screening value	BSV = below ecological screening value
PBC = potentially bioaccumulative constituent	
NSV = no screening value	

(10) Per the Work Plan, the SLERA utilizes only toxaphene samples analyzed using Method 1. Uncertainty associated with the results is discussed in the SLERA uncertainty section.

(11) Surrogate ESVs were utilized as follows:

total chromium uses hexavalent chromium as a surrogate

Shading = Maximum HQ > 1

Definitions:

OU1 = Operable Unit 1 (Outfall Ditch)

SLERA = Screening Level Ecological Risk Assessment

CAS = chemical abstract number

µg/L = microgram per liter

TXP = toxaphene

PAH = polynuclear aromatic hydrocarbon

SVOC = semivolatile organic compound

VOC = volatile organic compound

Table 8: Estimated Present Worth for Remedial Alternatives

Remedial Alternative	Estimated Capital Cost	Estimated Annual O&M Costs	Estimated Present Worth of O&M at 3%	Estimated Present Worth of O&M at 7%	Total Estimated Present Worth at 3%	Total Estimated Present Worth at 7%
1	$0	$0	$0	$0	$0	$0
2	$6,902,000	$118,740	$2,397,000	$1,473,450	$9,299,000	$8,375,450
3	$4,817,000	$118,740	$2,397,000	$1,473,450	$7,214,000	$6,290,450
3A	$5,382,000	$118,740	$2,397,000	$1,473,450	$7,779,000	$6,855,450
4	$3,015,000	$118,740	$2,397,000	$1,473,450	$5,412,000	$4,488,450
4A	$4,277,000	$118,740	$2,397,000	$1,473,450	$6,674,000	$5,750,450
5	$5,119,000	$118,740	$2,397,000	$1,473,450	$7,516,000	$6,592,450
5A	$5,802,000	$118,740	$2,397,000	$1,473,450	$8,199,000	$7,275,450
6	$5,843,000	$118,740	$2,397,000	$1,473,450	$8,240,000	$7,316,450
6A	$5,854,000	$118,740	$2,397,000	$1,473,450	$8,251,000	$7,327,450
7	$4,705,000	$118,740	$2,397,000	$1,473,450	$7,102,000	$6,178,450

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Chemical-Specific ARARs/TBC			
Action/Media	**Requirements**	**Prerequisite**	**Citation**
Protection of coastal and marine estuarine waters	The following criteria are deemed to be necessary and applicable to all waters of the State: (a) All waters shall be free from materials associated with municipal or domestic sewage, industrial waste or any other waste which will settle to form sludge deposits that become putrescent, unsightly or otherwise objectionable. (b) All waters shall be free from oil, scum and floating debris associated with municipal or domestic sewage, industrial waste or other discharges in amounts sufficient to be unsightly or to interfere with legitimate water uses. (c) All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses. (d) All waters shall be free from turbidity which results in a substantial visual contrast in a water body due to a man-made activity. The upstream appearance of a body of water shall be as observed at a point immediately upstream of a turbidity-causing man-made activity. That upstream appearance shall be compared to a point which is located sufficiently downstream from the activity so as to provide an appropriate mixing zone. For land disturbing activities, proper design, installation, and maintenance of best management practices and compliance with issued permits shall constitute compliance with Paragraph 391-3-6-.03(5)(d).	Waters of the State of Georgia with designated uses of *Recreation, Fishing, Propagation of Fish, Shellfish, Game and Other Aquatic Life and Coastal Fishing* under the Georgia Water Use Classifications at GA Rule §391-3-6-.03(4) – **relevant and appropriate**	GA Rule §391-3-6-.03 (5) *General Criteria for All Waters*

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Chemical-Specific ARARs/TBC			
Action/Media	**Requirements**	**Prerequisite**	**Citation**
	(e) All waters shall be free from toxic, corrosive, acidic and caustic substances discharged from municipalities, industries or other sources, such as nonpoint sources, in amounts, concentrations or combinations which are harmful to humans, animals or aquatic life.		
Protection of coastal and marine estuarine waters	In-stream concentrations of the following chemical constituents listed by the U.S.EPA as toxic priority pollutants pursuant to Section 307(a)(1) of the Federal Clean Water Act (as amended) shall not exceed the chronic criteria indicated below under 7-day, 10-year minimum flow (7Q10) or higher stream flow conditions except within established mixing zones or in accordance with site specific effluent limitations developed in accordance with procedures presented in §391-3-6-.06. As applied to *Coastal and Marine Estuarine Waters* Arsenic – 36 µg/L Cadmium – 8.8 µg/L Chromium VI - 50 µg/L Copper – 3.1 µg/L Lead - 8.1 µg/L[1] Mercury - 0.025 µg/L[2] Nickel – 8.2 µg/L Selenium – 71 µg/L	Waters of the State of Georgia with designated uses of *Recreation, Fishing, Propagation of Fish, Shellfish, Game and Other Aquatic Life and Coastal Fishing* under the Georgia Water Use Classifications at GA Rule §391-3-6-.03(4) – **relevant and appropriate**	GA Rule §391-3-6-.03(5)(e)(ii) *Criteria for Protection of Aquatic Life*

1 The in-stream criterion is expressed in terms of the dissolved fraction in the water column. Conversion factors used to calculate dissolved criteria are found in the EPA document – National Recommended Water Quality Criteria – EPA 2006.
2 The in-stream criterion is lower than the EPD laboratory detection limits (A "*" indicates that the criterion may be higher than or lower than EPD laboratory detection limits depending upon the hardness of the water).

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Chemical-Specific ARARs/TBC			
Action/Media	**Requirements**	**Prerequisite**	**Citation**
	Zinc – 81 µg/L *NOTE:* Current methods available in commercial laboratory can detect at or below the specified concentration. Total mercury is recoverable form (not dissolved) as specified at GA Rule §391-3-6-.03 (5)(e)(ii). Thus aqueous samples are not filtered as indicated in the reference to approved methods in 40 CFR 136 at GA Rule §391-3-6-.03(13). See table entry below.		
Protection of coastal and marine estuarine waters	In-stream concentrations of the following chemical constituents listed by the U.S.EPA as toxic priority pollutants pursuant to Section 307(a)(1) of the Federal Clean Water Act (as amended) shall not exceed criteria indicated below under 7-day, 10-year minimum flow (7Q10) or higher stream flow conditions except within established mixing zones or in accordance with site specific effluent limitations developed in accordance with procedures presented in 391-3-6-.06: Toxaphene - 0.0002 ug/L Cyanide – 1 µg/L	Waters of the State of Georgia with designated uses of *Recreation, Fishing, Propagation of Fish, Shellfish, Game and Other Aquatic Life and Coastal Fishing* under the Georgia Water Use Classifications at GA Rule §391-3-6-.03(4) – **relevant and appropriate**	GA Rule §391-3-6-.03(5)(e)(iii) *Criterion for Protection of Aquatic Life*
Protection of coastal and marine estuarine waters	In-stream concentrations of the following chemical constituents listed by the U.S.EPA as toxic priority pollutants pursuant to Section 307(a)(1) of the Federal Clean Water Act (as amended) shall not exceed criteria indicated below under annual average or higher stream flow conditions: Toxaphene - 0.00028 ug/L Carbon Tetrachloride - 1.6 µg/L	Waters of the State of Georgia with designated uses of *Recreation, Fishing, Propagation of Fish, Shellfish, Game and Other Aquatic Life and Coastal Fishing* under the Georgia Water Use Classifications at GA Rule §391-3-6-.03(4) – **relevant and appropriate**	GA Rule §391-3-6-.03(5)(e)(iv) *Criterion for Protection of Human Health*
Sampling of surface water to assess compliance with criteria specified in GA Rule	Analytical standards for these samples must comply with the requirements of *Title 40, Code of Federal Regulations*, Part 136.	Sampling methods for water quality samples collected and reported by any person(s), (including volunteer	GA Rule §391-3-6-.03(13) *Acceptance of Data*

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Chemical-Specific ARARs/TBC			
Action/Media	**Requirements**	**Prerequisite**	**Citation**
§391-3-6-.03(5)	*NOTE: A site-specific sampling and quality assurance plan will be required as part of the EPA-approved remedial design and implementation.*	groups), to the Division – **relevant and appropriate**	

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Location-Specific ARARs/TBC			
Location Characteristics	**Requirements**	**Prerequisite**	**Citation**
	Wetlands		
Presence of wetlands	Requires Federal agencies to evaluate action to minimize the destruction, loss or degradation of wetlands and to preserve and enhance beneficial values of wetlands.	Actions that involve potential impacts to, or take place within, wetlands – **TBC**	Executive Order 11990 – *Protection of Wetlands* Section 1.(a)
Presence of wetlands	If project will have unavoidable adverse impacts after all appropriate and practicable steps have been taken to avoid or minimize impacts, responsible party must implement compensatory mitigation – i.e., the restoration, creation, enhancement, or (in some circumstances) preservation of aquatic resources. This requires a mitigation work plan, including detailed specifications and descriptions for compensatory mitigation. The regulations also require objective performance standards, monitoring for at least 5 years and active long-term management and maintenance where necessary to ensure long-term sustainability. *NOTE: Per CERCLA §121(e)(1) permits are not required for on-site response action; however project must comply with any substantive requirements that otherwise would be included in a CWA 404(b) permit including appropriate and practicable mitigation after consultation with USCOE.*	Actions that involve unavoidable adverse impacts to waters of the United States (including jurisdictional wetlands) – **applicable**	33 CFR PART 332 *et. seq.* Compensatory Mitigation For Losses of Aquatic Resources

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Location-Specific ARARs/TBC			
Location Characteristics	**Requirements**	**Prerequisite**	**Citation**
	Floodplains		
Presence of floodplain designated as such on a map[3]	Shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.	Federal actions that involve potential impacts to, or take place within, floodplains – **TBC**	Executive Order 11988 Section 1. *Floodplain Management*
	Shall consider alternatives to avoid, to the extent possible, adverse effects and incompatible development in the floodplain. Design or modify its action in order to minimize potential harm to or within the floodplain.		Executive Order 11988 Section 2(a)(2) *Floodplain Management*
	Where possible, an agency shall use natural systems, ecosystem processes, and nature-based approaches when developing alternatives for consideration.		Executive Order 13690 Section 2 (c)
Presence of floodplain designated as such on a map[3]	The Agency shall design or modify its actions so as to minimize[4] harm to or within the floodplain.	Federal actions affecting or affected by Floodplain as defined in 44 CFR § 9.4 – **relevant and appropriate**	44 CFR § 9.11(b)(1) *Mitigation*
	The Agency shall restore and preserve natural and beneficial floodplain values.		44 CFR § 9.11(b)(3) *Mitigation*
	The Agency shall minimize: • Potential harm to lives and the investment at risk from base flood, or in the case of critical actions[5], from the 500-year flood; • Potential adverse impacts that action may have on floodplain values.		44 CFR § 9.11(c)(1) and (3) *Minimization provisions*

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Location-Specific ARARs/TBC			
Location Characteristics	**Requirements**	**Prerequisite**	**Citation**
Aquatic Resources and Coastal Zone Areas			
Location encompassing *aquatic ecosystem* as defined in 40 CFR 230.3(c)	Except as provided under [CWA] section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, or if it will cause or contribute to significant degradation of the waters of the United States.	Action that involves the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands – **relevant and appropriate**	40 CFR Part 230.10(a) and (c) Restrictions on Discharge
	No discharge of dredged or fill material shall be permitted if it: (1) Causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable State water quality standard; (2) Violates any applicable toxic effluent standard or prohibition under section 307 of the CWA; (3) Jeopardizes the continued existence of species listed as endangered or threatened under the Endangered Species Act of 1973, as amended, or results in likelihood of the destruction or adverse modification of a habitat which is determined by the Secretary of Interior or Commerce, as appropriate, to be a critical habitat under the Endangered Species Act of 1973, as amended. If an exemption has been granted by the Endangered Species Committee, the terms of such exemption		40 CFR Part 230.10(b)

[3] Under 44 CFR § 9.7 ***Determination of proposed action's location***, Paragraph (c) *Floodplain determination*. One should consult the FEMA Flood Insurance Rate Map (FIRM), the Flood Boundary Floodway Map (FBFM) and the Flood Insurance Study (FIS) to determine if the Agency proposed action is within the base floodplain.

[4] Minimize means to reduce to smallest amount or degree possible. 44 C.F.R. § 9.4 Definitions.

[5] See 44 C.F.R. § 9.4 Definitions, Critical action. Critical actions include, but are not limited to, those which create or extend the useful life of structures or facilities such as those that produce, use or store highly volatile, flammable, explosive, toxic or water-reactive materials.

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Location-Specific ARARs/TBC			
Location Characteristics	**Requirements**	**Prerequisite**	**Citation**
	shall apply in lieu of this subparagraph; (4) Violates any requirement imposed by the Secretary of Commerce to protect any marine sanctuary designated under title III of the Marine Protection, Research, and Sanctuaries Act of 1972.		
Location encompassing *aquatic ecosystem* as defined in 40 CFR 230.3(c)	Except as provided under [CWA] section 404(b)(2), no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps [in accordance with 40 CFR 230.70 *et seq. Actions To Minimize Adverse Effects*] have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.	Action that involves the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands – **relevant and appropriate**	40 CFR Part 230.10(d)

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Location-Specific ARARs/TBC			
Location Characteristics	**Requirements**	**Prerequisite**	**Citation**
Location encompassing *aquatic ecosystem* as defined in 40 CFR 230.3(c)	Must comply with the substantive requirements of the NWP 38 General Conditions, as appropriate, any regional or case-specific conditions recommended by the Corps District Engineer, after consultation. *NOTE: Although permits are not required per CERCLA Section 121(e)(1), consultation with the USACE recommended to determine whether any adverse impacts not covered by the permit that may require mitigation. Such mitigation would be performed as part of the remedial action.*	Discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands – **TBC**	Nation Wide Permit (38) Cleanup of Hazardous and Toxic Waste [33 CFR Part 323.3(b) requires EPA to obtain authorization under general permit]
Presence of coastal marshlands	No person shall remove, fill, dredge, drain, or otherwise alter any marshlands or construct or locate any structure on or over marshlands in this state within the estuarine area thereof without first obtaining a permit. *NOTE: Per CERCLA §121(e)(1) permits are not required for on-site response action; however project must comply with any substantive requirements that otherwise would be included in a permit.*	Alteration to, or construction on or over, the marshlands or water bottoms within the estuarine area of the State – **applicable**	Georgia Coastal Marshlands Protection Act O.C.G.A. §12-5-286(a)
Presence of marshlands and estuarine area	There is a 50-foot marshlands buffer applicable to the upland component of the project as measured horizontally inland from the coastal marshland-upland interface, which is the Coastal Marshland Protection Act jurisdiction line, so as to ensure the project does not result in the filling or other alteration of the coastal marshlands.	Upland component of the project as defined in GA Rule 391-2-3-.02(2)(i) in *coastal marshlands* as defined in GA Rule §391-2-3-.02(2)(b) – **applicable**	GA Rule §391-2-3-.02(4)(a)

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Location-Specific ARARs/TBC			
Location Characteristics	**Requirements**	**Prerequisite**	**Citation**
Presence of marshlands and estuarine area	Except as provided in subparagraph 2. of this paragraph and paragraphs (d) and (g) below, no land-disturbing activities within the project boundaries shall be conducted within the 50-foot marshlands buffer, and such marshlands buffer shall remain in its natural, undisturbed state of vegetation, so as to naturally treat stormwater during both construction and post construction phases of the upland component of the project.	Upland component of the project as defined in GA Rule 391-2-3-.02(2)(i) in *coastal marshlands* as defined in GA Rule §391-2-3-.02(2)(b) – **applicable**	GA Rule §391-2-3-.02(4)(b)(1)
	Land disturbance and construction of structures within the 50-foot marshlands buffer in the upland component of the project shall be limited to the following: (i) Construction and maintenance of temporary structures necessary for construction of the marshlands component of the project; (ii) Construction and maintenance of permanent structures that are required for the functionality of and/or provide permanent access to the marshlands component of the project; and (iii) Planting and grading with vegetated materials within the marshlands buffer to enhance stormwater management, such as erosion and sediment control measures, and to allow pedestrian access for passive recreation.		GA Rule §391-2-3-.02(4)(b)(2)

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Location-Specific ARARs/TBC			
Location Characteristics	**Requirements**	**Prerequisite**	**Citation**
Presence of marshlands and estuarine area	After such land disturbing activities associated with (b)2.(i) above are completed, and except as allowed for in (b)2.(ii) and (iii) above, the marshlands buffer must be restored to and maintained in a natural vegetated state or in a vegetated state at least as protective or better than pre-construction conditions, subject to hand trimming and thinning as authorized in the permit. *NOTE: Per CERCLA §121(e)(1) permits are not required for on-site response action; however project must comply with any substantive requirements that otherwise would be included in a permit.*	Upland component of the project as defined in GA Rule 391-2-3-.02(2)(i) in *coastal marshlands* as defined in GA Rule §391-2-3-.02(2)(b) – **applicable**	GA Rule §391-2-3-.02(4)(c)
	Already existing impervious surfaces and structures within the marshlands buffer area may remain and be maintained, provided the replacement, modification or upgrade does not increase any encroachment upon the required marshlands buffer in effect at the time of the replacement, modification or upgrade.		GA Rule §391-2-3-.02(4)(d)
	Marshlands buffers shall be designed, installed and/or maintained sufficiently such that stormwater discharge to coastal marshlands from the marshlands buffer is managed according to the policy, criteria, and information including technical specifications and standards in the Coastal Stormwater Supplement to the Georgia Stormwater Management Manual, 1st Edition, April 2009. *NOTE: Georgia Stormwater Management Manual, including supplements, may be identified as To Be Considered guidance in developing and*	Upland component of the project as defined in GA Rule 391-2-3-.02(2)(i) in *coastal marshlands* as defined in GA Rule §391-2-3-.02(2)(b) – **applicable**	GA Rule§ 391-2-3-.02(4)(e)

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Location-Specific ARARs/TBC			
Location Characteristics	**Requirements**	**Prerequisite**	**Citation**
	implementing marshland buffers that comply with this GA Rule.		
Georgia Shore Protection	No person shall construct or erect any structure or construct, erect, conduct, or engage in any shoreline engineering activity or engage in any land alteration which alters the natural topography or vegetation of any area within the jurisdiction of this part except in accordance with the terms and conditions of a permit. *NOTE: Per CERCLA §121(e)(1) permits are not required for on-site response action; however project must comply with any substantive requirements that otherwise would be included in a permit.*	Activities that affect beaches and dynamic dune fields located on Georgia's barrier islands and the submerged shoreline lands adjacent to such beaches and dynamic dune fields seaward – **relevant and appropriate**	Georgia Shore Protection Act O.C.G.A. §12-5-237(a)
Submerged Cultural Resources	All findings of submerged cultural resources shall be reported to the Georgia Department of Natural Resources within two days of discovery, Saturday, Sundays, and legal holidays excluded.	Discovery of prehistoric or historic sites, ruins, artifacts, treasure, treasure-trove, and shipwrecks or vessels and their cargo or tackle, which have remained on the bottom for more than 50 years, and similar sites and objects found in the Atlantic Ocean within the three-mile territorial limit of the State of Georgia or within its navigable waters – **relevant and appropriate**	O.C.G.A. §12-3-81
Threatened and Endangered Species			
Presence of Threatened and Endangered Wildlife listed in 50 CFR 17.11(h) – or critical habitat of such species	Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse	Agency action that may jeopardize listed wildlife species, or destroy or adversely modify critical habitat – **applicable**	16 U.S.C. §1536 (a)(2) – or Section 7(a)(2) of *the Endangered Species Act of 1973*

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Location-Specific ARARs/TBC			
Location Characteristics	**Requirements**	**Prerequisite**	**Citation**
	modification of habitat of such species which is determined by the Secretary of Interior, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. *NOTE: Despite that consultation may be considered an administrative requirement, it should be performed to ensure activities are in compliance with substantive provisions of the Endangered Species Act and regulations.*		
Presence of Threatened and Endangered Wildlife listed in 50 CFR 17.11(h)	It is unlawful to take threatened or endangered wildlife in the United States. *NOTE: Under 50 CFR 10.12 Definitions, the term "take" means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.*	Action that may jeopardize listed wildlife species – **applicable**	50 CFR Part 17.21(c) 50 CFR Part 17.31(a) 50 CFR Part 17.42(a)(2)
Presence of protected Marine Mammals	It is unlawful to take any marine mammal in waters or on lands under the jurisdiction of the United States.	Action that may jeopardize protected marine mammals – **applicable**	Marine Mammal Protection Act, 16 U.S.C. §1372 Section 102 (a)(2)(A)
Presence of Migratory Birds listed in 50 CFR 10.13	No person may take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such bird except as may be permitted under the terms of a valid permit issued pursuant to the provisions of this part and part 13 of this chapter, or as permitted by regulations in this part, or part 20 of this subchapter (the hunting regulations).	Action that have potential impacts on, or is likely to result in a 'take' (as defined in 50 CFR 10.12) of migratory birds – **applicable**	Migratory Bird Treaty Act, 16 U.S.C. §703(a) 50 CFR 21.11 *General Permit Requirements*

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
	General Construction Standards – All Land-disturbing Activities (i.e., excavation, clearing, grading, etc.)		
Managing stormwater runoff from land-disturbing activities	Shall implement best management practices, including sound conservation and engineering practices to prevent and minimize erosion and resultant sedimentation, as provided in O.G.C.A. § 12-7-6(b), during excavation activity.	Land-disturbing activity (as defined in O.C.G.A. §12-7-3(9)) of more than one acre of land – **applicable**	GA Erosion and Sedimentation Act O.G.C.A. §12-7-6(b)
	Shall control turbidity of stormwater runoff discharges to the extent the limits in O.C.G.A. § 12-7-6 shall not be exceeded.	Land-disturbing activity (as defined in O.C.G.A. §12-7-3(9)) of more than one acre of land – **applicable**	GA Rule §391-3-7-.06
Managing stormwater runoff from upland area	There shall be no discharge of untreated stormwater from developed or disturbed areas, whether surface or piped, to coastal marshlands from the upland component of the project. The Committee is authorized to waive this requirement if the Committee finds that the site or project characteristics prohibit treatment, there is no practicable alternative, and it has minimal adverse impact.	Upland component of the project as defined in GA Rule §391-2-3-.02(2)(i) in coastal marshlands as defined in GA Rule 391-2-3-.02(2)(b) – **applicable**	GA Rule §391-2-3-.02(5)(a)
	In addition to the requirements of Section (5)(a) above, discharged stormwater from the upland component of the project shall be managed according to the policy, criteria, and information including technical specifications and standards in the Coastal Stormwater Supplement to the Georgia Stormwater Management Manual, 1st Edition, April 2009. *NOTE: Georgia Stormwater Management Manual, including supplements, may be identified as To Be Considered guidance in managing stormwater that complies with this GA Rule.*		GA Rule §391-2-3-.02(5)(b)
Managing discharge of wastewater	No person shall discharge, allow, or cause to be discharged into the CS4 or watercourses any materials, other than stormwater, including but not limited to pollutants or waters containing any pollutants that cause or contribute to a	Discharge of wastewater other than stormwater – **relevant and appropriate**	Glynn County Ordinance 2-27-11

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
	violation of applicable water quality standards.		
Managing fugitive dust emissions	Shall take all reasonable precautions to prevent fugitive dust from becoming airborne, including the following precautions: (i) use of water or chemicals for dust control; (ii) application of asphalt, water, or chemicals on surfaces that can give rise to airborne dusts; (iii) installation of hoods, fans, and filters to enclose and vent the handling of dusty materials; (iv) covering, at all times when in motion, open bodied trucks transporting materials likely to give rise to airborne dusts; and (v) prompt removal of earth or other material from paved streets onto which it has been deposited.	Operations, processes, handling, transportation or storage which may result in fugitive dust – **relevant and appropriate**	Georgia Air Quality Control Regulations Rule §391-3-1-.02(2)(n)(1)
	Shall not allow the percent opacity from any fugitive dust source to equal or exceed 20 percent		Georgia Air Quality Control Regulations Rule §391-3-1-.02(2)(n)(2)
Waste Characterization – Primary Wastes (e.g., excavated soil/sediment) and Secondary Wastes(e.g., wastewaters and spent treatment media)			
Characterization of *solid* waste (all primary and secondary waste)	Must determine if solid waste is hazardous waste or if waste is excluded under 40 CFR 261.4(b); and must determine if waste is listed under 40 CFR Part 261.	Generation of solid waste as defined in 40 CFR 261.2 and which is not excluded under 40 CFR 261.4(a) – **applicable**	40 CFR 262.11(a) and (b) GA Rule §391-3-11-.08
	Must determine whether the waste is (characteristic waste) identified in subpart C of 40 CFR part 261by either: (1) Testing the waste according to the methods set forth in subpart C of 40 CFR part 261, <u>or</u> (2) Applying knowledge of the hazard characteristic of the		40 CFR 262.11(c) GA Rule§391-3-11-.08

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
	waste in light of the materials or the processes used.		
	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chapter 40 for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste which is determined to be hazardous – **applicable**	40 CFR 262.11(d) GA Rule §391-3-11-.08
Characterization of *hazardous* waste (all primary and secondary waste)	Must obtain a detailed chemical and physical analysis on a representative sample of the waste(s), which at a minimum contains all the information that must be known to treat, store, or dispose of the waste in accordance with pertinent sections of 40 CFR 264 and 268.	Generation of RCRA hazardous waste for storage, treatment or disposal – **applicable**	40 CFR 264.13(a)(1) GA Rule §391-3-11-.10
Characterization of *hazardous* waste (all primary and secondary waste) *Cont'd*	Must determine the underlying hazardous constituents [as defined in 40 CFR 268.2(i)] in the waste.	Generation of RCRA characteristic hazardous waste (and is not D001 non-wastewaters treated by CMBST, RORGS, or POLYM of Section 268.42 Table 1) for storage, treatment or disposal – **applicable**	40 CFR 268.9(a) GA Rule §391-3-11-.16
	Must determine if the waste is restricted from land disposal under 40 CFR 268 *et seq.* This is done by determining if the hazardous waste meets the treatment standards in 40 CFR 268.40, 268.45 or 268.49 and the determination can be made concurrently with the hazardous waste determination required in 40 CFR 262.11 by either: testing in accordance with prescribed methods <u>or</u> use of generator knowledge of waste.		40 CFR 268.7 GA Rule §391-3-11-.16
	Must comply with the special requirements of 40 CFR 268.9 in addition to any applicable requirements in 40 CFR 268.7.	Generation of waste or soil that displays a hazardous characteristic of ignitability, corrosivity, reactivity, or toxicity for storage, treatment or disposal – **applicable**	40 CFR 268.7(a)(1) GA Rule §391-3-11-.16

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
	Must determine each EPA Hazardous Waste Number (Waste Code) to determine the applicable treatment standards under 40 CFR 268.40 *et. seq*. This determination may be made concurrently with the hazardous waste determination required in Sec. 262.11 of this chapter.		40 CFR 268.9(a) GA Rule §391-3-11-.16
Temporary Storage of Wastes – Primary Wastes (e.g., excavated soil/sediment) and Secondary Wastes(e.g., wastewaters and spent treatment media)			
Temporary storage of hazardous waste in containers	A generator may accumulate hazardous waste at the facility provided that: • waste is placed in containers that comply with 40 CFR 265.171-173 • the date upon which accumulation begins is clearly marked and visible for inspection on each container • container is marked with the words "hazardous waste"	Accumulation of RCRA hazardous waste on site as defined in 40 CFR 260.10 – **applicable**	40 CFR 262.34(a)(1)-(3) GA Rule §391-3-11-.08
	• container may be marked with other words that identify the contents.	Accumulation of 55 gal. or less of RCRA hazardous waste at or near any point of generation – **applicable**	40 CFR 262.34(c)(1) GA Rule §391-3-11-.08
Use and management of hazardous waste in containers	If container is not in good condition (e.g. severe rusting, structural defects) or if it begins to leak, must transfer waste into container in good condition.	Storage of RCRA hazardous waste in containers – **applicable**	40 CFR 265.171 GA Rule §391-3-11-.10
	Use container made or lined with materials compatible with waste to be stored so that the ability of the container is not impaired.		40 CFR 265.172 GA Rule §391-3-11-.10
	Keep containers closed during storage, except to add/remove waste.		40 CFR 265.173(a) GA Rule §391-3-11-.10

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
	Open, handle and store containers in a manner that will not cause containers to rupture or leak.		40 CFR 265.173(b) GA Rule §391-3-11-.10
Storage of hazardous waste in container area	Area must have a containment system designed and operated in accordance with 40 CFR 264.175(b).	Storage of RCRA hazardous waste in containers with *free liquids* – **applicable**	40 CFR 264.175(a) GA Rule §391-3-11-.10
	Area must be sloped or otherwise designed and operated to drain liquid from precipitation, or Containers must be elevated or otherwise protected from contact with accumulated liquid.	Storage of RCRA hazardous waste in containers that *do not contain free liquids* (other than F020, F021, F022, F023,F026 and F027) – **applicable**	40 CFR 264.175(c)(1) and (2) GA Rule §391-3-11-.10
Closure performance standard for RCRA container storage unit	Must close the facility (e.g., container storage unit) in a manner that: • Minimizes the need for further maintenance; • Controls minimizes or eliminates to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run –off, or hazardous waste decomposition products to the ground or surface waters or the atmosphere; and • Complies with the closure requirements of subpart, but not limited to, the requirements of 40 CFR 264.178 for containers.	Storage of RCRA hazardous waste in containers – **applicable**	40 CFR 264.111 GA Rule §391-3-11-.10
Closure of RCRA container storage unit	At closure, all hazardous waste and hazardous waste residues must be removed from the containment system. Remaining containers, liners, bases, and soils containing or contaminated with hazardous waste and hazardous waste residues must be decontaminated or removed. [Comment: At closure, as throughout the operating period, unless the owner or operator can demonstrate in accordance with 40 CFR 261.3(d) of this chapter that the	Storage of RCRA hazardous waste in containers in a unit with a containment system – **applicable**	40 CFR 264.178 GA Rule §391-3-11-.10

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
	solid waste removed from the containment system is not a hazardous waste, the owner or operator becomes a generator of hazardous waste and must manage it in accordance with all applicable requirements of parts 262 through 266 of this chapter].		
Performance criteria for staging pile	Staging pile must: • facilitate a reliable, effective and protective remedy; • must be designed to prevent or minimize releases of hazardous wastes and constituents into the environment, and minimize or adequately control cross–media transfer as necessary to protect human health and the environment (e.g. use of liners, covers, run–off/run–on controls).	Storage of remediation waste in a staging pile – **applicable**	40 CFR 264.554(d)(1)(i) and (ii) GA Rule §391-3-11-.10
Operation of a staging pile	The staging pile must not operate for more than two years, except when the Director grants an operating term extension under 40 CFR 264.554(i). You must measure the two-year limit (or other operating term specified by the Director in the permit, closure plan, or order) from first time remediation waste placed in staging pile. *NOTE: Any time period greater than two years for operation of the staging pile will be documented and justified in the ROD.*	Storage of remediation waste in a staging pile – **applicable**	40 CFR 264.554(d)(1)(iii) GA Rule §391-3-11-.10
Design criteria for staging pile	In setting standards and design criteria must consider the following factors: • Length of time pile will be in operation; • Volumes of waste you intend to store in the pile; • Physical and chemical characteristics of the wastes to be stored in the unit; • Potential for releases from the unit; • Hydrogeological and other relevant environmental	Storage of remediation waste in a staging pile – **applicable**	40 CFR 264.554(d)(2)(i) –(vi) GA Rule §391-3-11-.10

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
	conditions at the facility that may influence the migration of any potential releases; and • Potential for human and environmental exposure to potential releases from the unit.		
Operation of a staging pile	Must not place in the same staging pile unless you have complied with 40 CFR 264.17(b).	Storage of "incompatible" remediation waste (as defined in 40 CFR 260.10) in staging pile – **applicable**	40 CFR 264.554(f)(1) GA Rule §391-3-11-.10
	Must separate the incompatible waste or materials, or protect them from one another by using a dike, berm, wall or other device.	Staging pile of remediation waste stored nearby to incompatible wastes or materials in containers, other piles, open tanks or land disposal units – **applicable**	40 CFR 264.554(f)(2) GA Rule §391-3-11-.10
	Must not pile remediation waste on same base where incompatible wastes or materials were previously piled unless you have sufficiently decontaminated the base to comply with 40 CFR 264.17(b).		40 CFR 264.554(f)(3) GA Rule §391-3-11-.10
Closure of staging pile of remediation waste	Must be closed within 180 days after the operating term by removing or decontaminating all remediation waste, contaminated containment system components, and structures and equipment contaminated with waste and leachate. Must decontaminate contaminated subsoils in a manner that EPA determines will protect human and the environment.	Storage of remediation waste in staging pile in previously contaminated area – **applicable**	40 CFR 264.554(j)(1) and (2) GA Rule §391-3-11-.10
	Must be closed within 180 days after the operating term according to 40 CFR 264.258(a) and 264.111 or 265.258(a) and 265.111.	Storage of remediation waste in staging pile in uncontaminated area – **applicable**	40 CFR 264.554(k) GA Rule §391-3-11-.10
Waste Treatment and Disposal – Primary Wastes (e.g., excavated soil/sediment) and Secondary Wastes (e.g., wastewaters, spent treatment media)			
Disposal of RCRA-hazardous waste in a land-based unit	May be land disposed if it meets the requirements in the table "Treatment Standards for Hazardous Waste" at 40 CFR 268.40 before land disposal.	Land disposal, as defined in 40 CFR 268.2, of restricted RCRA waste – **applicable**	40 CFR 268.40(a) GA Rule §391-3-11-.16

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
	All underlying hazardous constituents [as defined in 40 CFR 268.2(i)] must meet the Universal Treatment Standards, found in 40 CFR 268.48 Table UTS prior to land disposal	Land disposal of restricted RCRA characteristic wastes (D001-D043) that are not managed in a wastewater treatment system that is regulated under the CWA, that is CWA equivalent, or that is injected into a Class I nonhazardous injection well — **applicable**	40 CFR 268.40(e) GA Rule §391-3-11-.16
	To determine whether a hazardous waste identified in this section exceeds the applicable treatment standards of 40 CFR 268.40, the initial generator must test a sample of the waste extract or the entire waste, depending on whether the treatment standards are expressed as concentration in the waste extract or waste, or the generator may use knowledge of the waste. If the waste contains constituents (including UHCs in the characteristic wastes) in excess of the applicable UTS levels in 40 CFR 268.48, the waste is prohibited from land disposal, and all requirements of part 268 are applicable, except as otherwise specified.	Land disposal of RCRA toxicity characteristic wastes (D004-D011) that are newly identified (i.e., wastes, soil, or debris identified by the TCLP but not the Extraction Procedure) — **applicable**	40 CFR 268.34(f) GA Rule §391-3-11-.16
Disposal of RCRA *hazardous soils* in a land-based unit	Must be treated according to the alternative treatment standards of 40 CFR 268.49(c) <u>or</u> Must be treated according to the UTSs [specified in 40 CFR 268.48 Table UTS] applicable to the listed and/or characteristic waste contaminating the soil prior to land disposal.	Land disposal, as defined in 40 CFR 268.2, of restricted *hazardous soils* – **applicable**	40 CFR 268.49(b) GA Rule §391-3-11-.16
Disposal of RCRA characteristic wastewaters in an NPDES permitted WWTU	Are not prohibited, if the wastes are managed in a treatment system which subsequently discharges to waters of the U.S. pursuant to a permit issued under 402 of CWA (i.e., NPDES permitted), unless the wastes are subject to a specified method of treatment other than DEACT in 40 CFR 268.40, or D003 reactive cyanide. *NOTE: For purposes of this exclusion, a CERCLA on-site wastewater treatment unit that meets all of the identified*	Land disposal of RCRA restricted hazardous wastewaters that are hazardous only because they exhibit a characteristic and not otherwise prohibited under 40 CFR 268 – **applicable**	40 CFR 268.1(c)(4)(i) GA Rule §391-3-11-.16

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
	CWA NPDES ARARs for point source discharges from such system, is considered wastewater treatment system that is NPDES permitted.		
Disposal of RCRA characteristic wastewaters in a POTW	Are not prohibited, if wastes are treated for purposes of the pretreatment requirements of Section 307 of the CWA, unless the wastes are subject to a specified method of treatment other than DEACT in 40 CFR 268.40, or are D003 reactive cyanide.	Land disposal of hazardous wastewaters that are hazardous only because they exhibit a characteristic and are not otherwise prohibited under 40 CFR 268 – **applicable**	40 CFR 268.49(b) GA Rule §391-3-11-.16
Discharge of Wastewaters			
Discharge of wastewater from treatment unit or de-watering	All pollutants shall receive such treatment or corrective action so as to ensure compliance with the terms and conditions of the issued permit and with the following, whenever applicable: • Effluent limitations established by EPA pursuant to Sections 301, 302, 303 and 316 of the Federal CWA; • Effluent limitations and prohibitions and pretreatment standards established by the EPA pursuant to Section 307 of the Federal CWA; • Notwithstanding the above, more stringent effluent limitations may be required as deemed necessary by the EPD (a) to meet any other existing Federal laws or regulations, or (b) to ensure compliance with any applicable State water quality standards, effluent limitations, treatment standards, or schedules of compliance. *NOTE: Per CERCLA §121(e)(1) permits are not required for on-site response action; however project must comply with any substantive requirements that otherwise would be included in a permit.*	Discharge of any pollutant into the waters of the State – **applicable**	GA Rule §391-3-6-.06(4)(a) (1),(3) and (10) Degree of Waste Treatment Required

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
Discharge of wastewater from treatment unit or de-watering - *Cont'd*	Until such time as such criteria, standards, limitations, and prohibitions are promulgated pursuant to Sections 301, 302, 303, 304(e), 306, 307 and 405 of the Federal CWA, the EPD shall apply such standards, limitations and prohibitions necessary to achieve the purposes of said sections of the Federal Act. With respect to individual point sources, such limitations, standards, or prohibitions shall be based upon an assessment of technology and processes, to-wit: 1. To existing point sources, other than publicly owned treatment works, effluent limitations based on application of the best practicable control technology currently available; 2. To publicly owned treatment works, effluent limitations based upon the application of secondary treatment or treatment equivalent to secondary treatment in accordance with Federal Regulations, 40 C.F.R. 133.102 and .105; 3. To any point source, other than publicly owned treatment works, whose construction commences after the initial effective date of this Paragraph, and for which there are not new source performance standards, effluent limitations which reflect the greatest degree of effluent reduction which the EPD determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants, consistent with 40 C.F.R. 125.3(c)(2); 4. To any point source, as appropriate, effluent limitations or prohibitions designed to prohibit the discharge of toxic pollutants in toxic amounts or to		GA Rule §391-3-6-.06(4)(d) Degree of Waste Treatment Required

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
	require pretreatment of pollutants which interfere with, pass through, or otherwise are incompatible with the operation of publicly owned treatment works; and 5. To any point source, as appropriate, more stringent effluent limitations as are required to ensure compliance with applicable State water quality standards, including those to prohibit the discharge of toxic pollutants in toxic amounts. Where necessary, NPDES Permits issued or reissued after the adoption of this paragraph shall include numeric criteria based upon the following procedures to ensure that toxic substances and other priority pollutants are not discharged to surface waters in harmful amounts. *NOTE: Per CERCLA §121(e)(1) permits are not required for on-site response action; however project must comply with any substantive requirements that otherwise would be included in a permit.*		
Monitoring of discharges into surface water	The monitoring requirements of any discharge authorized by any such permit shall be consistent with Federal Regulations, 40 C.F.R. 122.41, 122.42, and 122.44 and applicable State laws. *NOTE: Per CERCLA §121(e)(1) permits are not required for on-site response action; however project must comply with any substantive requirements that otherwise would be included in a permit. Monitoring parameters including frequency will be included in a CERCLA document such as a Remedial Action Work Plan that is reviewed by EPD.*	Discharge of any pollutant into the waters of the State – **applicable**	GA Rule §391-3-6-.06(11)(a)

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
Transportation of Wastes			
Transportation of hazardous waste on-site	The generator manifesting requirements of 40 CFR 262.20–262.32(b) do not apply. Generator or transporter must comply with the requirements set forth in 40 CFR 263.30 and 263.31 in the event of a discharge of hazardous waste on a private or public right-of-way.	Transportation of hazardous wastes on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way – **applicable**	40 CFR 262.20(f) GA Rule §391-3-11-.08
Transportation of hazardous waste off-site	Must comply with the generator requirements of 40 CFR 262.20–23 for manifesting, Sect. 262.30 for packaging, Sect. 262.31 for labeling, Sect. 262.32 for marking, Sect. 262.33 for placarding, Sect. 262.40, 262.41(a) for record keeping requirements, and Sect. 262.12 to obtain EPA ID number.	Preparation and initiation of shipment of hazardous waste off-site – **applicable**	40 CFR 262.10(h); GA Rule §391-3-11-.08
	Must comply with the requirements of 40 CFR 263.11-263.31. A transporter who meets all applicable requirements of 49 CFR 171-179 and the requirements of 40 CFR 263.11 and 263.31 will be deemed in compliance with 40 CFR 263.	Transportation of hazardous waste within the United States requiring a manifest – **applicable**	40 CFR 263.10(a) GA Rule §391-3-11-.09
Transportation of hazardous materials	Shall be subject to and must comply with all applicable provisions of the HMTA and DOT HMR at 49 CFR 171-180. In addition to any specific requirements set forth in GA Rule 672-10,all hazardous materials shall be packaged, marked, labeled, handled, loaded, unloaded, stored, detained, transported, placarded, and monitored in compliance with 49 CFR.	Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material — **applicable**	49 CFR 171.1(c) GA Rule §672-10(a)
Transportation of samples (i.e.	Are not subject to any requirements of 40 CFR Parts 261 through 268 or 270 when:	Samples of solid waste or a sample of water, soil for purpose of conducting	40 CFR 261.4(d)(1)(i)–(iii) GA Rule §391-3-11-.07

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

Action-Specific ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
contaminated soils and wastewaters)	• the sample is being transported to a laboratory for the purpose of testing; or • the sample is being transported back to the sample collector after testing. • the sample is being stored by sample collector before transport to a lab for testing	testing to determine its characteristics or composition – **applicable**	
	In order to qualify for the exemption in paragraphs (d)(1)(i) and (ii), a sample collector shipping samples to a laboratory must: • Comply with U.S. DOT, U.S. Postal Service, or any other applicable shipping requirements • Assure that the information provided in (1) thru (5) of this section accompanies the sample. • Package the sample so that it does not leak, spill, or vaporize from its packaging.	Samples of solid waste <u>or</u> a sample of water, soil for purpose of conducting testing to determine its characteristics or composition– **applicable**	40 CFR 261.4(d)(2)(i)(A) and (B) GA Rule §391-3-11-.07
Transportation and handling of solid waste	No person shall engage in solid waste or special solid waste handling in Georgia or construct or operate a solid waste handling facility in Georgia, except those individuals exempted from this part under Code Section 12-8-30.10, without first obtaining a permit from the director authorizing such activity.	Management of solid waste in Georgia – **applicable**	Georgia Solid Waste Management Act of 1990 O.C.G.A. §12-8-24

ARAR = applicable or relevant and appropriate requirement
CFR = *Code of Federal Regulations*
CWA = Clean Water Act of 1972
DEACT = deactivation
DOT = U.S. Department of Transportation
EPA = U.S. Environmental Protection Agency
EPD = Georgia Environmental Protection Division of the Georgia Department of Natural Resources
HMR = Hazardous Materials Regulations
HMTA = Hazardous Materials Transportation Act
GAC = granulated activated carbon
GA Rule = *Rules and Regulations*, Section as noted
LDR = Land Disposal Restrictions
NPDES = National Pollutant Discharge Elimination System

Table 9 - Chemical-, Location-, and Action-Specific ARARs/TBC
Terry Creek Site, Operable Unit 01 (OU01), Brunswick, Glynn County, Georgia

O.C.G.A. = *Official Code of Georgia Annotated*, Chapter as noted
POTW = Publicly Owned Treatment Works
RCRA = Resource Conservation and Recovery Act of 1976
TBC = to be considered
TCLP = Toxicity Characteristic Leaching Procedure
U.S. = United States
USCOE = U.S. Corps of Engineers
UTS = Universal Treatment Standard
WWTU = Waste Water Treatment Unit

PART 3: RESPONSIVENESS SUMMARY

TERRY CREEK SUPERFUND SITE OPERABLE UNIT 1
PROPOSED PLAN RESPONSIVENESS SUMMARY

Table of Contents

Please note that a list of acronyms/abbreviations and the references for this Responsiveness Summary is contained in the Record of Decision (Part 1).

Attachments

1.0 PUBLIC REVIEW PROCESS

1.1 Introduction

This Responsiveness Summary (RS) provides a summary of comments and concerns received during the public comment period related to the Terry Creek Superfund Site, Operable Unit 1 (OU1) Proposed Plan, and provides the responses of the US Environment Protection Agency (EPA) to those comments and concerns.

A RS serves two functions: first, it provides the decision maker with information about the views of the public, government agencies, and potentially responsible parties (PRPs) regarding the proposed remedial action and other alternatives; and second, it documents the way in which public comments have been considered during the decision-making process and provides answers to significant comments.

Public involvement in the review of Proposed Plans is stipulated in Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Sections 300.430(f)(3)(i)(F) and 300.430(f)(5)(iii)(B) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). These regulations provide for active solicitation of public comment.

All public comments received are addressed in this RS. The RS was prepared following guidance provided by the EPA in EPA 540-R-92-009 (*Community Relations in Superfund: A Handbook*) and the Office of Solid Waste and Emergency Response (OSWER) in OSWER 9836.0-1A (*Community Relations during Enforcement Activities and Development of the Administrative Record*). The comments presented in this document have been considered in EPA's decision in the selection of an interim remedy to address the contamination at OU1 of the Terry Creek Site.

The text of this RS explains the public review process and how comments were responded to. In addition to this text, there are two attachments:

Attachment 1 The Comment and Response Index, which contains summaries of every comment received and EPA's response.
Attachment 2 Transcript of the July 30, 2015 public meeting.

1.2 Public Review Process

The EPA relies on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the Proposed Plan for the Terry Creek OU1 Superfund Site, Brunswick, Georgia was made available to the community on June 26, 2015.

The complete Administrative Record file, which contains the RI/FS report and risk assessments, upon which the Selected Interim Remedy is based, is available at the locations listed below.

Information Repositories for the Terry Creek Superfund Site
Administrative Record

Brunswick-Glynn Co. Library
208 Gloucester Street
Brunswick, GA 31520
(912) 279-3740

U.S. EPA - Region 4
Superfund Records Center
61 Forsyth St., SW
Atlanta, GA 30303

1.3 Public Comment Period, Public Meeting and Availability Sessions

The public comment period is intended to gather information about the views of the public regarding both the remedial alternatives and general concerns about the site. A notice of the start of the public comment period, the public meeting date, the preferred remedy, contact information, and the availability of above-referenced documents was provided in a fact sheet distributed to the public on June 26, 2015 and published in the *Brunswick News* on the same day.

The public comment period for the Terry Creek OU1 Proposed Plan commenced on June 26, 2015 and continued until September 11, 2015 for a total of 75 days. During that period, a public meeting was held on July 30, 2015. Approximately 50 people, including residents, local business people, university students, media, and state and local government officials, attended. A question-and-answer session followed the formal presentation at the public meeting. A complete transcript of the public meeting can be found in Attachment 2 of this RS. On December 8, 2015, representatives from EPA and EPD met with officials from the City of Brunswick and Glynn County, and held a public availability session in Historic City Hall which was attended by approximately 60 people. The purpose of the meetings and public availability session was to provide the community with additional information relating to the preferred alternative and answer any questions presented.

1.4 Receipt and Identification of Comments

Public comments on the Proposed Plan and EPA Region 4 responses were received as written comments submitted to the EPA Region 4 via e-mail and oral comments made at the public meeting. Each submission was assigned one of the following letter codes:

GEC – Glynn Environmental Coalition
ESC – Environmental Stewardship Concepts
100Mi – One Hundred Miles
SR – Satilla Riverkeeper
Regional or local agencies and officials

- GC – Glynn County
- CB – City of Brunswick
- PDB – Planning and Development Manager City of Brunswick
- JWSC – Brunswick – Glynn County Joint Water and Sewer Commission

Corporation

- H – Hercules, Inc.

Public Comments

- RA – Ronald Adams

These codes were assigned for the convenience of readers and to assist in the organization of this RS; there was no priority or special treatment given to one commenter over another in the responses to comments. Within each of the coded categories, the comments were assigned a number based on the order in which they were presented, such as GEC-1, GEC-2, etc.

1.5 Locating Responses to Comments within the Comment and Response Index

The Comment and Response Index (Attachment 1) contains a complete listing of all comments and responses from the EPA. The index allows readers to find answers to specific questions they have raised and is organized as follows:

- The first column lists the location (i.e., commenter), according to their assigned letter code (e.g., GEC, ESC, 100Mi). For GEC comments, a number corresponding to the order that the comment was received is assigned. For all other comments, comments are numbered sequentially within the comment category (e.g., ESC-1.1). ESC-1.1 refers to the first comment from the Environmental Stewardship Concepts letter to the EPA relating to the first comment category (Remedial Alternative Selection). ESC-2.2 refers to the second comment from the Environmental Stewardship Concepts letter to the EPA relating the second comment category (Remedial Investigation).
- The second column in Attachment 1 provides the comment.
- The third column provides the response to the comment or a reference to a response previously made.

In a few instances, a commenter may appear in the Comment and Response Index more than once, because he/she sent different letters, sent letters that were different from their oral statements, or made different oral statements. If an individual spoke for a group and then wrote a letter in his/her own name (or vice-versa), the submissions were coded separately and each appears in the Comment and Response Index.

It was not always clear if a commenter intended to represent an organization/group or simply himself /herself. The reader is advised to examine both the listing for the name of the group, firm, or association used on the letterhead of a written submission and the public comment list for his/her own name.

Attachment 1 Comment and Response Index

Identifier	Comment Summary	Response
City of Brunswick Resolution No. 2015-06 and City of Brunswick Resolution Cover Letter Sept. 11, 2015		
CB-1	The City of Brunswick, formally supports that: 1. EPA select Alternative 5 - Box Culvert Re-Routed with Limited Sediment Removal as the preferred remediation alternative for Operable Unit 1;	Table 8-3 Summary and Ranking of Remedial Alternatives in the OU1 Focused RI/FS details the ranking process of the alternatives contained in the Proposed Plan and Alternative 4 was ranked highest. One reason Alternative 4 is ranked higher than Alternative 5 is that the newly constructed conveyance structure in Alternative 4 provides an easier means of maintenance such as sediment removal and sediment testing and better accommodates varying water flows during storm events. Also, Alternative 4 provides the same level of risk reduction and is more cost effective than Alternative 5.
CB-2	2. In addition to selection of Alternative 5 as the preferred remediation alternative, the U.S. Environmental Protection Agency proceed with complete soil and groundwater remediation of Outfall Ditch 1 Operable Unit 1, as well as Operable Units 2 and 3 (OU1, OU2 and OU3) of the Terry Creek Superfund Site.	The National Contingency Plan (NCP) in 40 C.F.R. Section 300.430(a)(ii)(A) provides: "Sites should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phased analysis and response is necessary or appropriate given the size or complexity of the site, or to expedite the completion of total site cleanup." There are four areas potentially contributing toxaphene or toxaphene residues to the Terry Creek and Dupree Creek system. These areas include: the Outfall Ditch and three dredge spoils areas (identified as Main, Riverside, and Carter's Island on Figure 2 of the IROD). To satisfy this recommendation, the July 2009 Site Management Plan (SMP) was developed. This plan divides the Terry Creek Site into three operable units (OU): • OU1 Outfall Ditch, • OU2 Dredge Spoils and Upland Soils, • OU3 Terry and Dupree Creeks. The scope of the interim remedy for OU1 only addresses contaminated sediments remaining in the Outfall Ditch. EPA prioritized OU1 due to its relatively small size, the residual toxaphene concentrations present in the Outfall Ditch, and the fish tissue concentration reductions observed from the initial removal dredging

Identifier	Comment Summary	Response
		action. A dredging and removal action was conducted in 1999 and 2000 which removed approximately 35,000 cubic yards of contaminated sediment from the Outfall Ditch and portions of Terry and Dupree Creeks. Of that amount approximately 16,800 cubic yards of contaminated sediment were removed from the Outfall Ditch. In 2005, the Office of Inspector General (OIG) conducted an audit of the Hercules 009 Landfill Superfund Site in Brunswick, Georgia and recommended that EPA Region 4 use the GC-ECNI-MS (also known as GC-NIMS) analytical method. This method, in certain sample types and congener concentrations, allows for better specificity and sensitivity when quantifying individual congeners in the environment. The USEPA Office of Solid Waste has developed a new method (SW 846 Method 8276) using GCNIMS to measure/analyze individual toxaphene congeners of interest. While progress has been made on the analytical method there are still uncertainties relating to the toxicity of toxaphene breakdown products making it difficult to develop a cleanup number for weathered toxaphene at this time for OU1. In January of 2016, EPA Region 4 requested assistance from the National Center for Environmental Assessment (NCEA) to develop toxicity information relating to weathered toxaphene which then may be used to develop cleanup numbers. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed. As a result, the EPA has selected an interim remedy which will protect human health and the environment by eliminating, or greatly reducing, the pathway of exposure to human and ecological receptors within the Outfall Ditch, as well as downstream receptors, while a cleanup number for weathered toxaphene is being developed. EPA guidance document *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (July 1999) describes the process for implementing interim actions. During the scoping, or at some other point in the

Identifier	Comment Summary	Response
		remedial investigation/feasibility study the lead agency may determine that an interim remedial action is appropriate. An interim action is limited in scope and only addresses areas/media that will be followed by a final operable unit record of decision. A reason to take an early action may be to take quick action to protect human health and the environment from an imminent threat in the short term, while a final remedial solution is being developed. Additionally, EPA guidance document *Remediating Contaminated Sediment Sites – Clarification of Several Key Remedial Investigation/Feasibility Study and Risk Management Recommendations, and Updated Contaminated Sediment Technical Advisory Group Operating Procedures* (January 2017) recommends to consider a structured adaptive management approach to response action implementation that includes using early actions, interim and contingency remedies. A groundwater cleanup action of the former Hercules pesticide facility is being overseen by the Georgia Environmental Protection Division (EPD) under Resource Conservation Recovery Act (RCRA) authority. The groundwater plume from that facility has migrated offsite and has moved under several offsite properties including the Terry Creek Site. As a result, EPD required the former owner of the facility, Hercules Incorporated, now known as Hercules, LLC, and the facility operator, Pinova, Incorporated (presently owned by DRT), to implement an Interim Measures Plan to address contaminated groundwater offsite. The RCRA permit issued to Hercules and the facility operator requires the performance of semi-annual sampling of groundwater. There are over 100 wells monitoring the groundwater. Hercules and the Site operator are currently performing a risk assessment for soils on the former Hercules facility and groundwater on the former Hercules facility and offsite. A Corrective Action Plan for all soils and groundwater exceeding the risk based goals developed in the risk assessment for that RCRA corrective action will be submitted to EPD for approval upon completion of the risk assessment.

Identifier	Comment Summary	Response
		Based on comments received on the OU1 Proposed Plan during the public comment period, the selected interim remedy in the IROD includes the requirement to develop a long-term monitoring plan during the Remedial Design of the OU1 remedy. The long-term monitoring of OU1 and remedial investigations for OU2 may include groundwater and pore water sampling to evaluate the nature and extent of contaminated groundwater, and include evaluation of existing groundwater sampling data, including but not limited to that obtained from the RCRA corrective actions being overseen by EPD. Additionally, fish sampling has been conducted in 2001, 2005, 2007, 2009, 2011, 2013, and 2015. After the removal dredging operation in 2000, a noticeable decrease in fish tissue concentrations of toxaphene was observed. Fish tissue monitoring will continue into the future, and it is anticipated that another decrease in fish tissue concentrations will occur after implementing the interim remedy. The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable. See 40 C.F.R. § 300.430(a)(1)(iii)(A). Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. There is no universal remedy applicable to all sediment sites and many risk management decisions for sediment sites include a combination of remedial options. For the Terry Creek Site, a CERCLA removal action was implemented in 1999/2000, which addressed the principal threat waste for technical toxaphene through hot-spot dredging in Terry and Dupree Creeks as well as the Outfall Ditch, removing approximately 35,000 cubic yards of contaminated

Identifier	Comment Summary	Response
		sediment from those areas of the Site, of that amount approximately 16,800 cubic yards of contaminated sediment were removed from the Outfall Ditch. This action removed approximately 80%-90% of the contaminant mass, based on technical toxaphene, including high concentrations of toxaphene from the Outfall Ditch, resulting in a substantial decrease in toxaphene concentrations in fish tissue. The selected interim remedy for OU1 is expected to complement the dredging previously performed with the overall goal of protecting human health and the environment and result in further reductions in fish tissue concentrations of toxaphene by containing contaminated sediment and eliminating pathways for exposure in the Outfall Ditch. This interim action is protective of human health and the environment, complies with (or waives) Federal and State applicable or relevant and appropriate requirements for this limited-scope action, and is cost-effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize containment to reduce the mobility of contamination and thus is in furtherance of that statutory mandate. Principal threat wastes contained in sediment in the Outfall Ditch pertaining to technical toxaphene were removed in 1999 and 2000. This interim action utilizes containment to reduce the mobility of sediment contamination from the Outfall Ditch and eliminate exposure to sediment contamination in OU1. At the present time, a toxicity value for weathered toxaphene has not been developed by the EPA and therefore the EPA is selecting an interim remedy. When an EPA toxicity value for weathered toxaphene is developed, the EPA will assess the potential risks associated within the Outfall Ditch to determine if further actions are needed and thereafter select a final action for OU1. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action.

Identifier	Comment Summary	Response
		Because this is an interim action ROD, review of this Site and of this remedy will be ongoing as EPA continues to develop final remedial alternatives for OU1. The selected interim remedy approach for OU1 is consistent with USEPA guidance documents, particularly with the *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (USEPA, 2005), the *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites* (USEPA, 2002), and *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*, (USEPA, 1997), *Remediating Contaminated Sediment Sites – Clarification of Several Key Remedial Investigation/Feasibility Study and Risk Management Recommendations, and Updated Contaminated Sediment Technical Advisory Group Operating Procedures* (January 2017), and *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (July 1999). Collectively, these EPA guidance documents highlight the consideration of separating the management of source areas with the most elevated concentrations of chemicals of potential concern (COPCs) from other, less concentrated areas and utilizing a structured adaptive management approach to response action implementation. EPA is in the process of developing a schedule for the RI workplan(s) submittal for OU2 and OU3. Following EPA approval of the RI workplan(s) for OU2 and OU3, investigations will begin for OU2 and OU3. EPA will continue to provide updates to stakeholders as part of its community outreach. As discussed above, this action for OU1 is interim and will be followed by a final action at a later date. An additional Proposed Plan will be issued, a public comment period will occur after issuance of the Proposed Plan.

Identifier	Comment Summary	Response
CB-3	The resolution states that the City of Brunswick would prefer that EPA select Alternative 5 –Box Culvert Re-Routed with Limited Sediment Removal - as the preferred remediation alternative rather than the currently selected Alternative 4. It is the opinion of the city that a box culvert in this location will be much more beneficial than an open channel as the city moves forward with development and revitalization of the subject area.	EPA appreciates the City of Brunswick notifying us of your potential redevelopment plans surrounding OU1. EPA is required to consider the reasonably anticipated future land use (RAFLU) when developing remedial actions. According to the City of Brunswick's 2008 Community Agenda/Comprehensive Plan which describes the City of Brunswick's 2030 Vision and based on existing zoning and surrounding land uses, the EPA determined the OU1 parcel would continue to be used for commercial industrial use in selecting an interim remedy for OU1. The commercial industrial use includes conveyance of stormwater from the former Hercules plant facility through an outfall ditch. The selected interim remedy reroutes the existing outfall ditch and constructs a new stormwater conveyance structure. A reason EPA selected an open conveyance structure for the new stormwater conveyance was to provide an easier means of maintenance, such as sediment removal and sediment testing, and to better accommodate varying water flows during storm events. EPA met with the City of Brunswick on December 8, 2015, to discuss the proposed OU1 remedy, and to gain a better understanding of the City's interest in potential reuse plans for the Outfall Ditch and surrounding area. EPA recommends that the City of Brunswick meet in the near future with the current property owner of the OU1 parcel, Hercules Incorporated, now known as Hercules LLC, to discuss the City's potential reuse plans. Depending on the outcome of such discussions (i.e. if Hercules agrees to sell, lease, provide an easement, and/or donate the OU1 parcel to the City and/or Glynn County for future reuse of OU1), EPA may be able to design and implement the OU 1 remedy to support the City's potential reuse plans, such as construction of a roadway. See response to comment CB-2 above for further information relating to the rationale for dividing the Terry Creek Site into operable units and phasing remedial investigations.
CB-4	In addition to the selection of Alternative 5, the City of Brunswick urges the U.S. EPA to complete full remediation of soil and groundwater at the Outfall Ditch 1 Operable Unit 1 as opposed to the "limited sediment removal" as listed in the proposed alternatives. The complete contamination removal is necessary to facilitate future development of the area and to recapture the high quality of the environmental and natural assets in the area. It is the city's opinion that complete soil and groundwater remediation should occur at the Outfall Ditch I Operable Unit 1 (OU 1) as well as Operable Units 2 and 3 (OU 2 & 3) when those remediation projects begin.	
Planning and Development Manager, City of Brunswick, email August 8, 2015		
PDM-1	First, the City of Brunswick has the intention of connecting Warde Street to the south of the outfall parcel	See response to comments CB-3 & CB-4 above.

Identifier	Comment Summary	Response
	up to Norman/Harold Friedman Streets to the north as generally shown with the red line on the attached map. The extension of Warde Street will serve the redevelopment of several parcels on the east side of U.S. 17 and alleviate some of the traffic conflicts that will occur with the redevelopment of those parcels. It will be much easier for the new street to cross the outfall ditch if the outfall ditch is filled with box culverts as described in the EPA alternatives numbered 5 and 5A. The City of Brunswick prefers a remedial alternative that includes the use of box culverts to aid the redevelopment of the adjacent parcels.	EPA recommends that the City of Brunswick meet in the near future with the current property owner of the OU1 parcel, Hercules Incorporated, now known as Hercules LLC, to discuss its potential reuse plans. Depending on the outcome of such discussions (i.e. if Hercules agrees to sell, lease, provide an easement, and/or donate the OU1 parcel to the City and/or Glynn County), EPA may be able to design and implement the OU1 interim remedy to support the City's potential reuse plans, such as construction of a roadway.
PDM-2	Second, the difficulty of maintaining fish consumption advisory signs on the subject parcel was mentioned at the public meeting. The City's code enforcement department is available, if you need, to monitor any signs that are placed on the subject parcel and can report any sign related issues to the E.P.A. or to Hercules as appropriate. Please let me know if you need any assistance monitoring signs that are placed on the outfall parcel.	EPA appreciates the offer of assistance from the City and will alert the Georgia Department of Natural Resources (GADNR), who establishes fish consumption advisories and oversees maintenance of fish consumption advisory signs, that it may use your office as a resource in maintaining the fish consumption advisory signs. EPA welcomes and appreciates your assistance in notifying us and GADNR if fish consumption advisory signs are vandalized or removed.
Brunswick-Glynn County Joint Water & Sewer Commission, email July 30, 2015		
JWSC-1	The Brunswick – Glynn Joint Water and Sewer Commission provides water and sewer service to Glynn County. Currently, JWSC does not provide service to Terry Creek Road. The JWSC requests that the EPA and Hercules research any possible funding sources to provide clean and safe drinking water into the Terry Creek Road residents. Our engineering staff will be working on a engineers cost estimate for this project. Once we complete this estimate, we will forward the estimate and request that your agency and Hercules attempt to acquire a funding source for this project.	A groundwater cleanup is being conducted at the former Hercules facility through a RCRA corrective action with oversight from EPD. Data collected as part of the June 6, 2014 Brunswick Interim Measures Plan for Groundwater at the Former Hercules Brunswick Facility does not indicate that the groundwater plume has migrated to the Terry Creek subdivision (also known as the Trailer Park). The EPA and EPD will continue to monitor this situation and take actions as appropriate. The Terry Creek subdivision located off of the Torras Causeway was not investigated as part of the Focused RI/FS for OU1. This area may be investigated as the RI/FS for OU2 and/or OU3 is implemented.

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		See response to comment CB-2 above for further explanation of the scope of the selected interim remedy for OU1.
Glynn County letter September 4, 2015		
GC-1	The Glynn County Board of Commissioners, acting in its capacity as the governing authority of Glynn County, formally supports the complete removal of contamination from Operative Unit One. Further, the Glynn County Board of Commissioners urges the state and federal governments to cause removal of all contamination in the soil and groundwater of the Terry Creek Dredge Spoils area including Operative Units One, Two, and Three.	See response to comment CB-2 above for further information relating to the rationale for dividing the Terry Creek Site into operable units, phasing remedial investigations, and the scope of the selected interim remedy for OU1.
Ronald M. Adams emails July 29 and September 11, 2015		
RA-1a	The outfall ditch falls within the facility boundaries covered under the RCRA permit of which Hercules and Pinova are the permittees and the ongoing maintenance of the outfall is necessary for the plant to continue to function.	OU1 includes the Outfall Ditch on the eastern side of Highway 17. See response to comment CB-2 above for further explanation of the scope of the selected interim remedy for OU1 and the stormwater conveyance structure which will be constructed as part of the OU1 interim remedy.
RA-1b	Hercules, Pinova, and Ashland should all be responsible parties for purposes of cleanup and damages for all contamination that originated at the plant site.	As an owner and operator of a portion of the Terry Creek Site during a time in which disposal of hazardous substances occurred, Hercules Incorporated, now known as Hercules LLC (Hercules), has been identified as a potentially responsible party pursuant to CERCLA Section 107(a). The EPA is conducting investigations to determine if there are other potentially responsible parties who may be liable at the Terry Creek Site. To date, Hercules has entered into an AOC and an Amended AOC for removal of contaminated sediment from the Outfall Ditch and Terry and Dupree Creeks and performed and funded those removals pursuant to the terms of the AOCs, as well as an AOC for RI/FS, which requires Hercules to perform and fund an OU2 and OU3 RI/FS in addition to the OU1 RI/FS it performed and funded. Hercules has indicated its willingness to enter into a Consent Decree to fund and perform the selected interim remedy at OU1, to be lodged with the United States District Court upon completion of negotiations. Timelines for the negotiation process are specified in

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		CERCLA Section 122(e). Since the Terry Creek Site is not listed on the National Priorities List and the Superfund Alternative Approach is being utilized, the EPA will require as a component of the OU1 Consent Decree, that Hercules perform and fund the OU1 Remedial Design and Remedial Action, with EPA oversight, and provide liquid financial assurance prior to commencement of the OU1 interim action for the estimated costs of the interim OU1 remedial design and remedial action.
RA-1c	The proposed remediation plan under CERCLA does not address groundwater contamination that is beneath the outfall parcel and adjacent land. This plan should address groundwater contamination.	The scope and role of OU1 is not intended to address groundwater or the dredge spoils. OU1 is intended to address sediment contamination within the Outfall Ditch. Groundwater contamination on the Hercules former pesticide plant is currently being addressed under the facility's RCRA permit with the EPD serving as the lead agency in oversight of the corrective action. See response to comment CB-2 above for further explanation of the scope of the selected interim remedy for OU1.
RA-1d	Contamination from the still house and old tank farm areas and from the former settling ponds continues to migrate into the groundwater and move eastward.	
RA-1e	The RCRA cleanup standard of 5 PPB for benzene is apparently not the standard to which the outfall parcel will be cleaned.	
RA-2	Further, this plan does not address, nor does it establish a time line for addressing, other issues which include, but are not limited to, the following: • Dredge spoils and the sediment in the creeks and rivers • The groundwater contamination spreading from the main facility on the west side of US 17 The plan does not establish a time line with measurable benchmarks and penalties for failure to adhere to the successful remediation.	Hercules Incorporated, who converted to Hercules, LLC in 2016, and Pinova are co-permittees on Amendment to Hazardous Waste Facility Permit No. HW -052 (D&S) issued on July 29, 2015. That permit pertains to post-closure care of five former impoundments on the former Hercules pesticide plant facility used to manage wastewater from the manufacturing of toxaphene and the storage of hazardous waste containers. Several years ago, Pinova purchased the active portions of the facility (including most of the SWMUS) and Hercules retained the remaining portions of the property including the permitted storage area and the closed surface impoundments regulated unit. In the sale, Hercules retained liability for all past releases. Pinova Holdings, Inc., the parent company of Pinova was purchased by Symrise AG in 2015. In December 2016, DRT purchased the Pinova Brunswick Plant from Symrise. Notification of the ownership change was submitted to EPD, but the RCRA permit has not been amended at this time. The facility is still operating

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		under the name of Pinova. A new RCRA permit application is due in 2017. The groundwater plume from the former pesticide facility has migrated offsite and has moved under several offsite properties including the Terry Creek Site. As a result, EPD requested Hercules/Pinova to submit an Interim Measures Plan (IM Plan) to address contaminated groundwater offsite. In September 2014, EPD approved Hercules' IM Plan to perform bench and field scale studies to determine if phytoremediation for shallow onsite groundwater and plume stop for deep groundwater will work at the facility. In 2015, Hercules/Pinova modified the IM Plan to use pump and treat rather than phytoremediation for the shallow onsite groundwater in the vicinity of the former surface impoundments. Contamination beyond the facility boundaries is presently known to exist in the deep portion of the shallow aquifer. Shallow wells offsite have been sampled and continue to be sampled under the current permit but have not shown evidence of contamination. Hercules/Pinova's RCRA permit requires them to perform semi-annual sampling of groundwater. There are over 100 wells monitoring the groundwater. Hercules/Pinova are currently performing a risk assessment for soils and groundwater related to the corrective action requirements. A Corrective Action Plan for all soils and groundwater exceeding the risk based goals developed in the risk assessment will be submitted to EPD upon completion of the risk assessment. In 2010, Hercules performed corrective action of the N-street ditch and Solid Waste Management Unit 5 (SWMU-5) (former toxaphene production facility) under the RCRA permit. That corrective action removed the majority of the toxapahene contaminated soils and sediments at the facility, including removal of soil down to the water table and offsite disposal of the contaminated soils. Part of the corrective action included lining the N-street ditch with concrete fabriform to prevent contaminated groundwater from entering the ditch and ease removal of accumulated sediments in the future.

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		The N-street ditch collects stormwater runoff from the facility and the neighborhood upgradient as well as non-contact cooling water. The N-street ditch drains under Highway 17 and into Dupree and Terry Creeks. Pinova has an NPDES permit for the stormwater discharge. The sampling point for monitoring of the discharge for compliance with the terms of the NPDES permit is on the west side of Hwy 17.
RA-3	The plan appears to have deficiencies in design including: a. the plan appears to ignore the potential for weather events such as hurricanes and extended rain. We do not see floodgates in the description of the plan to prevent rising sea water flooding through the new outfall and onto the plant site potentially contaminating the property of others including our property. b. the plant site continues to have soil contamination that in extreme weather could contaminate the new outfall channel and the creek after it is remediated c. the plan does not appear to have a settling area (such as a pond) for any contamination that is able to get into the pollution stream of the plant and prevent its introduction into the public waterways	The interim remedy selected for OU1 includes filling the current Outfall Ditch with compacted soil and armoring with rip rap to prevent erosion at the confluence of the current Outfall Ditch with Dupree Creek. A newly constructed stormwater conveyance structure will be concrete lined and will convey stormwater from the N-street ditch and Highway 17. Floodgates are not part of the selected interim remedy but the above described armoring and a vegetated cover on top of the compacted fill will be designed to prevent erosion and/or releases of residual contamination during storm events. The owner/operator of the current operating facility will be responsible for maintaining compliance with the existing RCRA and/or NPDES permits, and any amendments thereto. Hercules is also responsible for conducting the corrective action at the former pesticide plant. Sediment in the newly constructed stormwater conveyance structure will be sampled and if necessary contaminated sediment will be removed and disposed of in accordance with an EPA approved operation and maintenance plan. Areas west of Highway 17, including the N Street ditch, are being addressed through a RCRA corrective action overseen by EPD. Any investigation and/or corrective action of soil on the former Hercules plant facility would occur pursuant to RCRA permit requirements. OU1 only consists of the Outfall Ditch east of Highway 17. See Figure 4 in the Interim Record of Decision for a diagram depicting the boundaries of OU1.
RA-4	The plan to place a covenant on the property restricting future use suggests an ultimate cleanup plan that results in	The property comprising OU1 is currently owned by Hercules Incorporated, now known as Hercules LLC, and is zoned

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	residual contamination and an incomplete cleanup. Any proposal which allows residual contamination to exist is basically a taking of private property of adjacent and nearby land owners and subjects others to the continued effects and damages from the contamination. This alternative to a complete cleanup is not in the public's interest. The US 17 corridor is the subject of a redevelopment effort by the City of Brunswick. The US 17 corridor is the key link between the mainland, and St. Simons and Jekyll Islands. Placing restrictive future use covenants on this property or allowing contamination to remain on the property may limit the options of the current and future governments of Brunswick to direct the redevelopment of this area of the City.	commercial/industrial. Any potential reuse plans of the Outfall Ditch would need to be negotiated with Hercules since it is the current property owner of the Outfall Ditch. Institutional controls that will be implemented at OU1, as required by the interim ROD, do not constitute a takings under the Fifth Amendment of the U.S. Constitution because the institutional controls are being put in place to protect human health and the environment and do not prevent uses of the property that are protective of the interim remedy. The institutional controls to be implemented at OU1, including an environmental covenant, may place some restrictions on the use of the property to protect the interim remedy, but not necessarily limit redevelopment. As the owner of the OU1 parcel, Hercules may select to place more restrictions on its property than required by the interim ROD. See responses to comments CB-3 & CB-4 above for further information relating to the potential to design and implement the OU1 interim remedy to support potential reuse plans of the City of Brunswick.
RA-5	A far better alternative to proposed alternative 4 is to combine alternative 2 (removal of 36,000 cubic yards of contaminated material) and alternative 5 (box culvert installation). Any plan that is adopted must require Hercules/Ashland/Pinova to eliminate groundwater contamination that exists on the Terry Creek Dredge Spoils area within the next 12 months. Further, soil contamination on the west side of US 17 should be required to be completely remediated within the next 24 months. Until soil contamination on the west side of US 17 is addressed, the outfall is subject to additional contamination.	The scope and role of the interim action at OU1 is to address sediment contamination within the Outfall Ditch. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed. A final decision will be made at a later date. If Alternative 2 Sediment Removal Within Existing Channel were selected, then Alternative 5 Box Culvert Re-Routed With Limited Sediment Removal would not likely be implemented as well since the current outfall ditch would not necessarily need to be rerouted. See response to comment CB-2 above for further information relating to the rationale for dividing the Terry Creek Site into operable units, phasing remedial investigations, and the scope of the selected interim remedy for OU1.

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RA-6	An idea to consider is the separation of the two functions of the outfall into distinct pathways. Approximately 7,000,000 gallons of cooling water is discharged to the outfall each day. The other function of the N Street Ditch/Outfall is to allow storm water runoff from the plant site as well as upstream runoff from the City of Brunswick. The separation of these streams would allow for measurement of runoff contamination without the dilutive effect of the cooling water. This separation would also allow for a smaller settling area prior to discharge into DuPree creek as the cooling water flowing in a separate pathway would not require a settling area.	This suggestion may be evaluated during the remedial design of OU1. Discharges from the current operating facility are pursuant to the requirements contained in the operating facility's RCRA and NPDES permits issued by the Georgia Environmental Protection Division. See response to comment RA-3 above for further information relating to the scope of the RCRA permit requirements/corrective action requirements and the CERCLA remedial action.
RA-7	Finally, the sea level in Georgia has risen by an average of about 1.5 inches every decade for the last 100 years, and the rise in sea level is said to be accelerating. This fact makes the containment and remediation of both soil and groundwater contamination more complex, more urgent and critically important. Continued changes in the sea level without a comprehensive and timely solution to the current contamination has the potential for severe negative consequences for Brunswick and Glynn County and the region.	When implementing a remedy at a Superfund site, pursuant to the Office of Solid Waste and Emergency Response (OSWER) Climate Change Adaptation Implementation Plan dated June 2014, the EPA should take into consideration the effects of climate change. Since the Terry Creek Site is located on the coast of Georgia, possible effects of climate change could include rising sea levels, storm surges, and strong hurricanes. The selected interim remedy reroutes the current Outfall Ditch into a new, concrete lined conveyance channel, backfills the current Outfall Ditch, and armors the banks of the former Outfall Ditch near Dupree Creek. The new, concrete lined conveyance channel provides protection against rising sea levels and storm surges. Once the current Outfall Ditch is back filled, rip rap will be used to armor the banks of the former ditch along Dupree Creek. This process is referred to as coastal hardening, and is consistent with EPA's climate change adaptation policy. Remaining sediments in the Outfall Ditch would be covered with approximately 2 to 8 feet of clean fill to contain any remaining contamination and eliminate the pathway of exposure. Regular inspections and as-needed repairs will assure that erosion or other issues will be dealt with promptly. Additionally, a long term monitoring plan will be developed during the OU1 Remedial Design and thereafter implemented and Five Year Reviews will be conducted

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		to ensure the continued protectiveness of the OU1 interim remedy. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. For further information, please see: *U.S. Environmental Protection Agency Climate Change Adaptation Plan*; EPA 100-K-14-001; June 2014. See response to comment CB-2 above for further information relating to the rationale for dividing the Terry Creek Site into operable units, phasing remedial investigations, and the scope of the selected interim remedy for OU1.
RA-8	The entire contamination problem originated from one source. A piecemeal plan has allowed delays and incomplete remediation over the past 21 years. A seamless, coordinated approach to a complete remediation is necessary to protect the health and welfare of the citizens of Brunswick and Glynn County. A complete remediation is vital to the economic health of the City of Brunswick and Glynn County. And complete remediation is important for the protection of the natural resources for future generations.	The former Hercules pesticide plant facility and the Terry Creek Site are both large and complicated in nature. EPA is addressing the Terry Creek Site utilizing CERCLA authority. EPD is addressing the Hercules former pesticide plant facility and groundwater contamination originating on the former Hercules plant facility utilizing RCRA authority. The scope and role for OU1 is to address sediment contamination in the Outfall Ditch of the Terry Creek Site. See response to comment CB-2 above for further information relating to the rationale for dividing the Terry Creek Site into operable units, phasing remedial investigations at the three operable units, and selecting an interim remedy for OU1.
RA-9	I request information contained in the Brunswick Interim Measures Plan for Groundwater, Former Hercules Brunswick Facility, June 6, 2014 be considered in the analysis of alternatives and final determination for OU1.	As discussed in the response to comment RA-8 above, EPA is addressing the Terry Creek Site utilizing CERCLA authority and the EPD is addressing the former Hercules plant facility and groundwater contamination utilizing RCRA authority. Information contained in the RCRA Interim Measures Plan may aid in the remedial investigations to be performed at OU2 and OU3 under CERCLA. Additionally, groundwater monitoring data obtained from the RCRA corrective action may provide information to assist in evaluating the effectiveness of the selected interim remedy for OU1.

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Satilla Riverkeeper Letter September 11, 2015		
SR-1	The proposed EPA cleanup plan for this site on Hwy 17 does not go far enough in removing and remediating toxaphene (pesticide) contaminated soils, sediment, and groundwater at the outfall ditch, leaving both human and natural communities still at risk of exposure to these toxins and ultimately limiting any potential future use of this site.	The scope and role of OU1 is to address sediment contamination in the Outfall Ditch of the Terry Creek Site. See response to comment CB-2 above for further information relating to the rationale for dividing the Terry Creek Site into operable units, phasing remedial investigations, and the scope of the selected interim remedy for OU1. See responses to comments CB-3 & CB-4 above for further information relating to the potential to design and implement the OU1 interim remedy to support potential reuse plans.
SR-2	We request that a larger amount of sediment be removed, as discussed in Alternative 2. This method, in addition to the rerouting of outfall as described in Alternative 5, would be a preferred method of addressing the contaminated site.	During the dredging removal action conducted in 1999/2000, approximately 35,000 cubic yards of contaminated sediment were removed from the Outfall Ditch, Dupree Creek, and Terry Creek, of that amount approximately 16,800 cubic yards of contaminated sediment were removed from the Outfall Ditch. This represented approximately 80%-90% of the contaminant mass of technical toxaphene from the Outfall Ditch. While this removal was highly effective, residual contaminated sediment remained. If an additional sediment removal action was conducted in the Outfall Ditch, it is possible that residual contamination would once again be left behind because dredging is not always 100% effective. EPA prioritized performance of the interim remedy at OU1 due to its relatively small size, dredging and removal of approximately 35,000 cubic yards of contaminated sediment from the Outfall Ditch and portions of Terry and Dupree Creeks in 1999 and 2000, and the ability to expeditiously select and implement an interim OU1 remedial action that eliminates the pathway of exposure to human and ecological receptors within the Outfall Ditch. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed. Long term monitoring will be conducted to determine the effectiveness of the interim remedy, and a final decision will be made at a later date.

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		Table 8-3 Summary and Ranking of Remedial Alternatives in the OU1 Focused RI/FS dated December 2014 details the ranking process of the alternatives contained in the OU1 Proposed Plan and the preferred alternative 4 was ranked highest. One reason Alternative 4 is ranked higher than Alternative 5 is that the newly constructed conveyance structure in Alternative 4 provides an easier means of maintenance such as sediment removal and sediment testing and better accommodates varying water flows during storm events. Also, Alternative 4 provides the same level of risk reduction and is more cost effective than Alternative 5. See response to comment CB-2 above for further information relating to the rationale for dividing the Terry Creek Site into operable units, phasing remedial investigations at the three operable units, and selecting an interim remedy for OU1.
SR-3	The current plan (Alternative 4) will include minimal removal (1200 cubic yards) of soil and sediment, which leaves much of the contamination in place. Covering soil does not eliminate pathways via fish and birds, which will continue to eat small organisms that accumulate toxins underneath any caps on the soil. Surface and groundwater will continue to move sediment into the marsh, waters and other potential exposure pathways. Because this plan does not permanently remove contaminated soil and sediment from the site, it does not sufficiently protect humans and wildlife from potential future chemical exposure.	See response to comment SR-1 above.
SR-4	Groundwater contamination that exists on site is also a concern. This water has been shown to move up through the sediment and into the Outfall Ditch, meaning that the surface water and groundwater are mixing. This groundwater contamination needs to be thoroughly delineated and a remediation plan, potentially using bioremediation techniques, must be put in place to prevent this water from being a future source of contamination to the surrounding soil and downstream area, particularly due	The intent of the interim action for OU1 is to contain sediments in the Outfall Ditch and eliminate the pathway of exposure to human and ecological receptors from the sediment. While there is interaction between the groundwater and surface water in the Outfall Ditch, the shallow groundwater is not presently known to contain contamination from the current operating facility. The contaminated groundwater plume is in the deeper portion of the surficial aquifer and presently is not known to interact with OU1.

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	to the flow of ground and surface water in the east direction towards tidal waters where it may be able to spread toxins.	Based on data contained in the Semi-Annual Groundwater Monitoring Report dated June 2014 submitted by the Antea Group, on behalf of Hercules, the contaminated groundwater plume migrating from the former Hercules plant is approximately 70 to 75 feet below sea level when it flows under the area of OU1, and this plume is not currently migrating upward towards the Outfall Ditch. Therefore, the plume is not known to be mobilizing contamination from OU1 at this time. Additionally, site characterization data contained in the RI/FS for OU1 indicate that toxaphene-impacted sediments and porewater in OU1 do not currently serve as a source of groundwater contamination. A groundwater cleanup action is being implemented by Hercules with oversight by EPD under RCRA authority at the former Hercules facility. The groundwater plume from the facility has migrated offsite and has moved under several offsite properties including the Terry Creek Site. As a result, EPD requested Hercules/Pinova submit an Interim Measures Plan (IM Plan) to address contaminated groundwater offsite. In September 2014, EPD approved Hercules' IM Plan to perform bench and field scale studies to determine if phytoremediation for shallow onsite groundwater and Plume Stop for deep groundwater will work at the facility. In 2015, Hercules/Pinova modified the IM Plan to use pump and treat rather than phytoremediation for the shallow onsite groundwater in the vicinity of the former surface impoundments. Contamination beyond the facility boundaries is in the deep portion of the shallow aquifer. Shallow wells offsite have been sampled and continue to be sampled under the current RCRA permit but have not shown evidence of contamination. Hercules/Pinova's RCRA permit requires them to perform semi-annual sampling of groundwater. There are over 100 wells monitoring the groundwater. Hercules/Pinova are currently performing a risk assessment for soils and groundwater as part of the RCRA corrective action. A Corrective Action Plan for all soils and groundwater exceeding the risk based goals developed in the risk assessment will be submitted upon completion of the risk assessment.

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		The scope and role of this interim action is to contain contaminated sediment in the Outfall Ditch. See response to comment CB-2 above for further information relating to the rationale for dividing the Terry Creek Site into operable units, phasing remedial investigations at the three operable units, and selecting an interim remedy for OU1.
SR-5	A more thorough analysis of the pathways in which plants and animals are exposed to the onsite chemicals needs to be conducted. For instance, marsh grass can take up toxaphene out of the sediment into their leaves, stems and roots when growing or even planted in the contaminated sediments. This can then be eaten by other organisms, creating bioaccumulation of the toxin, or leave the site during storms, winter dieback or a strong outgoing tide.	In accordance with *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments - Interim Final*, OSWER 9285.7-25, June 1997, Ecological Risk Assessments (ERA) are conducted using a tiered approach and are punctuated with Scientific Management Decision Points (SMDPs). The screening-level ecological risk assessment for OU1 found that unacceptable risks to the benthic community existed and that further ecological risk assessment was unnecessary. It recommended that the EPA proceed directly to Step 8, *Risk Management*, which considered the potential ecological risk reduction provided by performance-based remedial actions that focus on eliminating direct exposure to all contaminants in the Outfall Ditch and eliminating the potential transport of contaminants to Dupree Creek and other downstream locations. Additional ecological risk assessments will be conducted as part of the remedial investigations for OU2 and OU3. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected.
SR-6	Considering human consumption of contaminated fish is the greatest risk to human health, the effectiveness of the current fish consumption advisory should be analyzed to gain a greater understanding of how the local population,	The Georgia Department of Natural Resources (GADNR) establishes and maintains fish consumption advisories. The EPA remains supportive of GADNR in doing so. A recreational fishing survey may be a useful tool to gain more accurate analysis of potential exposures

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	which includes minority communities, are consuming contaminated fish. A recreational fishing survey may lead to a more accurate analysis of this potential exposure pathway in humans, and can in turn direct and focus future educational efforts on the subject.	from the consumption of fish in Terry and Dupree Creeks. In support of the need for fish tissue data, Hercules has conducted fish sampling in Terry and Dupree Creeks in 2001, 2005, 2007, 2009, 2011, 2013, and 2015.
Hercules, Inc. Letter September 11, 2015		
H-1	Hercules Incorporated, now known as Hercules LLC, submitted a letter that presents background information and responds to comments raised by attendees at the public meeting. The responses were supportive of the preferred alternative presented in the Proposed Plan.	The comments of Hercules Incorporated, now known as Hercules LLC, are noted and its letter is attached to the Responsiveness Summary.
100 Miles letter September 4, 2015		
Remedial Alternative		
100Mi-1.1	Overall, we do not feel the Proposed Preferred Alternative goes far enough to clean up the Outfall Ditch/Operative Unit 1 (OU1). We suggest EPA select a cleanup alternative that removes more of the contamination found in OU1: that the EPA tie OU1 remediation to other efforts to clean up contamination caused by the Hercules operations: and that the EPA clarify how and when the contamination found in other operable units will be remediated.	There are significant unresolved issues regarding analytical methodology and the toxicity of toxaphene that make performing cleanups of OU2 and OU3 at the same time as performing an interim remedy at OU1 impractical. As explained in the 2009 Site Management Plan, sediments within the Outfall Ditch have the highest relative residual concentration of toxaphene at the Terry Creek Site. As such, the Outfall Ditch was established as the highest priority OU. Implementing the interim remedy will eliminate, or greatly reduce, exposure to contaminated sediment in OU1 and contribution to downstream receptors. In January of 2016, EPA Region 4 requested assistance from the National Center for Environmental Assessment (NCEA) to develop toxicity information relating to weathered toxaphene which then may be used to develop cleanup numbers. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. Investigations and cleanups of OU2 and OU3 are dependent on the development of analytical methodology and the toxicity of weathered toxaphene. These efforts are ongoing.
100Mi-1.2	It is our understanding that the Hercules site has multiple operable units that require clean up. When will the other operable units (specifically OU2 and OU3) be addressed and how will the proposed remedies for those sites be linked to the cleanup of OU1?	

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		See response to comment CB-2 for further information relating to the rationale for dividing the Terry Creek Site into operable units, phasing remedial investigations, and selecting an interim remedial action for OU1.
100Mi-1.3	The recommended alternative identifies a remedial alternative that into lined conveyance channel. This alternative will allow too much exposure to the contaminated waters and sediments in the area. While it would be best to completely remove the contamination. A preferred alternative would involve completely culvertizing the channel (as described in Alternatives 5 and 5A. to significantly reduce potential exposure to the chemicals of concern.	See response to comment CB-2 for further information relating to the rationale for dividing the Terry Creek Site into operable units, phasing remedial investigations, and selecting an interim remedial action for OU1. See responses to comments CB-3 and SR-2 above.
100Mi-1.4	Page two of the Superfund Proposed Plan Fact Sheet refers to the cleanup of OU2 and OU3 is contingent upon.... "gaining consensus on the toxicity of the toxaphene breakdown products for both human and ecological receptors." How can the agency use a difference in opinion or disagreement in the breakdown of a chemical as an excuse for delaying action to clean it up?	See response to comments CB-1 and CB-2 above for further information related to the EPA's basis for the selected interim remedy for OU1, the ranking of alternatives, the rationale for dividing the Terry Creek Site into operable units and phasing of remedial investigations. Site characterization of OU2 and OU3 will utilize best available analytical methods to determine the nature and extent of contamination, including toxaphene (including weathered or degraded toxaphene). The Office of Inspector General report "Appropriate Testing and Timely Reporting are Needed at the Hercules 009 Landfill Superfund Site, Brunswick, GA" dated September 26, 2005 states the following regarding toxaphene and degradation of toxaphene: "Hercules Incorporated began producing toxaphene, an agricultural pesticide, in 1948 and continued production through 1980. Toxaphene was one of the most heavily used insecticides in the United States until 1982, when EPA cancelled the registrations for most uses; all uses were banned in 1990. Unlike most organic environmental pollutants, toxaphene is not a single organic compound. As manufactured, the original toxaphene
100Mi-1.5	The best option to appropriately address this issue. should include: - Extensive and appropriate testing to determine the extent of the toxaphene contamination and all chemicals created as toxaphene breaks down. - Removal of more than 1,200 cubic yards of contaminated sediments. Other alternatives that would remove 12,800 cubic yards of contaminated sediments are preferred.	

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		pesticide is a mixture of more than 200 closely related chlorinated organic compounds. This original toxaphene pesticide mixture is commonly known as "technical" toxaphene. Technical toxaphene consists mainly of polychlorinated bornanes with between six to nine chlorines attached. The term, congener, is used to refer to a single, structurely-unique constituent of the mixture. In other words, at least 200 individual toxaphene congeners make up the original toxaphene pesticide mixture. Individual congeners are often given their own names, such as Hx-Sed, Hp-Sed, p26, or p50. In the Office of Inspector General's (OIG's) review of the available scientific literature on the environmental degradation of the original toxaphene mixture (a.k.a. technical toxaphene), we found numerous references to biotic and abiotic degradation, and to aerobic and anaerobic degradation. The aerobic degradation of technical toxaphene occurs at the slowest rate and has an aerobic half-life report of about 10-14 years (Fingerling 1996). On the other hand, anaerobic degradation of technical toxaphene occurs at a much faster rate and has an anaerobic half-life of about 6 weeks. Therefore, since the use of toxaphene was severely restricted in 1982 (i.e., about 23 years ago), any technical toxaphene left in the environment from 1982 or before has theoretically undergone two or more half-lives. Thus, at most, only 25 percent of the original starting material should theoretically still be present. By contrast, the only reported condition under which toxaphene does not degrade is autoclaved soil (i.e., all microbes in the soil have been killed off) (Fingerling 1996). Therefore, technical toxaphene is expected to degrade in the environment and its degradation is mediated primarily by microbes living in the soil." EPA may refer to this as degraded toxaphene, weathered toxaphene, or breakdown products. There is no single absolute definition for weathered or degraded toxaphene. The terms weathered and degraded are used interchangeably to refer to toxaphene whose chromatographic pattern no longer matches analytical laboratory

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		standards for technical toxaphene due to alterations by environmental processes. EPA has the ability to collect samples and analyze for both technical toxaphene and select long-lived congeners of weathered or degraded toxaphene. Upon receiving this data, EPA has toxicity values for technical toxaphene which are widely supported by scientific literature. However, the only toxicity values for weathered or degraded toxaphene are the ones presented in the 2006 report titled "Development of a reference dose for the persistent congeners of weathered toxaphene based on in vivo and in vitro effects related to tumor promotion", commonly referred to as the Simon/Manning Paper. In October 2006, the OIG stated it believed the toxicity values presented in the Simon/Manning paper were the "best and only available scientific information that quantifies the human health risk to weathered toxaphene..." but acknowledged that "science is dynamic and continuously evolves as new information becomes available, so the Simon/Manning paper is not the last word on the issue, but represents the next step into the understanding of risk posed by weathered toxaphene. More scientific information should be available in five years to allow for a better estimate of the human health risk posed by weathered toxaphene...." EPA Region 4 is working with the EPA Superfund Technical Support Center under the National Center for Environmental Assessment to evaluate the available scientific literature to determine whether there has been better information published to aid EPA in determining toxicity, developing risk-based cleanup levels, a final remedy for OU1, and remedies for OU2 and OU3. EPA may also conduct site specific toxicity studies to help inform the conceptual site model and develop cleanup alternatives for OU2 and OU3. See response to comment CB-2 for further information relating to the rationale for dividing the Terry Creek Site into operable units,

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		phasing remedial investigations, and selecting an interim remedial action for OU1.
100Mi-1.6	The parent plant of the Hercules plant is Ashland. Inc. Additionally. Other companies have a history of ownership on the site, including Pinova that currently operates the active industrial site. Why does the proposed plan not identify and assign remediation obligations to other potentially responsible parties?	As an owner and operator of a portion of the Terry Creek Site during a time in which disposal of hazardous substances occurred, Hercules Incorporated, now known as Hercules LLC (Hercules), has been identified as a potentially responsible party pursuant to CERCLA Section 107(a). The EPA is conducting investigations to determine if there are other potentially responsible parties who may be liable at the Terry Creek Site. To date, Hercules has entered into an AOC and an Amended AOC for removal of contaminated sediment from the Outfall Ditch and Terry and Dupree Creeks and performed and funded those removals pursuant to the terms of the AOCs, as well as an AOC for RI/FS, which requires Hercules to perform and fund an OU2 and OU3 RI/FS in addition to the OU1 RI/FS it performed and funded. Hercules has indicated its willingness to enter into a Consent Decree for OU1, to be lodged with the United States District Court, upon completion of negotiations pursuant to the timelines specified CERCLA Section 122(e). Since the Terry Creek Site is not listed on the National Priorities List and a Superfund alternative approach is being utilized, the EPA will require as a component of the OU1 Consent Decree that Hercules perform and fund the OU1 Remedial Design and Interim Remedial Action, with EPA oversight, and provide liquid financial assurance prior to commencement of the OU1 work.
100Mi-1.7	Georgia Environmental Protection Division (GA EPD) requires Pinova submit discharge monitoring reports to comply NPDES permits in compliance with the Federal Clean Water Act. Pinova regularly reports that the outfall ditch channels six million gallons of water a day (6 MGDl. The volume discharges into Terry Creek and includes storm water from the City of Brunswick, runoff from the former Hercules plant site, and industrial discharge from the active Pinova plant. Based on the EPA's Enforcement and Compliance History Online – ECHO - website (echo.epa.gov), as recently as third quarter of 2012,	Hercules Incorporated, now known as Hercules LLC, and Pinova are co-permittees on Amendment to Hazardous Waste Facility Permit No. HW -052 (D&S) issued on July 29, 2015. That permit pertains to post-closure care of five former impoundments on the former Hercules pesticide plant facility used to manage wastewater from the manufacturing of toxaphene and the storage of hazardous waste containers. Several years ago, Pinova purchased the active portions of the facility (including most of the SWMUS) and Hercules retained the remaining portions of the property including the permitted storage area and the closed surface impoundments regulated unit. In the sale, Hercules retained liability for all past releases. Pinova Holdings, Inc.,

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	Pinova's discharge monitoring reports discovered toxaphene in monitored water (See ECHO records for CWA Source ID GA0003735), With any potential for contributing toxaphene into our waterways, it would seem irresponsible for EPA to not address such contributions and require remediation by the contributing entity. How will EPA prevent toxaphene-contaminated waters from entering OU1 exacerbating the problem?	the parent company of Pinova was purchased by Symrise AG in 2015. In December 2016, DRT purchased the Pinova Brunswick Plant from Symrise. The facility is still operating under the name of Pinova. In 2010, Hercules performed remediation of the N-street ditch and the solid waste management unit 5 (SWMU-5) (former toxaphene production facility). This remediation removed the majority of the toxapahene contaminated soils and sediments at the facility. Part of the corrective action included lining the N-street ditch with concrete fabriform to prevent contaminated groundwater from entering the ditch and ease removal of accumulated sediments in the future. The N-street ditch collects stormwater runoff from the former pesticide facility and the neighborhood upgradient as well as non-contact cooling water. The N-street ditch drains under Hwy 17 and into Dupree and Terry Creeks. Pinova has an NPDES permit for its stormwater discharge and the sampling point for monitoring the discharge for compliance with the NPDES permit is on the west side of Hwy 17. Surface water runoff into the newly constructed conveyance structure will continue to be monitored, and enforcement actions may be taken by EPD and/or EPA for violations of the NPDES permit and/or unauthorized discharges as necessary to ensure upstream sources do not contribute to the Terry Creek Site.
100Mi-1.8	Additionally, as sea level continues to rise, marshlands and uplands will be eroded and both clean and contaminated sediments will be released into the waterways, How will the proposed cleanup plan prevent increasing sea level from releasing more contaminants captured in the soils in OU1? Additionally, how will the proposed cleanup plan prevent the disruption of contaminated sediments during extreme weather events, such as hurricanes and tropical storms?	See response to comment RA-7 above for additional information regarding how the selected interim remedy accounts for rising sea levels and storm events.
100Mi-1.9	In conclusion, One Hundred Miles suggests the cleanup plan go further to remove the contaminated soils from the	See response to comment CB-2 above for further information relating to the rationale for dividing the Terry Creek Site into operable units,

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	Terry Creek outfall ditch and eliminate the potential exposure to wildlife and humans.	phasing remedial investigations, and the scope of the selected interim remedy for OU1.
Risk Assessment		
100Mi-2.1	What role has the Center for Disease Control and/or the U.S. Agency for Toxic Substances and Disease Registry (ATSDR) in evaluating the toxicity of OU1? As well as OU2 and OU3 site and the extent of the health effects caused by the contamination of the Hercules site?	ATSDR completed a Public Health Assessment (PHA) in 2002, which is included in the Administrative Record as Document 10784179. ATSDR issued a PHA on August 12, 2002. The PHA addressed the Terry Creek Site as a whole. Recommendations included: 1. "Based on data gaps such as uncertainty in the PCC [polychlorinated camphenes] levels of [sic] 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 and determine whether further limits or restrictions are warranted. People eating fish from nearby areas can lower their risk of ingesting organic contaminants such as PCC and PCBs by removing fatty tissue before cooking, as well as by eating small (younger) fish. 2. Due to interference from other chlorinated compounds in the fish samples and the uncertainty they cause in the toxaphene estimates, sensitive and specific methods, such as electron capture negative ion mass spectrometry (GC-ECNIMS) are recommended for the evaluation of PCC in fish and sediment. GA EPD and USEPA will employ such methods. 3. Additional seafood sampling is needed to help assure residents that fish caught in unrestricted 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: PCC, heavy metals--including mercury--and PCBs.

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		4. It is recommended that those residential yards that receive or have received silty run off from flooding drainage ditches on the Hercules plant site be sampled for PCC. 5. Garden soils should be analyzed for PCC if contaminated dredge spoil or other major sources of PCC contamination are suspected. 6. The community well at the Terry Creek Mobile Home Park (TCMHP) should be tested with a minimum detection limit below the MCL of 3 ppb to assure residents that their drinking water is safe. ATSDR needs further information (such as the depth of the well and any sampling data) regarding the community well at the TCMHP. 7. ATSDR has requested, and should obtain, all future or additional data for Terry Creek that is currently available. 8. Based on the results of the air toxics data set collected as part of the Brunswick/Glynn County Initiative, ATSDR recommends further evaluation of air quality in the general area of Brunswick, particularly with respect to potential carcinogens and respiratory irritants."
100Mi-2.2	What is the connection between the toxicity of OU1 and the plume of benzene contaminated groundwater under the Terry Creek site and beyond? Who is the responsible party for cleaning up the benzene plume? What is the plan and proposed timeline for cleaning it up?	At this time, there is no known connection between the benzene groundwater contaminant plume and OU1. See response to comment SR-4 above for further information relating to the groundwater plume associated with the former Hercules pesticide facility and the parties conducting the corrective action. Also see response to comment CB-2 above for additional information related to the RCRA corrective action addressing the benzene contaminated groundwater plume overseen by EPD.
Environmental Stewardship Concepts letter September 2, 2015		
Selected Alternative		

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ESC-1.1	Why does the preferred alternative not include the four box culvert, relocation of the ditch, substantially greater sediment removal and biodegradation?	See responses to comments CB-1 & CB-2 above for discussion of EPA's rationale for the interim remedy selection at OU1.
ESC-1.2	How is the remediation method expected to keep groundwater contamination from remobilizing?	The intent of the interim action for OU1 is to contain sediments in the Outfall Ditch and eliminate the pathway of exposure to human and ecological receptors from the sediment. While there is interaction between the groundwater and surface water in the Outfall Ditch, the shallow groundwater is not presently known to contain contamination from the current operating facility. The contaminated groundwater plume is in the deeper portion of the surficial aquifer and presently is not known to interact with OU1. Based on data contained in the Semi-Annual Groundwater Monitoring Report dated June 2014 submitted by the Antea Group, on behalf of Hercules, the contaminated groundwater plume migrating from the former Hercules plant is approximately 70 to 75 feet below sea level when it flows under the area of OU1, and this plume is not currently migrating upward towards the Outfall Ditch. Therefore, the plume is not known to be mobilizing contamination from OU1. Additionally, site characterization data contained in the RI/FS for OU1 indicate that toxaphene-impacted sediments and porewater in OU1 do not currently serve as a source of groundwater contamination. The groundwater plume is the subject of a RCRA corrective action, which EPD has the lead in overseeing performance of that action. Based on comments received on the OU1 Proposed Plan, the selected OU1 interim remedy requires the development of a long term monitoring plan to be developed during the OU1 Remedial Design and thereafter implemented. Monitoring will include, but not be limited to groundwater and pore water to ensure that the OU1 remedy remains protective. See response to comment CB-2 above for further information relating to the groundwater cleanup being conducted under RCRA.

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ESC-1.3	It is unclear if there was ever any dredging of the triple box culvert at any time in its history. A disadvantage of a culvert is the need for periodic cleanout of the silting sediment.	EPA agrees that a disadvantage of a box culvert is a need for periodic dredging. See responses to comments CB-1 and CB-2 above for additional information regarding EPA's rationale for the interim remedy selection of an open culvert in the Outfall Ditch to be newly constructed and lined with concrete.
Remedial Investigation		
ESC-2.1	Bioassays need to be conducted for sediments (surface and deep), pore water, surface water, and plant matter as food and prey items.	After implementation of the interim remedy, the pathway of exposure to ecological receptors to contaminated sediment contained in the Outfall Ditch should be eliminated. A monitoring program will be implemented to monitor groundwater and porewater. If data indicates that remaining sediment serves as a source of contamination to groundwater/porewater, then additional ecological reviews will be conducted. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. EPA will conduct ecological risk assessments as part of OU2 and OU3. Many options exist for conducting ecological risk assessments and may include site specific studies such as bioassays. See response to comment SR-5 above for additional information relating to the OU1 ecological risk assessment.
ESC-2.2	Why has EPA not included dioxins and furans in the RI analysis as contaminants? Will EPA require measurement of dioxins/furans in sediment, soil and groundwater at the site?	Dioxins were measured and detected in two sediment samples taken in the Outfall Ditch. Toxic equivalency concentrations for detected PCDDs/PCDFs in sediment collected from the 0.5-2 ft interval are below the Region IV criterion of 2.5 parts per trillion, indicating a limited potential for adverse ecological effects; the fish, mammal, and avian PCDD/PCDF toxic equivalency concentrations are 0.13, 1.8, and 0.86 ppt, respectively. Contaminants of concern have not yet been selected for OU2 and/or OU3. Further evaluation of dioxin/furans will be conducted during the RI for OU2 and OU3.

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ESC-2.3	What is the toxicity of site environmental media, including sediment (surface and at depth), pore water, surface water, and biota?	See response to comment SR-5 above for discussion of how the ecological risk assessment was conducted at OU1.
ESC-2.4	Why has EPA not included dioxins and furans in the RI analysis as contaminants? Will EPA require measurement of dioxins/furans in sediment, soil and groundwater at the site?	See response to comment ESC 2.2 above for discussion of dioxin sampling in the Outfall Ditch.
ESC-2.5	Dioxin concentrations need to be measured in all sediment samples, as well as in pore water, suspended sediment and animal tissue, owing to the presence of dioxin in toxaphene products.	
ESC-2.6	The Work Plan for the RI/FS also anticipated leaving contamination in place that may pose continued risks to ecological receptors, indicated by the suggestion that the remediation may take the form of a performance based, rather than a standards-based or risk-based cleanup. The Work Plan needs to provide a method by which the remediation will be protective of ecological systems and human health.	See response to comment CB-2 above for further discussion on EPA's rationale for the interim OU1 remedy selection.
ESC-2.7	The text says that the detailed Conceptual Site Model is "under development" and will be in the final RI/FS report, contrary to guidance and standard. That is not the way to proceed. EcoRA guidelines from 1998 clearly state that the CSM comes first. Also see Glen Suter et al. textbooks on general Ecological Risk Assessment and ecological risk assessments for contaminated sites. The proposition that a conceptual site model is not prepared at a later time, but is supposed to be prepared at the outset. The RI/FS must include a conceptual site model.	This comment appears to have been made prior to completion of the OU1 Focused RI/FS. The December 2014 OU1 Focused RI/FS report that is included in the Information Repository has an extensive discussion of the conceptual site model, which assisted EPA in an interim remedy selection for OU1.
ESC-2.8	The plan calls for composite samples (page 24), which is inappropriate for characterizing the distribution, nature and extent of contamination, as EPA guidance dictates.	A series of 33 discreet and 11 composite samples were collected according to the 2012 Work Plan for the OU1 Focused RI/FS. Appendix A, Section 4.2.1, Shallow Sediment, page 7 of the 2012 Work Plan describes the sampling procedure. This sampling procedure is consistent with EPA *Guidance for Choosing a Sampling Design for Environmental Data Collection (EPA QA/G-5S),*

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		December 2002, and *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive 93355.3-01, October 1988.*
ESC-2.9	The RI/FS on page 38 indicates that dioxins were measured in two sediment samples, which is consistent with information that dioxin is a contaminant of toxaphene production. The next statement that the dioxin in sediment samples must be derived from other sources is not credible and needs to be removed.	See response to comment ESC-2.2 above. After the remedial investigations of OU2 and OU3, EPA will identify contaminants of concern and any possible sources in those OUs.
ESC-2.10	If shallow groundwater in the vicinity of the ditch likely discharges into the Outfall Ditch and Dupree Creek, then groundwater needs to be better characterized and analyzed as a possible source of contaminants. The groundwater plume associated with the plant, while being managed under RCRA, is wholly dismissed and mentioned only once in the RI/FS.	See response to comments CB-2 and SR-4 above for further discussion of groundwater contamination and the RCRA corrective action being conducted with oversight from EPD.
ESC-2.11	How will EPA address the problem of recontamination by existing and future groundwater contamination of OU1, the Outfall Ditch?	
ESC-2.12	The Outfall Ditch is being prioritized as a source of toxaphene to be remediated, but the larger issue is still the source of toxaphene to the Outfall Ditch, which has not been documented as remediated since the completion of corrective actions in 2010 on the Plant and the N-Street Ditch that feed into the Outfall Ditch. There was no reduction in fish tissue toxaphene in 2011. Additional testing must be done to confirm any measurable impact from the corrective actions.	See responses to comments CB-2 and RA-1c above for further discussion on the RCRA corrective action being undertaken at the Hercules former pesticide plant facility. In support of the need for fish tissue data, Hercules has conducted fish sampling in Terry and Dupree Creeks in 2001, 2005, 2007, 2009, 2011, 2013, and 2015. EPA will continue to require Hercules to collect fish tissue sampling and evaluate impacts to Terry and Dupree Creeks as part of the OU3 remedial investigation.
ESC-2.13	What is the depth of contamination across the entire site? Has EPA accepted a depth at which no contamination occurs, and is therefore "clean?"	As part of the OU1 Focused Remedial Investigation, sediment sampling was conducted February 28 to March 1, 2012, in the Outfall Ditch. Sediment cores were collected from 17 locations. Three cores were collected along each of the five transects and two cores were collected near the triple box culvert. Shallow cores (0-2ft) and one deep core (up to 10 ft) were collected. Figures 3-1 and 5-4 of the OU1 Focused RI/FS provide further details. EPA is in the process of

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		developing a cleanup number for weathered toxaphene. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. Additional site characterization will be conducted as part of the remedial investigations for OU2 and OU3.
ESC-2.14	It is unclear how the accumulated volume of sediment since the previous removal was calculated (estimated to be: Pre-weir = 7500 cy and post-weir = 10,500 cy)	Section 4: Physical Characteristics, page 27 of the December 2014 OU1 Focused RI/FS describes how the volume of accumulated sediment was calculated: "A post-excavation bathymetric survey was performed by ARC Surveying following the removal action. ARC Surveying completed a bathymetric survey in 2012 (Figure 4-1), and the 2012 survey was compared to the 1999 post-excavation survey. The difference in the sediment elevation between the two surveys was used to calculate the thickness of sediment accumulation over the last, approximately, 13 years". Additionally, Figure 4-2 of the OU1 Focused RI/FS provides details relating to sediment accumulation between 1999 and 2012.
ESC-2.15	The seepage rate (net gain of groundwater into the Outfall Ditch) pre-weir is 1,352 gpd and post-weir is 2,593 gpd. This information indicates a lot of seepage from groundwater into the Outfall Ditch not to be considered a contaminated source	The contaminated groundwater plume migrating from the former Hercules pesticide facility is approximately 70 to 75 feet below sea level when it flows under the area of OU1. Based on data contained in the Semi-Annual Groundwater Monitoring Report dated June 2014 submitted by the Antea Group, on behalf of Hercules, this plume is not currently known to be migrating upward towards sediment in OU1. Therefore, the plume is not presently known to be mobilizing contamination from OU1. See response to SR-4 above for further information relating to the groundwater plume and the RCRA cleanup being conducted.
ESC-2.16	Net groundwater discharged into the Outfall Ditch may be substantial, based on the area being a "gaining" area, but this section seems to downplay the potential VOC contribution of groundwater.	
ESC-2.17	A report of this size and importance (the RI/F) should have an Executive Summary and an Abbreviations page to make the material more accessible to the public.	Noted.
Feasibility Study		

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ESC-3.1	The Feasibility Study presumes a remedy in the design and stated purpose, and fails to offer a full range of remediation alternatives for analysis. In this regard, the Feasibility Study does not meet regulatory requirements.	The final OU1 Focused RI/FS dated December 2014, as approved by the EPA, includes seven remedial alternatives. These alternatives include a range of proposed remedial activities including excavation, containment, rerouting of the Outfall Ditch, and combinations thereof. These alternatives were evaluated and compared in accordance with the factors in the NCP and consistent with EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* dated October 1988. The selected interim remedy will eliminate, or reduce, exposure to downstream receptors from contaminated sediment in OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for further information relating to the implementation of an interim remedy.
ESC-3.2	Alternative and in situ methods could have been considered in the FS part of the report, but were completely absent. New methods may have advantages that are not possible with conventional approaches.	EPA's *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (U.S. EPA 2005) indicates that three options are available for the remediation of contaminated sediments which are the most viable: monitored natural recovery, in-situ capping, and dredging/excavation. In-situ treatment technologies (i.e. solidification, bioremediation) for contaminated sediments in tidal systems are very limited. The principal threat waste for technical toxaphene at OU1 was addressed in 1999 and 2000 through hot-spot dredging in the Outfall Ditch removing approximately 35,000 cubic yards of contaminated sediment from the Outfall Ditch and Terry and Dupree Creeks, of that amount approximately 16,800 cubic yards of contaminated sediment were removed from the Outfall Ditch. Approximately 80-90% of the containment mass, including high concentrations of toxaphene from the Outfall Ditch, was removed at that time resulting in a substantial decrease in toxaphene concentrations in fish tissue. In response to EPA's comments on the draft RI/FS dated February 2014, Hercules submitted the revised Focused RI/FS for OU1 dated

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		December 2014 which included Alternative 7: Carbon-Amended Sand Cap Channel with Limited Sediment Removal. The sand cap would create a barrier between overlying materials and underlying sediment. The addition of granular activated carbon (GAC) to the sand cap was intended to promote the sorption and permanent in situ sequestration of hydrophobic organic contaminants, similar in concept to cement-based solidification/stabilization technologies. See response to comment CB-2 above for information related to the EPA's interim remedy selection at OU1.
ESC-3.3	Ultimately, none of the alternatives will bring this site to a conclusive cleanup if the ongoing source of toxaphene is not remediated successfully, and this report does nothing to address this most important issue.	See response to comment 100Mi-1.7 above related to the RCRA corrective action being performed at the former Hercules pesticide facility west of Highway 17 by Hercules with oversight from the EPD.
ESC-3.4	The RI/FS alternatives do nothing to permanently remove contaminated sediments, only to ineffectively, remove contact with the contaminated sediment. The capping remedies require monitoring in perpetuity, which would greatly increase their costs. These costs are not adequately and fully characterized.	See response to comment CB-2 above for information relating to the removal of the principal threat waste in the Outfall Ditch via dredging in 1999 and 2000 and for further information relating to the implementation of an interim remedy and final remedy selection at a later date. If an additional removal of contaminated sediment via dredging was conducted at OU1, it is possible that residual contamination would remain in OU1 because dredging is not always 100% effective. At this time a cleanup number for weathered toxaphene is not available and a determination that dredging achieved a successful cleanup could not be determined. The intent of the interim remedy is to eliminate the pathway of exposure to contaminated sediment. The December 2014 OU1 Focused RI/FS included costs associated with implementation of each of the seven remedial alternatives. The annual costs associated with Operation and Maintenance were included for each of the containment alternatives which includes monitoring, if necessary.
ESC-3.5	Any discussion about construction times, possible contamination during construction, and difficulties of remediating the existing ditch without re-routing, are all trivial. For a remediation project of this small scale (as compared to the Hudson River which is undergoing dredging), a greater amount of sediment removal must be a larger part of the alternatives.	
ESC-3.6	Section 8.3.2 of the FS explains the Remedial Action Objectives. All four are objectives to reduce exposures with no objective for removal of the source material or	This comment appears to be related to the Remedial Alternative Screening Technical Memorandum dated December 2012.

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	eliminating toxicity. The completion exclusion of removal as an objective seems completely inconsistent with EPA directives and guidance to treat or remove toxicity before relying on covering the source. This RI/FS lacks consideration of removal or treatment options. As a result, this Proposed Plan is deficient in failing to present appropriate remedies of a sufficient range and that satisfy ARARs.	The Remedial Action Objectives (RAOs) in Section 8.3.2 of the OU1 Focused RI/FS dated December 2014 are consistent with the principles laid out in the 2009 Site Management Plan that is part of the Administrative Record. Further, the OU1 Focused RI/FS was revised in December 2014 to include a range of alternatives, including Alternative 2: Sediment Removal Within Existing Channel. The removal in the Outfall Ditch of principal threat wastes for technical toxaphene via dredging in 1999 and 2000 removed approximately 35,000 cubic yards of contaminated sediment from the Outfall Ditch, as well as Terry and Dupree Creeks, of that amount approximately 16,800 cubic yards of contaminated sediment were removed from the Outfall Ditch, which represented approximately 80%-90% of the contaminant mass in the Outfall Ditch. While this removal was highly effective, residual contaminated sediment remained in the Outfall Ditch. If an additional removal action was conducted in the Outfall Ditch, it is possible that residual contamination could once again be left behind because dredging is not always 100% effective. The selected interim remedy eliminates the pathway of exposure to human and ecological receptors and therefore is protectective of human health and the environment and will satisfy ARARs. See response to CB-2 above for further information relating to the implementation of an interim remedy and final remedy selection.
ESC-3.7	Section 8.3.4 of the FS on page 60 refers to MNR associated with reductions in surface sediment toxaphene concentrations, but fails to note that toxaphene degradation in the sediment is sufficiently slow that burial is the process that takes place. Wisely, MNR is not considered any further.	Noted.
ESC-3.8	Similarly, in Section 8.3.4 on pages 60-61, the RI/FS discounts removal because it is too difficult and too expensive, but fails to provide any substantive or meaningful support for this position. The RI/FS needs to give more than token consideration to removal.	This comment appears to reference pages in the OU1 Focused RI/FS document which was submitted by Hercules for EPA approval in February 2014. That document was revised by Hercules based on comments from the EPA and resubmitted in December 2014. The revised version included Alternative 2: Sediment Removal Within

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		Existing Channel. The OU1 Focused RI/FS dated December 2014 serves as the basis for the Proposed Plan. See response to comment CB-1 above for further information relating to the ranking of alternatives. See response to CB-2 above for further information relating to the implementation of an interim remedy and final remedy selection.
ESC-3.9	There is no consideration given to bioremediation, despite the fact that Hercules has conducted pilot studies with new methods for bacterial degradation.	See response to comment ESC-3.2 above.
ESC-3.10	There is no discussion of testing excavated material for contaminants that is temporarily stockpiled to be used as backfill.	The OU1 Proposed Plan and Interim ROD lay out the primary elements of the OU1 interim remedy. Details such as those suggested in this comment will be determined in the Remedial Design phase of the project.
ESC-3.11	The preferred alternative uses armoring of remaining contaminated sediments left in place to prevent erosion, disturbance etc. This approach is not practical in the long term for a site that is basically a tidal salt marsh zone for several reasons. First of all, sea level rise will inundate the location. Second, changes in flow patterns and erosion in nearby areas will alter the existing flow patterns and the "new" flow patterns that are to be put in place with the remediation. Finally, extreme weather events such as hurricanes, floods and localized flooding will erode the stability of the armored area, exposing contaminated sediments. The armoring will have to be inspected annually and repairs made as needed.	See response to comment RA-7 above.
ESC-3.12	If or when the site is disrupted or inundated, will EPA insure that further remedial actions are taken to address recontamination by contaminants left in place? Has EPA accounted for this cost?	
Environmental Justice		
ESC-4.1	Why did EPA not conduct an EJ analysis?	EPA Region 4 utilized an environmental justice screening tool called EJSCREEN.

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	Why did EPA fail to consider the fish consumption exposures of the African American community in Brunswick? How will this Proposed Plan address EJ problems that exist in Brunswick now and in the future?	EJSCREEN is an environmental justice mapping and screening tool that provides the EPA with a nationally consistent dataset and approach for combining environmental and demographic indicators. Users identify a geographic area, and then the tool provides demographic and environmental information for the area. All indicators included in the report are publicly available data. EJSCREEN simply displays the information and includes a method for combining environmental and demographic indicators into environmental justice (EJ) indexes. EJSCREEN uses maps and reports to present three kinds of information: Environmental indicators, demographic indicators and EJ Indexes. The EJSCREEN conducted for OU1 includes: 1. 12 environmental indicators 2. 6 demographic indicators 3. 12 EJ indexes Each EJ index combines demographic indicators with a single environmental indicator. This tool provides a number of capabilities, including: • Color-coded mapping; • The ability to generate a standard report for a selected area; and • Comparisons showing how values for a selected area compare to its state, EPA region, or the nation. See https://www.epa.gov/ejscreen for additional information on EJSCREEN. The results of this screening for the area around OU1 are included at the end of the Responsiveness Summary. A map identifying potential minority and low income communities within a one mile radius of the facility is also included. It would appear from this map that the area surrounding OU1 would be considered a potential environmental

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		justice area. Based on the EJSCREEN Analysis, 80% of the approximate 5,801 person population located within a one mile radius of OU1 is identified as minority, compared to 44% in the State of Georgia and 36% nationally. Additionally, 62% of the approximate 5,801 person population located within a one mile radius of OU1 is identified as low income, compared to 38% in the State of Georgia and 34% nationally. The Georgia Department of Natural Resources' fish consumption guidelines illustrate that there are potential risks associated with consumption of fish and other seafood from the creeks located nearby OU1, including Dupree and Terry Creeks. The elevated concentrations of toxaphene residues in OU1 sediments likely contribute to the body burdens of toxaphene in the fish species. Based on these considerations, a performance-based interim remedy that eliminates the transport of contaminants to Dupree Creek and other downstream locations should result in a further reduction of the potential risks associated with fish and seafood consumption by recreationalists, including those who may live in potential environmental justice areas nearby OU1. See response to CB-2 above for further information relating to the implementation of an interim remedy and final remedy selection.
Analytical Method		
ESC-5.1	Appendix A of the RI/FS was conducted and prepared by Hercules consultants Geosyntec, with other labs completing the lab work. This Appendix indicates that EPA Method 8276 is the most sensitive method, but calls on using Method 2 in addition to Method 8276, because of consistency with historical sampling that used Method 2. The problem lies in the cover letter that states the Appendix recommended against using Method 8276, when such a statement is not made in the Appendix. This document is not Agency policy and not an official document on measuring chlorinated camphenes.	The EPA permitted Hercules and its contractor to use Method 1 and Method 2 on surface water, sediment, pore water, and soil as opposed to solely using Method SW-846 8276 for reasons stated in the 2009 Site Management Plan and the OU1 Focused RI/FS dated December 2014. The main reason is that at the time of the proposed sampling, no commercial laboratories were yet established or proficient to perform Method SW-846 8276 on soil or sediment. Also, historical analytical data for OU1 has been primarily reported by Method 1 or Method 2. It is agreed that Method 2 allows for a more conservative quantitation of toxaphene. Ultimately, 10 sediment samples were collected from the Outfall Ditch and analyzed by Method 8276 for

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ESC-5.2	Why does EPA accept the data using measuring methods that are inaccurate and that underestimate concentrations of contaminants?	comparison. The results are available in Appendix A of the Focused RI/FS for OU1: Outfall Ditch dated December 2014. Additional delineation utilizing Method 8276 may be conducted during the remedial design for the interim remedy at OU1 or after a toxicity value for weathered toxaphene is developed. Decisions regarding sampling and analytical methodology for future investigations at the site will be determined at a later date. The contaminated sediment remaining in OU1 is a known source of contamination to downstream receptors. The intent of the interim action at OU1 is to eliminate this pathway of exposure. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for further information relating to the implementation of an interim remedy and final remedy selection.
ESC-5.3	Will EPA use EPA Method 8276 exclusively for this site in the future? Given that most of the data in the RI are not accurate measures of environmental contamination, how will EPA handle the inaccurate data to determine remediation requirements?	
ESC-5.4	The NIMS method (Method 8276) has been performed in consideration of planning for OU2 and OU3, but is not relied upon for OU1, according to the Proposed Plan. As the Outfall Ditch is the source issue, environmental media in the ditch must be analyzed with the best/most sensitive congener evaluation available (Method 8276)	
ESC-5.5	The RI/FS contains the laboratory results of toxaphene breakdown products using the outdated methods, not the official EPA Method 8276, but the evaluation of the data will be performed under "separate cover" which means that the results will not adequately inform this remediation effort at the Outfall Ditch. The full data set and evaluation need to be included here.	
Risk Assessment		
ESC-6.1	How will EPA incorporate the IRIS RfD into the Terry Creek site remediation? Will EPA establish a PRG for dioxins in fish, in surface waters and in sediments?	See response to comment ESC-2.2 above for discussion concerning dioxin analysis in OU1. If dioxin is determined to be a contaminant of concern in OUs 2 and/or 3, then PRGs will be developed using appropriate toxicity data for all impacted media, including fish, if warranted.
ESC-6.2	The considerable discussion over toxicity values for toxaphene or chlorinated camphenes, presents an issue that remains unresolved. EPA needs to take a position on this matter and insist that the values developed and used by EPA are the ones that the company will ascribe to and use.	See response to comment 100Mi-1.4 above for information relating to development of toxaphene toxicity values.

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ESC-6.3	This RI/FS wholly ignores conducting a Human Health Risk Assessment, with no mention of human health risks in a specific context. The RI/FS must, at the very least, include a summary of human health risks by noting the exposure pathways, types of health effects, what is known of dose-response relationships and a characterization of risks. But to completely exclude a section on human health is not acceptable. Any examination of the nature and extent of contamination demands an analysis of human health effects.	Based on the comment submitted by ESC in March 2014 concerning the draft OU1 RI/FS dated February 2014, the EPA required Hercules to revise the OU1 RI/FS to address Human Health Risk Assessment and that document was revised and resubmitted in December 2014. The revised version included Section 7: Risk Assessment Summary which includes a discussion of Human Health Risk Assessment. See page 45 of the December 2014 OU1 Focused RI/FS. The OU1 Focused RI/FS included a Human Health Risk Assessment. The main conclusions therein are: 1. The direct contact risks to trespassers from exposure to OU1 media are considered to be negligible. 2. The GADNR fish consumption guidelines illustrate that there are potential risks associated with consumption of fish and other seafood. The elevated concentrations of toxaphene residues in OU1 sediments likely contribute to the body burdens of toxaphene in the fish species. Based on these considerations, a performance-based remedy that eliminates the transport of contaminants to Dupree Creek and other downstream locations should result in a further reduction of the potential risks associated with seafood consumption by recreationalists. After the implementation of the interim remedy for OU1, groundwater and pore water will be sampled to determine the success of the remedy and if the contained sediment serves as a source of contamination. Depending on the results of the monitoring, additional human health risk evaluations may be conducted.
ESC-6.4	The area surrounding the Outfall Ditch is too residential to be cleaned up to a non-residential standard.	The scope and role of the OU1 interim remedy is to address contaminated sediments contained in the Outfall Ditch. These sediments do not represent a residential exposure scenario. The Upland Soils around OU1 and the Dredge Spoils will be addressed as part of OU2. The area immediately surrounding the Outfall Ditch is currently zoned as commercial/industrial and is anticipated to remain as such. According to the City of Brunswick's 2008 Community Agenda/Comprehensive Plan for its 2030 Vision, the area around

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		OU1 and portions of OU2 Upland Soils are zoned commercial/industrial and will likely remain zoned as such.
ESC-6.5	The Ecological Conceptual Site Model only contains very general reference to groups of wildlife, not taking any one species specifically as a representative in that environment to determine its actual exposure pathways. Specific receptors can and should be used in the ecological risk assessment.	In accordance with *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments - Interim Final*, OSWER 9285.7-25, June 1997, Ecological Risk Assessments (ERAs) are conducted using a tiered approach and are punctuated with Scientific Management Decision Points (SMDPs). SMDPs represent points in the ERA process where the risk assessor, risk manager, and interested parties reach concurrence on conclusions, actions, or methodologies that are needed such that the ERA process can continue (or terminate) in a technically defensible manner. Based on the magnitude of the screening-level risk estimates for toxaphene developed in the Screening Level ERA and the recognition that a more comprehensive ecological investigation of OU1 in a Baseline ERA (Steps 3 through 7) is also likely to identify potential risks to ecological receptors, the SLERA concluded with a SDMP recommending no further ecological investigation for the Outfall Ditch. Rather, it was recommended that the ERA proceed directly to Step 8, *Risk Management*, which considered the potential ecological risk reduction provided by performance-based remedial actions that focus on eliminating direct exposure to all contaminants in the Outfall Ditch and eliminating the potential transport of contaminants to Dupree Creek and other downstream locations. The intent of the interim remedy is to eliminate the pathway of exposure to ecological receptors for the contaminated sediment in OU1. After implementation of the interim remedy, groundwater and pore water will be evaluated to determine if the sediments continue as a source of contamination. Based on the data, further evaluations will be conducted to determine if additional remedial action is needed.
ESC-6.6	The ecological risk assessment fails to consider the accumulation of toxaphene or chlorinated camphenes in marsh grass, Spartina alterniflora as a component in the exposure analysis and trophic transfer of toxaphene. ESC has previously submitted material on this point.	
ESC-6.7	Only one of the wildlife groups under consideration includes prey as a exposure pathway. This limited approach is wholly insufficient as prey items are a major source of contaminant exposure for chemicals such as chlorinated camphenes and dioxins that are bioaccumulative. For these chemicals, the food consumption pathway is considered the most significant of possible exposure pathways. In the present case, with no empirical data on exposures, there is no reason to conclude otherwise.	
ESC-6.8	Why has EPA not insisted that site data on exposures be collected by the PRP?	

<table>
<tr><th>Identifier</th><th>Comment Summary</th><th>Response</th></tr>
<tr><td></td><td></td><td>See response to CB-2 above for further information relating to the interim remedy and final remedy selection.

Additional ecological risk assessments will be conducted as part of the remedial investigations for OU2 and OU3.</td></tr>
<tr><td>ESC-6.9</td><td>Does EPA assume that exposures to all receptors are as given in the Exposure Factors Handbook?</td><td>The Exposure Factors Handbook is a resource that EPA uses to identify sources for appropriate exposure factors to be used in risk calculations. However, EPA recognizes that exposures are site-specific and that site-specific exposure factors can be used in human health and ecological risk assessments.</td></tr>
<tr><td>ESC-6.10</td><td>The SLERA and the determination as to whether a BERA should follow must include the data analyzed under the approved EPA Method 8276.</td><td>See responses to comments ESC5.1 and ESC-6.5 above.</td></tr>
<tr><td>ESC-6.11</td><td>Comparison of toxaphene and chlorinated camphenes found in fish pre- and post-remediation should not have been used to relax fish consumption guidelines when the post-remediation (2001) included different areas and species sampled than the pre-removal (1997) effort.</td><td rowspan="4">The development and maintenance of fish advisories is a responsibility of the Georgia Department of Natural Resources (GADNR) and EPA is supportive of GADNR with respect to establishing and maintaining fish consumption advisories. A recreational fishing survey may be a useful tool to gain more accurate analysis of potential exposures from the consumption of fish in Terry and Dupree Creeks. In support of the need for fish tissue data, Hercules has conducted fish sampling in Terry and Dupree Creeks in 2001, 2005, 2007, 2009, 2011, 2013, and 2015. Additional fish sampling events may occur in the future to support development of fish advisories.

The EPA appreciates your suggestions concerning community outreach pertaining to fish consumption advisories. The EPA has periodically sent out Fact Sheets to Brunswick community members about the Terry Creek Site (and other Superfund sites in Brunswick, Georgia), and plans to continue to do so, as well as continue to conduct public meetings and availability sessions to discuss the Site.</td></tr>
<tr><td>ESC-6.12</td><td>What will EPA do to include fish consumption information in the effectiveness of the remedy before and after remedial actions?</td></tr>
<tr><td>ESC-6.13</td><td>Targeted outreach to the most exposed and susceptible population is encouraged, particularly during the most popular times for fishing. Mass media and mail-outs were the most effective and preferred methods of receiving advisory info; these methods should be used when resources are available.</td></tr>
<tr><td>ESC-6.14</td><td>In order to provide more accurate, effective fish consumption advisories that reduce regionally specific exposure pathways, clear, targeted education and locally-based advisories should be designed. When possible, target audience members should be involved in the process of crafting and disseminating educational materials. More realistic advisories can be created by basing monitoring and advisory decisions on regional species-specific</td></tr>
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<tr><th>Identifier</th><th>Comment Summary</th><th>Response</th></tr>
<tr><td></td><td>sportfish consumption levels, not just on contaminant levels alone. Providing clear, culturally tailored health messages regarding fish advisories will promote more informed choices about fish consumption that will minimize potential exposures to environmental pollutants.

Will EPA consider the patterns and importance of fish consumption as an exposure for recreational and subsistence anglers in the Brunswick area?</td><td></td></tr>
<tr><td>ESC-6.15</td><td>How does EPA plan to implement the information found in these studies, especially carcinogenicity, into the remediation of the site?</td><td>This comment appears to relate to approximately 60 pages of literature citations from a literature search conducted by ESC for the years 2011-2015 regarding dioxin toxicity studies. Toxicity criteria for all contaminants are guided by OSWER Directive 9285.7-53, Human Health Toxicity Values in Superfund Risk Assessments dated December 2003, which establishes a hierarchy for the selection of toxicity criteria for carcinogenic and noncarcinogenic human health endpoints. For all contaminants of concern identified in the RIs for OU2 and OU3, toxicity criteria through this directive and any updates thereto will be used to establish Preliminary Remedial Goals.</td></tr>
<tr><td>ESC-6.16</td><td>What are the Preliminary Remediation Goals (PRGs) at the site for dioxins/furans in sediment, water, and fish tissue?</td><td rowspan="2">The OU1 selected interim remedy is expected to eliminate the exposure pathway to human and ecological receptors from contaminated sediment in OU1, therefore PRGs for surface water and fish tissue were not developed. Further evaluation of PRGs will be conducted as the science related to the toxicity of weathered toxaphene evolves and the remedial investigations for OU2 and OU3 are implemented.

Superfund sites are evaluated on a site by site basis. See response to comment CB-2 above for information relating to the selection of an interim remedy at OU1 and a later final remedial decision.</td></tr>
<tr><td>ESC-6.17</td><td>The Lower Duwamish Waterway Superfund Site created a PRG for surface water for PCB contamination, which became a cleanup level for surface water in the Record of Decision. Will EPA complete similar action decisions for the Terry Creek OU 1 site for toxaphene, dioxins and furans?</td></tr>
<tr><td colspan="3">Glynn Environmental Coalition (GEC) letter September 1, 2015</td></tr>
<tr><td colspan="3">Extent of contamination</td></tr>
<tr><td>GEC-1</td><td>Was the vertical extent of the contamination in the outfall ditch delineated?</td><td>Prior to a removal action commencing in 1999/2000, characterization of the extent of contamination in the Outfall Ditch was performed. After dredging and removal of contaminated sediment from OU1,</td></tr>
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		additional sampling was conducted as part of the OU1 Focused Remedial Investigation. Sediment sampling was conducted February 28 to March 1, 2012, in the Outfall Ditch. Sediment cores were collected from 17 locations. Three cores were collected along each of the five transects and two cores were collected near the triple box culvert. Shallow cores (0-2ft) and one deep core (up to 10 ft) were collected. Figures 3-1 and 5-4 of the OU1 Focused RI/FS provide further details. Considering the dredging and sediment removal of approximately 16,800 cubic yards of contaminated sediment from the Outfall Ditch in 1999 and 2000 and the relatively small area of the Outfall Ditch, the EPA determined that the number and location of the RI samples was sufficient to determine the nature and extent of any remaining post-removal sediment contamination in the Outfall Ditch. The intent of the interim action at OU1 is to eliminate the pathway of exposure to contaminated sediments in the Outfall Ditch. Additional delineation may be conducted during the remedial design or after a toxicity value for weathered toxaphene is developed to further define the nature and extent of sediment contamination. After completion of the interim remedy, groundwater and pore water will be monitored to determine the effectiveness of the interim action. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information relating to the selection of an interim remedy and final remedy decision process.
GEC-2	How much separation is there between the bottom of contaminated sediments in the drainage ditch and the top of the contaminated groundwater underneath the Site?	The contaminated groundwater plume migrating from the former Hercules plant is approximately 70 to 75 feet below sea level when it flows under the area of OU1. Based on data contained in the Semi-Annual Groundwater Monitoring Report dated June 2014 submitted by the Antea Group, on behalf of Hercules, this plume is not currently known to be migrating upward towards the sediment in OU1. Therefore, the plume is not known presently to be mobilizing
GEC-3	Does the contaminated groundwater underneath the outfall ditch have the capability to remobilize the chemicals in the outfall ditch?	

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		contamination from OU1. The groundwater plume is the subject of a RCRA corrective action, which EPD has the lead. See response to comments RA-2 and SR-4 above for additional information related to groundwater contamination.
GEC-5	What is the horizontal extent of the contamination at the Site, including the areas proposed for re-routing the outfall ditch?	The horizontal extent of the Outfall Ditch contamination is contained within the banks of the Outfall Ditch. Areas beyond the footprint of the Outfall Ditch are part of OU2 or OU3 and will be evaluated during the remedial investigations for those operable units. Contamination that may exist in soil excavated for construction of the re-routed ditch will be characterized for proper management and disposal during the remedial design. See ROD Figure 4 for approximate boundaries of OU1.
Toxicity		
GEC-13	Will the wastes the EPA proposes to leave in place continue to be toxic for more than 30 years?	The intent of the selected interim remedy is to eliminate the pathway of exposure to contaminated sediment in the Outfall Ditch. EPA is selecting an interim remedy to control a known source of contamination while toxicity information relating to weathered toxaphene is being developed. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. Contaminated sediments that will underlie the proposed geo-textile fabric liner and compacted clean soil over the fabric may remain in the Outfall Ditch for more than 30 years. However, these contaminated sediments will not be accessible to human or ecological receptors after the geo-textile fabric liner is placed over the contaminated sediments in the existing Outfall Ditch and is backfilled with compacted clean soil material. As long as the liner and compacted clean soil barrier remains intact, there will be no known risk to human or ecological receptors due to the presence of the contaminated sediment that will be located beneath the liner and clean soil barrier. Additionally, five-year reviews, institutional controls, and a long term monitoring plan will be implemented to guarantee the OU1 interim remedy remains effective and is protective of human health and the environment.
GEC-14	Can the EPA evaluate the number of years the wastes remaining in place will be toxic without knowing what chemicals are present and the vertical extent of contamination?	
GEC-15	Do we need to know just how poisonous every chemical in the poisonous polychloro camphene chemical mixture is to develop a remedial plan?	

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		See response to CB-2 above for additional information relating to the selection of an interim remedy and final remedy decisions.
GEC-168	Has the EPA or any of the stakeholder agencies conducted additional specific sediment toxicity sampling in the vicinity of the Terry Creek Site since 1994? If not, why not?	No additional sediment toxicity sampling has taken place. Since contaminated sediments within the boundaries of the Outfall Ditch will be contained under a geo-textile fabric liner and compacted clean soil, the pathway of exposure should be eliminated. Therefore, additional sampling of sediment was not needed to make an interim remedy selection for the Outfall Ditch. The OU1 selected interim remedy includes a requirement to develop a long term monitoring plan during the remedial design which will include, but not limited to groundwater and porewater sampling to evaluate the effectiveness of the interim remedy and the performance of 5 Year Reviews to make certain the interim remedy is effective and remains protective of human health and the environment. Additional toxicity sampling of sediments located within the boundaries of OU2 and OU3 is expected to be conducted as part of the Remedial Investigations for OU2 and OU3. See response to CB-2 above for additional information relating to the selection of an interim remedy and final remedy decisions.
GEC-169	Is the observed toxicity from the sediments important data to have in order to complete the ecological risk assessment?	Collection of sediment toxicity data within the boundaries of OU2 and OU3 is expected to be part of the ecological risk assessment that will be performed as part of the OU2 and or OU3 Remedial Investigations. The intent of the interim action at OU1 is to eliminate the pathway of exposure to ecological receptors from contaminated sediment in the Outfall Ditch. After the implementation of the interim remedy, monitoring of groundwater and porewater will be conducted to determine remedy effectiveness. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. The selected interim remedial alternative for OU1 is expected to eliminate the pathway of exposure to human and ecological receptors
GEC-170	Is observed toxicity data important to develop remedial action goals protective of human health and the environment?	
GEC-188	Have observed toxicity sampling been designated for the sediments in the Outfall Ditch? If not, why not?	
GEC-189	Does the EPA agree it would be helpful to have observed toxicity data from the Outfall Ditch to quantify both human health risk and ecological risk from the undescribed chemical wastes the EPA proposes to leave in place?	

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		from the sediments contained in OU1. An interim remedy of containment and isolation of contaminated sediment is consistent with EPA's 2005 *Contaminated Sediment Remediation for Hazardous Waste Sites* guidance document. EPA-540-R-05-012 and *Remediating Contaminated Sediment Sites-Clarification of Several Key Remedial Investigation/Feasibility Study and Risk Management Recommendations, and Updated Contaminated Sediment Technical Advisory Group Operating Procedures* dated January 9, 2017, OLEM Directive 9200.1-130.
Ecological Risk		
GEC-163	Was Step 4 of the ecological risk assessment process ever completed?	The Ecological Risk Assessment conducted as part of the OU1 Focused RI/FS dated December 2014 concluded the following: "Based on the magnitude of the screening-level risk estimates for toxaphene developed in the SLERA and the recognition that a more comprehensive ecological investigation of OU1 in a BERA (Steps 3 through 7) is also likely to identify potential risks to ecological receptors, this SLERA concludes with a SDMP recommending no further ecological investigation for the Outfall Ditch. Rather, it is recommended that the ERA proceed directly to Step 8, *Risk Management*. The intent of the interim remedy for OU1 is to eliminate the pathway of exposure to ecological receptors from contaminated sediment in the Outfall Ditch and eliminating the potential transport of contaminants to Dupree Creek and other downstream locations." Additional ecological risk assessments will be conducted during the RI for OU2 and OU3. Additionally, the EPA notes that this comment appears to refer to a RI/FS Work Plan which was submitted by Hercules to the EPA in 2000. However, the EPA never approved Hercules' proposed 2000 RI/FS Work Plan.
GEC-252	Will the EPA order Hercules to obtain ecological samples, perform observed toxicity sampling, or have the work	On September 30, 1999, EPA entered into an Administrative Order by Consent (AOC) with Hercules, whereby Hercules agreed to

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	completed and bill the Responsible Party as the EPA has the power to do under CERCLA?	conduct a Remedial Investigation and Feasibility Study for the entire Site. Pursuant to the July 2009 Site Management Plan, the EPA determined that the Site should be broken into three operable units. Hercules agreed in the AOC for RI/FS to perform and pay for the RI/FS work and to pay for the EPA's costs in overseeing the performance of the RI/FS at the Site. As part of the RI/FS process, EPA may order Hercules to obtain ecological samples and perform toxicity tests. The scope and role of the OU1 interim remedial action is to address contaminated sediments within the Outfall Ditch.
GEC-254	What ecological sampling, other than seafood, does the EPA have scheduled for the Terry Creek Site?	No ecological sampling is scheduled at this time. If it is determined that such testing is needed, it will be conducted as part of the OU2 and/or OU3 RIs.
GEC-284	What are the ecological end point being targeted by the RI/FS for OU1?	There is no specific ecological endpoint targeted for the OU1 RI/FS. The interim remedy selected for OU1 is expected to eliminate the pathway of exposure for human and ecological receptors from the sediments in OU1, and therefore will address risk for all endpoints.
GEC-285	What is the level of ecological and human health risk the RI/FS expects to achieve?	
GEC-286	Over what time period are the expected reductions in ecological health risks expected to take place?	Once implemented, potential human and ecological exposure pathways are expected to be eliminated, and risk from exposure to sediment in OU1 is expected to be eliminated. Reductions in ecological health risks are expected to be achieved at OU1 upon completion of construction of the OU1 interim remedy since the pathway of exposure is expected to be eliminated at that time. The intent of the interim remedy is to eliminate the pathway of exposure to human and ecological receptors from the contaminated sediment in OU1. After implementation of the interim remedy, groundwater and pore water will be evaluated to determine if the sediments continue to serve as a source of contamination. Based on the data, further evaluations will be conducted to determine if additional remedial action is needed.

Identifier	Comment Summary	Response
		See response to CB-2 to above for additional information regarding the selection of an interim remedy and final remedy decisions.
PRP Compliance		
GEC-149	Please explain why the EPA has been unable to obtain sampling and analysis compliance from the Responsible Party?	As part of its obligations spelled out in the AOC for RI/FS, Hercules is required to conduct the RI/FS in accordance with the requirements of CERCLA and as directed by EPA. With respect to these issues as of the time of selecting an interim remedial action for OU1, Hercules is considered to be in compliance presently with the requirements of the AOC for RI/FS at OU1. If the EPA deems that Hercules is noncompliant with the requirements of the AOC for RI/FS, the EPA would notify Hercules of such noncompliance. If Hercules thereafter failed to come into compliance, the EPA could complete the RI/FS and seek its costs from responsible parties for doing so pursuant to CERCLA Sections 104, 106, and 107.
GEC-150	What is the EPA decision-making process to resolve Responsible Party noncompliance, and at what point does the EPA have another party collect the data and bill the Responsible Party?	
GEC-151	Does the EPA have the authority to contract for the remedial investigation and feasibility study and bill the recalcitrant Responsible Party?	Yes, pursuant to CERCLA Sections 104, 106, and 107. However, at the time of selecting the OU1 interim remedial action, Hercules is considered to be in compliance with the requirements of the AOC for RI/FS at OU1.
GEC-247	Is the Hercules response "unresponsive' to the EPA comment by failing to address, "A soil cover with rip rap on top would be highly susceptible to storm surges, high tidal influences, and rising sea levels over time. Additionally, man-made activities that may occur in the area could easily alter the cover and cause sediment dispersal and contaminant release back into the creek."?	EPA agrees that climate change may impact the permanence of the selected OU1 interim remedy. Regular inspections and as-needed repairs will assure that erosion or other issues will be dealt with promptly resulting from either weather events or man-made activities. Institutional controls, including development and implementation of an environmental covenant, are components of the OU1 interim remedy. These controls are being put in place to protect the integrity of the interim remedy; and thus, protect human health and the environment. See response to comment RA-7 above for further information concerning selection of the OU1 interim remedy related to possible storm surges, rising sea levels, and strong hurricanes.

Identifier	Comment Summary	Response
		See response to CB-2 above for additional information relating to the selection of an interim remedy and final remedy decisions.
RCRA		
GEC-259	Why is EPD's RCRA Correction Action at the Hercules Brunswick facility is dependent on Region 4's lead concerning toxaphene? Please explain in detail.	GEC's comments numbered GEC-259, 260, 262, 263, and 264 reference a briefing paper prepared by a Region 4 Remedial Project Manager, who formerly worked on the Hercules 009 Landfill Site and the Terry Creek Site, for the Regional Administrator dated 2006 regarding the EPA's Office of Inspector General's audit of the Hercules 009 Landfill Site and Region 4's responses thereto. Since the 2006 briefing paper was prepared, the RCRA corrective action on the Hercules' former pesticide facility has been and is being conducted as discussed in response to comment RA-1c. EPD serves as the lead on that RCRA corrective action and the EPA serves as the lead on the CERCLA actions at OU1, OU2, and OU3. Coordination between EPD and EPA occurred and continues to occur in selecting the RCRA corrective action and the CERCLA remedies at the Terry Creek Site. Section 7 of the Risk Assessment Summary of the OU1 RI/FS dated December 2014 provides details of the human and ecological risk assumptions for OU1 at Terry Creek. Based on the human health risk evaluation described in Section 7, no further investigation was recommended for evaluating direct contact human health risks at OU1. Rather, it was recommended in the Risk Assessment Summary that performance-based remedial goals for the Outfall Ditch be developed that focus on eliminating direct exposure to contaminants in the Outfall Ditch and eliminating the potential transport of contaminants to Dupree Creek and other downstream locations. The intent of the interim remedy is to eliminate the pathway of exposure to human and ecological receptors from the contaminated sediment in OU1. After implementation of the interim remedy, groundwater and pore water will be evaluated to determine if the sediments continue as a source of contamination. Based on the data, further evaluations will be conducted to determine if additional
GEC-260	What was EPA Region 4's lead concerning toxaphene and what action did it entail, and what action did EPA Region 4 take since 2006 in this lead role?	
GEC-262	What is the EPA Region 4 involvement in the former Hercules Plant RCRA investigation and remedial activities?	
GEC-263	What were the EPA Region 4 efforts to evaluate human health risk?	
GEC-264	What were the results of EPA Region 4's efforts to evaluate human health risk?	

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		remedial action is needed. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
Meetings		
GEC-212	Since 2000, how many meeting did the EPA have with local officials and citizens in Brunswick, Glynn County, Georgia, during the development of the Proposed Plan for the Outfall Ditch?	EPA has been actively engaged with the affected community since the 1990s concerning the Terry Creek Site and has strived to maintain a collaborative relationship with those interested residents during the OU1 interim remedy selection process. In August 1995, EPA in cooperation with EPD, launched a special project called the Brunswick/Glynn County Community Based Environmental Protection Project (Brunswick CBEP). The CBEP project was part of a new EPA approach to long-term environmental protection, an approach that emphasizes community involvement in the protection of natural resources. From the beginning, community members contributed to the goals and direction of the project. Stakeholders, include but are not limited to area citizens, the City of Brunswick, Glynn County, Glynn County Health Department, Glynn Environmental Coalition, Save the People Association, Inc., EPA, EPD, U.S. Fish & Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA), and the Agency for Toxic Substances and Disease Registry (ATSDR). On August 10, 1995, a public meeting was held for the Brunswick CBEP to obtain comments from the community and government agencies. The meeting discussed the three NPL sites located in Brunswick: LCP Chemicals Plant, Brunswick (Escambia) Wood Preserving, and Hercules 009 Landfill. The Terry Creek Site, while not final on the NPL, was also discussed.
GEC-213	On what dates and locations did the meetings to provide equal access to the decision making process take place?	
GEC-214	Who did the EPA invite to attend the meetings and was there public notice to involve the community in the Terry Creek Site decision-making process?	

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		In December 1997, ATSDR advertised public availability sessions to be held on January 20 and 21, 1998 to obtain community input relating to the Terry Creek Dredge Spoil Areas/Hercules Outfall Site. ATSDR obtained health and environmental concerns from 63 residents living near the Terry Creek Site. As an additional effort to inform the Brunswick community, the EPA began to mail out the Brunswick Environmental Cleanup Newsletter in 2008. This newsletter contains information relating to all of the superfund sites in Brunswick and has been mailed approximately 12 times since 2008 and the EPA plans to continue to do so. In 1998, EPA awarded a technical assistance grant (TAG) to the Glynn Environmental Coalition (GEC) for the Terry Creek Dredge Spoil Areas/Hercules Outfall Site. The purpose of the TAG is to help communities participate in Superfund cleanup decision making by providing funding to community groups to allow them to hire their own independent technical advisor to interpret and explain technical reports, site conditions, and the EPA's proposed clean-up plans and decisions to the community. EPA continues to fund the TAG and it has been renewed several times to the GEC since it was first awarded in 1998. In June 2015, the OU1 Proposed Plan was developed and sent to approximately 340 citizens residing in Brunswick, Georgia. The OU1 Proposed Plan provided that the period for the public to comment thereon was from June 29, 2015 to August 14, 2015. Additionally, the Proposed Plan informed citizens that a public meeting would be held on July 30, 2015, from 6 to 7:30 p.m. at the Brunswick/Glynn County Library in Brunswick, Georgia. On June 26, 2015, notice was placed in the *Brunswick News* announcing the public meeting to be held on July 30, 2015 at the Brunswick/Glynn County Library in Brunswick, Georgia to discuss the Proposed Plan for OU1, the Outfall Ditch, in accordance with CERCLA and the NCP. During the July 30, 2015 public meeting, EPA presented the Focused RI and FS results and the Proposed Plan for OU1.

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		Approximately 50 people attended the meeting and many presented comments and questions during the meeting, including GEC members. The transcript from the July 30, 2015 Public Meeting is included in Appendix A to the Record of Decision. Pursuant to requests from GEC and other members of the public, the public comment period was extended to September 11, 2015, for a total of public comment period of 75 days. On December 8, 2015, EPA and EPD met with officials from the City of Brunswick and Glynn County to discuss their potential reuse plans of OU1 and the surrounding area and held a public availability session in Historic City Hall in Brunswick, Georgia. The public availability session was attended by approximately 60 people, including GEC members. The purpose of the meetings on December 8, 2015 was to provide the community with additional information relating to the preferred alternative and answer any questions presented. Additionally, documents and reports pertaining to OU1, the Outfall Ditch, have been placed in the Terry Creek Site's Information Repository located at the Brunswick/Glynn County Library and such documents and reports are sent directly to the GEC. EPA continues to mail out the Brunswick Environmental Cleanup Newsletter periodically to residents in Brunswick, Georgia providing status updates about cleanup efforts at the Terry Creek Site, Hercules 009 Landfill, LCP Chemical, and Brunswick Wood Preserving Superfund Sites.
GEC-215	Since 2000, how many meetings did the EPA have with Hercules, their contractors, or consultants representing the Responsible Parties?	As outlined in the Terry Creek Site AOC for RI/FS, Hercules is required to perform and fund the RI/FS at the Terry Creek Site pursuant to the EPA's oversight. As a result, since 2000, EPA has met and continues to meet with Hercules and its representatives on multiple occasions, both telephonically and in person at the Site, in EPA Region 4's Atlanta office, and in Hercules' office in Delaware, to discuss planning and performance of the terms of the AOC for RI/FS. As discussed in response to comment GEC-212 above, reports
GEC-216	On what dates and locations did the EPA have meetings with Hercules, their contractors, or consultants representing the Responsible Parties?	

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		and documents that were produced as a consequence of these communications and meetings are routinely placed in the Information Repository at the Brunswick/Glynn County Library and sent directly to the GEC.
GEC-266	While the community was "...put on hold..." by EPA Region 4, did the EPA continue to meet with Hercules or their consultants and contractors? If so, on what dates did these meetings take place and are records from these meetings in the Administrative Record for the Terry Creek Site?	This comment references a briefing paper prepared by a Region 4 Remedial Project Manager, who formerly worked on the Hercules 009 Landfill Site and the Terry Creek Site, for the Regional Administrator dated 2006 regarding the EPA's Office of Inspector General's audit of the Hercules 009 Landfill Site and Region 4's responses thereto. That briefing paper discusses a request for a meeting by the Kiwanis Club relating to the OIG investigation at the Hercules 009 Landfill. The EPA postponed the meeting until the EPA's final response to the OIG was completed. EPA provided the final response to the OIG on June 20, 2006, and met with the Kiwanis Club in October 2006. See response to comment GEC-215 above for information related to meetings held with Hercules to discuss planning and performance of the RI/FS.
GEC-267	Do the EPA Region 4 records appear to be centered around meetings with Hercules and avoiding meetings with the community?	EPA has been actively engaged with the affected community since the 1990s and has strived to maintain a collaborative relationship with those interested residents during the OU1 interim remedy selection process. See response to comment GEC-212 above for additional information relating to community participation activities conducted by the EPA concerning the OU1 interim remedy selection process. In overseeing timely and compliant performance of the OU1 RI/FS by Hercules, the EPA has met with Hercules multiple times as further discussed in response to comment GEC-215 above. Reports and documents that were produced as a consequence of these communications and meetings are routinely placed in the Information Repository at the Brunswick/Glynn County Library and sent directly to the GEC.
NOAA		
GEC-256	Has the EPA taken the data needs of the National Oceanic and Atmospheric Administration (NOAA) for the	EPA has consulted with NOAA and the U.S. Fish and Wildlife Service (USFWS) over the course of investigations and removal

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	Resource Damages Claim into consideration when developing remedial investigation plans?	actions at the Terry Creek Site. Pursuant to Section 104(b)(2) and 122(j) of CERLCA, EPA notified natural resources trustees of a release at the Terry Creek Site on November 1, 1994, in a letter from Douglas F. Mundrick, P.E., Chief, South Superfund Remedial Branch. Additionally, NOAA provided comments to EPA on the OU1 RI/FS Workplan on September 15, 2010. EPA will continue to seek input from these natural resource trustees on issues such as endangered species and ecological conceptual models and associated potential risk and risk management decisions as the part of the OU1 final remedy decision, and the OU2 and OU3 remedial investigations. The assessment of Natural Resource Damages (NRD) may occur following remedial action because remedial actions sometimes also effectively restore habitat. Because the choices made in cleanup decisions can affect the amount of NRD, EPA coordinates with Trustee agencies on cleanup decisions. This coordination helps to inform EPA about the potential impacts of different cleanup alternatives on natural resources, which may help to reduce the potential liability for the damage caused by contamination.
GEC-257	What data has the EPA included in the Remedial Investigation, Feasibility Study, or Remedial Design in support of the Resource Damages Claim?	
GEC-258	Has the EPA stayed in contact with the Resource Damages Claim stakeholder agencies and addressed sampling and analysis needed for a National Resource Damages Assessment (NRDA)?	
Environmental Justice		
GEC-111	What were the Environmental Justice considerations that went into the remedy selection process?	See response to comment ESC-4.1 above. See responses to comments 100Mi-1.4 and ESC-5.1 above for information concerning the selection of the analytical methods at OU1. The OU1 interim remedial action may restore value to the property and surrounding communities that have been negatively affected by contamination. Upon completion of the remedial action at OU1, Hercules may decide, along with stakeholders, that the Outfall Ditch, which is presently owned by Hercules, may be reused. Depending on the type and nature of the reuse, it could help revitalize the local economy with jobs and tax revenues. For additional
GEC-112	What are the names of the people and affiliations of those who evaluated the Environmental Justice considerations that went into the remedy selection process?	
GEC-211	How does continued use of the Toxaphene Task Force method, or Method 1, address Environmental Justice issues raises in the letter by Dr. Sass?	
GEC-232	What are the ramifications to the community from leaving the chemical contamination in place, both economically and from an Environmental Justice standpoint?	

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		information on EPA's policy relating to reuse and redevelopment of Superfund sites see the following website: https://www.epa.gov/superfund-redevelopment-initiative.
Analytical Method		
GEC-6	Why did the EPA choose to use an analytical method the EPA Office of Inspector General found inappropriate?	See response to comment ESC-5.1 above for information relating to the EPA selection and use of analytical methods. The intent of the interim action is to eliminate the exposure pathway of human and ecological receptors to the contaminated sediment in the Outfall Ditch. During the remedial design or after a toxicity value for weathered toxaphene is developed, further delineation utilizing the preferred Method 8276 may be conducted to assist in the final remedy decision which will be made at a later date.
GEC-7	Why does the Propose Plan reference seafood sampling results that demonstrated the inability of the Toxaphene Task Force method (Method 1) to identify polychloro camphene?	The OU1 Proposed Plan does discuss previous seafood/fish sampling events that have occurred at Terry Creek to provide historical context and background information regarding the Site. The OU1 interim remedy focuses solely on the sediments contained in the Outfall Ditch. Such data may be utilized in selecting a remedy at OU2 and/or OU3.
GEC-98	What is the congener profile of the "Technical Toxaphene" analytical standard being used by the methods referenced in the Remedial Investigation and Feasibility Study, Method 1, Method 2, and Method 3?	Commercially available Technical Toxaphene was available for Method 1 and Method 2. A mixture of the 6 parlars, Hp-SED, and Hx-SED is also commercially available.
GEC-99	Are all three methods using the same toxaphene analytical standard and who is the provider? What is the description of the toxaphene analytical standard?	See response to comments 100Mi-1.4 and ESC-5.1 above for information relating to EPA selection and use of analytical methods.
GEC-100	Who makes the decision about which toxaphene analytical standard is used for the analysis by the three analytical methods described in the Remedial Investigation and Feasibility Study?	EPA requires that samples are sent to laboratories approved for conducting analysis. Those laboratories utilize best laboratory management practices and each Laboratory's Quality Management Plan is used to determine which analytical standards are utilized for each method selected by EPA for use.
GEC-101	Were the same seafood samples tested by the Toxaphene Task Force Method (Method 1) where no toxaphene was reported as present re-tested by the Method 3, Negative Ion	See response to comment GEC-7 above for further information relating to seafood/fish sampling events that have occurred at the Site.

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	Mass Spectroscopy (NIMS) and toxaphene found in all samples?	
GEC-102	Why is the EPA allowing an analytical method, Method 1, be used to guide the Remedial Investigation and the decision-making at the Terry Creek Site?	The 2012 "Focused Remedial Investigation/Feasibility Study Work Plan Operable Unit 1 (OU1) Outfall Ditch" approved by the EPA required the use of Method 1, Method 2, and Method 8276. See response to comment ESC-5.1 above for further information relating to use of analytical methods.
GEC-103	Is the reason Method 1 is being used at the Terry Creek Site because it has been demonstrated to NOT find the chemicals of concern?	
GEC-113	What are the rational for using multiple analytical methods for polychloro camphene?	
GEC-114	Did the EPA require Hercules/Ashland to use multiple analytical methods for polychloro camphene?	
GEC-115	Would the cost for using three different analytical methods been better utilized by fully determining the vertical and horizontal extent of contamination in the Outfall Ditch? If not, why not?	Methods 1 and 2 differ only in the way that the data is interpreted, after the sample preparation and instrumental analysis has been completed. The cost to do that is minimal when compared to the expense of the entire analytical procedure. See response to comment GEC-1 above for explanation of determining nature and extent of contamination in OU1.
GEC-116	Did the EPA Office of Inspector General (EPA OIG) find Method 1 (the Toxaphene Task Force Method) inappropriate?	The OIG report does not state that Method 1 (which is criteria used to evaluate samples for weathered toxaphene) is inappropriate. Any reference to inadequacy of Method 8081 is its lack of identification of breakdown products, stating that "...analytical Method 8081 was not designed for and is inadequate to detect and measure toxaphene degradation products. Therefore, EPA needs to use a different analytical method, such as negative ion mass spectroscopy, to definitively assess the presence or absence of toxaphene degradation products..." During the remedial design or after a toxicity value for weathered toxaphen is developed, further delineation utilizing Method 8276 may be conducted to assist in the final remedy decision which will be made at a later date. See response to comment 100Mi-1.4 above concerning selection of analytical methods for OU1.
GEC-117	What was the decision-making process that led to using a method found to be inappropriate by the EPA OIG?	

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		See response to CB-2 to above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-118	Are there email communications between the EPA and Georgia Environmental Protection Division discussing NOT testing (retesting) areas were the Toxaphene Task Force method was used previously?	During the development of the OU1 Focused RI/FS, EPA and EPD discussed and agreed on sampling methods, sampling locations, and sampling parameters included in the OU1 RI/FS workplan. During the remedial design or after a toxicity value for weathered toxaphene is developed, further delineation utilizing Method 8276 may be conducted to assist in the final remedy decision which will be made at a later date.
GEC-119	Is the Terry Creek Site one of the sites where the Toxaphene Task Force analytical method was used in the past?	Yes.
GEC-120	Is the use of the Toxaphene Task Force analytical method an extension of the agreement described in the June 29, 1993 letter from Marshall Steinberg, Vice-President, Hercules Health and Environment; to Harold Reheis, Director of the Georgia Environmental Protection Division, and Patrick Tobin, Action Director of EPA Region 4?	The June 29, 1993 letter from Marshall Steinberg, Vice-President, Hercules Health and Environment to Harold Reheis, Director of the Georgia Environmental Protection Division, and Patrick Tobin, Acting Director of EPA Region 4, summarizes a meeting held in Atlanta on June 15, 1993. The purpose of the meeting was to discuss how the work of the Toxaphene Task Force would be applied to the qualitative identification and the quantitative determination of toxaphene in environmental samples. Based on the discussions at the June 15 meeting, it was established that in all future analyses for toxaphene residues, the official method of analysis will be EPA Method 8080. The above referenced letter states: "For interpretation of the language in Paragraph 7.6.3.1 of the Method, Conclusion 3 of the Toxaphene Task Force report will be used as clarifying language to guide analysts in the qualitative identification of residues as toxaphene and in their quantitative measurement. All gas chromatographic profiles which do not satisfy those criteria will not be regarded as toxaphene, their residues will not be quantified, and the samples will be reported as toxaphene not present."
GEC-121	Did the June 29, 1993 letter from Marshal Steinberg describe an agreement between Hercules, the Georgia Environmental Protection Division, and EPA Region 4 to set criteria to limit the reporting of the quantity of polychloro camphene present?	
GEC-122	Did the June 29, 1993 letter from Marshal Steinberg describe an agreement between Hercules, the Georgia Department of Environmental Protection Division, and EPA Region 4 to use an analytical method that would not quantify or report chemicals that were present?	
GEC-123	Did the EPA Office of Inspector General describe in great detail how chemicals were NOT being reported in his report Appropriate Testing and Timely Reporting Are Needed at the Hercules 009 Landfill Superfund Site,	

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	Brunswick, Georgia, Report 2005-P-00022 September 13, 2005?	However, the presence of technical toxaphene in the analytical sampling conducted in the ditch demonstrated that toxaphene was present and could be a continued source to Terry and Dupree Creeks. This was sufficient information to allow EPA to take an action and address toxaphene in the ditch. Additional analytical information was not necessary to trigger cleanup action. During the remedial design or after a toxicity value for weathered toxaphene is developed, further delineation utilizing Method 8276 may be conducted to assist in the final remedy decision which will be made at a later date. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to comment CB-2 above for additional information relating to the selecting of an interim remedy and final remedy decision. See response to comment 100Mi-1.4 above for information relating to the Office of Inspector General Report and selection of analytical methods for OU1.
GEC-124	Why does the EPA still insist on using an analytical method that has been repeatedly shown to under report, or report as not present, the amount of chemicals in samples?	
GEC-125	Did the EPA Office of Inspector General found appropriate testing was needed in 2005?	
GEC-126	Did the EPA Office of Inspector General explain in great detail how the Toxaphene Task Force method did not report polychloro camphene chemicals produced at the Hercules Plant?	
GEC-127	Did the EPA Office of Inspector General explain in great detail how the Toxaphene Task Force method did not report the most prevalent polychloro camphene present in the Hercules 009 Landfill Superfund Site and Terry Creek Site, Hep-Sed and Hex-Sed?	
GEC-128	Why does the EPA NOT want the quaintly of Hep-Sed and Hex-Sed reported in samples from the Terry Creek Site?	Hex-SED and Hep-SED have been analyzed for OU1. The results are in Appendix A of the OU1 Focused RI/FS.
GEC-129	Does the acronym TAUC stand for Total Area Under the Curve?	Yes.
GEC-130	Does TAUC report all the polychloro camphene present in the sample?	The intent of using the TAUC quantification guidance is to allow quantitation of all chlorinated constituents (camphenes, bornanes, etc.) which are found in toxaphene. By using the TAUC, all residues that elute between the commercially available first and last eluting congeners (Parlar 11 and Parlar 69) are quantified. If other organochlorine pesticides are determined to be present in the sample, their contribution is removed and they are quantified separately.

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GEC-131	Does the TAUC Method report "Total Toxaphene" and Apparent Toxaphene" used by the Food and Drug Administration?	EPA scientists are not aware of an FDA "Apparent Toxaphene" method. The TAUC quantification technique provides for a "Total Toxaphene" value. (See response to comment GEC-130 above.) The term "Apparent Toxaphene" has been infrequently used in the peer-reviewed literature to describe results with less than a 100% pattern match when comparing sample residues to analytical toxaphene standards. Without knowing details of the FDA "Apparent Toxaphene" method, any comparison to TAUC methodology is impossible.
GEC-132	Does the U.S. Food and Drug Administration, in the "apparent toxaphene" method, instructs to include all peaks, and notes that relative heights and widths of matching peaks in the residue and reference standard will probably differ?	
GEC-133	How does limiting the reporting of TAUC make the data more robust?	Section 1.1 of SW-846 Method 8276 describes the rationale, which was implemented because of the potential for inaccurate quantitation. In part it states: "...the quantitation of weathered toxaphene may be considered subjective and qualitative with the success highly dependent on matching the calibration standards to the weathered peak pattern." As with any multi-component residue analysis, quantitative and qualitative success of the analytical technique is based on comparison of standards to weathered residues. Because of the physics of the NIMS detector, response can vary by orders-of-magnitude between congeners, even in un-weathered toxaphene. As toxaphene residues weather, congener profiles change and quantitation which is based on un-weathered technical toxaphene, is affected in NIMS analysis: that is the reason that Method 8276 recommends against quantitation of weathered toxaphene residues using technical toxaphene standards.
GEC-134	Was the reason for excluding TAUC by Method 8276 to avoid discovery of an under quantification of polychloro camphene by the Method 8081 TAUC?	
GEC-135	Does the EPA have records of the decisions made via telephone in writing and incorporate them into the Administrative Record (AR)?	The administrative record through the Proposed Plan was released to the public on June 25, 2015, and can be found at the information repository located at Brunswick/Glynn County Regional Library.
GEC-136	Where in the AR can the decision to excluded TAUC analysis by Method 8276 be located?	Discussion of the use of Methods 8081 and 8276 is included in Appendix A of the OU1 Focused RI/FS dated December 2014.
GEC-137	Did the 10 samples analyzed by EPA Method 8276 show an under quantification of polychloro camphene by the Toxaphene Task Force method?	The analytical results are available in Appendix A of the OU1 Focused RI/FS dated December 2014. The analytical results ranged from non-detect to 0.0096 µg/L.
GEC-153	What is the rational for sampling by the EPA approved method for polychloro camphene and then not utilizing the data?	See Appendix A of the December 2014 OU1 Focused RI/FS and response to comment 100Mi-1.4 above for further information on method selection and data utilization.

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GEC-154	For what informational purposes is the Method 8276 (Method 3) data intended?	
GEC-155	What is the rational for excluding the Method 8276 data from the Remedial Investigation?	
GEC-172	Is EPA Region 4 the only EPA Region that uses their version of total area under the curve (TAUC)?	Laboratories perform QA/QC analyses to document their analytical proficiency. EPA Method 8081B discusses approaches to the quantitation of multi-component analytes. Toxaphene is specifically addressed, as are different techniques to quantitate residues; total area is one option offered. The use of select peaks for quantitation, as well as guidance in reporting degraded multi-component analytes is also given within Method 8081B. Professional judgement of the analyst is required when performing analyses from widely varied sample matrices and sites. What is appropriate for one site may not produce results of the required data quality for another.
GEC-173	Is EPA Region 4 the only EPA Region that uses the Toxaphene Task Force method, also known as Method One?	
GEC-174	What is the analytical method used by other EPA Regions to delineate and plan cleanups of sites with polychloro camphene contamination?	
GEC-175	Why is the EPA Region 4 trying to answer the question at Terry Creek, what is toxaphene?	Toxaphene is a contaminant of concern at OU1 and was manufactured by Hercules. See response to comment 100Mi-1.4 above for further discussion about the scientific uncertainty associated with analyzing and determining toxicity of weathered toxaphene. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-176	Other than EPA Region 4, are there other EPA Regions trying to answer the question, what is toxaphene?	Two reports issued by the OIG (September & December 2005) directed EPA to develop a method for detecting weathered toxaphene and to develop appropriate toxicity criteria.
GEC-202	Why is EPA Region 4 using Method 1, the Toxaphene Task Force method, when it has been demonstrated to NOT find toxaphene or polychloro camphene at 52 times the EPA DO NOT EAT level in biota?	See response to comment 100Mi-1.4 above for further information related to analytical method selection and determining the interim remedy for OU1.
GEC-208	Does the EPA agree that an analytical method that does not find the chemicals of concern will not produce data which to compare results?	

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GEC-209	How much does Method 1 under quantify the amount of polychloro camphene, as described in the Hercules Patent?	
GEC-210	Is the Toxaphene Task Force Method, or Method 1, use anywhere besides the Terry Creek Site?	
GEC-261	Was EPA Region 4 the lead to establish the Toxaphene Task Force, Method 1, as the analytical method for the former Hercules Plant site and the Terry Creek Site?	The task force method was developed in conjunction with EPA and EPD and under an enforcement agreement with Hercules. See response to comment 100Mi-1.4 above for further information related to analytical method selection and determining the interim remedy for OU1.
GEC-277	Why was the discredited Toxaphene Task Force (TTF) method the primary guiding analytical method for the RI/FS?	
GEC-278	Did the EPA note, "...the task force method for toxaphene has been questioned due to its inability to detect or underestimate toxaphene concentrations"?	During remedial design for OU1 or after a toxicity value for weathered toxaphene is developed, additional sampling may be conducted utilizing Method 8276.
GEC-279	When did the EPA approve the TTF method for use at the Terry Creek Site for the 2014 RI/FS?	The EPA approved the OU1 Focused RI/FS Workplan dated January 2012 which contained the use of TTF method as well as multiple other analytical methods.
GEC-280	Does the EPA agree Method 8276 is an official EPA analytical method?	Yes. EPA Method 8276 was incorporated into the Hazardous Waste Test Method SW-846 in 2012.
GEC-281	Did the EPA recommend Method 8276 be utilized on a larger scale at the Terry Creek Site?	Method 8276 was used to analyze 10 samples within the Outfall Ditch for toxaphene and toxaphene congeners. Appendix A of the OU1 Focused RI/FS provides further details. The methods to be used for OU2 and OU3 have not been determined at this time. EPA is in the process of developing a schedule for the RI workplan submittal for OU2 and OU3. Following EPA approval of the RI workplan, investigations will begin for OU2 and OU3.
GEC-282	Were there agreements between the EPA and Hercules to minimize use of EPA Method 8276? If so, when were the agreements made and where can the documentation be found?	See responses to comments 100Mi-1.1 and 100Mi-1.4 above for further information related to analytical method selection and determining the interim remedy for OU1.
Dioxin		
GEC-194	Did the deeper sediment samples analyzed for dioxins/ furans extend the entire vertical depth of contaminated sediments? If not, why not, and what was the decision	Dioxin was detected in two samples located in the Outfall Ditch. Table 5-1 of the OU1 Focused RI/FS lists the results. Sampling was

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	making matrix used for to establish the sampling depths in the Outfall Ditch?	conducted consistent with the January 2012 Workplan for the OU1 RI/FS.
GEC-4	What is the EPA's reasoning for not analyzing for dioxin for the entire vertical depth of the contaminated sediments in the outfall ditch?	The intent of the interim remedy for OU1 is to eliminate the pathway of exposure to human and ecological receptors from contaminated sediment in the Outfall Ditch. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions. The vast majority of exposure to contaminants in the Outfall Ditch is in the surficial sediment rather than deeper sediment. For ecological receptors, surficial sediment in the biologically active zone (0 to 0.5 ft below the sediment/water interface) is considered the point-of-exposure for sediment-dwelling or sediment-foraging receptors. See response to comments ESC-2.2 and GEC-1 above for further information relating to the characterization of sediment contamination in OU1.
GEC-10	Why did the EPA allow Hercules to sample for dioxin in a manner that would look at newly deposited sediments instead of the vertical extent of the historical contamination?	
GEC-156	What action will the EPA take to refute the continued assertion by Hercules Incorporated that dioxin was not produced with polychloro camphene pesticide?	Contaminants of concern for OU2 and OU3 will be defined during the remedial investigations for those OUs and further review of dioxin will be conducted at that time. EPA is continuing to conduct investigations identifying potentially responsible parties at all of the site. If dioxin is determined to be a contaminant of concern at OU2 and/or OU3, EPA will request any potentially responsible party identified to conduct remedial actions related to dioxins. See response to comment ESC-2.2 above for further information relating to the characterization of sediment contamination in OU1.
GEC-157	Will the EPA incorporate dioxin and furan data from the sludge basins on the Hercules Plant site and the Hercules 009 Landfill Superfund Site into the body of knowledge for the Terry Creek site?	
GEC-158	Will the EPA order Hercules and Ashland to remove all statements from Terry Creek Site documents concerning dioxin and furan not been produced at the Hercules plant?	
GEC-159	Was step three of the ecological risk assessment process completed?	GEC's comments contained in GEC-159, 160, 161, 162, and 164 reference a proposed "April 2000" RI/FS Work Plan. The proposed

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GEC-160	Was step three of the ecological risk assessment process avoided in order to avoid sampling for dioxin per the EPA's request?	RI/FS Work Plans submitted by Hercules to the EPA for review and approval in 2000 and 2001 were never approved by EPA or implemented. The RI/FS submitted by Hercules to the EPA in December 2014, which serves as a basis upon which the OU1 interim remedy selection is made, was prepared in accordance with an approved RI/FS Work Plan for OU1 dated January 2012. These documents are part of the Administrative Record and were sent directly to the GEC. See response to comment ESC-6.5 above for further information relating to the selection of the parameters of the ecological risk assessment performed at OU1. Also see response to comments ESC-2.2 and GEC-194 above for further information relating to characterization of sediment contamination in OU1.
GEC-161	As the dioxin sampling discussed in the remedial investigation and feasibility study work plan dated April 2000 been rescheduled?	
GEC-162	Does the EPA agree the dioxin and furan sampling at the Terry Creek Site is deficient and significantly more data is needed before a Proposed Plan can be considered or implemented?	
GEC-164	Is there an association between step four of the ecological risk assessment process not being completed and the failure test for dioxin?	
GEC-165	Is Method 8081 the appropriate method for analysis of dioxin? If not, what is the appropriate method?	No. The use of EPA Methods 1613 and 8290 would be preferred over Method 8081 for analysis of dioxin compounds. Method selection would be dependent on data quality objectives. Method 8081 has not been validated for the analysis of dioxins.
GEC-166	The sampling for dioxin extending back to 1997 establish probable cause to believe dioxin and furans are associated with the manufacturing processes that took place over the past hundred years at the Hercules plant?	See response to comment GEC-156 above for further information relating to additional investigations to be performed for OU2 and OU3. Any additional information that may obtained during ongoing potentially responsible party investigations and during the OU2 and OU3 remedial investigations related to dioxin and furans will be evaluated as further information is available.
GEC-167	Will the EPA require all references to dioxin not being associated with the Hercules facility be removed from documents concerning the Terry Creek site?	
GEC-180	Has dioxin analysis been added to section 7 of the remedial investigation and feasibility study work plan?	GEC's comments contained in GEC-180, 181, and 182 reference "WORK PLAN FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY July 2001". This proposed Work Plan was never approved by EPA, and thus not implemented by Hercules. See response to comments ESC-2.2 and GEC-4 above for further information relating to characterization of sediment contamination in OU1.
GEC-181	Have the background samples and the dioxin analysis been added to table 7-1?	
GEC-182	Have five Creek sediment samples been added for dioxin analysis in the remedial investigation?	

Identifier	Comment Summary	Response
GEC-183	Did the EPA specify the select sample locations for dioxin analysis? If not who selected the locations and the number of samples to be tested for dioxin?	Pursuant to the requirements of the AOC for RI/FS, Hercules was required to submit a RI/FS Work Plan, including a Sampling Plan, to the EPA for review and approval. EPA, after consultation with EPD, approved the OU1 Work Plan submitted by Hercules dated January 2012.
GEC-184	Why sample for dioxin only from 0 to .5 feet and .5 feet to 2 feet?	See response to comment GEC-194 above for information relating to selection of sampling parameters at OU1.
GEC-185	Are samples from 0 to .5 feet and from .5 feet to 2 feet located in sediments that of accumulated since the removal action in 1999 – 2000?	It is possible that new sediment accumulated since the removal action in 1999. Figure 4-2 of the OU1 Focused RI/FS provides information relating to sediment deposition between 1999 and 2012.
GEC-186	Was the EPA's rationale for not testing for dioxin throughout the vertical extent of polychloro camphene manufacturing wastes located in the Outfall Ditch?	See response to comments GEC-1 and GEC-194 above for further information relating to the characterization of sediment contamination in OU1.
GEC-187	Would dioxin data be helpful in determining the additive of toxic effects from polychloro camphene manufacturing wastes and other byproducts such as dioxin?	
GEC-191	Will the EPA order Hercules to remove all statements arguing that dioxin was not produced at the plant during polychloro camphene manufacture from Terry Creek Site documents?	See response to comment GEC-156 above for further information relating to additional investigations to be performed for OU2 and OU3. Any additional information that may obtained during ongoing potentially responsible party investigations and during the OU2 and OU3 remedial investigations related to dioxin and furans will be evaluated as further information is available.
GEC-192	Why did the EPA not refute the statement, Dioxins are not known to have been used or produced at the Plant," back and 2000 when the Remedial Investigation Work Plan was being developed?	
GEC-193	What is the depth of "deeper sediment samples were also analyzed for dioxins/furans"?	See Appendix E: Focused Screening Level Ecological Risk Assessment Terry Creek in the OU1 Focused RI/FS dated December 2014. See response to comments GEC-1 and GEC-194 above for further information relating to the characterization of sediment contamination in OU1.
Institutional Controls/Outreach		
GEC-12	What is the EPA's definition of "Environmental Controls?	Institutional controls (ICs), which may also be referenced as environmental controls, are defined in the EPA's March 1, 2005 guidance entitled *Institutional Controls: A Citizen's Guide to*

Identifier	Comment Summary	Response
		Understanding Institutional Controls at Superfund, Brownfields, Federal Facilities, Underground Storage Tanks, and Resource Conservation and Recovery Act Cleanups (OSWER 9255.0-98) as generally: "administrative and legal tools that do not involve construction or physically changing the site. ICs are generally divided into four categories: 1) Government Controls – include local laws or permits (e.g., county zoning, building permits, and Base Master Plans at military facilities); 2) Proprietary Controls- include property use restrictions based on private property law (e.g., easements and covenants); 3) Enforcement Tools- include documents that require individuals or companies to conduct or prohibit specific actions (e.g., environmental cleanup consent decrees, unilateral order, or permits); and 4) Informational Devices- include deed notices or public advisories that alert and educate people about a site." ICs are defined in the EPA's December 2012 guidances entitled *Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites* and *Institutional Controls: A Guide to Preparing Institutional Control Implementation and Assurance Plans at Contaminated Sites* as "non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for exposure to contamination and/or protect the integrity of a response action." ICs typically are designed to work by limiting land and Sites and /or resource use or by providing information that helps modify or guide human behavior at a site.
GEC-18	What portion of the budget is directed to seafood consumption advisory signs in the Terry Creek, Dupree Creek, and Back River area?	The cost estimates in the OU1 Proposed Plan do not include maintenance of fish consumption advisory signs due to toxaphene and toxaphene residues in fish tissues because the development and maintenance of fish advisories is conducted by the GADNR. GADNR has established and implemented fish advisories for Terry and Dupree Creeks, including placing fish advisory signs around the Site. Additionally, on or about January 2016, Hercules placed fish consumption signs on its property in two locations, including adjacent to the Outfall Ditch. On or about March 2016, fish consumption signs were placed in 4 locations on the F.J. Torras Causeway.
GEC-19	What portion of the budget is focused for direct outreach and contact with habitual fishers from the Terry Creek Area?	

Identifier	Comment Summary	Response
GEC-16	Where can the EPA's plan be found for the "Institutional Controls" for fishermen and others potential impacted by the Terry Creek Site until such time as the remedial actions are implemented and seafood is no longer under a consumption advisory?	The development and maintenance of fish advisories is conducted by the GADNR and EPA is supportive of GADNR with respect to establishing and maintaining fish consumption advisories. In support of the need for fish tissue data, Hercules has conducted fish sampling in Terry and Dupree Creeks in 2001, 2005, 2007, 2009, 2011, 2013, and 2015. Additional fish sampling events may occur in the future to support development of fish advisories. See response to comment GEC-18 above for information concerning why a budget was not established in the remedy alternatives for OU1 to address fish advisories and consumption of seafood.
GEC-17	What is the budget designated by the EPA or Hercules for the "Institutional Controls" to address risk to those fishing and consuming seafood from the Terry and Dupree Creek Area?	
GEC-145	What was the EPA's rational for using the undefined term "environmental controls" instead of the defined term "institutional controls"?	The EPA's OU1 Proposed Plan uses the terms "Institutional Controls" in the Glossary on page 18 and "land use controls" on page 14, but not the term "environmental controls". The OU1 Proposed Plan discusses "environmental covenant" as a form of an institutional control/land use control in the description of alternatives for Alternatives 3, 3A, 4, 4A, 5, 5A, 6, and 7. See response to comment GEC-12 above for further information relating to the definition of "Institutional Controls". The EPA did not define "environmental controls" in the Proposed Plan because that term was not used therein.
GEC-146	Why did the EPA not define "environmental controls" in the Proposed Plan?	
GEC-147	Did the obtuse nature of the EPA's use of "environmental controls" mask the actual meaning of the term, which appears to be "institutional controls"?	
GEC-148	At the time the response was written, were there any proposed remedies that did not need institutional controls?	Alternatives 1(no further action) and 2 (sediment removal within existing channel) did not include Institutional Controls.
GEC-190	Would observed toxicity data be helpful in developing Institutional Controls, if needed, for the final proposed remedy?	The proposed Institutional Controls discussed in the OU1 FS and Proposed Plan pertain to prevention of disturbance of the filled-in ditch and maintaining the integrity of the OU1 remedy to protect human health and the environment. As part of a final remedy for OU1 and future remedy for OU2, Dredge Spoils and Upland Soils, and OU3, Dupree and Terry Creeks, additional Institutional Controls may be implemented if deemed necessary.
GEC-241	What institutional controls or environmental controls are the EPA or Hercules implementing to address the human health risk from consumption of contaminated seafood?	See response to comment GEC-18 above for information about why institutional controls related to consumption of contaminated seafood

Identifier	Comment Summary	Response
GEC-255	In detail, what are the institutional controls being implemented to address human consumption of seafood from the Terry Creek, Dupree Creek, and Back River fishing areas?	are not included as a component of the selected interim remedy for OU1.
GEC-268	Were the requests from Hercules acted upon during the first quarter of 2006 while the requests from the community were put on hold?	See response to comment GEC-266 above.
GEC-269	Was the extension of the time period to respond to the EPA Office of Inspector General by EPA Region 4 in response to a request by Hercules?	It is not clear to which extension the comment is specifically referring. On March 21, 2006, as part of the OIG review of the Hercules 009 Landfill, EPA submitted a memorandum to the OIG detailing an interim response, and stating that EPA was awaiting additional information (from the scientific community) before finalizing its response and that this information was anticipated by June 22, 2006. EPA submitted its final response to the OIG on June 20, 2006.
GEC-270	Did EPA Region 4 and Hercules work closely or together to formulate a response to the EPA Office of Inspector General?	This comment relates to the Hercules 009 Landfill Site. Hercules performed the remedial action at the Hercules 009 Landfill Site with oversight from the EPA pursuant to a settlement agreement. As a result, the EPA sought information from Hercules in preparation of a response to the EPA's OIG.
Patent		
GEC-21	Was the pesticide patented under Patent Number 2,565,471 by Hercules Incorporated manufactured at the Brunswick, Georgia, Hercules Plant?	Generally, the term technical toxaphene is used to refer to toxaphene as it was manufactured. Toxaphene does not occur naturally, and is a complex mixture of at least 670 chlorinated terpenes. Technical Toxaphene can be produced commercially by reacting chlorine gas with technical camphene in the presence of ultraviolet radiation and catalyst, yielding chlorinated camphene containing 67-69% chlorine by weight. Especially in the United States, the definition of "technical toxaphene" was patterned after the Hercules Incorporated's product (Hercules Code Number 3956) marketed under the trademark name of Toxaphene. Between 1948 and 1980, Hercules produced toxaphene, a chlorinated pesticide, at its Brunswick Plant. Hercules Incorporated let the name of toxaphene lapse into the public domain so that many products with similar properties are referred to as toxaphene. Other companies used slightly different manufacturing
GEC-22	Is the name of the pesticide in the Patent called polychloro camphene?	
GEC-23	Was polychloro camphene pesticide manufactured in Brunswick, Glynn County, Georgia from 1948 until 1980?	
GEC-24	Was the polychloro camphene produced at the Brunswick, Glynn County, Georgia Hercules Plant sold under many names and synonyms?	
GEC-25	The Polychloro camphene was reported to have been produced in many different formulations. Are the	

Identifier	Comment Summary	Response
	preceding names under which the Patent protected polychloro camphene pesticide was sold?	processes, leading to a chlorinated camphene mixture with degrees of total chlorination and distribution of specific congeners that are not the same as Hercules Incorporated's product. For instance, the toxaphene-like product commonly marketed under names like "Stroban(e)" had a slightly lowered degree of chlorination and used slightly different camphene or pinene feedstocks. Toxaphene has not been manufactured in the United States since 1982. – Source: A Toxicological Profile for Toxaphene, October 2014, ATSDR. Hercules stopped production of toxaphene at the Brunswick Plant in 1980 and EPA banned toxaphene in 1990. Any toxaphene found at the Terry Creek Site has potentially been exposed to environmental conditions for over 35 years and its chemical composition may have changed so that toxaphene encountered in the environment may not be identical to toxaphene as manufactured or sold prior to 1980. Therefore, when implementing the Focused Remedial Investigation at OU1, EPA evaluated the nature and extent of contamination as it currently exists within the Outfall Ditch.
GEC-26	Does the Hercules Patent, Number 2,565,471, describes any molecule of between 3 and 10 Chlorine moieties being the toxic ingredient of the invention?	Chlorine content is expressed as a percentage. There is no discussion within the patent which involves an empirical formula in the Hercules Patent Number 2,565,471.
GEC-27	Does the Hercules Patent, Number 2,565,471, very high killing power of the polychloro camphene, in extremely dilute solutions?	The patent claims, in part: "...Because of the very high killing power of the polychloro camphenes, extremely dilute solutions of these toxicants are effective."
GEC-28	Does the Hercules Patent, Number 2,565,471, describe polychloro camphene as toxicants?	Yes.
GEC-29	Does the Hercules Patent, Number 2,565,471, describe polychloro camphene as toxicants in the pesticide when chlorinated to between 3 and 10 chlorines per camphene?	See response to comment GEC-26 above.
GEC-30	Does the Hercules Patent, Number 2,565,471, specify any specific ratios of specific chemicals from the chlorination of camphene in the final product?	Hercules Patent Number 2,565,471 does not specify any specific ratios.
GEC-31	Does the Hercules Patent, Number 2,565,471, describe a chemical formula?	No. An empirical formula is not given in the patent. Polychlorinated camphene with varying ranges of chlorine content is stated.

Identifier	Comment Summary	Response
GEC-32	Can the Hercules Patent, Number 2,565,471, be describe more accurately as a recipe for the production of a polychlorinated camphene pesticide with a wide range of chemical components with 3 to 10 chlorine moieties?	The patent is for "Insecticidal compositions comprising chlorinated camphene".
GEC-33	Does the Hercules Patent, Number 2,565,471, describe a mixture of chemicals resulting in a chemically nonspecific product?	Yes. The patent describes a process which results in polychlorinated camphene having differing degrees of chlorination.
GEC-34	How many individual chemicals can be produced by the process described in the Hercules Patent, Number 2,565,471?	The patent does not state that information.
GEC-35	What is the number of chemicals compositions that can be obtained from the process described in the Hercules Patent, Number 2,565,471?	
GEC-36	Does the Hercules Patent, Number 2,565,471, claim killing power of polychloro camphene at extremely dilute solutions?	See response to comment GEC-27 above.
GEC-37	Does the EPA feel Hercules exaggerated the killing power of Hercules Patent, Number 2,565,471 with chlorine at 40% to 75%?	It is unknown if Hercules exaggerated the killing power of Hercules Patent Number 2,565,471.
GEC-38	Does the EPA agree Hercules Patent, Number 2,565,471, describes a pesticide manufacturing process to produce a pesticide formulation with a polychloro camphene between 40% and 75%?	The patent describes a generalized process to produce polychloro camphene with chlorine content ranging from 40 -75%, dependent on the time the synthetic process is allowed to react. It is not known if the process described in U.S. Patent # 2,565,471 was used for the commercial manufacture of toxaphene.
GEC-39	In the process of reaching the goal an average of 60% to 72% chlorine attached to camphene, were polychloro camphene with more than 72% and less than 60% produced?	No absolute values are given. The patent uses the terms 'should' and 'preferably'. The patent states: "The chlorinated camphenes in accordance with this invention should contain an amount of chlorine of about 40% to about 75%, preferably from about 60% to about 72%."
GEC-40	Does the goal of an average of 60% to 72% chlorine attached to camphene bracket polychloro camphene with between 6 and 9 chlorine per camphene?	The chlorine content for hexachlorocamphene ($C_{10}H_{10}Cl_6$) is 62% and nonachlorocamphene ($C_{10}H_7Cl_9$) is 72%, to two significant figures, expressed on a mass basis.
GEC-41	Does the EPA have a sample of the pesticide produced each year at the Hercules plant?	EPA does not possess any such samples.

Identifier	Comment Summary	Response
GEC-42	How many samples does the EPA have of the pesticide produced at the Brunswick, Glynn County, Georgia, Hercules Plant, and what is the year of manufacture of each?	
GEC-43	What was the variability between batches or production runs of the polychloro camphene pesticide at the Brunswick, Glynn County, Georgia, Hercules Plant?	See response to comment GEC-21 above.
GEC-44	Is the following definition of pesticide called toxaphene (the Patented Hercules pesticide called polychloro camphene) accurate?	
GEC-45	Does the definition of "Toxaphene" include a range of polychloro camphene with 5 to 12 chlorines per camphene?	
GEC-46	What does the word "mean" mean in the "Toxaphene" definition?	Mean is what most people commonly refer to as an average. The mean refers to the number you obtain when you sum up a given set of numbers and then divide this sum by the total number in the set. Mean is also referred to more correctly as arithmetic mean.
GEC-47	Does the word "mean" mean there are chemicals with less chlorine and more chlorine per camphene?	
GEC-48	Does formula weight of these compounds ranging from 308 to 551 grams/mole describe polychloro camphene with 5 to 12 chlorines per camphene?	Yes.
GEC-49	Does the described formula weight of these compounds ranging from 308 to 551 grams/mole describe polychloro camphene with 5 to 12 chlorines per camphene describe the definition of Toxaphene?	See response to comment GEC-21 above.
GEC-50	Does the definition or the Hercules Patent for polychloro camphene designate as specific chemical composition of the individual polychloro camphene chlorine weights in the pesticide?	
GEC-51	Is "Technical Toxaphene" any formulation of polychloro camphene with a chlorine weight of around 40% to 75% chlorine per camphene, and preferably around 60% to 72% by weight of chlorine, and the toxic ingredients of the invention are polychloro camphene with 3 to 11 chlorines?	
Hercules Manufacturing		

Identifier	Comment Summary	Response
GEC-52	Does the EPA agree the Brunswick, Glynn County, Georgia Hercules Plant released the wastewater from the manufacturing of polychloro camphene to the Outfall Ditch?	Yes.
GEC-53	Has the EPA compared the wastewater with the polychloro camphene product to determine of the waste stream had the same chemical composition as the pesticide product?	EPA does not have samples of the company's manufacturing wastewater from 1980 or prior. Toxaphene production ceased in 1980.
GEC-54	How many samples does the EPA have of the pesticide manufacturing wastewater and the corresponding final polychloro camphene product?	
GEC-55	From how many batches of production runs were the samples obtained?	
GEC-56	During the 1948 to 1980 production run of polychloro camphene, how many years' worth of wastewater characterization does the EPA have for the Terry Creek Dredge Spoil Areas Hercules Outfall Site, and how often during the year was the data collected?	
GEC-57	Does the EPA have the Hercules quality control data from the production of polychloro camphene?	EPA does not have quality control data from the production of polychloro champhene at the Brunswick Plant. Hercules stopped production of toxaphene at its Brunswick Plant in 1980 and EPA banned toxaphene in 1990. Any toxaphene found at the Terry Creek Site has potentially been exposed to environmental conditions for over 35 years and its chemical composition may have changed so that toxaphene encountered in the environment may not be identical to toxaphene as manufactured or sold prior to 1980. Therefore, when implementing the Focused Remedial Investigation at OU1, EPA evaluated the nature and extent of contamination as it currently exists in the Outfall Ditch.
GEC-58	Has the EPA asked for the Hercules quality control data from the production of polychloro camphene? If not, why not?	
GEC-59	Would the Hercules quality control data from the production of polychloro camphene be helpful in understanding the composition of the pesticide manufacturing wastes discharged in to Terry and Dupree Creeks?	
GEC-60	What is the variability in the chemical composition of the wastewater stream from the Hercules Plant from 1948 to 1980?	See response to comment GEC-21 above.
GEC-61	Does the goal of an average of 60% to 72% chlorine result in a production target of 6 to 9 chlorine per camphene specified in Hercules Patent, Number 2,565,471?	

Identifier	Comment Summary	Response
GEC-62	Do the polychloro camphene manufacturing wastes in Terry and Dupree Creeks predominantly contain the production target of 60% to 72% chlorine?	
GEC-63	Will the EPA describe how the polychloro camphene manufacturing wastes entered the wastewater stream in future Terry Creek Dredge Spoil Areas Hercules Outfall Site documents?	Section 1.3 entitled Site Background contained in the Focused OU1 RI/FS dated December 2014 provides a description of the Site operating history. This Site history may be repeated in future site documents or modified if any new Site operating history is obtained.
GEC-64	Do the different polychloro camphene chlorine weights result in different solubility for each in water?	The assumption that molecules with fewer chlorine moieties would be more soluble in water is reasonable.
GEC-65	If so, would the less chlorinated polychloro camphene (with less chlorine moieties) be more soluble in water? If not, why not?	
GEC-66	Can these different polychloro camphene solubility's be used to predict the likely wastewater composition from the Hercules Plan during pesticide production?	See response to comment GEC-21 above.
GEC-67	Would information about the polychloro camphene manufacturing wastes provide information important in measuring any breakdown in the environment, and determining if the polychloro camphene at the Terry Creek Outfall site is consistent with what was discharged during pesticide production?	
GEC-171	Has EPA Region 4 considered reading the Hercules Patent for polychloro camphene so they can understand and answer the question, "What is Toxaphene"?	
GEC-179	Does the Hercules patent for their polychloro camphene pesticide describe what toxaphene is? If not, what is the difference between the pesticide with polychloro camphene patented by Hercules and what EPA Region 4 refers to as toxaphene?	
Weathered/Degraded Toxaphene		
GEC-68	Did Reimold (1974) and Maruya (1999) essentially describe the same chemical composition of polychloro camphene in the sediments from Terry and Dupree Creeks?	The Office of Inspector General report "Appropriate Testing and Timely Reporting are Needed at the Hercules 009 Landfill Superfund Site, Brunswick, GA" report 2005-P-00022 dated September 26,

Identifier	Comment Summary	Response
GEC-69	If the observed chemical composition of polychloro camphene and Terry and Dupree Creek are remaining the same for an extended period of time, what evidence does the EPA have to support the formation of subcategories called degraded toxaphene and whether toxaphene?	2005, states the following regarding toxaphene and degradation of toxaphene: "Hercules Incorporated began producing toxaphene, an agricultural pesticide, in 1948 and continued production through 1980. Toxaphene was one of the most heavily used insecticides in the United States until 1982, when EPA cancelled the registrations for most uses; all uses were banned in 1990. Unlike most organic environmental pollutants, toxaphene is not a single organic compound. As manufactured, the original toxaphene pesticide is a mixture of more than 200 closely related chlorinated organic compounds. This original toxaphene pesticide mixture is commonly known as "technical" toxaphene. Technical toxaphene consists mainly of polychlorinated bornanes with between six to nine chlorines attached. The term, congener, is used to refer to a single, structurely-unique constituent of the mixture. In other words, at least 200 individual toxaphene congeners make up the original toxaphene pesticide mixture. Individual congeners are often given their own names, such as Hx-Sed, Hp-Sed, p26, or p50. In the Office of Inspector General's (OIG's) review of the available scientific literature on the environmental degradation of the original toxaphene mixture (a.k.a. technical toxaphene), we found numerous references to biotic and abiotic degradation, and to aerobic and anaerobic degradation. The aerobic degradation of technical toxaphene occurs at the slowest rate and has an aerobic half-life report of about 10-14 years (Fingerling 1996). On the other hand, anaerobic degradation of technical toxaphene occurs at a much faster rate and has an anaerobic half-life of about 6 weeks. Therefore, since the use of toxaphene was severely restricted in 1982 (i.e., about 23 years ago), any technical toxaphene left in the environment from 1982 or before has theoretically undergone two or more half-lives. Thus, at most, only 25 percent of the original starting material should theoretically still be present. By contrast, the only reported condition
GEC-70	What specific chemicals are present in EPA's definition of degraded toxaphene?	
GEC-71	What is the metric being used by the EPA to quantify the rate of degradation in "degraded toxaphene"?	
GEC-72	What are the differences in the chemical composition of degraded toxaphene and weathered toxaphene?	
GEC-73	What are the differences in the chemical composition of degraded toxaphene and weathered toxaphene?	
GEC-74	Are the terms degraded toxaphene and weathered toxaphene being used to describe the polychloro camphene chemicals that bioaccumulate? If so, what are the specific definitions of degraded toxaphene and weathered oxaphene bioaccumulation by species?	
GEC-75	What specific chemicals are present in EPA's definition of weathered toxaphene?	
GEC-76	What specific polychloro camphene must be present to meet the EPA's definition of weather toxaphene?	
GEC-77	Is weather toxaphene the same as the polychloro camphene that bioaccumulate in biota? If so, what are the different polychloro camphene compositions of "weathered toxaphene" by species?	
GEC-78	What is the metric being used by the EPA to quantify the rate of degradation (or "weathering") in "weathered toxaphene"?	
GEC-79	Do all of the polychloro camphene chemicals being described in the sediments fall within the range of patent protected toxic ingredients of the patented Hercules invention for a polychloro camphene pesticide?	

Identifier	Comment Summary	Response
GEC-80	If not, what are the other chemicals present, and have they been identified and quantified?	under which toxaphene does not degrade is autoclaved soil (i.e., all microbes in the soil have been killed off) (Fingerling 1996). Therefore, technical toxaphene is expected to degrade in the environment and its degradation is mediated primarily by microbes living in the soil." EPA may refer to degraded toxaphene, weathered toxaphene, or breakdown products interchangeably. There is no single absolute definition of degraded toxaphene. The terms weathered and degraded are used interchangeably to refer to toxaphene whose chromatographic pattern no longer matches analytical laboratory standards due to alterations by environmental processes. Under certain conditions, creation of congeners not found in virgin toxaphene is possible. The terms degraded and weathering are being used in this context to describe an altered toxaphene chromatographic profile in the Terry Creek environs, but geologists routinely use the terms to describe geologic events and how, as an example, rocks are broken down to dissolved salts. The terms weathering and degradation are not exclusive to toxaphene but merely allow the verbal exchange of information about the state of something, relative to its initial properties. See response to comment 100Mi-1.4 above for more information concerning ongoing toxicological studies relating to toxaphene and its breakdown products. An interim action has been selected to be implemented while toxicity information and cleanup numbers for weathered toxaphene are being developed. A final remedial decision will be made at a later date. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-81	Does the EPA agree that the synonyms toxaphene, degraded toxaphene, and weathered toxaphene all describe chemicals within the scope of the Hercules Patent for polychloro camphene pesticide? If not, what chemicals are being excluded? Have any of the chemicals being excluded been documented to NOT have been manufactured at the Hercules Plant?	
GEC-82	If the EPA disagrees, what are the polychloro camphene chemicals in the Outfall Ditch that do not fall under the definition presented in the Hercules Patent and what percent of the total volume do they represent?	
GEC-224	Are there any ongoing "Weathered Toxaphene" toxicological studies by the EPA or Hercules, and if not, why not?	
GEC-225	If there are no other toxicological studies planned or in progress, is " ....toxicity reference values for these weathered toxaphene congeners to environmental receptors have not been developed," an excuse to hold up remedial activities?	
GEC-226	What is the definition of "Weathered Toxaphene" by total chlorine weight, number of chlorine per camphene, and the specific chemical composition?	
GEC-298	What is the definition of the term "weathered toxaphene" referenced in this document in terms of the polychloro camphene by chlorine weight, number of chlorine per camphene, and mole weight?	
GEC-325	Was "weathered toxaphene" defined by the Weinberg Group as P26, P50, P62, HxSed, HpSed, and mixtures to model weathered toxaphene?	
GEC-326	What were the "mixtures to model weathered toxaphene" referenced in the Weinberg Group Power Point?	

Identifier	Comment Summary	Response
GEC-327	What is the definition of "weathered toxaphene" presented by the Weinberg Group?	The Site file does contain some presentations submitted by the Weinberg group, a Hercules consultant at the time of submittal, and Site documents may refer to reports/presentations to provide historical context. However, EPA has not received any final products from the Weinberg group, and therefore has not approved any findings submitted in the initial documents.
GEC-328	Did EPA Region 4 adopt the "weathered toxaphene" definition presented by the Weinberg Group?	
GEC-329	If EPA Region 4 did not adopt the definition of "weathered toxaphene" presented by the Weinberg Group, what is EPA Region 4's definition of "weathered toxaphene" by chemical composition, chlorine weight of the polychloro camphene, and any other metrics to define what comprises "weathered toxaphene"?	
GEC-330	Does all the "weathered toxaphene" fall under the Hercules patent for polychloro camphene, and if not, which chemicals do not fall under the patent but are considered "weathered toxaphene"?	
Lab Standards		
GEC-83	Does EPA agree that the broad range of specific chemical combinations found in the technical toxaphene analytical standards are a good indicator of the breath and scope of chemical combinations that can be reasonably expected from the manufacturing process used by Hercules to produce polychloro camphene?	Yes. The residues found at OU1 are indicative of toxaphene contamination. Congener ratios will change over time altering the chromatographic profile of the residue and therefore the specific chemical combinations.
GEC-84	Does the wide breadth and scope of technical toxaphene analytical standards contained the chemicals described in the Hercules patent for polychloro camphene?	
GEC-85	Has the EPA looked at technical toxaphene standards to determine if a specific standard closely matches the polychloro camphene chemical combinations being observed at the Terry Creek Site?	It is the policy at the Region 4 laboratory that when toxaphene residues are determined to be present, the chromatographic profile is compared against different analytical technical toxaphene standards. The analytical standard having the profile most closely matching the pattern of the incurred residue is then used for quantitation. Terry Creek samples would be treated the same as any other sample.
GEC-86	Does the EPA have descriptions for the chemical composition and variability of polychloro camphene manufactured from 1948 to 1970?	See response to comment GEC-21 above.

Identifier	Comment Summary	Response
GEC-87	Do the surface sediments and resident fish (Fundulus sp.) from the Terry/Dupree Creek tidal marsh system contain polychlorinated camphene that are found in technical toxaphene?	Toxaphene has been detected in sediments and fish from Terry and Dupree Creeks.
GEC-88	Do the prominent polychloro camphene include hexa-, hepta-, octa-chlorinated congeners that, in general, eluted in the early part of the chromatographic region where PCCs in unmodified technical toxaphene elute?	Prominent PCCs which include hexa-, hepta- and octa-chlorinated congeners have been shown to elute in the early part of the chromatographic region where PCCs in unmodified technical toxaphene elute. However, congeners having this description do not exclusively elute in the early region of the chromatogram. Congener ratios will vary with the environmental process that the residue has undergone.
GEC-89	Was the problem encountered caused by use of an analytical toxaphene standard that did not match the specific chemical profile encountered at the Terry Creek Site?	That is unknown but unlikely, however, the below statement (in the referenced AR Document ID 10784168) by Dr. Maruya in a letter dated July 31, 1997, to Leo Francendese would lead one to conclude that the greater challenge is identification and accurate quantitation of the weathered/degraded toxaphene residue, which is made more difficult by interfering co-extracted materials. In this particular case PCB (Aroclor 1268) contributes to uncertainty, in addition to that originating from environmental degradation processes. Dr. Maruya, from the above referenced document: "...[I]n the environment, the difficulty encountered in comparing residues to source material and/or pure, unmodified standards is exacerbated by selective PCB/PCC transport, transformation, uptake and accumulation processes... Thus, PCB/PCC profiles in contaminated aquatic biota are quite complex...."
GEC-90	Do other analytical toxaphene standards more closely match the chemical profile of polychloro camphene and polychloro camphene manufacturing wastes?	Analytical standards of technical toxaphene are purchased from commercial sources. Within the multiple commercially available standards, two different chromatographic profiles can be discerned. The standard which most closely matches the weathered/degraded residue would be utilized. See response to comment GEC-85 above.
GEC-91	Were the manufacturing processes for the most part nonspecific, these mixtures contained many different congeners, none of which accounts for more than 15% of	Yes, according to the referenced AR Document ID 10784168 a letter from Dr. Maruya dated July 31, 1997, which contains the statement "...manufacturing processes were for the most part nonspecific, these

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	the total by weight, and these mixtures contained many different congeners?	mixtures contained many different congeners, none of which accounts for more than 15% of the total by weight".
GEC-92	What are the range of polychloro camphene produced from manufacturing processes that were for the most part nonspecific?	Unknown, however, one can reasonably expect the range to be within that typically associated with toxaphene, containing congeners with 6 – 10 chlorine atoms. It would be within reason to expect that Hercules tried to control their industrial process to match the desired end-product as closely as possible, thereby maximizing profitability.
GEC-93	Are the earlier studies discussed above from the Terry Creek Site? If not, does it indicate a different congener profile was being encountered at the Terry Creek Site?	It is unclear which studies this comment refers to.
GEC-94	What are the ramifications to the Terry Creek Site from selective polychloro camphene transport, transformation, uptake and accumulation processes in seafood, benthic biota, and plants?	The exact ramifications are unknown. Toxaphene contamination has been detected in sediment, soil, and fish at the Terry Creek Site.
GEC-95	Are there toxaphene standards that more closely match the congener profile at the Terry Creek Site? If so, why are they not used?	See response to comments GEC-85 and GEC-90 above.
GEC-96	Does the toxaphene standard used influence the quantification or identification of earlier eluding polychloro camphene?	That is possible, however, any differences are probably negligible when considered relative to the measurement uncertainty involving the entire process, from sampling to analytical determination. That being said, it is the policy of the EPA Region 4 laboratory to utilize an analytical standard having a profile which most closely matches the pattern of the incurred weathered/degraded residue. Doing so provides the best estimation of the residue concentration. See response to comments GEC-85 and GEC-90 above.
GEC-97	What is the name of the company of companies providing the "technical toxaphene" analytical standard used at the Terry Creek Site?	Hercules contracted with TestAmerica to conduct the analysis of samples from OU1.
Economic Impacts		
GEC-105	What analysis did the EPA perform to quantify the economic impacts to the community (Glynn County and the City of Brunswick) from leaving the contaminated sediments in place?	Each OU1 remedial alternative was evaluated by the EPA according to the nine criteria for evaluating remedial alternatives as explained in the NCP in 40 C.F.R. § 300.430(e)(9)(iii)(G), including the following remedial alternative costs: (1) capital costs, (2) annual operation and

<table>
<tr><th>Identifier</th><th>Comment Summary</th><th>Response</th></tr>
<tr><td>GEC-106</td><td>What factors did the EPA consider as part of the economic analysis?</td><td rowspan="5">maintenance (O&M) costs; and (3) net present value of capital and O&M costs. Tables of such costs are listed in the OU1 Feasibility Study and discussed in the Interim Record of Decision. An economic analysis to quantify the economic impacts to Glynn County and the City of Brunswick community, as described in the GEC-105 comment, is not required as part of the CERCLA process and was not conducted.

An interim remedy has been selected for OU1 at this time. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.

Cost estimates for each of the remedial alternatives were developed using A Guide to Developing and Documenting Cost Estimates During the Feasibility Study, July 2000, OSWER 9355.0-75.

The OU1 interim remedial action may improve value to the property comprising OU1 and surrounding communities that have been negatively affected by contamination. Upon completion of the remedial action at OU1, Hercules, the current owner of the property comprising OU1, may decide, along with stakeholders, that portions of this property may be reused. Depending on the type and nature of the reuse, it could help revitalize the local economy with jobs and tax revenues. For additional information on EPA's policy relating to reuse and redevelopment of Superfund sites see the following website: https://www.epa.gov/superfund-redevelopment-initiative.

See response to comment CB-3 above for further information relating to possible reuse of OU1.</td></tr>
<tr><td>GEC-107</td><td>Where can the economic analysis of the impacts to the community from the Proposed Plan remedial options be found?</td></tr>
<tr><td>GEC-108</td><td>Were the benefits to the community and Hercules weighted, and if so, where can this analysis of economic benefits to both parties be found?</td></tr>
<tr><td>GEC-109</td><td>Did the EPA consider the economic ramifications of the proposed remedy on the community, or only Hercules/Ashland?</td></tr>
<tr><td>GEC-110</td><td>On what dates and locations did the economic analysis (concerning either or the City of Brunswick and Glynn County, and Hercules Incorporated/Ashland) take place and where can the results of these analysis be found?</td></tr>
<tr><td>GEC-233</td><td>What inputs from the City of Brunswick Master Plan, Community Development, or the Commission did the EPA factor into the Proposed Plan, and how did these shape the decision-making of the EPA?</td><td>The EPA reviewed the City of Brunswick's 2008 Community Agenda/Comprehensive Plan which describes its 2030 Vision. Additionally, EPA and EPD met with the City of Brunswick on December 8, 2015, to discuss the City's potential reuse plans of the Terry Creek Site and the surrounding area. EPA will continue to work with the City of Brunswick as reuse plans evolve and after the City</td></tr>
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		has an opportunity to discuss its potential reuse plans of the property comprising OU1 with Hercules, the current owner of that parcel of property. See response to comment CB-3 above.
GEC-235	Why is the EPA considering a Proposed Plan that will essentially forever limit the economic potential of the Brunswick waterfront?	See response to comments GEC-105 and GEC-233 above. Generally, even when Institutional Controls, including land use restrictions are implemented as part of remedial action, the site may still be reused as long as the reuse does not negatively impact the protectiveness of the remedy. The current owner of the OU1 parcel of property is Hercules and as the owner of that property, it may decide to impose additional land use restrictions on its property than required by the OU1 Interim ROD.
GEC-248	Did the EPA contact the City of Brunswick concerning Hercules proposed land use controls which would be implemented to prevent manmade activities from occurring, and the implication of such a decision upon future planning and development, and economic ramifications? If so, on what dates this these communications take place and with whom?	
Other Regions Experience with Toxaphene Cleanups		
GEC-177	Have other EPA Regions produced final cleanup goals for Sites with Toxaphene? If so, what were the Action Levels for soil, sediment, and water?	Superfund sites are handled on a case by case basis considering site specific factors including the type and location of the contaminant(s). Remedial action objectives, cleanup goals, and technologies may vary from site to site. For example, cleanup of residential soils would be handled differently than a cleanup at an industrial facility. For OU1 at the Terry Creek Site, an interim remedy has been selected to eliminate the pathway of exposure to human and ecological receptors from contaminated sediments in the Outfall Ditch. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions. Within EPA Region 4, there are several sites including, but not limited to, Hercules 009 Landfill located in Brunswick, Georgia, T.H. Agriculture and Nutrition located in Albany, Georgia, and Woolfolk Chemical Works located in Fort Valley, Georgia where toxaphene
GEC-178	Has EPA Region 4 gathered any data from the other EPA Regions that have produced successful Remedial Action plans for toxaphene contaminated sites? If so, which ones are being considered as guidance for the Terry Creek Site?	
GEC-227	Have other cleanups of toxaphene or polychloro camphene sites been completed by the EPA in the United States, and if so, where are they located and how did they "define goals for success"?	
GEC-228	What technologies have been used to cleanup other EPA toxaphene or polychloro camphene contaminated sites?	

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		has been identified as a contaminant of concern. The T.H. Agriculture and Nutrition site had soils and groundwater containing toxaphene contamination. Soils were removed and taken to a landfill. A pump and treat system was installed to treat groundwater. Toxaphene was not the primary driver for cleanup at T.H. Agriculture. The cleanup goals established in the 1996 ROD for that site were 29 parts per million for surface soil and 3 parts per billion for groundwater. At the Woolfolk Chemical site, contaminated soils were removed or contained on site as part of the remedial action. Soils which contained toxaphene at concentrations higher than a site specific cleanup number of 34.5 parts per million (ppm) established in the 1995 ROD were removed at the site. However, toxaphene was collocated with soils contaminated with arsenic, which was the primary COC at the site. To date, a record of decision with cleanup numbers for weathered toxaphene has not been approved by any EPA region. EPA is in the process of developing a toxicity value for weathered toxaphene. Terry Creek is a unique and complex site due to its coastal location and being tidally influenced which may limit options of remedial alternatives such as removal, in-situ treatment, bioremediation, and other conventional treatment methods as being viable to fully protect human health and the environment. Additionally, a removal action was conducted in 1999/2000 that removed approximately 35,000 cubic yards of contaminated sediment via hot-spot dredging in Terry and Dupree Creeks as well as the Outfall Ditch. See response to comment CB-2 above.
Alternatives/Options		
GEC-9	Why did the EPA add excavation of the sediments as a proposed remedial option (Alternative 2) after the analytical work was done for the Remedial Investigation?	Per the NCP in 40 C.F.R. § 300.430(e), remedial alternatives are developed and evaluated in a feasibility study which follows the remedial investigation. At OU1, a combined RI/FS document was developed and before final approval of the RI/FS, the EPA required

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		Hercules to include a sediment removal alternative for evaluation in the Feasibility Study. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-104	Does the EPA agree removal of the contaminated sediments will remove the need for long-term monitoring?	During the dredging removal action conducted in 1999/2000, approximately 35,000 cubic yards of contaminated sediment were removed from the Outfall Ditch, Dupree Creek, and Terry Creek, including of that amount approximately 16,800 cubic yards from the Outfall Ditch. This represented approximately 80%-90% of the contaminant mass for technical toxaphene from the Outfall Ditch. While this removal was highly effective, residual contaminated sediment remained. Long-term monitoring may still be required if Alternative 2 were selected as a final remedy at OU1 since dredging may not fully remove all soil contamination.
GEC-138	Why does the Proposed Plan not include the combination of alternatives packaged into a comprehensive remedial alternatives that achieve RAOs, satisfy ARARs, and satisfy the nine criteria of the National Contingency Plan (NCP)?	The Proposed Plan includes multiple remedial alternatives which include a combination of alternative approaches (including Alternatives 3 through 7). The interim remedy selected is a combination of excavation and offsite disposal of approximately 1,200 cubic yards of sediment, re-routing the stormwater discharge flowing from the former Hercules plant into a newly constructed concrete-lined conveyance channel, removal of the weir in the Outfall Ditch, placement of a layer of geotextile fabric over the existing sediment within the Outfall Ditch, backfilling the Outfall Ditch with compacted soil over the geotextile fabric, and armoring the backfill slope into Dupree Creek with riprap, which achieves RAO's, satisfies ARARs, and satisfies the nine criteria specified in the NCP for remedy selection. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will

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		reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-139	What was the decision-making process the EPA used to exclude implementation of Alternative 5 followed by Alternative 2 in the Proposed Plan?	See response to comment RA-5 above.
GEC-140	Were the only remedies considered by the EPA those that leave contaminated sediments in place?	No, Alternatives 2, 3, 4, 4A, 5, 5A, 6, 6A, and 7 all include removal of sediment ranging from approximately 1,200 cubic yards up to 36,000 cubic yards. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-141	Did the EPA have an agreement with Hercules/Ashland to produce a Remedial Investigation and Feasibility Study that considered only remedies that left a significant amount of the sediments in place?	On September 30, 1999, the EPA entered into an Administrative Order by Consent with Hercules wherein Hercules agreed to conduct a Remedial Investigation and Feasibility Study. As discussed in response to comment GEC-9, a combined RI/FS document was developed by Hercules for OU1 and before final approval, the EPA required Hercules to include a sediment removal alternative for evaluation in the FS. Alternative 2 includes removal of approximately 36,000 cubic yards of sediment by dredging the existing Outfall Ditch. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.

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GEC-142	Was Alternative 2 added to the remedies to be included in the Proposed Plan late in the process?	Alternative 2 was added to the revised RI/FS which was submitted in December 2014 and serves as the basis for the Proposed Plan. Alternative 2 is a component of the EPA approved RI/FS dated December 2014. The June 2015 Proposed Plan included all alternatives evaluated in the December 2014 Feasibility Study, including Alternative 2.
GEC-143	On what date was Alternative 2, removal of the sediments, added to the Proposed Plan?	
GEC-144	Is the data presented in the Remedial Investigation sufficient to implement Alternative 2?	As discussed in response to comment 100Mi-1.4, scientific uncertainties exist in developing a cleanup number at OU1 for weathered toxaphene. Therefore, the EPA selected as an interim remedy, Alternative 4 instead of Alternative 2, because Alternative 4 allows a near term interim remedy to be implemented with significant risk reduction without having to resolve the scientific issues (e.g., analytical method and toxicity) associated with the development of a numeric cleanup level for weathered toxaphene. Several possible methods are available however, it is assumed under this alternative that a hydraulic dredging process would be utilized. Core samples collected in 2012 indicate that elevated toxaphene concentrations remain within the sediment both in shallow sediment and at depth. The limits and depth of dredging associated with Alternative 2 and depicted on Figure 8-1 of the December 2014 Focused RI/FS for OU1 are based on the results of 17 core samples analyzed for the presence of toxaphene within the sediment. Dredging depths shown represent depth to non-detectable limits, or to the full depth of the investigation plus 2 feet (where toxaphene remained detectable, at the deepest limit of investigation). As shown on Figure 8-1, the depth of channel dredging under this alternative ranges from approximately 8.0 to 11.0 feet below mean sea level and would remove approximately 36,000 cubic yards of sediment within the Outfall Ditch. However, at this time, there is uncertainty if such removal action would remove all weathered toxaphene contamination within the Outfall Ditch (see response to Comment 100Mi-1.4 above). Alternative 4 should eliminate the pathway of exposure to

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		human and ecological receptors within OU1 and therefore be protective of human health and the environment. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. and a final decision will be made at a later date. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-150	Why has the EPA presented a Proposed Plan when the most basic information, which the EPA has already identified as being needed for a viable remedial investigation, has not been produced?	The EPA is uncertain exactly what "most basic information" is referenced in this comment as "being needed for a viable remedial investigation". See the OU1 Focused RI/FS contained in the administrative record and sent directly to GEC for the data utilized in developing remedial alternatives and responses to comments CB-2, 100Mi-1.4, and ESC-6.5 above for discussions concerning the information utilized by the EPA in its interim remedy selection. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected and a final decision will be made at a later date. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-217	When did Alternative 3 become Alternative 4?	A draft Focused OU1 RI/FS document was submitted to EPA by Hercules in February 2014. EPA provided Hercules comments on such draft, including a requirement for inclusion of an alternative to remove sediment within the Outfall Ditch. Thereafter, Hercules submitted a revised OU1 RI/FS to the EPA in December 2014 containing a sediment removal alternative resulting in the renumbering of the alternatives.
GEC-218	Did Alternative 3 become Alternative 4 late in the process due to the addition of a sediment removal option, Alternative 2?	

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GEC-229	Is there any documentation of the Hercules and EPA agreement to abandon a numeric risk-based cleanup goal?	The Site Management Plan produced in 2009 and included in the Administrative Record stated this: "The remedial action objective defined for the unit can be a narrative, performance based goal (i.e. protectiveness achieved via pathway elimination) versus numerical risk-based concentrations." See responses to comments CB-2 and 100Mi-1.4 above for additional information about the EPA's decision to select a performance based goal instead of a numeric cleanup number. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-230	Were the Remedial Investigation Work Plans sufficient to evaluate pathway elimination via removal of the contamination from the Outfall Ditch?	
GEC-231	Was the only option the Remedial Investigation Work Plans would fully support the covering of wastes in place and limited sediment removal?	
GEC-234	If removal of the contaminated sediments resulted in the desired substantial decrease in fish tissue concentrations following the removal action, why is the EPA considering an unproven approach with the potential to fail?	
GEC-236	On what date was the dredge option to remove sediments (Alternative 2) from the Outfall Ditch added to the Feasibility Study?	See response to comment GEC-217 above for information about when a sediment removal alternative was added to the OU1 Feasibility Study.
GEC-237	Was the dredge option to remove sediments from the Outfall Ditch added to the Feasibility Study to make it appear more than limited sediment removal and covering up the waste was considered?	No. It was included to provide a broad range of alternatives.
GEC-238	Does the Administrative Record support the conclusion that the only remedial action considered was limited sediment removal and covering of the remaining wastes?	No. The OU1 Feasibility Study, which is part of the Administrative Record, demonstrates that a range of options were considered. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 and 100Mi-1.4 above for additional information regarding the selection of an interim remedy and the process for a final remedy decision at a later date.
GEC-239	Is the Proposed Plan a summary of the option considered to implement the pre-determined EPA/Hercules Agreement?	
GEC-240	Why is the human health risk assessment not discussed?	The human health risk assessment is summarized in the Proposed Plan and Section 7 of the December 2014 OU1 Focused RI/FS.

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GEC-273	Why were the In-Situ options not presented in the RI/FS?	See response to comment ESC-3.2 above for information relating to in-situ options.
GEC-274	Did EPA Region 4 repeatedly tell Hercules to include the In-Situ option for consideration and evaluation in the RI/FS?	
GEC-275	Was there an agreement between the EPA and Hercules after these comments to eliminate In-Situ as an option?	
GEC-276	Were in-situ options presented in the Outfall Ditch Proposed Plan? If Not, why not?	
GEC-219	Was the Outfall Remedial Investigation Work Plan sampling and analysis plan designed to support a sediment removal option? If not, why not?	See response to comments GEC-1, CB-2 and 100Mi-1.4 above.
GEC-220	If the Outfall Ditch Remedial Investigation Work Plan sampling and analysis plan was designed to support a sediment removal option, why is the vertical extent of contamination not defined in the Outfall channel?	
GEC-245	Does the EPA agree the Hercules response is "unresponsive" and does not address the problem being identified by the EPA, which is: "Screening of in-situ technologies such as in-situ solidification/stabilization or in-situ chemical reduction still is not included as requested by EPA in previous comments on the RI/FS Work Plan and the Remedial Alternative Screening Technical Memorandum"?	See response to comment ESC-3.2 above for information relating to screening of in-situ options.
GEC-246	Why are the in-situ technologies such as in-situ solidification/ stabilization or in-situ chemical reduction still is not included in the Proposed Plan for the Outfall Ditch?	
GEC-287	Over what time period are the human health risk reductions expected to be obtained?	The selected interim remedy isolates residual contaminants, thereby eliminating potential exposure pathways for human receptors. As soon as construction of the selected interim remedial action is finished, the risk reductions are expected to be obtained.

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		An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
Weinberg and Simon		
GEC-8	Why does the EPA interject studies and reports from the now discredited Weinberg group and the discredited journal, Regulatory Toxicology and Pharmacology?	It is unclear which studies the commenter is referring to specifically. The site file does contain some presentations submitted by the Weinberg group, a Hercules consultant at the time of submittal, and documents may refer to reports/presentations to provide historical context. However, EPA has not received any final products from the Weinberg group, and therefore has not approved any findings submitted in the initial documents.
GEC-11	Why has the EPA interjected arguments developed by the Weinberg Group for the continued delay of the investigation and cleanup of the remaining operable units at the site, and was the toxaphene toxicological work undertaken by the Weinberg Group in 2006-7 ever competed? If not, why not?	
GEC-195	Was the Weinberg Group hired by Hercules around August 2007 to produce the toxicological work?	It is EPA's understanding that Hercules contracted with the Weinberg Group to conduct toxicological studies relating to toxaphene. EPA has not received, or approved, any completed studies from the Weinberg Group on behalf of Hercules.
GEC-196	Was the August 23, 2008 email between David Clay, EPA Region 4; and Greg Luetscher, EPA Region 4, about the Weinberg Group and state that the work could take 2-4 years?	EPA records contain an email in the Terry Creek file dated August 23, 2007, (not 2008) which summarizes a presentation from the Weinberg group and states that toxicology work could take 2-4 years. However, EPA has not received, or approved, any completed studies from the Weinberg Group on behalf of Hercules.
GEC-197	What was the final product produced by the Weinberg Group and when was it received by the EPA?	
GEC-198	Why do the EPA and Hercules still contend this work must be completed before doing more work at the Terry Creek Site?	See response to comment 100Mi-1.4 above for additional information relating to the development of toxicity information and cleanup numbers associated with weathered toxaphene. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will
GEC-199	Does either Hercules or the EPA currently have toxicology work underway concerning polychloro camphene (also known as Toxaphene)?	

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GEC-200	If not, why is the toxicology work underway concerning polychlorinated camphene (also known as Toxaphene) not being done or being delayed?	reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-201	Is delay of work at the Terry Creek the reason the toxicology work is not underway concerning polychlorinated camphene (also known as Toxaphene)? If this is not the reason, what is delaying the remedial activities at the Terry Creek Site?	
GEC-221	Did Hercules hire the Weinberg Group in 2007 to conduct a toxicological study? (Source: EPA Briefing Summary, August 20, 2007)	See response to comment GEC-195 above.
GEC-222	Was the toxicological study by the Weinberg Group expected to be complete in 3-4 years?	
GEC-223	Was the study completed, and if not, why not?	
GEC-271	At what point in time did the Weinberg Group become involved in the Terry Creek Site?	
GEC-272	Did the Weinberg Group help formulate the arguments being put forth by the EPA and Hercules in the Proposed Plan for the Terry Creek Site?	
GEC-300	Does Simon and Manning (2006) base their speculation on polychloro camphene manufacturing wastes?	An article was published in the *Regulatory Toxicology and Pharmacology*, Volume 44 (2006), written by Ted Simon and Randall Manning entitled "Development of a reference dose for the persistent congeners of weathered toxaphene based on in vivo effects related to tumor promotion". The premise upon which their findings are based are included within the before mentioned article which is contained in the administrative record. Simon and Manning concluded in the article that current human exposure to toxaphene is to weathered toxaphene, not technical toxaphene, and the continued use of the more stringent toxicity assessment for technical toxaphene will result in inaccurate risk/hazard estimates and possibly unnecessary and overly costly cleanups. Simon and Manning stated therein that technical toxaphene consists of a mixture of up to 800 different chemicals, known as congers and technical toxaphene weathers in the environment by both biotic and abiotic processes. They found that
GEC-301	Were the MATT, 2000, fish dosed with polychloro camphene manufacturing wastes?	
GEC-302	What is the relevance of Simon and Manning (2006) to the ecological risk assessments?	

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		the human body burden of toxaphene consist of only five persistent congeners that are not metabolized and three of those occur in considerably greater amounts than the others. Because of the rapid metabolism and excretion of the non-persistent congeners, the persistent congeners that make up the human body burden most likely play a role in eliciting any potential adverse effects. They further discussed in the article that EPA's toxicity assessment for technical toxaphene is based on the occurrence of liver cancer in rodents, and considerable doubt exists whether that assessment is applicable to weathered toxaphene. Using experimental results from European Union scientists (the results therefrom are cited in comment GEC-301 as "the MATT, 2000"), a reference dose was developed for weathered toxaphene by Simon and Manning based on the three most persistent congeners that comprise the human body burden. The critical effect chosen was tumor promotion. To apply the reference dose to a particular weathered toxaphene mixture, information will be needed regarding the percentage of the congeners in the mixture. Manning and Simon describe in the article the description of the study providing the critical effect and the preparation of the weathered toxaphene mixture. They state that weathered toxaphene was prepared by dosing codfish with 30 ppm technical toxaphene via feed pellets for two months. Cod liver extracts were used as the source of weathered toxaphene. At the conclusion of the feeding period, a total of 1880 mg of toxaphene residue was obtained from the pooled cod livers. Analysis of the cod liver extracts revealed a mixture of many toxaphene congeners, including p-26, p-50, and p-62. As stated in response to comment to 100Mi-1.4 above, the EPA selected an interim remedy at OU1 that eliminates the pathway of exposure to human and ecological receptors instead of a risk-based cleanup-level.

Identifier	Comment Summary	Response
		An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-303	Does Ted Simon list the Weinberg Group as one of his clients?	EPA is not privy to this information.
GEC-304	Was Simon and Manning (2006) written while Ted Simon was working for EPA Region 4?	Ted Simon was an employee of the EPA when the "Simon and Manning paper" was written and was not am employee or consultant of Hercules. Ted Simon received a salary from the EPA during his employment as a human health risk assessor in Region 4.
GEC-305	Was Ted Simon working for the EPA and Hercules (or one of Hercules' consulting firms) when Simon and Manning (2006) was written or when published?	
GEC-307	Who hired Ted Simon to produce this report?	
GEC-308	Who paid Ted Simon to produce this report?	
GEC-309	Did EPA Region 4 use the recommendations presented by Ted Simon or use the EPA IRIS database for seafood advisories in the Terry Creek Area from 2006 until now, or at any time?	The development and maintenance of fish advisories is conducted by the Georgia Department of Natural Resources and EPA is supportive of GADNR with respect to establishing and maintaining fish consumption advisories.
GEC-310	Did EPA Region 4 use the recommendation presented by Ted Simon in any way at the Terry Creek Site?	See response to comment 100Mi-1.4 above.
GEC-321	Did the Weinberg Group either directly or through Hercules provide the EPA Region 4 response to the EPA Office of Inspector General (EPA OIG) concerning the report, Appropriate Testing and Timely Reporting Are Needed at the Hercules 009 Landfill Superfund Site, Brunswick, Georgia?	See response to comment GEC-195 above.
GEC-322	Was Ted Simons working for the Weinberg Group when the Simon and Manning, 2006 paper was written?	No, Dr. Simon was employed by the EPA at that time.
GEC-323	Was Dr. Ted Simon hired or contracted by the Weinberg Group or through Hercules to work with the Weinberg Group?	Dr. Simon no longer works at the EPA. The EPA is uncertain of his employment, or clients, after leaving the EPA.

Identifier	Comment Summary	Response
GEC-324	Is this why Dr. Ted Simon lists the Weinberg Group as one of his clients (http://ted.wixsimon.com/clients/)?	
GEC-331	Is Hercules Inc., noted as have hired the Weinberg Group to develop toxicity information relating to toxaphene breakdown products?	See response to comment GEC-195 above.
GEC-332	What is the definition of "breakdown products"?	See response to comments GEC-68 and GEC-21 above.
GEC-333	What is the specific chemical composition of the group of polychloro camphene defined as "breakdown products" for which the Weinberg Group was developing toxicity information?	
GEC-334	Did EPA Region 4 receive work plans for these toxicity studies?	It is unclear which work plans the commenter is referring to specifically. If this comment is referring to work being conducted by the Weinberg group, the EPA did not receive any final work products, including work plans, from the Weinberg group on behalf of Hercules. The Weinberg Group is not mentioned or discussed in the OU1 Proposed Plan. In the OU1 Proposed Plan, the EPA provides the public with information concerning Site history and Site investigations performed to provide historical context. See response to comment GEC-195 above.
GEC-335	Are the work plans for the toxaphene breakdown products toxicity studies in the Terry Creek Site Administrative Record?	
GEC-336	Were these toxicity studies of toxaphene breakdown products ever completed? If not, why not?	
GEC-337	If not, why does the EPA still reference these toxicity studies in the Proposed Plan many years after projected completion date in 2011?	
GEC-338	Did the Weinberg Group come under investigation by the Energy and Commerce Committee for a "Science for Sale" scheme in 2008?	Congressional members serving on the House of Representatives' Energy and Commerce Committee conducted an investigation of the Weinberg Group related to scientific integrity of the company.
GEC-339	Is it true that the Weinberg Group wrote, "We will harness...the scientific and intellectual capital of our company with one goal in mind -- creating the outcome our client desires"?	EPA is uncertain whether the Weinberg Group wrote such statement.
GEC-340	Why is any mention of the Weinberg Group not found in the Administrative Record after February 2008?	See response to comment GEC-195 above.
GEC-341	Were the toxicological studies the Weinberg group was working on ever completed?	

Identifier	Comment Summary	Response
GEC-342	Was another firm contracted to complete the toxicological studies work since 2008?	See response to comment 100Mi-1.4 above for additional information relating to the development of toxicity information and cleanup numbers associated with weathered toxaphene. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-343	If not, why is the lack of this data being cited in the Proposed Plan as the reason to not move forward with risk-based remedies at the Terry Creek Site?	
Fish/Seafood		
GEC-242	As a "…as a known source of toxaphene…" does OU1 poses an indirect risk to human health or is this a completed exposure route via seafood consumption?	Consumption of impacted fish is a potential route of human exposure associated with the Terry Creek site as a whole. Fish advisories are in place to limit consumption. The selected interim remedy is expected to eliminate the pathway of exposure to human and ecological receptors from contaminated sediments in OU1. See response to CB-2 to above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-243	Did the Agency for Toxic Substance and Disease Registry (ATSDR) produce a Public Health Assessment (PHA), discuss seafood consumption in the PHA, and make recommendations? What were the recommendations and have they been implemented?	ATSDR issued a Public Health Assessment (PHA) on August 12, 2002. The PHA addressed the Terry Creek Site as a whole. Recommendations included: 1. "Based on data gaps such as uncertainty in the PCC levels of [sic] in fish, ATSDR recommends limiting exposure to contaminated seafood from Dupree and Terry Creeks. It is further recommended that the Georgia Environmental Protection Division (EPD) continue evaluation of seafood and determine whether further limits or restrictions are warranted. People eating fish from nearby areas can lower their risk of ingesting organic contaminants such as PCC and PCBs by removing fatty tissue before cooking, as well as by eating small (younger) fish. 2. Due to interference from other chlorinated compounds in the fish samples and the uncertainty they cause in the toxaphene estimates, sensitive and specific methods, such as electron capture negative ion mass spectrometry (GC-ECNIMS) are

Identifier	Comment Summary	Response
		recommended for the evaluation of PCC in fish and sediment. EPD and USEPA will employ such methods. 3. Additional seafood sampling is needed to help assure residents that fish caught in unrestricted 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: PCC, heavy metals--including mercury--and PCBs. 4. It is recommended that those residential yards that receive or have received silty run off from flooding drainage ditches on the Hercules plant site be sampled for PCC. 5. Garden soils should be analyzed for PCC if contaminated dredge spoil or other major sources of PCC contamination are suspected. 6. The community well at the Terry Creek Mobile Home Park (TCMHP) should be tested with a minimum detection limit below the MCL of 3 ppb to assure residents that their drinking water is safe. ATSDR needs further information (such as the depth of the well and any sampling data) regarding the community well at the TCMHP. 7. ATSDR has requested, and should obtain, all future or additional data for Terry Creek that is currently available. 8. Based on the results of the air toxics data set collected as part of the Brunswick/Glynn County Initiative, ATSDR recommends further evaluation of air quality in the general area of Brunswick, particularly with respect to potential carcinogens and respiratory irritants." Recommendations 1, 6, and 7 have been implemented. Recommendations 2 and 3 are in progress. Recommendations 4, 5, and 8 are under advisement.
GEC-288	Does the EPA have guidance documents for fish advisories driven by polychloro camphene (also known as toxaphene) (EPA 1999)?	Yes.

Identifier	Comment Summary	Response
GEC-289	Does the EPA fact sheet, "Toxaphene Update: Impact on Fish Advisories" have data to set remedial goals for seafood (EPA, 1999)?	The fact sheet "Toxaphene Update: Impact on Fish Advisories" dated 1999 provides monthly fish consumption limits for toxaphene.
GEC-290	Does the EPA also have fact sheets concerning fish consumption for dioxins/furans, mercury, and PCBs?	Yes.
GEC-291	Does the EPA have data from fish from Terry Creek for dioxins/furans, mercury, and PCBs?	Yes.
GEC-292	Have dioxins/furans, mercury, and PCBs been found in Terry and Dupree Creek sediments?	As part of the Focused RI/FS for OU1 dated December 2014, sediment samples were collected and analyzed from the Outfall Ditch. Table 3-1 Sample Analyte List and Table 5-2 Summary of Detected Compounds in Sediment in the OU1 RI/FS provide the results. Further analysis and evaluations of sediments in Terry and Dupree Creeks may be conducted as part of the remedial investigations for OU2 and OU3 to further determine the nature and extent of contamination.
GEC-293	If so, has the EPA evaluated the polychloro camphene, dioxins/furans, mercury, and PCBs in developing the seafood consumption advisory for Terry and Dupree Creeks, and the surrounding area?	These comments appear to relate to a paper written by Dr. Ted Simon titled *A Re-Evaluation of Fish Advisories Based on Weathered Toxaphene in Fish and Changing Levels of Toxaphene Residues in Fish Near Brunswick, GA* dated June 2006. This document was not utilized by the EPA in the selection of the interim remedy for OU1 Outfall Ditch at the Terry Creek Site. See response to comment GEC-16 above for further information relating to the development and maintenance of fish consumption advisories by the Georgia Department of Natural Resources.
GEC-295	Has the EPA IRIS database been used to set fish advisories in Terry Creek?	
GEC-296	Is the EPA IRIS database the current document used to set fish advisories in Terry Creek? If not, why not?	
GEC-297	What are the differences in the seafood consumption advisories before and after the application of, "...major factor driving the reduction in fish advisory levels is the use of a new reference dose for weathered toxaphene"?	
GEC-299	Did the EPA abandon using the IRIS database for fish consumption advisories? Was the change only in EPA Region 4?	

Identifier	Comment Summary	Response
GEC-306	Does the EPA advocate for the removal of seafood sampling data in order to eliminate consumption advisories?	
GEC-311	Does the EPA recommend using total toxaphene for seafood advisories?	
GEC-312	What are the seafood advisories based upon the total toxaphene and," those presented in this report…"?	
GEC-313	What are the quantified differences between the two methods when applied to seafood advisories?	
GEC-314	Did the method proposed by Ted Simon only address the carcinogenic risks from the polychloro camphene in seafood from Terry Creek or include non-carcinogenic risks, too?	
GEC-315	Did Ted Simon address non-cancer risk to the kidney, liver, children, and pregnant women?	
GEC-316	Did Ted Simon include the additive effects from the other chemicals like dioxin/furans, mercury, PCBs (and Aroclor 1268 in particular) and the implications for added cancer risk and other non-carcinogenic risks?	
GEC-317	Were the results of Simons and Manning, 2006 the discussion of data produced by others with no data of their own, or any data from the Terry Creek site which included the full scope of contaminants?	
History		
GEC-203	How was the waste stream formed?	Section 1.3 Site Background of the December 2014 Focused OU1 RI/FS provides details relating to past operations at the Hercules facility and provides: "The plant became operational in 1911; it is believed that the Outfall Ditch was constructed at this time. Between 1948 and 1980 Hercules produced toxaphene, a chlorinated pesticide, at its Brunswick Plant. Untreated wastewater from the production of toxaphene was discharged through the Outfall Ditch into Dupree Creek until 1972. A wastewater treatment plant was installed in 1972,
GEC-204	Were there other manufacturing processes at the Hercules Plant from 1909 to 2015 that contributed to the waste stream?	
GEC-205	What are the chemicals and wastes released in the wastewater over the 106 year history?	
GEC-206	What documentation is being used to describe the waste stream and chemicals in the wastewater?	

Identifier	Comment Summary	Response
GEC-207	Has a comprehensive list of chemical, processes, and products produced at the Hercules plant been placed in the Terry Creek Site Administrative Record? If not, why not?	and the amount of toxaphene in the permitted discharge was significantly reduced after that time until toxaphene production ceased in 1980." Exact quantities of released contaminants are not known.
GEC-251	What is the range of levels of toxaphene wastes on the former Hercules Plant Site in sediments, soil, and groundwater?	
GEC-318	Using the estimate above, what is the quantity of toxaphene pesticide released to Terry and Dupree creeks?	
GEC-319	In addition to the toxaphene pesticide released, what was the quantity of other manufacturing wastes and the composition of these wastes over the past 106 years?	
GEC-320	Have a vertical profile cores been taken from the Outfall Ditch to characterize the scope of chemicals deposited in the ditch over the 106 year history of the ditch being used for chemical plant wastes? If not, why not?	See response to comment GEC-1 above.
Miscellaneous		
GEC-20	Should a chemical plant clean up its waste outfall every hundred years? Is the EPA suggesting the answer to this question is no and just cover it up?	The EPA is committed to successful implementation of a remedial action at OU1. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. For additional information about the interim remedy selected at OU1, see responses to comments CB-2 and 100MI-1.4 above.
GEC-244	Will the EPA affirm the Trailer Park is contaminated and retain the area as part of the Terry Creek Site and future Remedial Investigations?	Section 1.3 Background, page 2 of the OU1 Focused RI/FS states that: "The Terry Creek project was completed by the Corps in 1939; and subsequently, maintenance dredging occurred in 1940, 1941, 1942, and 1946, prior to production of toxaphene. Some dredge spoils from these dredging activities were disposed in an area located adjacent to the Torras Causeway beside Terry Creek, which is currently known as the Trailer Park Dredge Spoil Area." Remedial investigation of the Trailer Park area may be conducted as part of OU2.

Identifier	Comment Summary	Response
		See response to comments JWSC-1 and ESC-1.2 above for further information relating to the groundwater cleanup being conducted under RCRA authority and sampling events conducted at the Trailer Park.
GEC-249	What action is the EPA taking to assure continued releases of toxaphene do not occur from the former Hercules Plant?	See responses to comments CB-2, JWSC-1, and RA-1c above for further information relating to RCRA actions being conducted at the former Hercules facility with oversight from GA EPD.
GEC-250	What level of toxaphene constitutes "de mimimis" amounts?	This comment appears to refer to a Hercules response to an EPD comment regarding the RCRA corrective action at the Hercules plant. EPA does not have a definition of "de minimis" in reference to toxaphene.
GEC-253	Has the Remedial Investigation and Feasibility Study been modified to address the comments by the GA-EPD?	A Focused RI/FS was submitted in February 2014 by Hercules and a revised version, which incorporated comments from EPA and EPD, was submitted to the EPA by Hercules in December 2014. The revised December 2014 Focused RI/FS was the basis for the Proposed Plan and the interim remedy selected. A final remedy will be selected at a later date after toxicity information and cleanup numbers related to weathered toxaphene are developed. An interim remedy is being implemented at OU1. When an EPA toxicity value for weathered toxaphene is available, the EPA will reassess the potential risks associated within OU1 to determine if further actions are needed prior to a final action being selected. See response to CB-2 above for additional information regarding the selection of an interim remedy and final remedy decisions.
GEC-265	Was a national panel with intent to move the best available science forward formed, as proposed by Hercules? If so, what were the results and were the results implemented by Hercules or the EPA?	This comment appears to refer to a March 2006 update to the Regional Administrator from a former Remedial Project Manager working on both the Hercules 009 Landfill Site and the Terry Creek Site regarding the path forward to develop a new analytical method for toxaphene. EPA released the new Method 8276 in 2012. See response to 100Mi-1.1 above for additional information regarding work currently being conducted to develop toxicity information and cleanup numbers associated with weathered toxaphene.

Identifier	Comment Summary	Response
GEC-294	EPA Comment • Provide the regulatory framework for the project, identify lead regulatory agency, identify stakeholders and input to key decisions. Who are the stakeholders referred to in the above statement?	Stakeholders may include community members, environmental organizations, EPD, Hercules, NOAA, Fish and Wildlife, and others.

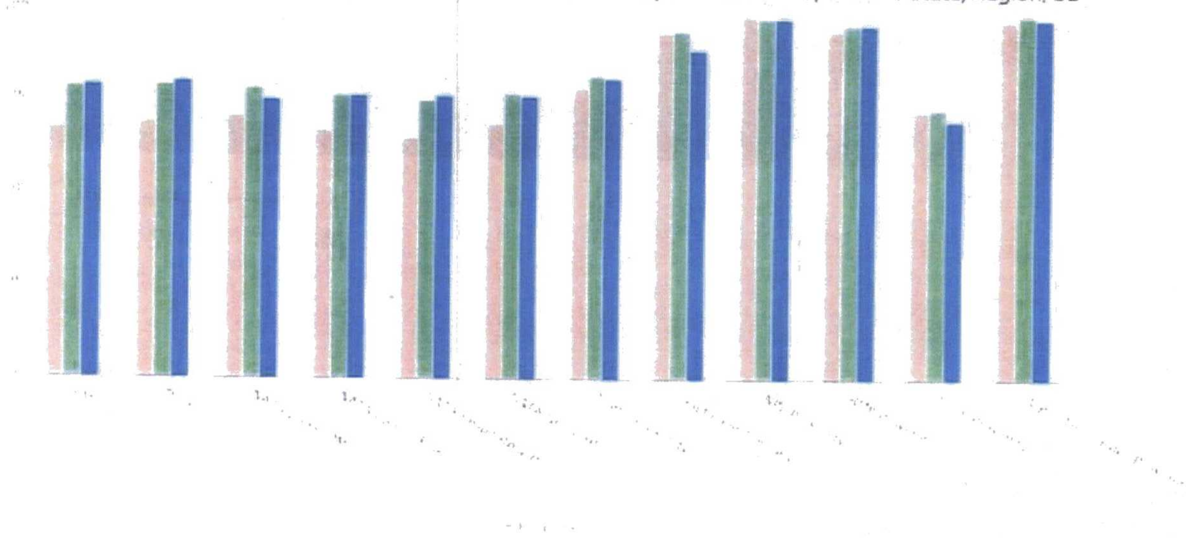
EJSCREEN Report

for 1 mile Ring Centered at 31.163970,-81.479420, GEORGIA, EPA Region 4

Approximate Population: 5801

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	67	78	79
EJ Index for Ozone	69	79	80
EJ Index for NATA Diesel PM	71	78	75
EJ Index for NATA Air Toxics Cancer Risk	67	76	76
EJ Index for NATA Respiratory Hazard Index	65	75	76
EJ Index for NATA Neurological Hazard Index	69	77	76
EJ Index for Traffic Proximity and Volume	79	82	81
EJ Index for Lead Paint Indicator	94	94	89
EJ Index for Proximity to NPL sites	99	98	98
EJ Index for Proximity to RMP sites	95	96	96
EJ Index for Proximity to TSDFs	73	73	70
EJ Index for Proximity to Major Direct Dischargers	98	99	98

EJ Index for the Selected Area Compared to All People's Block Groups in the State/Region/US



This report shows environmental, demographic, and EJ indicator values. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports

EJSCREEN Report

for 1 mile Ring Centered at 31.163970,-81.479420, GEORGIA, EPA Region 4

Approximate Population: 5801

November 30, 2015

Digitized Point

Buffer Area

1:36,112

United States Environmental Protection Agency

EJSCREEN Report

for 1 mile Ring Centered at 31.163970,-81.479420, GEORGIA, EPA Region 4

Approximate Population: 5801

Selected Variables	Raw Data	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu g/m^3$)	9.02	11.4	0	9.59	30	9.78	28
Ozone (ppb)	43.6	50.7	4	45.3	33	46.1	33
NATA Diesel PM ($\mu g/m^3$)*	0.378	0.573	49	0.53	50-60th	0.824	<50th
NATA Cancer Risk (lifetime risk per million)*	39	52	18	45	<50th	49	<50th
NATA Respiratory Hazard Index*	1.5	2.3	21	2	<50th	2.3	<50th
NATA Neurological Hazard Index*	0.042	0.05	43	0.052	<50th	0.063	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	69	110	75	85	72	110	66
Lead Paint Indicator (% Pre-1960 Housing)	0.47	0.14	93	0.16	91	0.3	72
NPL Proximity (site count/km distance)	0.73	0.032	99	0.07	99	0.096	98
RMP Proximity (facility count/km distance)	1.6	0.27	98	0.25	98	0.31	97
TSDF Proximity (facility count/km distance)	0.0077	0.0086	67	0.025	36	0.054	20
Water Discharger Proximity (facility count/km distance)	1.6	0.19	99	0.19	99	0.25	98
Demographic Indicators							
Demographic Index	71%	41%	88	37%	90	35%	90
Minority Population	80%	44%	81	36%	86	36%	85
Low Income Population	62%	38%	85	38%	86	34%	88
Linguistically Isolated Population	2%	3%	68	4%	67	5%	59
Population With Less Than High School Education	23%	16%	75	16%	75	14%	79
Population Under 5 years of age	8%	7%	60	6%	66	7%	65
Population over 64 years of age	13%	11%	70	14%	55	13%	58

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: http://www.epa.gov/ttn/atw/natamain/index.html

For additional information, see: www.epa.gov/environmentaljustice

Attachment 2 Transcript of July 30, 2015 Public Meeting

U. S. ENVIRONMENTAL PROTECTION AGENCY

In re:)
)
)
Terry Creek Superfund Site)
)
Outfall Ditch/Operable Unit 1

Public Meeting

July 30, 2015

6:00 p.m.

Brunswick Glynn County Library
208 Gloucester Street
Brunswick, Georgia

Debbie Gilbert, Certified Court Reporter, B-515

APPEARANCES

On behalf of US EPA:

Scott Martin, Remedial Project Manager
Angela R. Miler, Community Involvement Coordinator
William Denman, Section Chief
Tonya Floyd, Legal Representative
Tim Frederick, Human Health Risk Assessor

On behalf of the Georgia EPD:

Jim Brown

On behalf of Pinova:

Tim Hassett

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ANGELA MILLER: Good evening, everybody. Good evening, thank you so much for coming out. This meeting I know in the paper there was a little bit of confusion. This is the winning lottery meeting.

No, this is the EPA meeting. We're here tonight to talk about the Terry Creek dredge spoils, Operable Unit 1.

We need to be -- we're going to have a presentation, and then we're going to have question and answers and we have to be out of here at 7:30.

And I know some of y'all want to go over to the Georgia EPD meeting so you will have time to do that.

I have a transcriber that is taking down the entire meeting, so when we get to the question and answers, if you would, stand up, please state your name and spell any unusual.

If you don't do it, I'm going to say "state your name" and you're going to go to sleep hearing that in your head with my annoying southern accent. Okay. So when you stand up, please state your name so we can have all that on the record. Thank you so much for coming out.

I do have a really important question to ask. Living here, do you get used to this heat?

SPEAKERS: No.

ANGELA MILLER: It's hot in Atlanta, but it is not this hot. So -- but thank you again so much for coming out, and I'm going to turn it over to Scott Martin, my project manager.

SCOTT MARTIN: Okay. I guess the first question for y'all, is this good or do you prefer -- is this better? Can you hear me at all in the mike? Is this --

ANGELA MILLER: You pulled it up a little bit more. That's good.

SCOTT MARTIN: How is that? Is that any better? Can you hear me good?

ANGELA MILLER: That's better.

SCOTT MARTIN: Okay. Let's see, figure out where to put this. Okay, as Angela said, I'm Scott Martin. I'm the remedial project manager for EPA Region 4 for the Terry Creek site.

EPA Region 4 handles eight southeastern states, and I have sites in Georgia, Mississippi, South Carolina, Florida.

So we're here to talk about tonight the Terry Creek dredge spoils, Hercules outfall, and specifically I want to talk about Operable Unit 1, and we will talk about other aspects of the site as well, and I have a presentation to get through.

I know you'd probably rather just get to the question-and-answer part but I'd like to kind of, if we can, keep it casual, and if something comes up in the presentation, you can ask me a question, but if I need to keep rolling, you know, I will try to just so we get to the end and we get it all.

Next slide, and I guess Angela already mentioned, yeah, just to make sure everybody is in the right spot. The Georgia EPD meeting is at the historic city hall down the street.

Okay, so brief agenda, already did welcomes, introductions. I will give you background on what is Superfund, lay out requirements for community participation in Superfund, go over the proposed plan and at the end, there will be a specific question-and-answer time, but as I go along, just ask a question.

Again, I'm Scott Martin. I'm the project manager. I have William Denman, Bill Denman is my supervisor, section chief. Tonya Floyd is our legal representation on the site. Tim Frederick -- this fellow back here -- he's my human health risk assessor. I was not able to get our ecological risk assessor. He couldn't make it, and y'all met Angela, our community involvement coordinator.

I believe Jim Brown with Georgia EPD is here, and then we have Tim Hassett with Hercules, and I've seen several contractors with Geosyntec that are working on the site as well.

SPEAKER: Can you turn the lights down a little bit?

ANGELA MILLER: They all go out. And we tried it when we were here at the last meeting.

SCOTT MARTIN: Well, sorry about that, and after this meeting, and I will -- if anybody specifically asks, I will make sure you get it and I will send a copy of the presentation to our community group, the Glynn Environmental Coalition, down here.

I will try to get it up on our Web site so you can download it, but I was -- didn't make any copies of it because I didn't know how many people would be here and I was working on it until about five minutes before I came over here.

So Superfund is the easiest pronounced name for the Comprehensive Environmental Response, Compensation and Liability Act of 1980, which basically gives EPA the ability to clean up hazardous waste sites.

Generally speaking, if it's on the Superfund list, it's an abandoned facility or it's not in operation. This site is a little different. Across the street, you have the old Hercules plant that is now Pinova, and typically, we handle the cleanup of these sites using two different cleanup methods.

One is a removal action. That group is our emergency response and removal group, and they handle things like drum removal. If a train comes off the tracks and the chlorine tank is spewing chlorine into the air, those guys respond to that. I'll talk more about the removal that was done at Terry Creek.

And then a remedial action is more what I deal with. It's the long-term cleanup plan for the site and is the more permanent solution, long-term goal.

Okay, I already I guess basically jumped my next two slides. I already hit removal action, and again I will talk about the one here at Terry Creek in just a minute, and see, I'm getting ahead of myself.

So the Superfund process is a long process. And I know some frustrations can come up that it seems slow, but here's where they start off with site discovery. That can come from we work with -- the states can request a site to become on the NPL.

Sometimes a citizen might find -- typically a citizen is going to find something that's going to be a removal action.

Then you go through the site evaluation process, which we, you know, use to determine if it's worthy of being on the national priorities list or Superfund list.

Then we will list the site. Then you conduct a remedial investigation. Then after the remedial investigation, you go into the feasibility study, which is where, okay, we've figured out what the problem is, now what do we do about it, and usually come up with, you know, multiple different alternatives on how you're going to clean it up, and then that moves into what we're in now, called the proposed plan, where we've got a document that we've laid out I think in this case something like seven alternatives, and one of those, what we call the preferred alternative, has kind of come to the top and we're here today to talk about that.

I will present the preferred alternative. And then we go through and, you know, that may or may not be the final cleanup remedy at the site.

So after this meeting, I will get comments. We will finalize the cleanup decision, whatever that is, in what we call a record of decision. That lays out the final cleanup plan and has the responses to the summaries, the comments that I've received during the comment period.

Then you move into remedial design. Well, actually in this case, since we actually have a viable responsible party, Hercules, that's paying for the cleanup, I guess that's one thing I should differentiate.

Some of the cleanups are what we call fund leads, which that's paid for by the Superfund that was created back in the eighties with a -- I guess a small tax on oil barrels, prices of oil to create a pool of money that we know was going to be used to take care of these sites that would be coming into the cleanup scheme.

So the next step here, once we get to remedy selection, we will actually be able to start negotiating with Hercules which will be the legal document that sets forth the requirements they have to comply with for cleanup.

Then we move into remedial design, which basically that's if you are going to build a house, you have to have a blueprint, right, so we go into that.

Then we get to the actual cleanup and this part seems like a while to get to, but it's usually the part that goes along fastest. For example, I had a site in Hattiesburg, Mississippi that took about 12 years to get to actual cleanup, and then the actual cleanup took 11 months and we're done with that site.

Then depending on how the -- what the

cleanup ends up, you may need to do operations and maintenance if there's waste left in place, containment strategy or groundwater monitoring.

If it's something where you're able to, you know, dig up all the soil and take it away, you probably wouldn't have operations and maintenance.

And then eventually you get to deletion, which we actually take it off the national priorities list. I have not done that yet on any of my sites, but hopefully we're getting there.

Okay, and I kind talked on this already, but the community participation is something that we want to do but it's also a requirement of CERCLA or Superfund law, you know, so the purpose of that is for me to be here to present to you, take comments.

Superfund law lays out that we have to have -- provide the opportunity for a public meeting. In this case, we're having the public meeting. We have to have a minimum of a 30-day comment period, and then if we're asked, we automatically extend it out another 30 days to a total of 60.

Currently, I originally had the comment period as 47-day, was going to go with 45, but I think it fell on a Friday so I went ahead and extended it out to 47.

We're talking about I already have a request in to extend the comment period out further, and that's something we will take into consideration as we move forward.

And then the administrative record is a way that we try to get everything out to everybody and I know some folks have commented -- and we have a CD here. It's a little -- a lot of information on it. It might be a little hard to find.

The very end, if we make it, I've got a screen shot of how to open up the file that gives you the list of all the document names, and that's here in the library, and then we also have it at our office, which we can forward.

I think most people here, I'm guessing, are pretty familiar with the Terry Creek site, but obviously it's located here in Brunswick, consists of saltwater tidal creek and marsh systems near Terry Creek and Dupree Creek. Terry Creek actually goes into the Back River and I believe into the St. Simons Sound.

Right now the site management plan that we have laid out, we're proposing to do the cleanup under three operable units, and I will have a figure here in just a second that shows those.

Outfall or OU1, which we're talking about specifically tonight, is the outfall ditch, just the ditch itself.

OU2 is the land around the ditch and then the three dredge spoils that are out there.

Then OU3 would be Terry and Dupree Creeks, and that would likely encompass the sediments and the fish, you know, at some point.

Have to figure out -- there's a fish advisory in the area and, you know, at some point hopefully we will get to lift that fish advisory, so that would probably be handled under OU3.

Like I said, this action is specifically about the outfall ditch. This is not the last you're going to see of EPA. This isn't the final cleanup decision for the site. This is specifically focused on an area that we know still serves as a source for the rest of the site.

We're coming to, EPA's approach, get this area first, and then there's some complicated technical issues related to toxaphene, toxaphene toxicity, how do you measure toxaphene, that we will hopefully get into more in the other operable units.

I've had a couple of people talk to me about -- there's a little -- I don't know if "confusion" is the word -- but across the street from Terry Creek is the Hercules or Pinova plant.

That is a currently operating facility, and it's managed under another program called RCRA, and they have a groundwater plume coming off of the site.

It does come underneath Terry Creek, but the cleanup of that is actually being managed as part of the plant. I think I have somewhere to talk about that a little more and we can get into that at the Q and A in the end, and maybe Jim from the EPD can talk about it a little bit.

Brief background on the site. I guess you guys know that Hercules has been here for quite a while. Operated or produced toxaphene from the forties into the eighties.

At one point they discharged contaminated wastewater into I believe the site, they call it the entry ditch, and then it came into the outfall ditch.

At some point that was stopped, and they were put under a discharge permit, a water discharge permit.

Then eventually toxaphene was banned in 1990, and so, of course, it's no longer produced here. The site was proposed to the NPL back in 1997, and it's never actually gone final on the list.

It's -- it's actually kind of what we call Superfund alternative before we even used the term.

It was an attempt to move forward with cleanup to not have it on the site, I know, because there are other sites here as well. I think there was some input from the community not to have a fourth site on the NPL list.

Briefly I mentioned we did a -- conducted a dredging removal action between 1999 and 2000. And then since then in '97, '01, 2005, '07, '09, '11, '13, we do a fish sampling event in the Terry and Dupree Creek and I think one in the

Back River. We may have one coming up. Are we doing one this year?

SPEAKER: Yes.

SCOTT MARTIN: So we have another fish sampling event coming up this year, and that's just another way that we monitor the effects of the site.

As I mentioned, there are fish consumption guidelines in place. That's another measure that we use to limit exposure to toxaphene and generally the way somebody here would be exposed would be eating fish.

There are other pathways, but I think the main one here is fish, and as I mentioned, the facility is currently operating as the Pinova plant.

Toxaphene was used as a pesticide, insecticide, sorry, and this was -- this slide here somebody had a hard time figuring out how much to give to you. We could probably talk a week or more about it. There's how you look at toxaphene, how it was manufactured and then when it gets out to the environment, it looks different. It's composed of over 600 different congeners. It's transformed quickly into the environment, so the mix of congeners, the concentrations are not the same as if you were analyzing for what we refer to technical toxaphene and how it was produced at the plant.

And so the problem that we entered is once it's out in the environment, the analytical method that we used to analyze for it might not catch it, and so it's been a pretty long time over years, EPA has worked to develop a new method that will analyze for the breakdown products as well the original product.

It's a new method out called 8276, so that's great that we have that new method. The catch is we have limited toxicity data on the new method.

We had hoped -- EPA has a program that we call IRIS that's the group that they come up with the toxicity descriptions and cleanup numbers and things like that of a chemical.

We have a list of 51 chemicals that are going to be reviewed over the next, you know, many years, and toxaphene was on that list and then at some point it came off.

So that's kind of the bind that I'm in trying to come up with cleanup plan. So, okay, well, this slide is really hard to see. Sorry about that. But this was just to show you, I think everybody probably knows the site is right at the causeway going over to St. Simons. That star was just trying to show you that.

So here's an aerial view. I believe this is Highway 17, I want to say, so here's your causeway going out to St. Simons, the currently operating Pinova plant. It's really hard to see.

ANGELA MILLER: This map is in that proposed plan, if you guys have it.

SCOTT MARTIN: There's a map in the handout. So here is Operable Unit 1, which is the outfall ditch, and then we have the upland soils. Here's the main dredge spoils, about 72 acres. There's the Riverside dredge spoil.

I can't remember exactly how big that is off the top of my head, but you have a smaller one over here, Carter's Island, and then, of course -- don't want to trip -- Terry Creek and Dupree Creek and that's a little bit of the Back River up just to give you -- and so Operable Unit 1 is the ditch.

Operable Unit 2 is going to be the dredge spoils, and then the creeks will be Operable Unit 3.

This is just a closer-up view of the outfall ditch as it exists now, highway, the ditch, there's the -- there's a weir here, and this, I think, is in your handout as well, gives you a little better view of what we're talking about.

These are -- the figures happen to have where we took these transects or where we took sediment samples. It's part of the RI.

So, as I mentioned earlier, we did a removal action here at the site, and it was back in about '99, 2000 was the timeframe for it, and even though it's been a fairly lengthy span of time, really want to keep this in mind, that we're talking about we did this -- we've done this removal, and this is really kind of a -- you know, would have had liked to have a more seamless, continual action of the cleanup.

But with the whole toxaphene analytical method, there was a review by the inspector general. Things kind of stopped at the site. There's been a long break there, so as part of this action for the removal, the main focus of it is in the outfall ditch.

Did sediment removal, I believe, from, you know, one foot down to maybe ten. Within the ditch itself, we -- there was about 17,000 cubic yards of sediment removed.

Then in just this little area here that we call the -- it says the outfall ditch mouth, they removed -- we removed about another 10,000 cubic yards of soil -- sediment, sorry, and then based on sampling, there were some spots in the creeks that we took care of as well, and so that was the first real action, cleanup action, at the site and, you know, again, that was done by our removal group back in 2000.

Sorry. This slide is a little distorted from putting it in PowerPoint, but this is not in your handout that I have currently, but it's trying to show you a picture of the actual dredging operation.

You know, here's the dredge. Had some sheet piles out around the mouth. Can't really see them too well, or at least I can't. And these were sediment-drying beds here, and then you had water management to deal with as part of all the dredge there.

Next slide, please. Then the dredging operation that we did conduct was they used the clam shell, which is this, so it would basically just drop down, grab a scoop of sediment and take it over and drop it down on the, you know, in the storage area.

This is just a -- we were trying to run some math on the cubic yards of sediment removed and roughly about 35,000 yards was removed, cubic yards, and depending on the size of the truck, if you look at it that way, it would have been thousands upon thousands of truck loads of sediment that were taken away, which I believe was taken to a landfill but...

Next slide. Okay, so now the remedial investigations at Terry Creek OU1, we did most of the work, field work, back in 2002, and then we removed -- moved into report generation, things like that.

This investigation, like I said, specifically only focused on OU1. There's going to be more actions on other operable units. Again, I can say this is not the final cleanup plan for Terry Creek.

And the reason we are trying to focus on this the most, like I say, is we knew whichever method you used to analyze the toxaphene, we knew that the sediments in Terry Creek were -- or in the outfall ditch were still feeding into Terry Creek. They served as a source to the fish and other ecological organisms, so we decided we wanted to go in there if we can and tackle that first, and due to the uncertainties related to toxaphene and the cleanup number, the preferred alternative that came out is what we call pathway elimination.

We don't have a specific number that we're going to dredge to or treat to. We want to try to go in, contain it, eliminate the pathway, and then, you know, the sediments won't serve as a continued source to Terry and Dupree Creeks, yeah, and I already said we would achieve protectiveness there by pathway elimination is the goal here, and hopefully that again the point of this was to hopefully come in and do a quick action, and then as we move into the other OU's deal with all the very technical issues associated with that.

These remedial action objectives are in the proposed plan that you have as a handout.

Basically all of them in some way or another say what I just said. We're going to eliminate or minimize direct exposure pathways to potential receptors from the sediments.

We want to keep those sediments from being transported downstream. We want to eliminate, minimize exposure to potential receptors from pore water and then if we can prevent any contamination contributing to surface water, and during the remedial investigation, we did -- you know, we sampled pore water, surface water, sediment.

I don't remember having hits in the surface water. I think we did see a little toxaphene in the pore water, and, of course, in the sediment.

So, like I said, we finalized the remedial investigation, moved into the feasibility study, and so the purpose of that again is you identify what, you know, cleanup options, technologies.

We will screen those. Some make it into the feasibility study. Some don't. So we screen and evaluate.

Then you go through an analysis to weigh the different alternatives and eventually come up with the preferred alternative.

So this was another part that I had a hard time trying to figure out how many slides to -- I think if I went into a detailed description of each one of these, we might be here all night, but the detailed descriptions are in the proposed plan and the feasibility study that's part of the admin record.

And, of course, if we have questions about anything, we can talk about it. The first one that we always have to do with every site, we always have to compare our cleanup plan to if we did nothing, and that's called no action.

And here we've determined that an action needs to be taken, so we came up with these different alternatives to choose from.

One was to -- or 2, do another dredging operation. Alternative 3, we could do -- create a new ditch using sheet pile and do a little removal in the current ditch and backfill it, and these are kind of all the same.

Or you do sheet pile within the existing channel, put riprap down in the bottom, again trying to eliminate the pathway.

Alternative 4, do the concrete-lined new channel, backfill the existing outfall ditch with clean fill. Armor the end of it on the creek side with riprap.

And then Alternative 5, we looked at other options of using box culverts either within the existing channel or same thing, do a reroute with the box culvert, backfill the old ditch.

Another example that we looked at, using a technology called an Aqua Blok within the existing channel. What that is is actually basically pellets that you spray with a feeder and when we get in -- fall in the bottom of the ditch, they absorb water and basically form a clay layer.

Or another option was you can use carbon-amended sand, kind of do the same thing, spread it out in the ditch and cover the existing sediment and basically create a new layer of sediment to, you know, keep the contamination in the channel.

Or Alternative 7 was basically just in the existing channel come in with riprap, you know, the big rocks and just pour it down there and again just try to do a new layer to keep organisms away from the sediments.

So as part of the feasibility study, in the CERCLA requirements, we go into evaluating the remedy, and we have different criteria that we used, so the threshold, which is like the first level, we have to come up with something that protects human health and the environment. It's got to comply with the applicable and relevant appropriate requirements. Basically we have to be within the law, and so then we have your alternatives. You kind of start weighing them on a scale against each other, and you use these measures, long-term effective, how permanent is it, you know, can we -- same thing, short-term. Do you get a quick turn-around time or does it take longer; how much does it reduce the toxicities or the mobility or the volume through treatment.

And so like, for us, we're focusing more on the mobility aspect of it. Can you do it? You know, you have to look at that. You know, is it even a viable option, and then some options, of course, you have to look at cost.

You can, you know -- you can do things that may cost 200 million dollars, but is that really a viable option, so cost is a factor, and then the modifying criteria, we -- we work with the states and we work with the communities and we take comment and that's, you know, what we're here for tonight.

And you don't have to give me all your comments tonight. You can e-mail them to me. The proposed plan has my mail address, my e-mail address.

We are here tonight, we do have the recorder to help us take your verbal comments, and so then when I get back to the office I get a transcript of that, and that helps me, you know, so I'm not just going off my memory of what people said.

Okay. So in the proposed plan, the preferred alternative that we're proposing tonight is Alternative 4. It's to build a new concrete-lined channel, I guess to the south of the current ditch.

We will do some excavation within and sediment removal within the existing ditch now. Once it's empty, once we get the water out of it, take the weir out, we will put a geotextile liner at the bottom of the ditch to help serve as another layer to keep anything from moving up, and then, of course, we will backfill the ditch with clean fill, the existing ditch with clean fill.

You know, these issues will be hashed out more in remedial design, but I think the level of clean fill will be anywhere from two feet to I think in some areas maybe as much as ten feet of clean fill on top of the existing sediment.

It just really depends on how deep that ditch is once we get the water out of it, and then at the end, we will use riprap at the end of the ditch to armor the slopes of the grassy area there to, you know, help keep from the tides working the slopes.

And then here we will probably also implement what we refer as to institutional controls or deed restrictions to limit the use of the property and to protect our remedy, like the -- you know, the ditch that's going to have to be there basically as long as water keeps coming from upstream. You've got to protect that, and so that's a legal measure that we use to protect our remedy.

And this is kind of a -- I say conceptual depiction. I think it's a PhotoShop depiction of -- there's a bigger version over there. This is not how it's -- this is a drawing, basically, but it's on the computer, just to give you, try to give you an idea of what we're going to look at at the end is basically just -- you know, here's the old ditch, just put in a new one and this is very similar -- you can't really see it, but there's the N Street ditch, which comes up this way has had sort of the same treatment done to it. I believe they used what's called Fabriform concrete. Basically pillars that -- concrete and line the ditch so that again keeps the sediment in place and armors the slopes of the creek, helps protect erosion, and I think one reason this kind of came in the top of our preferred alternatives also, then, with the open channel here, it makes it easier for maintenance. If sediment starts to build up in that -- in the new ditch, you can come in and clean it out, you know. It's easier to get into as opposed to the box culvert.

Next slide, and this is just kind of blueprint AutoCAD drawing of just what, you know, it's basically a ditch, right? I mean, slope sides, flat bottom. Try and give you a little bit idea of what we're talking about here, but I don't have a picture of what it will look like when we're done because we're not done.

So what's the next steps? I guess I already kind of touched on this. We're in the comment period now.

We will -- these two kind of happen at the same time. We work to finalize the record of decision, and as part of that record of decision, we will have the response to comments that we receive during this public participation process.

And I guess I kind of hit some of these. The next step is negotiate the consent decree, move into remedial design and then move into remedial action, and I guess what's not on here is hopefully while we're doing these steps we will also begin working on the remedial investigation, feasibility study on OU's 2 and 3, so hopefully that's not do one thing and move on to the next, but -- okay.

All right, I guess that is all I have. Just a reminder, again, of how to get in touch with me. You've got my phone number, e-mail.

You can e-mail me your comments, call me. Do my best, you know, personally if you can write them, it's better for me because then I see what you're saying. I don't, you know, go on my memory.

You can e-mail Angela Miller. You can e-mail me. This is our mailing address if you prefer. If you want to -- I think if you want to talk to the court reporter after the meeting or I guess during the meeting -- if you stand up and talk, she will take your comments so we have all of those in place to help get your comments, and I guess real quick, Angela, before we get into -- go to the next slide, and I will show you -- it's really hard to see again, but if you get the CD here from the library that has the administrative record, it's not the most user friendly thing I've seen.

So based on people giving me, I was able to figure out there's a file -- if you open it up, you can't see it but it's down here at the bottom. It's called metapages, M-E-T-A pages. Double click that and it will open up the next slide.

If you have -- you have to have Adobe

Reader, which you can download free off the Internet if you don't have it, but once you click on that metapages file, it opens up this file, and at least then you have titles, and I think there's -- I was going to say dates, but I don't see it.

But anyway, that's at least a little more easier, friendly than just a list of pdf numbers, and then, of course, if you have questions on documents, you can always get in touch with me, and I think that's truly the end of my PowerPoint, so now Angela I guess -- how do you want to do it?

ANGELA MILLER: Remember, what do you when you stand up? State your name and spell any unusual, okay, so we will go ahead and start it out.

DANIEL PARSHLEY: I'm already standing.

ANGELA MILLER: Daniel is standing.

DANIEL PARSHLEY: Good evening, thank you for coming out --

ANGELA MILLER: State your name.

DANIEL PARSHLEY: -- concerning this site. I'm Daniel Parshley. I'm the project manager with Glynn Environmental Coalition and we administer the EPA technical assistance grant on this Superfund and the others in our community.

So I've been reading the documents on this site for the last 18 years and I base my comments upon those.

The proposed plan for the Terry Creek spoil areas attempts to answer the question what should be done about a ditch with a hundred years of waste from a chemical plant. They try to make it sound that this plant, the problem here, is a period from '48 'til '80 when they produced pesticides. This plant has been discharging poisons into our estuary for a hundred years.

The underlying -- the question is what do we do about a ditch with a hundred years of chemical plant waste? One would think the answer is obvious: Clean it up. But the EPA has proposed and is advocating for leaving the poison in our community, limiting future use of property and leaving a significant risk in the community for generations to come. That is the fact of the matter.

The EPA appears to have a serious hangup about getting consensus on the toxicity of toxaphene breakdown products, and you saw that in the presentation.

Thank goodness that's not what we're here to address. The question before us is what to do with a hundred-year-old ditch that transferred from a chemical plant to our estuary. That's the question that we're answering here.

Like every other hundred-year-old chemical plant ditch, there will never be a consensus about the toxicity of all the poisons that have been mixed in there over the last hundred years.

They haven't gotten one in the last 35 years. They are not in the next 35 years. We do need to know just how poisonous -- you know, the question is do we need to know just how poisonous every chemical in the poisonous chemical mixture is? No, we don't. What we need is to clean it up.

It is known that neither the EPA or Hercules bothered to complete the risk assessment. The reason is pretty obvious. It's general community knowledge that they fought folks in that area to kill all the life on the bottom of the boat. Beyond a shadow of doubt, the poison from the Hercules plant is the fish killer in the marine environment. Just another reason to stop this foolishness about trying to figure out what is or is not toxaphene.

It's -- there's poison. It needs to be cleaned up that simple. Anyway, it's not toxaphene that was released out of this ditch. It was a pesticide manufacturing waste, and all the other chemicals discharged from the Hercules plant over the last hundred years -- actually it's a little longer, since 1911.

Okay, let's go to the proposed plan and see what the EPA proposes. There are really just two issues here. First is making a decision about what the new outfall ditch is going to look like after it's constructed, and this decision appears to be pretty straightforward.

Alternative 5, the four boxed culverts, it will reroute the existing outfall ditch and it'll allow the existing ditch to be cleaned up. That appears to be the best option.

In addition, Alternative 5 has the greatest number of options for future use and development of the property provided the poison is cleaned up.

But the EPA proposes leaving the poison in the old outfall ditch and leaving the community with all the problems that it causes.

What are these problems? Well, according to the EPA, the site will not be usable for residential development. The documents for the site also warn about future development and bringing poisons to the surface again.

The only way this problem will be removed from the community is to remove the poison from the community.

So we're back to the original question. Should a chemical plant leave its waste -- should a chemical plant clean up its waste outfall every hundred years?

I really can't believe we're asking this question. Really, are we asking this question? Should a chemical plant clean up its outfall every hundred years?

Yes, a chemical plant should clean up its outfall every hundred years. The Glynn Environmental Coalition is going to submit proposed comments on the proposed plan. What we have before us tonight is not all the information. We asked Ms. Penny Gainer with the Georgia Department of Environmental Protection to provide the groundwater data for this piece of property.

As Mr. Martin has mentioned, we do have groundwater contamination beneath the site. It was not in the reports. Only recently have we received this report and -- detailing the extent and distribution of the contaminated groundwater underneath this Terry Creek site, and we need more time for thoughtful comments on this proposed plan and consider the implications to the future of our community.

Therefore, we respectfully request that the EPA to extend the public comment period by 45 days.

And in closing, this is an official public comment meeting. There's over 50 people here tonight. They are leaving us less than 45 minutes to submit public comment. A lot of people in our community are not comfortable submitting written comment.

It's a travesty to allow our community 45 minutes to comment when this has been languishing for 18 years.

Thank you and good evening.

SCOTT MARTIN: Couple of points. There was a lot of comments. I'm not going to try and touch everything. It did jog my mind for a few things. The area around the outfall ditch is currently zoned commercial industrial. So future use of the site -- that's one thing, reuse is important to EPA, but it's not up to us.

We do try our best to conduct our clean-ups in a way that provides for the maximum reuse in the future.

And for the comments, I'm sorry there's only so much time we have to do verbal comments, but again this is not the only time that you can comment. And --

MR. PARSHLEY: Please tell us where the next meeting is during the comment period. You said that it's not the only time for them to comment.

SCOTT MARTIN: Well, you can submit in writing. You can call us. Again, you know, it's -- you know, there's a 60-day comment period at least, but, you know, we don't have another meeting scheduled, but anyway, Angela, I don't know if you -- and you don't have to come up to the podium to speak either if you don't want to.

ANGELA MILLER: Yes, sir.

RON ADAMS: My name is Ron Adams, and I guess before I go to those comments, I will want to put some facts out on the table.

These came from -- originally from Hercules and through the EPD, but -- and this is -- this is only one chemical that we need to understand about this site.

This is our outfall property over here. This is the outfall ditch. This is the old original manufacturing plant site, and this is where there was a settling pond area over here.

And these numbers are -- the green is 5 to 25 parts per billion of benzene. Yellow is 25 to a hundred. Orange is a hundred to 500, and red is over 500. This is at the depth of 25 feet.

If we do a slice at 55 feet, it gets a little bigger and it gets over in other places, and then when we get to the next slide, which is at 75 feet, this shows that it has spread over this area. This is the outfall ditch.

Their map shows that the outfall ditch is clearly over the top of the benzene plume, and this is only one chemical, and I think we need to think -- I mean, this is a complicated issue, and there are a lot of moving parts to it, and we need to fully understand it and we need to clean the whole thing up.

This shows how the -- how the chemicals migrate, and then this is a 3-D presentation of how it flows down and then where it goes, but it's all underneath the outfall ditch. This is the outfall parcel up here.

The entire Hercules/Ashland/Pinova site with its many components of contamination and widespread dispersion of those contaminants is a complex and multi-faceted problem that requires a comprehensive plan for remediation.

My family owns property that adjoins the Terry Creek dredge spoils Operative Unit 1 on the east side of US 17.

We've cooperated with EPD to determine the extent of groundwater contamination and soil contamination from the Pinova/Hercules/Ashland site onto our property.

We're concerned why this is being

addressed under CERCLA and not under RCRA. These are our concerns.

The outfall ditch within the -- the outfall ditch lies within the facility boundaries of the RCRA permit that the Hercules/ Pinova plant operates under and of which Hercules and Pinova are the permittees, and that ditch has to stay in operation so that the -- so that the cooling water has a path to exit out to Dupree Creek.

Hercules, Pinova and Ashland should all be the responsible parties for purposes of cleanup and damages for all contamination that originated at the site.

The remediation plan under CERCLA does not address the groundwater contamination that's beneath the outfall parcel in the adjacent property. This plan should address the groundwater contamination.

Contamination from the still house and the old tank areas and from the former settling ponds continue to migrate into the groundwater.

The RCRA cleanup standard of five parts per billion for benzene is apparently not the standard to which the outfall parcel will be cleaned.

The plan to place a covenant on the property restricting future use suggests an ultimate cleanup plan that results in residual contamination and an incomplete cleanup.

Any proposal which allows residual contamination to exist is basically a taking of private property of adjacent and nearby landowners and subjects others to the continued effects and damages from contamination.

This alternative to a complete cleanup is not in the public's interest. The US 17 corridor is the key link between the mainland and St. Simons and Jekyll Islands.

The 17 corridor is the subject of a redevelopment plan by the City of Brunswick as we speak. Placing restricted future covenants on this property or allowing contamination to remain may limit the options of the current and future governments of Brunswick to direct the redevelopment of this area of the city.

A far -- a far better alternative to the Alternative 4 as presented is to combine Alternative 2, the complete removal of the outfall sludge -- it's approximately 36,000 yards of material -- and the installation of box culvert Option Number 5.

Any plan that's adopted must require Hercules, Ashland and Pinova to eliminate groundwater contamination on the Terry Creek dredge spoils within 12 months.

Further soil contamination on the west side of 17 should be required to be remediated within the next 24 months. Until soil contamination on the west side of 17 is addressed, the outfall is subject to additional contamination.

Sea level in Georgia has risen by an average of one and a half inches every decade for the past hundred years. The rise in sea level is said to be accelerating. This fact makes the containment and remediation of both soil and groundwater contamination more complex, more urgent and critically important.

Continued changes in the sea level without a comprehensive and timely solution to the current contamination has the potential for severe negative consequences for Brunswick, Glynn County and the region.

The entire contamination problem

originated in one source. A piecemeal plan has allowed delayed, incomplete remediation over 21 years. A seamless coordinated approach to complete remediation is necessary to protect the health and welfare of the citizens of Brunswick and Glynn County.

A complete remediation is vital to the economic health of the City of Brunswick and Glynn County, and complete remediation is important for the protection of the natural resources for future generations.

Thank you.

JILL WRIGHT: Jill Wright, W-r-i-g-h-t. I have a question for you.

SCOTT MARTIN: Yes.

JILL WRIGHT: Given that two people have already spoken and they suggest Alternative 5 is the best for our area, how did you come to the conclusion that 4 was the best? What were the reasons?

SCOTT MARTIN: Well, it goes back to you look at all the criteria that I mentioned, the balancing the threshold criteria and things like that, that's laid out more in the feasibility study, but briefly you just -- you know, it's easy to implement. This one, you know, is -- cost is a factor. It is, you know, less costly. Our opinion, the open ditch is a better alternative to the closed ditch, like I said, for the ease of maintenance, get the sediment removal, things like that.

So that's kind of how, you know, the 4 alternative came to the top. Each one has -- you know, for example, doing a complete new dredge, well, the dredging option that we already did, they basically kind of took that to its effective point and were hitting debris and things like that, so that's why that one fell down on the list.

There's still a multitude of factors that go into how we came up with that.

JILL WRIGHT: Can I follow up also?

SCOTT MARTIN: Sure.

JILL WRIGHT: So when you say it's the most cost effective, is this coming from the Superfund fund as opposed to Pinova or Hercules --

SCOTT MARTIN: No.

JILL WRIGHT: -- paying for -- how is it --

SCOTT MARTIN: We don't -- this one is, if you remember, I mentioned there's fund lead, which is Superfund, and in this case, Hercules has all the environmental liability of Terry Creek, and then they have done a cleanup on the Hercules or Pinova plant side under RCRA, and they -- they still have the environmental liability for that, so they are paying for it and, you know, not that you -- cost is a factor. I mean, we have to take it into account. It's just one of the factors, though.

JILL WRIGHT: Sorry. Cost to the existing company like Pinova or cost to...

SCOTT MARTIN: Well, whoever, whether it be from the Superfund or to a private entity, cost is one of the factors.

JILL WRIGHT: Okay.

SCOTT MARTIN: Because there are, you know, we could come up with a plan that costs a hundred million dollars but we might not have that money, so, you know, the difference between five or ten million, that's still a significant number, and then, you know, like one of the other -- the previous commenters said, it's absolutely correct that this is not a -- you know, we didn't look at certain things and it's not that we're not going to. But this one focused specifically on the ditch, and so there's going to be more -- we have to, you know, take into consideration as well Operable Unit 2. Just the main dredge spoil out there is 72 acres, so, you know, cost associated with doing something with that, I can't even start to calculate now. But this cleanup is paid for by Hercules.

JILL WRIGHT: Okay, thank you.

ANGELA MILLER: Yes, sir, in the back there. Yes, sir.

ROBERT RANDALL: Thank you, Angela. My name is Robert Randall, R-a-n-d-a-l-l. I'm a 25-year long member of the Glynn Environmental Coalition, so I've been watching this site for a long time also. I have some questions and also some comments and is it okay if I mix those up?

SCOTT MARTIN: Sure, absolutely, and I will do my best. I may not have all the answers right now, but I will try.

ROBERT RANDALL: I'd like to begin on Page 13 where it describes all Alternative 4, which is your preferred alternative. Just wanted to point out to everybody it says that this alternative would remove the sediment exposure pathway entirely.

It's very important that we understand the kind of language that EPA uses because they are not saying that it's going to remove the sediment. They are saying it removes the sediment exposure pathway entirely, so what they are claiming is that once they get done with this cleanup -- and it's not really a cleanup; it's containment. Once they get done with this that there is no way -- there is no way that the toxics in the sediment that's going to be left behind will be able to be exposed to you or your pets or the environment.

The same paragraph says that it will not be susceptible to storm surges or high tides. My question is: Does this mean that you believe that what you want to do here will survive a hurricane?

SCOTT MARTIN: That's a very hard question to answer, and the way we would -- we think it's a good protective remedy. It is a containment remedy, yes, and one way that we handle that is any time -- it's really hard to predict what --

if a hurricane hits. You know, so if a hurricane were to hit, you would -- most likely what we would have is we would come down, assess the site, possibly do sampling, see if the remedy was impacted. If it was, come back, fix it.

But, yeah, I have been asked -- trying to come up with an answer what would exactly happen in a hurricane event is kind of hard to come up with a, you know, an answer to, but it would be basically we would come back.

ROBERT RANDALL: I agree with you. We don't know what would happen so...

SCOTT MARTIN: Try to plan our best --

ROBERT RANDALL: It doesn't really remove the risk entirely is what you're saying.

SCOTT MARTIN: Right.

ROBERT RANDALL: Page 14, you state none of the alternatives reduce the toxicity of the sediments. My question is: Why did you not look at any alternative that would reduce the toxicity of the sediments?

SCOTT MARTIN: Well, during the feasibility study, we haven't really come up with any treatment options, and then like -- for example, out west, we have done clean-ups where toxaphene was used at cattle ranches. They used to have like dip vats that the cattle would basically walk through and get a solution on them. Out there, they were able to dig a new cell, take the sediment and liquid from the toxaphene dip vat, put it into the cell and then bioremediate it with biological treatment, but to do that in situ in the creek or in the ditch is challenging, and then it comes back again to the whole, you know, what is toxaphene, what's our cleanup number, what do we treat to, and so the approach here was again to try to tackle part of the source that we know, and then we move into the dredge spoils, the creeks, really get into the more risk assessment and come up with treatment numbers, those kinds of things, to move forward.

ROBERT RANDALL: Thank you. Page 16 is -- is the -- is the most disturbing page because, of course, that's the page where you go into more detail about your preferred alternative.

I -- I think I had just one more question and then a few comments. You are talking about excavating and off-site disposal about 1200 cubic yards of sediment.

By the way, I -- I don't want to ignore the fact that many, many, many thousands of cubic yards have already been removed from this site and that's a -- that's a plus. Where -- where is -- where is this off-site disposal to take place on?

SCOTT MARTIN: I don't know that for sure. But I believe at the -- like when we did the removal it went to a Subtitle D landfill, which is a non-hazardous landfill.

Exactly which one it went to, I -- I don't know that for sure, and a decision like that would be laid out in the remedial design phase.

ROBERT RANDALL: Probably somewhere else?

SCOTT MARTIN: It probably goes to -- like I say, it would go to what's called a Subtitle D landfill, which is a, you know, engineered containment cell for like garbage goes there, things like that, so it would be an engineered cell for containment.

ROBERT RANDALL: So here's -- here's what I'm looking at when I -- when I look at this. The first thing that jumps out at me, of course, is that you have selected as your preferred alternative the -- the cheapest. That immediately makes it suspect to me. You know, why -- why is it that our community is going to get the cheapest of the alternatives instead of something that might be better.

Secondly, you talked in response to an earlier commenter about cost effectiveness. It sounds to me like the only cost effectiveness that comes into play here is the cost to the polluter or to the taxpayer if -- if it's paid for by Superfund -- but in this case it should be the polluter -- is the cost to polluter of cleaning it up.

And there's no calculation in this -- if there is correct me -- but there is no calculation in this of the cost to the community of your preferred remedy.

Mayor Harvey is here tonight. He -- as Ron said, he might actually want to be able to do something with this property, and your remedy is to remove it from the ability of the city or the county or anybody else, for that matter, to do anything with it, and that calculation doesn't enter into your cost effectiveness, and I just want to object to that.

In -- in the second paragraph, in the second column of this, you -- you list some five things that it says that you believe that the preferred alternative meets these threshold criteria.

The last one, Number 5, is satisfying a statutory preference for treatment as a principal element to the extent practical, and I know a lot of things go by the wayside under that phrase, but then in the second paragraph below that at the end you also admit that the remedy does not meet the statutory preference for the selection of a remedy that involves treatment as a principal element, so I find myself wondering -- I mean, I -- I guess you can do it, but to me as a layperson this looks like saying two different things in one column here.

Does it meet it or does it not meet it? And I would, of course, say that it probably does not meet it. The bar that you set here seems extremely low. It is that the proposed remedy will provide for permanent long-term risk reduction.

Well, just about anything will do that. The site already has a fence around it and a keep-out sign, and if you just have somebody go around the perimeter every day and make sure the keep-out signs are still up, you have achieved permanent long-term risk reduction.

That is not cleanup, and if the -- if the EPA is really never, ever, ever, ever going to clean anything up -- and it looks to me like it's not -- I wish y'all would stop using that word, and be honest with the community about what you're doing to us. Thank you.

ANGELA MILLER: Yes, ma'am.

JULIE MARTIN: I'm Julie Martin, and my question I guess is, Scott, to you.

This is a very complicated issue on multiple levels. And we've got different types of groundwater chemicals, different levels, third-party property contamination, and so I realize that we're just dealing with the outfall, the MO -- or the MU -- or the OU1, the ditch, but in looking at the full project from a cleanup standpoint and the different phases and the project areas that have to be addressed, could you explain to us in laymen's terms the bigger picture, and it's really sort of a two-prong question.

Related to the ditch, to me, it seems as though that is a very crucial part of the cleanup. And I would want to make sure that the right thing is done for that fallout ditch because the potential for it to continue to spread seems greater, so if you could just explain the bigger picture so we can understand what, you know, how it's all going to fall into place and why -- I know you explained to some degree, why we're starting where we are and -- and shouldn't that be a really important focus for getting the cleanup right in that area.

SCOTT MARTIN: Yeah. It's like you said, it really is a mind-boggling, complicated, you know, all the -- the operating facility, groundwater, the dredge spoils, the fish, and, you know, part of all that, you throw in this -- the analytical method and interpretation of toxicity data for toxaphene and how do we handle that, and, you know, normally I have a site like my site that I work at in Hattiesburg that is digging up soil and I had a very clear "you dig this soil until you take a test and you get 10 parts per million" or whatever the number was. So that was very clear easy stopping point.

You know, the -- at the outfall channel, like I said, the big main treatment action that has been taken already is that removal that we've already done.

And this would have hoped to have been in a -- come in right behind the removal and do what we're talking about. You know, containment remedies particularly in creeks and estuaries, things like that, that's a pretty standard practice.

The -- I'm going blank on what the site is up north. Big -- big lake area. You know, they have done thousands and thousands of -- you know, covered it with -- contained the sediment.

NANCY NEYLANS: Love Canal.

SCOTT MARTIN: Sorry?

NANCY NEYLANS: Love Canal.

SCOTT MARTIN: No, not Love Canal.

SPEAKER: Onalaska Lake?

SCOTT MARTIN: Anyway, I know not everybody favors containment, but that is a remedy that is -- we use that. It's been our guidance. We do think it does provide a protective, you know, remedy.

The big picture, the overall whole area, you know, obviously separate from CERCLA or in combination with, you know, groundwater, under Superfund, whenever we do a groundwater cleanup the purpose of that is to return it to its beneficial use, and that depends on what the aquifer is classified as.

You know, if an aquifer is classified as a drinking water aquifer, then your goal is to return that aquifer back to meeting drinking water standards. You know, as far as the end result for the marsh area, things like that, would be probably to you're looking at ecological effects. I think -- I would hope that the ultimate end result of all this work would be when we go do our fish-sampling events and we analyze those fish that we don't see anything and we can take the fish advisory off and return it back to, you know, for good use for the community.

TIM FREDERICK: I just wanted to -- my name is Tim Frederick and I worked with Scott on the risk assessment portion of this, and we're running out of time, but if anybody wants to talk about toxicity or the risk assessment portion in particular, I'm around outside or in the parking lot, but the comment was made that, you know, putting a fence around restricting access essentially reduces risk, and that's not entirely the case because what our -- what our end point is, how people are exposed to the contaminants from this outfall right now are not at the outfall itself.

It's the contaminants, and we're hung up on toxaphene because that's what our analysis tells us is remaining in the sediment. It gets into fish and people eat the fish, so we have fish and we know that the fish are at elevated concentrations of toxaphene because we're measuring them every two years.

After your removal, there was a sharp drop, but it wasn't a big enough drop so it's really kind of -- we're looking at this as an urgent piece of the puzzle to take out the source of the ongoing toxaphene into the river, into the creek.

That's going to reduce -- we hope that will see another drop, and then as we move into the next phases, OU2 and OU3, that we will see those toxaphene levels in the fish keep coming down.

We're still seeing toxaphene decades after that was eliminated from production, where we're not seeing other contaminants as much because it was a very long-lived contaminant. It was intended to be applied in cotton fields where it would stay and have its effect of killing things, so it was designed to be long lasting in the environment, and that's what we're seeing, so the point of everything that we're doing is starting at a -- to eliminate the risk of eating fish.

That's our main risk driver here is consuming fish in the environment, is to cut off that pathway the best we can. We're going to remove where we know that there are the most contaminated sediments in that creek.

Again, where do we stop is a question that we -- is why we -- are having difficulty with we will dig it all up. Well, do we dig up every molecule? We -- that's an extremely hard standard to meet.

But with some of the uncertainties for the contaminant that we're seeing in the environment, due to the uncertainty about some of the toxic factors, we're not sure what a clean -- where a good number to stop would be.

So we want to take out the worst stuff that we see, and I think what we're talking about leaving behind is very, very low concentrations, which are then further protected by restricting the access. That's what's on the plan now. All of your comments are going to be taken into consideration before.

SCOTT MARTIN: Thanks, Tim. I completely forgot to mention the drop in concentrations in the fish.

ANGELA MILLER: You and then you. You do it and then you.

CARL BROWN: Carl Brown. You're just talking about the toxaphene levels in fish. People fish over there daily, and there is no signs or anything stating --

SCOTT MARTIN: Right.

CARL BROWN: -- that they shouldn't be eating those fish. And we -- and not just keep people from Brunswick but we have tourists that come here.

SCOTT MARTIN: And that's a real challenge. I -- when I -- you know, I have been with the site, you know, I started in about

2007, and I remember when I came down for the first fish sampling event that we did as part of the RI, there were signs. Some of them had bullet holes in them. Some get taken down. So that's one thing we can look at to maybe put signs back up. But they tend to disappear. The fish advisory is a state-run program. I know the GC has that on their Web site. You can go to the Georgia Web page and get it, but I understand what you're saying about people from out of town.

Maybe we can try to get signs back up and that will have to be something we continually, you know, work on because those signs disappear over the years.

JOHNNY CASON: Who put the original signage up? My name is Johnny Cason.

SCOTT MARTIN: I would have to look into that.

TIM FREDERICK: I think the original signs -- the state administers fish advisories since they are waters of the state. Please correct me if I'm wrong.

SPEAKER: It's the Coastal Resources Division of DNR put them up, and I think when you apply for a fishing license they give you a copy of the consumption guidelines, so there is some information going out to the public, but we've had problems in other areas around the state with keeping signage up in the fish consumption area. We try to put it at boat docks and ramps and things like that.

TIM FREDERICK: The fish advisories are an important part of preventing risk. It's an administrative control while we figure out what we're doing. If you've got a good idea of how to keep signs up, how to keep the public informed, how to prevent people eating the fish, please pass them along.

ANGELA MILLER: And then...

FELICIA HARRIS: My name is Felicia Harris. I'm mayor pro tem for the City of Brunswick. I've got -- and the question I have is dealing with what was said by Mr. Adams and the future limited use of property, and one of your -- in the plan that you are proposing.

As the City of Brunswick is actively and aggressively engaged in revitalizing this affected corridor, which just happens to be one of the main fairways for both the city and the county, to what extent does EPA plan to collaborate with local government, specifically the City of Brunswick, since we are engaged in plans for revitalization and economic development of that specific area?

What collaborative are you-all going to be doing specifically with the City of Brunswick.

WILLIAM DENMAN: My name is Bill Denman and I work with Scott at EPA Region 4. I'm also the Superfund redevelopment coordinator. So I've worked in a lot of redevelopment projects in our region and nationwide, and so, of course, we're very interested in what local governments are doing as far as your future plans and all that.

As Scott said, one of the things we look at, we look at designing a cleanup is what is the property zoned as, so the property is zoned commercial industrial, to our knowledge, so that is how we base our risk assessment, for the reasonably anticipated future land use.

That's the term that we use when we're developing our cleanup, so we have -- and so the restriction that we would put on it would restrict the future use of that to commercial industrial, which it's already zoned for, so if someone wants to come and use that property for commercial industrial use, it would be cleaned up for that.

They would have to know -- in the plan, in the plan they would know that there was contaminated sediment below a certain level and they couldn't dig up what we had put in to contain that, but it doesn't mean that they couldn't build things over it or that they couldn't build on the property.

So we've -- we've seen that all over the United States. Atlantic Station was not a Superfund site, but if you are familiar with Atlanta, Atlantic Station was a project where they took contaminated soil and consolidated it and then they built on top of it. And so that happens all the time, and I'm more than happy to have further discussions with you or anyone with the city about future use.

ANGELA MILLER: Sir.

DARREN WEST: My name is Darren West. I heard you saying that the plan phases were going out OU1, OU2 and OU3, and then you made a decision on the cost of the plan for OU1.

Is this cost the overall -- are you looking at the overall -- when you have to go and spend OU2 and OU3, is that what's driving the cost or is that affecting the cost of what you are suggesting to spend here on OU1?

SCOTT MARTIN: I haven't actually specifically looked at that issue, but it can, you know.

You know, in this case, there is what we call responsible party of Hercules that's paying for the cleanup. I'm sure they have looked more into costs of, you know, other options. Certainly look into the cost.

Cost of OU1 doesn't -- is really basically independent of OU2 and 3. But there's also the reality that, you know, even the federal government doesn't have an endless supply of money even though we print it; right?

So cost of the whole operation does have to be somewhat looked at, but OU1, 2 and 3 are independent of each other so...

ANGELA MILLER: I saw a hand over here and a hand over here. Do you want to go ahead, sir?

ARNE GLAZIER: Arne Glazier. Our commercial zoned district in the city allows residential -- and I'm sorry, I missed the fist part of the meeting, but would residential uses also be allowed, or is there going to be a restriction on residential on that piece of property?

WILLIAM DENMAN: There's a -- there's a -- we realize there is a disconnect between zoning and we realize there's zoning a lot of times only prevents -- like you could have residential in commercial, but you couldn't have commercial in residential. So that's something we understand.

When we look -- when we looked at zoning and we looked at restrictions, we would probably make this restriction to be for commercial industrial.

However, if someone wanted to build, say, you know, eight-story condo complex, you know, which would have to be elevated because it's right on the water, right, and there wouldn't be human exposure to any soil that was above residential standard, then it's the kind of thing that we could change, and we could change that.

As long as they understood, the main

restriction is going to be that whatever construction happens doesn't disturb the contained area and reexpose it to the...

SCOTT MARTIN: You know, and just to follow up on that, EPA does not own the property. We never will own the property. The future use is up to the property owner and the city and other interests, but we you try to work our best to help that out.

WILLIAM DENMAN: So usually -- so usually what we do is, you know, we based on the zoning of the property, we will put a restriction on it and make sure that we're specific about what needs to be protected.

If someone comes to us like the city or a developer and says, "Well, you know, we've got this project we want to put here; how can we do it," then we work with them to -- to provide them the information so that they can go, you know, if it's -- if it's appropriate, so they can go forward with the development as long as it's protective of people.

ANGELA MILLER: We've got about six more minutes. Him and you.

MAYOR CORNELL HARVEY: My name is Cornell

Harvey, H-a-r-v-e-y. I'm the mayor of the city. I've heard from each one of my -- each one of the commissioners of the City, and we stand together in saying that we want it completely cleaned up because we hear what you're saying, but we do want to maybe put residential there. We don't know yet, but we're trying to revitalize that corridor, and -- and basically it seems that something happened way back when and now we need to clean it up, but we're just going to do just a little courtesy swipe at it and then contain it or whatever, and that's -- that's not going to work.

We're trying our best here to revitalize this city, and we need, really need, for a good factual cleanup.

Commissioner Julie Martin said what's the plan for -- what's the whole plan. I know you're doing just Outfall 1, OU1. However, is there any -- do we have any -- do we know that you're going to do Outfall 2 and 3, whatever like that?

Do we know that that is going to happen and it's going to be done completely, or are we just -- you know, once you get this done, will you -- would that be it.

So, we don't know all those moving parts and there's really -- it's -- it's really concerning this whole city and that's why a lot of these citizen are here, to really find out what's going on.

Also the human aspect, I know you put out the fish advisory, but that doesn't stop people from fishing, and what -- what -- I think what really needs to be done is to find out, since this area has been -- really have a lot of cancer patients here, you know, has that really affected, you know, the treatment of cancer? Has it gone up higher because of this. That's what we really need to find out and it could be.

TIM FREDERICK: I was in the hall earlier talking to someone about this same topic. We can't say this person's cancer was caused by this or that.

MAYOR CORNELL HARVEY: Likelihood you could.

TIM FREDERICK: Huh?

MAYOR CORNELL HARVEY: Likelihood you could.

TIM FREDERICK: We can say that we know

that toxaphene is a carcinogen, but there are other carcinogens. What we can do, if you are interested in pursuing that, is CDC does health studies and can see is there an elevated cause of specific cancers that are -- that might be tied back to specific chemicals like toxaphene, but that's not a function that EPA can do. We would have to get you in touch with CDC.

MAYOR CORNELL HARVEY: But you're deciding -- but you are deciding which type of cleanup you're going to do based upon -- not based on that, and that could be a factor.

TIM FREDERICK: We -- yeah, we're basing our cleanup on what we know is in the environment, the health effects. We can speak generally about health effects, but if we're talking about the "is there a rise in a specific type of cancer or general cancers in the community," that's a different question, but if we want to protect people in the future from exposure to a carcinogen, then that's how we -- I know that's -- it's splitting hairs, but that's -- but that's what we do because we're looking at the chemical concentrations now and looking into the future, looking in the past about what health effects may be in the community. That's a different type of activity and that's CDC and county and state health departments.

WILLIAM DENMAN: And when Superfund was created, a specific part of CDC was created to have that public health function, and so we work in concert with them, normally, so we look at the -- you know, we are the engineers and scientists about what's here, how do we clean it up, what's the future risk.

They are more the public background of what, you know, what happened if I was exposed to this in the past, and so they have that expertise about that.

SCOTT MARTIN: Just a real quick loop back around, EPA is not going away. You know, we're here, other OU's. Even if Hercules were to disappear EPA will be here and we will be back.

ANGELA MILLER: Hold on, sir, we had a gentleman...

LONDON ROBERTS: London Roberts, L-o-n-d-o-n. My question is when -- if and when all of this gets cleaned up, is there any plans to return it back to its natural state?

SCOTT MARTIN: Meaning like the dredge spoils areas back to the marshland?

LONDON ROBERTS: Yeah, back to marshland.

SCOTT MARTIN: That's a -- that's a hard question to answer in the end. What we will do with those dredge spoils, you know, I was thinking about that on the way over here, and, for instance, there is no road to the main dredge spoil, so how do you -- you've got a -- let's say somehow we were going to completely remove that, how do you even go about doing that? Is it possible? You know, I guess it is humanly possible, but, you know, it may be astronomically expensive, but that's a question that's going to come up. Yeah, to get it all the way back to being a pristine marsh, that's a tough question to answer.

TIM FREDERICK: But Scott'll be back here telling you the results of the studies that were done out there, and when we're -- when we're ready to figure out what to do about that, but also leading up to it, we will want to get community input on it, what do you want to see out and how do we do it.

LONDON ROBERTS: I guess what you're

saying is no.

SCOTT MARTIN: I -- what I'm saying is I really can't answer that question right now, so it's hard to say, yeah, what it'll be.

TIM FREDERICK: We will be back.

ANGELA MILLER: Two more questions, and then we have to wrap it up or go to the parking lot.

TOMMY CASON: There's more than what I've got to offer, but I do want to know what Scott's connotation of "we will see more of EPA in Brunswick." You stated that several times.

SCOTT MARTIN: Well, I just want to make it clear that I was sort of getting the sense from people that they were maybe getting the feeling that we would come in, do this outfall ditch and then we're finished.

And I was just trying to reiterate that, no, that's not the case. We're still going to be here for UO's 2 and 3. We have other sites that we will be here for, you know, so I was just trying to make the --

TOMMY CASON: I picked up on it several times, Scott, and I think it's important to this community, to folks out here, if we have more

EPA presence here and I want to tell you, I represent the joint water sewer here.

I'm awfully concerned about our drinking water situation here. I'm on the city commission for the City of Brunswick, and I'm concerned about the residents and the area that we're here to talk about.

We've got Commissioner Harris over here. We've got the mayor. We've got Commissioner Martin. We've got Commissioner Elliott with the joint water sewer here. We've got Commissioner Brunson with the county commission here.

We -- we want EPA to help us get our community safe. I picked up the paper yesterday morning with this concern on my mind, reading about Toledo, Ohio and their drinking water.

I spent quite a bit of time in Toledo, Ohio. They have got a mess. I don't know if it was Lake Erie tract. I don't know. But anyway but that came to mind when you mentioned that, a northern city. We don't want that here. We want to get a handle on this thing.

It's been 18 or 19 years to get this outfall ditch up to this screen up here which very frankly we can't read. It's hard to ask questions with a presentation that you can't read, and I'm just pointing that out to you. Probably would have more questions, but it's important to this community that we get this thing totally remediated.

I live on Riverside Drive. My son played on the -- on the dikes that are where all this mess was piled up out there.

What's going to happen with the rest of the community here? That's a question we want to ask you and I along with the Glynn Coalition recommend that you extend for 45 days the comment period to get people in this community involved.

It's been 18 or 19 years in coming just to get to that part. Please give us another 45 days, and let's get together and talk about total remediation while we're doing it.

FELICIA HARRIS: I'd like to add something to what Commissioner Cason said, too. I'd like to see that 45 days extension, too, because for us, it would allow you-all an opportunity to be able to speak with the local entities, governmental entities to see what their foretelling or foreshadowing or foreplans are for revitalization and economic development so that those things can be took into account into your plan.

SCOTT MARTIN: Thank you.

TOMMY CASON: We're taking this very seriously, and we met with Dr. Fuehr last week, and I had no idea exactly what I was living in. I've got just a smattering.

There's no telling what information you folks have got. We've got to get this place cleaned up here, and -- and we've got to bring it out to the public's attention the severity of the problem, and we've got other people here, other employees of agencies that are involved here.

We've got Steve Swan that's the executive director of the joint water sewer. We've got his engineering staff. We were prepared to really answer some questions and have some information.

But we mainly want to let you know that we're serious about this thing and we feel like the position the City of Brunswick needs to take is being taken here today. Thank you. Thank everybody.

ANGELA MILLER: Okay, guys, thank you so much for coming. We really appreciate it.

SCOTT MARTIN: Yeah, really. Thank y'all for coming out on a Thursday night, and I know there are other things to do but we really appreciate it.

(Hearing concluded at 7:43 p.m.)

CERTIFICATE OF COURT REPORTER

STATE OF GEORGIA:

COUNTY OF GLYNN:

I hereby certify that the foregoing transcript was reported as stated in the caption and the questions and answers thereto were reduced to writing by me; that the foregoing 77 pages represent a true, correct, and complete transcript of the hearing on Thursday,July 30, 2015.

I certify that I am not disqualified for a relationship of interest under O.C.G.A. 9-11-28(c); I am a Georgia Certified Court Reporter here as an employee of Gilbert & Jones, Inc. who was contacted by U. S. Environmental Protection Agency to provide court reporting services for the proceedings; I will not be taking these proceedings under any contract that is prohibited by O.C.G.A. 15-14-37(a) and (b) or Article 7.C. of the Rules and Regulations of the Board; and by the attached disclosure form I confirm that neither I nor Gilbert & Jones, Inc. are a party to a contract prohibited by O.C.G.A. 15-14-37(a) and (b) or Article 7.C. of the Rules and Regulations of the Board.

This the 10th day of August 2015.

Debbie Gilbert

DEBBIE GILBERT, CERTIFIED COURT REPORTER, B-515

Attachment 3 Copies of Letters and E-Mails Submitted During the Public Comment Period

Ronald M. Adams

Brunswick, GA 31523

July 29, 2015

Mr. Scott Martin, EPA Remedial Project Manager
US-EPA Region 4, Superfund Division
61 Forsyth Street, SW
Atlanta, Georgia 30303

And Via Email

Martin.scott@epa.gov

RE: Terry Creek Dredge Spoils, Brunswick, GA 31520

Dear Mr. Martin,

The entire Hercules/Ashland/Pinova site with its many components of contamination and wide spread dispersion of those contaminants is a complex and multi-faceted problem that requires a comprehensive plan for remediation. My family owns property which adjoins the Terry Creek Dredge Spoils operative unit 1 on the east side of US 17. We have cooperated with the GA EPD in their effort to determine the extent of contaminated groundwater migration and soil contamination from the Pinova/Hercules/Ashland site onto our property.

We are concerned why, at this critical point in time, the issues surrounding this facility are now proposed to be addressed under CERCLA and not under RCRA. The following are our concerns:

a) The outfall ditch falls within the facility boundaries covered under the RCRA permit of which Hercules and Pinova are the permittees and the ongoing maintenance of the outfall is necessary for the plant to continue to function,

b) Hercules, Pinova, and Ashland should all be responsible parties for purposes of cleanup and damages for all contamination that originated at the plant site,

c) The proposed remediation plan under CERCLA does not address groundwater contamination that is beneath the outfall parcel and adjacent land. This plan should address groundwater contamination,

d) Contamination from the still house and old tank farm areas and from the former settling ponds continues to migrate into the groundwater and move eastward.

e) The RCRA cleanup standard of 5 PPB for benzene is apparently not the standard to which the outfall parcel will be cleaned.

Further, this plan does not address, nor does it establish a time line for addressing, other issues which include, but are not limited to, the following;

- Dredge spoils and the sediment in the creeks and rivers
- The groundwater contamination spreading from the main facility on the west side of US 17
- The plan does not establish a time line with measurable benchmarks and penalties for failure to adhere to the successful remediation.

Finally, this site and all of the associated sites, have been on the Georgia Hazardous Site Inventory since 1994. Meaningful progress has yet to occur.

The plan appears to have deficiencies in design including:

a) the plan appears to ignore the potential for weather events such as hurricanes and extended rain. We do not see floodgates in the description of the plan to prevent rising sea water flooding through the new outfall and onto the plant site potentially contaminating the property of others including our property

b) the plant site continues to have soil contamination that in extreme weather could contaminate the new outfall channel and the creek after it is remediated

c) the plan does not appear to have a settling area (such as a pond) for any contamination that is able to get into the pollution stream of the plant and prevent its introduction into the public waterways

The plan to place a covenant on the property restricting future use suggests an ultimate cleanup plan that results in residual contamination and an incomplete cleanup. Any proposal which allows residual contamination to exist is basically a taking of private property of adjacent and nearby land owners and subjects others to the continued effects and damages from the contamination. This alternative to a complete cleanup is not in the public's interest. The US 17 corridor is the subject of a redevelopment effort by the City of Brunswick. The US 17 corridor is the key link between the mainland, and St. Simons and Jekyll Islands. Placing restrictive future use covenants on this property or allowing contamination to remain on the property may limit the options of the current and future governments of Brunswick to direct the redevelopment of this area of the City.

A far better alternative to proposed alternative 4 is to combine alternative 2 (removal of 36,000 cubic yards of contaminated material) and alternative 5 (box culvert installation). Any plan that is adopted must require Hercules/Ashland/Pinova to eliminate groundwater contamination that exists on the Terry Creek Dredge Spoils area within the next 12 months. Further, soil contamination on the west side of US 17 should be required to be completely remediated within the next 24 months. Until soil contamination on the west side of US 17 is addressed, the outfall is subject to additional contamination.

An idea to consider is the separation of the two functions of the outfall into distinct pathways. Approximately 7,000,000 gallons of cooling water is discharged to the outfall each day. The other function of the N Street Ditch/Outfall is to allow storm water runoff from the plant site as well as upstream runoff from the City of Brunswick. The separation of these streams would allow for measurement of runoff contamination without the dilutive effect of the cooling water. This separation would also allow for a smaller settling area prior to discharge into DuPree creek as the cooling water flowing in a separate pathway would not require a settling area.

Finally, the sea level in Georgia has risen by an average of about 1.5 inches every decade for the last 100 years, and the rise in sea level is said to be accelerating. This fact makes the containment and remediation of both soil and groundwater contamination more complex, more urgent and critically important. Continued changes in the sea level without a comprehensive and timely solution to the current contamination has the potential for severe negative consequences for Brunswick and Glynn County and the region.

The entire contamination problem originated from one source. A piecemeal plan has allowed delays and incomplete remediation over the past 21 years. A seamless, coordinated approach to a complete remediation is necessary to protect the health and welfare of the citizens of Brunswick and Glynn County. A complete remediation is vital to the economic health of the City of Brunswick and Glynn County. And complete remediation is important for the protection of the natural resources for future generations.

Sincerely,

Ronald M Adams

Ronald M. Adams

Brunswick-Glynn County
Joint Water & Sewer Commission
1703 Gloucester Street
Brunswick, GA 31520
(912) 261-7120 Office (912) 261-7178 Fax

September 8th, 2015

United States Environmental Protection Agency (Region 4)
ATTN: Angela R. Miller
61 Forsyth Street, S.W.
Atlanta, GA 30303

Ashland Research Center
Remediation Manager for Hercules Inc.
ATTN: Timothy D. Hassett
500 Hercules Road
Wilmington, DE 19808

Re: Hercules remediation; Terry Creek residential community potable water and fire protection needs.
CERTIFIED MAIL: 7001 1140 0003 6927 3352 (EPA)
CERTIFIED MAIL: 7001 1140 0003 6927 3369 (Ashland Research Center)

Dear Ms. Miller and Mr. Hassett,

The Brunswick-Glynn County Joint Water and Sewer Commission (JWSC) interaction in recent months with the EPA, Hercules, Inc., and Pinova Holdings, Inc. concerning their proposed remediation project to remove benzene and other contaminants from the groundwater has been very informative. The great amount of effort expended to investigate and determine the extent of groundwater impact to our community and its residents is commendable. The JWSC has also learned a great deal more on the adjacent U.S. EPA project to remediate the Terry Creek Superfund Site Outfall Ditch. The condition of this property and its effects are extremely important to the citizens of the City of Brunswick and Glynn County. Hercules has shown how committed it is to be a safe and responsible member of the community. Our drinking water supply is our greatest resource and shall be protected by all parties.

In following with that commitment, the JWSC would like to notify the EPA and Hercules Inc. of the residential community that is immediately downstream and adjacent of the plume of contamination shown by your investigations and continuous monitoring. Terry Creek community, which is immediately adjacent to the Terry Creek outfall is a mix of private fixed residential and mobile home parcels. Glynn County shows at least 14 residential addresses in this community.

The JWSC water system currently does not extend to serve this community. Therefore, the residents are served potable water by private shallow wells. The information provided by Pinova/Hercules indicates that the plume of contamination does currently exist as close as 200 linear feet from the western extent of the Terry Creek community and is moving eastward. The presentations also stated that fishing and crabbing is forbidden by the State due to the contamination present in Terry Creek. Again, this creek is immediately adjacent to these homes which are using shallow wells and their drinking water source. This presents a concern with regard to the quality and safety of their water supply.

The JWSC has performed preliminary engineering work to determine the scope of a project to extend the water supply system to the Terry Creek community. You will find attached a proposed route for extension of the water system and associated project cost estimate.

The lack of public water service to the Terry Creek community also effects fire protection and associated insurance rates for the City of Brunswick. The City of Brunswick currently holds a Class 2 Fire Protection Rating from the Insurance Services Office (ISO). The Brunswick Fire Department is the smallest Class 2 rated fire department in the history of Georgia. According to the Brunswick Fire Department, the unprotected status of this area negatively affected the City of Brunswick's recent Insurance Services Office (ISO) Classification audit.

The JWSC requests that Hercules Inc. and the EPA provide funding to move this project forward. This improvement to the local community will directly help residents affected by the errors of years past and absolutely show the importance of good public relations by Hercules Inc. and Enviromental Protection Agency and your continuing commitment to being a good neighbor in the community. In addition, it would also be a very good gesture for the EPA and Hercules Inc. to pay for these residents associated tap and connection fees. These homes have been exposed to this contamination for a very long period of time and time is of an essence to correct the situation that these residents are incurring.

There are two certified letters that have been sent to the EPA and Hercules Inc. both. Your response in writing is respectfully requested. If you have any questions or desire any additional information, you may call me at your convenience: (912) 261-7100.

Sincerely,

Stephen A. Swan (Executive Director, JWSC)

Donald Elliott (Chairman, JWSC)

Cornell Harvey (Mayor, City of Brunswick)

Allen Booker (Glynn Co. Comm., District 5)

Attachments (2)

CC: File Copy
Nancy Mick (Pinova Holdings)
Timothy D. Hassett (Ashland Research Center)
Scott Martin (US EPA)
Mayor Cornell Harvey (City of Brunswick)
Commissioner Allen Booker (Glynn County)

TERRY CREEK WATERMAIN EXTENSION

BRUNSWICK - GLYNN JOINT WATER & SEWER COMMISSION

OPINION OF PROBABLE COST

AUGUST 11TH 2015

	EST. QTY.	UNIT	DESCRIPTION	UNIT PRICE	TOTAL PRICE
PUBLIC INFRASTRUCTURE PORTION					
1	4	EA	FIRE HYDRANT	$ 1,600.00	$ 6,400.00
2	8	EA	8 INCH VALVES	$ 800.00	$ 6,400.00
3	0.8	TON	FITTINGS	$ 2,000.00	$ 1,600.00
4	4	EA	8 X 6 MJ HYDRANT TEES	$ 150.00	$ 600.00
5	15	EA	8 X 8 MJ TEES	$ 150.00	$ 2,250.00
6	4	EA	6 INCH MJ VALVES	$ 600.00	$ 2,400.00
7	1	LS	TRAFFIC CONTROL	$ 5,000.00	$ 5,000.00
8	JOB	LS	LABOR BASED ON 100 WORKING DAYS	$ 79,416.00	$ 79,416.00
9	1700	LF	DIRECTIONAL BORE ALONG TORRAS CAUSEWAY (PIPE & LABOR)	$ 170.00	$ 289,000.00
10	500	LF	DIRECTIONAL BORE UNDER TERRY CREEK (PIPE & LABOR)	$ 220.00	$ 110,000.00
11	2300	LF	OPEN CUT WITHIN TERRY CREEK SUBDIVISION 8" C900	$ 40.00	$ 92,000.00
12	1	LS	GRASSING AND SURFACE RESTORATION	$ 5,000.00	$ 5,000.00
13	14	EA	8 X 1 WATER SERVICES TO INCLU. TUBING AND CURBSTOP	$ 750.00	$ 10,500.00
14	2	EA	FLUSH CONNECTIONS	$ 1,000.00	$ 2,000.00
SUBTOTAL					**$ 612,566.00**
ENGINEERING (12%)					$ 73,507.92
CONTINGENCY (10%)					$ 61,256.60
SURVEYING (10%)					$ 61,256.60
TOTAL OPINION OF PROBABLE COST					**$ 808,587.12**

OPERATIONAL/INSTALLATION FEES

	EST. QTY.	UNIT	DESCRIPTION	UNIT PRICE	TOTAL PRICE
1	14	EA.	1" BADGER METER	$ 800.00	$ 11,200.00
2	14	REU	CAPITAL WATER	$ 525.00	$ 7,350.00
3	14	EA.	DEPOSIT	$ 100.00	$ 1,400.00
4	14	EA.	CONNECTION FEE	$ 15.00	$ 210.00
TOTAL					**$ 20,160.00**
TOTAL FOR EACH RESIDENT					**$ 1,440.00**

This opinion of probable cost is based upon our professional judgement and the cost of most recent projects completed in this area and is not guaranteed. Actual construction costs may vary based upon approved construction plans, changing material costs, labor cost outside of Davis - Bacon Labor Scale, and the contractor's method of pricing.

N
TERRY CREEK SUBDIVISION
WARDE STREET
TORRAS CAUSEWAY
8"
A y information provided by the JWSC relating to the size and location of existing utilities (i.e. GIS maps, records, drawings, etc.) are offered to assist the designers and others in identifying available points of connection. Such information is offered for the user's information only and is not guaranteed. Use of such information for detailed design purposes without proper field verification shall be at the users own risk.
Created by H. Patel
TERRY CREEK SUBDIVISION
PROPOSED 8" WATER MAIN ROUTE
TO PROVIDE EMERGENCY FIRE PROTECTION
AND POTABLE WATER

CITY OF BRUNSWICK

601 Gloucester Street * Post Office Box 550 * Brunswick * Georgia * 31520-0550 * (912) 267-5500 * Fax (912) 267-5549

Cornell L. Harvey, Mayor
Julie T. Martin, Mayor Pro Tem
John A. Cason, III, Commissioner
Felicia M. Harris, Commissioner
Vincent T. Williams, Commissioner

City Attorney
Nathan T. Williams

City Manager
James D. Drumm

September 11, 2015

Mr. Scott Martin, Remedial Project Manager
Superfund Remedial Branch
U.S. Environmental Protection Agency
Atlanta Federal Center
61 Forsyth Street SW
Atlanta, GA 30303

RE: Terry Creek Superfund Site
Outfall Ditch / Operable Unit 1 (OU1)

Dear Mr. Martin,

The City of Brunswick has passed a resolution regarding the proposed cleanup plan for the Outfall Ditch / Operable Unit 1 (OU1) of the Terry Creek Superfund Site. Please accept the resolution as our comments on EPA's contamination remediation plan.

The resolution states that the City of Brunswick would prefer that EPA select <u>Alternative 5 – Box Culvert Re-Routed with Limited Sediment Removal</u> – as the preferred remediation alternative rather than the currently selected Alternative 4. It is the opinion of the city that a box culvert in this location will be much more beneficial than an open channel as the city moves forward with development and revitalization of the subject area.

In addition to the selection of Alternative 5, the City of Brunswick urges the U.S. EPA to complete full remediation of soil and groundwater at the Outfall Ditch / Operable Unit 1 as opposed to the "limited sediment removal" as listed in the proposed alternatives. The complete contamination removal is necessary to facilitate future development of the area and to recapture the high quality of the environmental and natural assets in the area. It is the city's opinion that complete soil and groundwater remediation should occur at the Outfall Ditch / Operable Unit 1 (OU1) as well as Operable Units 2 and 3 (OU 2 & 3) when those remediation projects begin.

CITY OF BRUNSWICK

601 Gloucester Street * Post Office Box 550 * Brunswick * Georgia * 31520-0550 * (912) 267-5500 * Fax (912) 267-5549

I hope that you will accept this letter and resolution as comments from the City of Brunswick regarding the Terry Creek Superfund Site Outfall Ditch / Operable Unit 1. If further information is needed, or if the city can be of any assistance, please contact me at (912) 267-5540.

Sincerely,

Garrow Alberson, P.E.
City Engineer
City of Brunswick

cc: file

RESOLUTION No. 2015-06

RESOLUTION SUPPORTING THE REMOVAL OF CONTAMINATION FROM OPERABLE UNIT ONE OF THE TERRY CREEK SUPERFUND SITE; URGING THE U.S. ENVIRONMENTAL PROTECTION AGENCY TO SELECT ALTERNATIVE 5 – BOX CULVERT RE-ROUTED WITH LIMITED SEDIMENT REMOVAL - AS THE PREFERRED REMEDIATION ALTERNATIVE; AND URGING THE STATE AND FEDERAL GOVERNMENTS TO CAUSE REMOVAL OF ALL CONTAMINATION IN THE SOIL AND GROUNDWATER OF THE TERRY CREEK SUPERFUND SITE INCLUDING OPERABLE UNITS ONE, TWO, AND THREE.

WHEREAS, U.S. 17 is a primary arterial thoroughfare in Brunswick, Georgia that connects Jekyll and St. Simons Islands to the mainland of Brunswick and Glynn County and is part of the highway system linking Brunswick to neighboring counties to the north and south; and,

WHEREAS, U.S. 17 is an important component to the economic health of Brunswick and Glynn County; and,

WHEREAS, U.S. 17 has been designated a gateway corridor; and,

WHEREAS, Hercules Terry Creek Outfall Operable Unit One is adjacent to this vital corridor; and,

WHEREAS, contamination of Operable Unit One is detrimental to the revitalization of the U.S. 17 corridor; and,

WHEREAS, the U.S. Environmental Protection Agency Region IV has outlined several options for the remediation of Operable Unit One; and,

WHEREAS, the Mayor and Board of Commissioners of the City of Brunswick urge the U.S. Environmental Protection Agency to select Alternative 5 - Box Culvert Re-Routed with Limited Sediment Removal; and,

WHEREAS, further the Mayor and Board of Commissioners of the City of Brunswick urge that all soil and groundwater remediation within the Terry Creek Superfund Site be completed for the redevelopment of the U.S. 17 Gateway Corridor;

NOW, THEREFORE, BE IT RESOLVED by the Mayor and Board of Commissioners, acting in its capacity as the governing authority of The City of Brunswick, formally supports that:

1. EPA select Alternative 5 – Box Culvert Re-Routed with Limited Sediment Removal as the preferred remediation alternative for Operable Unit 1;

2. In addition to selection of Alternative 5 as the preferred remediation alternative, the U.S. Environmental Protection Agency proceed with complete soil and groundwater remediation of Outfall Ditch / Operable Unit 1, as well as Operable Units 2 and 3 (OU1, OU2, and OU3) of the Terry Creek Superfund Site.

RESOLVED this 10th day of September, 2015.

Cornell L. Harvey

Cornell L. Harvey, Mayor

Naomi D. Atkinson

ATTEST: Naomi D. Atkinson, City Clerk

Martin, Scott

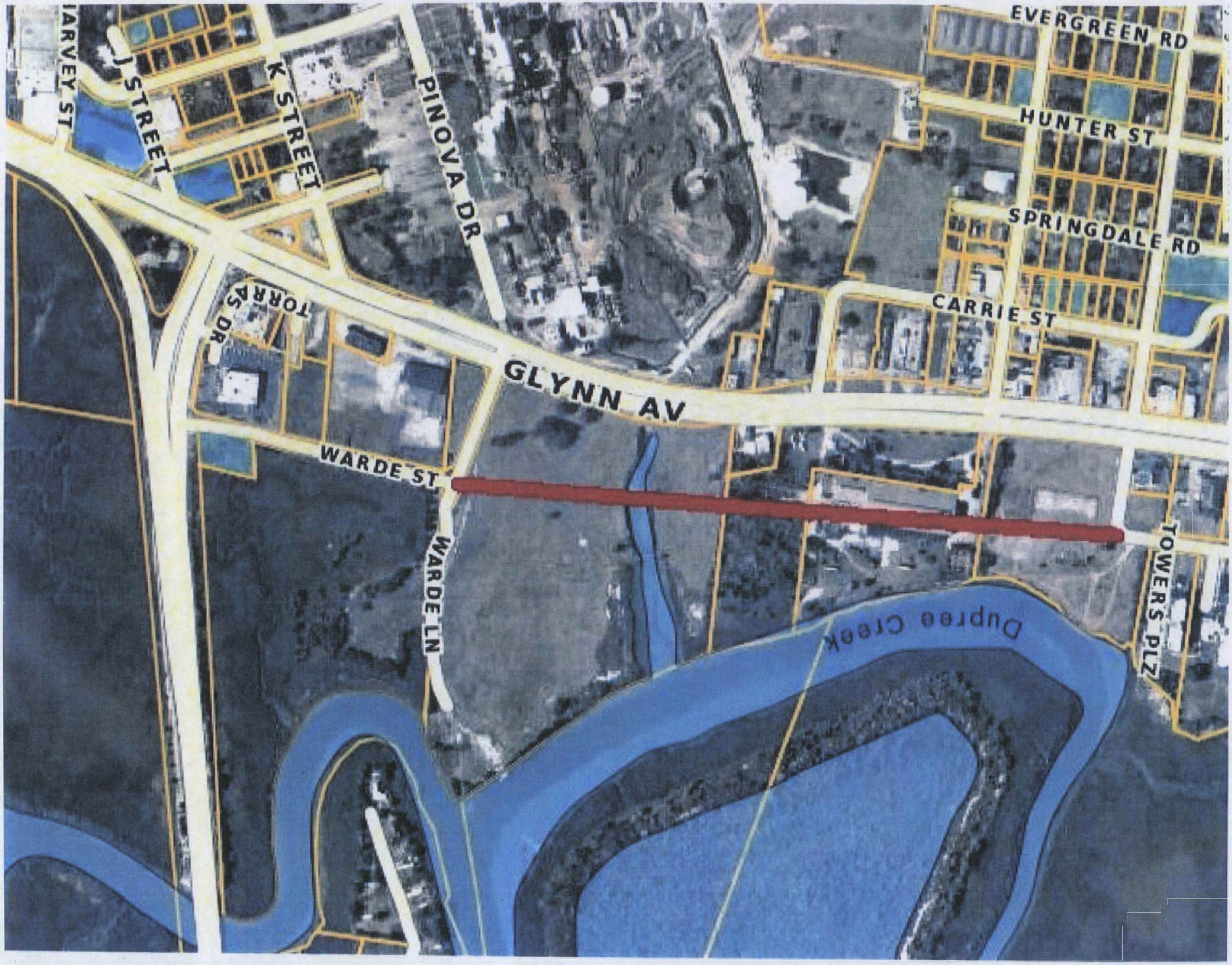
From:	Arne Glaeser <aglaeser@cityofbrunswick-ga.gov>
Sent:	Monday, August 10, 2015 3:39 PM
To:	Martin, Scott
Cc:	Garrow Alberson; Satillaron Adams; Commissioner Felicia Harris; Commissioner John Cason; Commissioner Julie Martin; Commissioner Vincent Williams; Mayor Cornell Harvey
Subject:	Terry Creek Superfund Site
Attachments:	Warde Street extension map.jpg

Mr. Martin,
Thank you for your recent presentation concerning remedial alternatives for the Terry Creek Outfall. As the city planner for Brunswick, I have two comments from the presentation.

First, the City of Brunswick has the intention of connecting Warde Street to the south of the outfall parcel up to Norman/Harold Friedman Streets to the north as generally shown with the red line on the attached map. The extension of Warde Street will serve the redevelopment of several parcels on the east side of U.S. 17 and alleviate some of the traffic conflicts that will occur with the redevelopment of those parcels. It will be much easier for the new street to cross the outfall ditch if the outfall ditch is filled with box culverts as described in the EPA alternatives numbered 5 and 5A. The City of Brunswick prefers a remedial alternative that includes the use of box culverts to aid the redevelopment of the adjacent parcels.

Second, the difficulty of maintaining fish consumption advisory signs on the subject parcel was mentioned at the public meeting. The City's code enforcement department is available, if you need, to monitor any signs that are placed on the subject parcel and can report any sign related issues to the E.P.A. or to Hercules as appropriate. Please let me know if you need any assistance monitoring signs that are placed on the outfall parcel.
Sincerely,

Arne Glaeser
Planning and Development Manager
City of Brunswick
912-267-5502



HARVEY ST
J STREET
K STREET
PINOVA DR
EVERGREEN RD
HUNTER ST
SPRINGDALE RD
CARRIE ST
TORRAS DR
GLYNN AV
WARDE ST
WARDE LN
TOWERS PLZ
Dupree Creek

GLYNN COUNTY ATTORNEY

701 "G" Street, Second Floor, Historic Courthouse Brunswick, Georgia 31520
Phone: 912-554-7470 Fax: 912-554-7597

A Golden Past.
A Shining Future.

VIA U.S. MAIL and EMAIL

September 4, 2015

Scott Martin
Remedial Project Manager
Superfund Remedial Branch
U.S. Environmental Protection Agency
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

RE: RESOLUTION OF THE GLYNN COUNTY BOARD OF COMMISSIONERS SUPPORTING THE REMOVAL OF CONTAMINATION FROM OPERATIVE UNIT ONE AND URGING THE STATE AND FEDERAL GOVERNMENTS TO CAUSE REMOVAL OF ALL CONTAMINATION IN THE SOIL AND GROUNDWATER OF THE TERRY CREEK DREDGE SPOILS AREA INCLUDING OPERATIVE UNITS ONE, TWO, AND THREE.

Dear Mr. Martin:

Attached hereto please find a resolution of the Glynn County Board of Commissioners pertaining to the above-referenced matter.

Thank you for your kind consideration of same. Should you have any questions, or if I may be of any further assistance, please do not hesitate to let me know.

Sincerely,

Aaron W. Mumford
Glynn County Attorney

AM/cas
Attachment
c: Angela Miller, Community Involvement Coordinator (via email)
Glynn County Board of Commissioners (via email)

GLYNN COUNTY BOARD OF COMMISSIONERS
BRUNSWICK, GEORGIA

Resolution: #R-38-15
Adoption: September 3, 2015

At the regular meeting of the Glynn County Board of Commissioners, held in the Glynn County Historic Courthouse, Second Floor Commissioners' Meeting Room, 701 "G" Street, Brunswick, Georgia, there were present:

Dale Provenzano, Chairman, District 2
Richard Strickland, Vice Chairman, District 3
Michael Browning, Commissioner, District 1
Bill Brunson, Commissioner, District 4
Allen Booker, Commissioner, District 5
Mark Stambaugh, Commissioner, At Large Post 1
Bob Coleman, Commissioner, At Large Post 2

On the motion of Commissioner Booker, which carried unanimously, the following Resolution was adopted:

RESOLUTION SUPPORTING THE REMOVAL OF CONTAMINATION FROM OPERATIVE UNIT ONE AND URGING THE STATE AND FEDERAL GOVERNMENTS TO CAUSE REMOVAL OF ALL CONTAMINATION IN THE SOIL AND GROUNDWATER OF THE TERRY CREEK DREDGE SPOILS AREA INCLUDING OPERATIVE UNITS ONE, TWO, AND THREE.

WHEREAS, U.S. 17 is a primary arterial thoroughfare in Brunswick, Georgia that connects Jekyll and St. Simons Islands to the mainland of Brunswick and Glynn County and is part of the highway system linking Brunswick to neighboring counties to the north and south; and,

WHEREAS, U.S. 17 is an important component to the economic health of Brunswick and Glynn County; and,

WHEREAS, U.S. 17 has been designated a gateway corridor; and,

WHEREAS, Hercules Terry Creek Outfall Operative Unit One is adjacent to this vital corridor; and,

WHEREAS, contamination of Operative Unit One is detrimental to the revitalization of the U.S. 17 corridor; and,

WHEREAS, the U.S. Environmental Protection Agency Region IV has outlined several options for the remediation of Operative Unit One; and,

WHEREAS, the Glyn County Board of Commissioners believes that complete remediation is necessary for the redevelopment of the U.S. 17 Gateway Corridor to occur;

NOW, THEREFORE, BE IT RESOLVED by the Glynn County Board of Commissioners, acting in its capacity as the governing authority of Glynn County, formally supports the complete removal of contamination from Operative Unit One. Further, the Glynn County Board of Commissioners urges the state and federal governments to cause removal of all contamination in the soil and groundwater of the Terry Creek Dredge Spoils area including Operative Units One, Two, and Three.

This Resolution shall be effective upon adoption.

This the 3rd day of September, 2015.

BOARD OF COMMISSIONERS,
GLYNN COUNTY, GEORGIA

DALE PROVENZANO, CHAIRMAN

ATTEST:

CINDEE OVERSTREET, CLERK

COMMISSIONERS BRUNSWICK GEORGIA GLYNN COUNTY

Satilla RIVERKEEPER®

Mr. Scott Martin, Remedial Project Manager
U.S EPA Region 4
Superfund Remedial Branch
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303-8960

September 11, 2015

Dear Mr. Martin,

The Satilla Riverkeeper has concerns regarding the proposed cleanup plan for the Outfall Dtich/Operable Unit 1(OU1) of the Terry Creek Superfund Site located in Brunswick, Georgia.

The proposed EPA cleanup plan for this site on Hwy 17 does not go far enough in removing and remediating toxaphene (pesticide) contaminated soils, sediment, and groundwater at the outfall ditch, leaving both human and natural communities still at risk of exposure to these toxins and ultimately limiting any potential future use of this site.

We request that a larger amount of sediment be removed, as discussed in Alternative 2. This method, in addition to the rerouting of outfall as described in Alternative 5, would be a preferred method of addressing the contaminated site

The current plan (Alternative 4) will include minimal removal (1200 cubic yards) of soil and sediment, which leaves much of the contamination in place. Covering soil does not eliminate pathways via fish and birds, which will continue to eat small organisms that accumulate toxins underneath any caps on the soil. Surface and groundwater will continue to move sediment into the marsh, waters and other potential exposure pathways. Because this plan does not permanently remove contaminated soil and sediment from the site, it does not sufficiently protect humans and wildlife from potential future chemical exposure.

Groundwater contamination that exists on site is also a concern. This water has been shown to move up through the sediment and into the Outfall Ditch, meaning that the surface water and groundwater are mixing. This groundwater contamination needs to be thoroughly delineated and a remediation plan, potentially using bioremediation techniques, must be put in place to prevent this water from being a future source of contamination to the surrounding soil and downstream area, particularly due to the flow of ground and surface water in the east direction towards tidal waters where it may be able to spread toxins.

A more thorough analysis of the pathways in which plants and animals are exposed to the onsite chemicals needs to be conducted. For instance, marsh grass can take up toxaphene out of the sediment into their leaves, stems and roots when growing or even planted in the contaminated sediments. This can then be eaten by other organisms, creating bioaccumulation of the toxin, or leave the site during storms, winter dieback or a strong outgoing tide.

Considering human consumption of contaminated fish fish is the greatest risk to human health, the effectiveness of the current fish consumption advisory should be analyzed to gain a greater understanding of how the local population, which includes minority communities, are consuming contaminated fish. A recreational fishing survey may lead to a more accurate analysis of this potential exposure pathway in humans, and can in turn direct and focus future educational efforts on the subject.

Due the Satilla Riverkeepers' concerns about the large number of local residents, recreationists, wildlife, fish and the limited use of the site if not more thoroughly remediated, we respectfully request EPA carefully consider these comments. We appreciate the opportunity to submit them.

Sincerely,

E. Ashby Nix
Satilla Riverkeeper & Executive Director

HERCULES

Hercules Incorporated
Hercules Research Center
500 Hercules Road
Wilmington, DE 19808-1599
Writer's Direct Dial: 302-995-3456

September 11, 2015

VIA ELECTRONIC MAIL

Mr. Scott Martin
U.S. EPA Region IV Atlanta Federal Center
61 Forsyth Street S.W.
Superfund Remedial Branch, Section C
Atlanta, Georgia 30303

RE: **Comments on Proposed Plan for OU1 at Terry Creek Dredge Spoil Site - Brunswick, GA**

Dear Mr. Martin:

This letter serves to provide comments on the United States Environmental Protection Agency's (EPA's) proposed plan for the Operable Unit 1 at the Terry Creek Dredge Spoil Site in Brunswick, Georgia. The Proposed Plan was issued by EPA on June 29, 2015 for a 45 day Public Comment period ending on August 14, 2015. A public meeting was held by EPA on June 30, 2015 in Brunswick. Several participants in the meeting requested that the public comment period be extended and therefore, EPA has extended the public comment period to September 11, 2015. During the public meeting, Hercules heard several general comments that we would like to address with this letter. Prior to addressing comments, some key background information on the Site is presented and a summary of the Proposed Plan selected by EPA.

BACKGROUND

The Terry Creek Dredge Spoil/Hercules Outfall Site (Site) located in Brunswick, Georgia, was proposed by the EPA for listing on the National Priorities List (NPL) in April 1997. An Administrative Order on Consent (AOC) was executed between Hercules Incorporated (Hercules) and EPA on 17 November 1998 to perform removal actions on certain sediments in the Outfall Ditch and Terry and Dupree Creeks. The removal action was implemented between 1999 and 2000. A separate AOC was executed between Hercules and EPA on 30 September 1999 to perform a Remedial Investigation/Feasibility Study (RI/FS) for the Site in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations and guidance. Pursuant to the 1999 AOC, Hercules submitted a revised RI/FS Work Plan to USEPA in 2001. However, due to concerns regarding the analytical methods for toxaphene, the project was temporarily suspended by EPA who had not provided comments nor approved the 2001 Work Plan for implementation. In June 2008, EPA requested a schedule for resuming RI/FS activities at the Site.

The concerns regarding the analytical methodology mentioned above were related to whether the existing analytical methods could quantify specific congeners/parlars in weathered toxaphene. As a result, the EPA Office of Solid Waste subsequently developed a new method (SW 846 Method 8276) using GC-NIMS to measure/analyze individual toxaphene congeners of interest. The new method was published in 2010 and is able to quantify a number of individual toxaphene congeners including Parlar 26 (p-26), Parlar 50 (p-50), Parlar 62 (p-62) and, Hx-Sed, and Hp-Sed. While the analytical method has been finalized, the method has not been commercialized and the analytical standards for these particular congeners are not readily available on the commercial market and will need to be sourced for a commercial laboratory to use the method on a large scale. Additionally, the toxicity of these newly identified congeners to ecological receptors is unknown and remains a significant technical challenge for the project.

In the interest of moving the project forward, Hercules developed a Site Management Plan (SMP) which divided the Site into multiple operable units (OUs) and targeted addressing the Outfall Ditch (Operable Unit 1) first. The Outfall Ditch was prioritized since it contained higher levels of toxaphene, was a manageable size, and a remedy could be selected that was not reliant on the toxaphene analytical methodology or toxicity reference value development. The remedial action objective (RAO) would be defined as a narrative, performance-based goal (i.e. protectiveness achieved via pathway elimination) versus numerical risk-based concentrations (which could not be evaluated at the time due to the lack of toxicity data). Operable Unit 2 (upland areas and dredge spoils) and Operable Unit 3 (Terry and Dupree Creeks) would be addressed separately.

Hercules has voluntarily conducted fish tissue surveys biannually to monitor the concentrations of toxaphene in fish tissue. The Georgia Department of Natural Resources (GDNR) has relied upon these data to routinely evaluate and update the fish consumption guidelines as necessary for the area; however, no additional substantial reductions in toxaphene levels in fish tissue have been documented beyond the initial decline after the 1999-2000 removal action. It is anticipated that eliminating the exposure to toxaphene from the Outfall Ditch through a capping remedy together with limited sediment removal will result in decreased concentrations of toxaphene in fish tissue that is at least equivalent to the protection offered through additional, more extensive sediment removal alone, and may even be more protective by minimizing sediment disturbance.

SUMMARY OF EPA's PROPOSED PLAN FOR OU1

Hercules completed the RI/FS for OU1 and EPA selected its preferred remedy to address OU1. EPA's Proposed Plan (PP) entails in-situ capping, and consists of the following components:

- re-routing the flow currently going into the Outfall Ditch to a newly constructed concrete-lined conveyance channel
- excavation and offsite disposal of approximately 1,200 cubic yards of impacted sediment from OU1
- removal of the weir
- placement of geo-textile fabric over existing sediment in the Outfall Ditch
- backfilling the Outfall Ditch with compacted clean soil over fabric
- armoring the backfill slope adjacent to Dupree Creek
- seeding and stabilization of disturbed areas
- establishment of an environmental covenant to require the future use of the property to be commercial/industrial and to restrict groundwater use
- periodic inspections, maintenance, and sediment removal from the Outfall Ditch

As set forth below, Hercules believes that EPA's preferred remedy is consistent with NCP goals, provides the same level of protectiveness as the other remedies, and is the most cost-effective remedy evaluated.

EPA'S PROPOSED PLAN IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT

EPA's preferred remedy, in-situ capping, is one of the three major remedial alternatives for sediment sites that are proven to achieve risk reduction by limiting exposure to contaminated sediments (EPA, 2005). Similar to other sediment remedies, the cap for the Outfall Ditch will be designed to reduce risk through physical isolation, stabilization, and chemical isolation. In addition, the cap will complement the dredging previously performed during the 1999-2000 removal action, with the overall goal of achieving further reductions in fish tissue concentrations in the Terry and Dupree Creek system.

During the public meeting, some participants indicated that "complete" removal (i.e., dredging) should be the selected remedy in lieu of in-situ capping. Consistent with the National Contingency Plan (NCP) and sediment guidance documents, dredging would require the development of risk-based cleanup goals in order to quantify the volume of sediment for removal. Here however, there are no toxicity reference values for weathered toxaphene, and therefore risk-based cleanup goals cannot be determined nor dredging volumes quantified.

A remedial alternative without clearly defined goals (i.e., risk-based cleanup goals) would result in an ambiguous technical approach and substantial uncertainties in associated implementation costs. The lack of specific goals makes it impossible to define what areas to remove and to what depth. Additionally, this problem cannot be resolved by removing sediments to background (non-detect) concentrations because this is not technically feasible and is not required under the NCP. Finally, by eliminating the human and ecological receptor pathways to impacted sediments, in-situ capping would provide the same level of effectiveness as dredging, and is consistent with NCP goals.

EXPENSE AND COST EFFECTIVENESS OF EPA's PROPOSED PLAN

The NCP evaluation criteria for selecting a remedy include implementability, overall protectiveness of human health and the environment, long-term permanence and effectiveness, and cost. Cost to implement is particularly important for differentiating remedies at sites like the Outfall Ditch, where all of the evaluated remedies afford the same general level of protection. All of the evaluated remedies with the exception of No Further Action would require significant expenditures by Hercules. EPA's preferred remedy is estimated to cost in excess of $5MM.

Despite the cost, Hercules supports EPA's preferred remedy because, among other things, it will effectively eliminate a contaminant source (Outfall Ditch sediments) immediately upon construction completion. Conversely, Hercules could have pursued Monitored Natural Recovery (MNR), an alternative, less expensive remedy that data indicates could be effective at the Site, but which would involve a much longer timeframe for achievement of RAOs. MNR relies on ongoing physical and biological processes to reduce concentrations and bioavailability (e.g., burial, transformation) of contaminants in sediments. The concentrations of toxaphene found during the Focused RI indicate that these natural processes (i.e., deposition of clean sediments on top of existing contaminated sediments and natural degradation of this contaminant) have reduced the toxaphene concentrations in the biologically active surface sediments of the Outfall Ditch compared to the post-excavation sampling performed following the 1999-2000 removal action. However, because an MNR remedy would require longer-term monitoring to evaluate and document its effectiveness, Hercules chose to pursue active remedies with shorter implementation timeframes to quickly eliminate the contaminant source. This pathway elimination goal is partly based on the observed sharp declines in fish tissue toxaphene concentrations following the 1999-2000 removal action. Hercules believes that implementing a more aggressive remedy to quickly eliminate exposure pathways to ecological receptors (fish) in the Outfall Ditch may lead to further reductions in fish tissue concentrations.

EPA's PROPOSED PLAN DOES NOT HINDER FUTURE DEVELOPMENT

Some participants in the public meeting expressed a preference for an alternative that would re-route the channel into a quadruple box culvert on the basis that the property would be more attractive for redevelopment. The potential for future redevelopment, however, is not among the remedy evaluation criteria set forth in the NCP.

In addition, implementation of the PP will allow the Site to be redeveloped for commercial/industrial uses, while still preserving the ability to redevelop the Site for other uses in the future. Re-purposing "brownfields" properties is done quite extensively across the country. EPA and the states (including Georgia) have well-defined Brownfields programs where former industrial property is redeveloped. Local examples include the Hercules 009 Landfill in Brunswick, which has been re-purposed into a parking lot; portions of the LCP site, which are now being used as the Glynn County Detention Center; and the Atlantic Station property in downtown Atlanta, which involved the repurposing of an old steel mill into a mixed-use property. While it is not a proper part of the remedial decision process under CERCLA, Hercules understands the public's interest in future redevelopment of the Site and is willing to discuss opportunities to do so with interested parties.

EPA'S PROPOSED PLAN DOES NOT IMPACT GROUNDWATER OR SURFACE WATER

During the public comment meeting, EPA received comments on potential impacts to groundwater and surface water resulting from alleged leaching from toxaphene-impacted sediments that will remain in place following completion of the preferred alternative. As part of EPA's preferred remedy, an environmental covenant will be placed on the property prohibiting the use of groundwater below the Site for potable or irrigation purposes, thus eliminating direct exposure to groundwater. Therefore, the point of exposure from toxaphene potentially leaching to groundwater would be its migration in groundwater to Dupree Creek.

The following lines of evidence indicate little potential for groundwater or surface water impacts following implementation of the OU1 preferred alternative:

- Toxaphene is only slightly soluble in water, with reported solubilities ranging from 0.4 mg/L to 3.3 mg/L (de Geus et al., 1999);
- Toxaphene has very low mobility, as it tightly sorbs to organic particles (e.g., Koc = 2.1×10^5 L/kg; EPA, 2015);
- Empirical data collected at and nearby OU1 support that toxaphene does not readily solubilize in groundwater. For example:
  - toxaphene is not detected in shallow wells at the Site;
  - at the nearby Hercules 009 Superfund Site, where toxaphene-impacted material has been documented, toxaphene was not detected in groundwater above the drinking water maximum contaminant level (i.e., 3 µg/L) during the last five-year review cycle (EPA, 2011);
  - Site characterization data indicate that toxaphene-impacted sediments and porewater in OU1 do not currently serve as a source of groundwater contamination;
  - toxaphene has not been detected in surface water samples at the Site, even though the surface water is in direct contact with the toxaphene-impacted sediments. Similarly, toxaphene was not detected in surface water samples at the Hercules 009 Landfill Superfund Site (EPA, 2011);
- Groundwater discharge to surface water from OU1 following implementation of the preferred alternative is expected to be negligible compared to the volumetric flow of Dupree Creek. For example, groundwater discharge from OU1 is estimated to be approximately 0.1 gallons per minute (gpm), assuming a groundwater velocity of 13 feet/year (based on studies at the Plant Site), an OU1 width and depth of 150 feet and 10 feet, respectively, and a porosity of 0.5. By comparison, the volumetric flow of Dupree Creek is conservatively estimated to be approximately 45,000 gpm, assuming the following:
  - A velocity of 0.2 feet/second (ft/sec) (conservative assumption, given the reported range of velocities [0.2 to 2.3 ft/sec] of Terry/Dupree Creeks reported in the RI/FS;
  - a width of 100 ft (approximate width at low tide compared to an approximate width at high tide of 400 ft); and
  - an average channel depth of 5 ft.

Based on these estimates, groundwater discharge from OU1 is estimated to represent less than 0.00033% of the conservatively estimated volumetric flow from Dupree Creek.

Furthermore, based on the physical-chemical properties of toxaphene (see e.g., sorption discussion above), migration of toxaphene (if present in groundwater) is anticipated to be significantly retarded compared to groundwater flow. The transport velocity of toxaphene (v_{tox}) in groundwater can be estimated by dividing the groundwater velocity (v_{gw}) by the estimated retardation factor (R). R is estimated using the following equation:

$$R = 1 + \frac{f_{oc}\,K_{oc}\,\rho_b}{\eta} = 1 + \frac{(0.001)\,(210{,}000)\,(1.233)}{(0.53)} = 595.3$$

where:

- *Koc* and porosity (η) are as stated previously;
- fraction of organic carbon (f_{oc}) is 0.001, based on OU1-specific data (Geosyntec, 2014); and
- bulk density (ρ_b) is 1.233 kilograms per liter (Geosyntec, 2014).

The rate of migration of toxaphene in groundwater is estimated using the following equation:

$$v_{tox} = \frac{v_{gw}}{R} = \frac{13\,ft/yr}{595.3} = 0.022\,ft/yr$$

This rate of toxaphene migration indicates that it would take approximately 46 years for toxaphene to migrate 1 foot in groundwater. Considering both the rate of migration and the groundwater discharge rate, any potential impact would be immeasurably small and significantly below any action level.

The analysis above predicts that EPA's preferred alternative will be protective of human health and the environment and will meet the RAOs for OU1. EPA's preferred remedy is also consistent with the NCP where engineering controls, such as containment, and institutional controls, such as deed restrictions, are used for short- and long-term management to prevent or limit exposure to contaminants.

Finally, on the subject of groundwater, while not directly related to the remedy selection for the Outfall Ditch, Hercules heard concerns during the public meeting about the City of Brunswick water supply. Hercules recently sampled both private and public wells closest to the Plant Site (at the Trailer Park) and found them to be clean. Hercules would like to stress that the groundwater contamination emanating from the Plant Site does not affect the water supply for the City of Brunswick. The groundwater contamination at the Plant Site is well delineated, is being monitored, is at a much shallower depth than the water supply wells used by the City, and is separated from the City water supply aquifer by several clay confining units.

Please call Tim Hassett if you have any questions (302-995-3456).

Sincerely,

John Hoffman

John Hoffman
Manager of Remediation

TDH/cck
response

e-copy
cc:

G. Roush – Geosyntec, Atlanta, GA
V. Krenicky – US Army Corp of Engineers, Savannah, GA
P. Gaynor – GA EPD, Atlanta, GA

REFERENCES

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Preserving Georgia's Coast. Forever.

September 4, 2015

Mr. Scott Martin
Remedial Project Manager
U.S. EPA Region 4
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

RE: Comments on the Proposed Clean Up Plan for the Outfall Ditch/Operable Unit (OU1) of the Terry Creek Superfund Site in Brunswick, Georgia

Dear Mr. Martin;

Thank you for the opportunity to provide comments on the Proposed Clean Up Plan for the Outfall Ditch/Operable Unit (OU1) of the Terry Creek Superfund Site in Brunswick, Georgia. The contamination caused by operations at the Hercules Brunswick pesticide plant is of great interest and concern to members of One Hundred Miles, residents of the state of Georgia, the City of Brunswick and Glynn County.

One Hundred Miles is a coastal advocacy organization dedicated to protecting, preserving and enhancing Georgia's 100-mile coast. We respectfully submit this comment letter into the public record in response to the U.S. Environmental Protection Agencies' (EPA) solicitation for comment released on June 29, 2015.

After reviewing the proposed clean up plan for the Terry Creek Superfund Site, we feel there remain serious questions and shortcomings that continue to threaten the health and safety of our citizens and wildlife. Overall, we do not feel the Proposed Preferred Alternative goes far enough to clean up the Outfall Ditch/Operative Unit 1 (OU1). We suggest EPA select a clean up alternative that removes more of the contamination found in OU1; that the EPA tie OU1 remediation to other efforts to clean up contamination caused by the Hercules operations; and that the EPA clarify how and when the contamination found in other operable units will be remediated.

Please respond promptly and thoroughly to the following questions and statements.

- It is our understanding that the Hercules site has multiple operable units that require clean up. When will the other operable units (specifically OU2 and OU3) be addressed and how will the proposed remedies for those sites be linked to the clean up of OU1?

- The recommended alternative identifies a remedial alternative that into lined conveyance channel. This alternative will allow too much exposure to the contaminated waters and sediments in the area. While it would be best to completely remove the contamination, a preferred alternative would involve completely culvertizing the channel (as described in Alternatives 5 and 5A, to significantly reduce potential exposure to the chemicals of concern.

- Page two of the Superfund Proposed Plan Fact Sheet refers to the clean up of OU2 and OU3 is contingent upon, "... gaining consensus on the toxicity of the toxaphene breakdown products for both human and ecological receptors." How can the agency use a difference in opinion or disagreement in the breakdown of a chemical as an excuse for delaying action to clean it up? Toxaphene is known to can cause liver and kidney damage, birth defects and cancer. The best option to appropriately address this issue, should include:

    - Extensive and appropriate testing to determine the extent of the toxaphene contamination and all chemicals created as toxaphene breaks down.

    - Removal of more than 1,200 cubic yards of contaminated sediments. Other alternatives that would remove 12,800 cubic yards of contaminated sediments are preferred.

- What role has the Center for Disease Control and/or the U.S. Agency for Toxic Substances and Disease Registry (ATSDR) in evaluating the toxicity of OU1, as well as OU2 and OU3 site and the extent of the health effects caused by the contamination of the Hercules site?

- What is the connection between the toxicity of OU1 and the plume of benzene-contaminated groundwater under the Terry Creek site and beyond? Who is the responsible party for cleaning up the benzene plume? What is the plan and proposed timeline for cleaning it up?

- The parent plant of the Hercules plant is Ashland, Inc. Additionally, other companies have a history of ownership on the site, including Pinova that currently operates the active industrial site. Why does the proposed plan not identify and assign remediation obligations to other potentially responsible parties?

- Georgia Environmental Protection Division (GA EPD) requires Pinova submit discharge monitoring reports to comply NPDES permits in compliance with the federal Clean Water Act. Pinova regularly reports that the outfall ditch channels six million gallons of water a day (6 MGD). The volume discharges into Terry Creek and includes stormwater from the City of Brunswick, runoff from the former Hercules plant site, and industrial discharge from the active Pinova plant. Based on the EPA's Enforcement and Compliance History Online – ECHO - website (echo.epa.gov), as recently as third quarter of 2012, Pinova's discharge monitoring reports discovered toxaphene in monitored water (See ECHO records for CWA Source ID GA0003735). With any potential for contributing toxaphene into our waterways, it would seem irresponsible for EPA to not address such contributions and require remediation by the contributing entity.

How will EPA prevent toxaphene-contaminated waters from entering OU1 exacerbating the problem?

- Additionally, as sea level continues to rise, marshlands and uplands will be eroded and both clean and contaminated sediments will be released into the waterways. How will the proposed clean up plan prevent increasing sea level from releasing more contaminants captured in the soils in OU1? Additionally, how will the proposed clean up plan prevent the disruption of contaminated sediments during extreme weather events, such as hurricanes and tropical storms?

- In conclusion, One Hundred Miles suggests the clean up plan go further to remove the contaminated soils from the Terry Creek outfall ditch and eliminate the potential exposure to wildlife and humans.

Thank you for the opportunity to submit these comments on the proposed clean up plan for the Terry Creek superfund site. Please contact me at any time if you have questions or need additional information.

Sincerely,

Alice Miller Keyes

Alice Miller Keyes
Associate Director

P.O. Box 2056, Brunswick, Georgia 31521
(912) 264-4111

Martin, Scott

From: Miller, Angela
Sent: Friday, July 31, 2015 9:59 AM
To: Steve Swan
Cc:
Subject:
Attachments:

Good morning Mr. Swan,

Thank you so much for coming out to our meeting last night. I have forwarded your concern to my Remedial Project Manager, Scott Martin. We are traveling back to Atlanta today so it may be Monday before we start discussions regarding this issue.

We will be in touch and look forward to working with you in resolving this concern.

All the best,
Angela R. Miller
U.S. EPA - Region 4
Public Affairs Specialist
(678) 575-8132
Miller.angela@epa.gov

On Jul 31, 2015, at 9:30 AM, Steve Swan <SSwan@bgjwsc.org> wrote:

> Mrs. Miller,
>
> Myself and my staff enjoyed your presentation last night in reference to the surface water discharge of Hercules into the Terry Creek. After listening last evening and reviewing your charts, we became concerned by the depth of the reported Benzene and the nearby shallow wells of the residents of Terry Creek Road. Currently all of these residents are on private shallow wells which are the nearest residents to the discharge point of Hercules. I have attached a map below showing the location of this residential area compared to the discharge point.
>
> The Brunswick – Glynn Joint Water and Sewer Commission provides water and sewer service to Glynn County. Currently, JWSC does not provide service to Terry Creek Road. The JWSC requests that the EPA and Hercules research any possible funding sources to provide clean and safe drinking water into the Terry Creek Road Residents. Our engineering staff will be working on a Engineers cost estimate for this project. Once we complete this estimate, we will forward the estimate and request that your agency and Hercules attempt to acquire a funding source for this project.
>
> The JWSC has a commission meeting on the 6th of August, where Ashland, Pinova, and the Antea Group will be giving a presentation to our commission on the proposed projects they are working towards. Greg Cherry of the USGS will be present for this presentation to answer questions concerning our local water supply and any exposure or dangers that the Superfund Site may pose to our current drinking water system. We encourage the EPA to attend this session to comment and answer any questions.

The commission meeting will be held at 1703 Gloucester Street, Brunswick Georgia at 2 PM on August 6th, 2015. We look forward to seeing you there!

TERRY CREEK ROAD RESIDENTS	HERCULES DISCHARGE POINT

<image006.png>

Sincerely,

Stephen A. Swan
Executive Director
Brunswick-Glynn County
Joint Water & Sewer Commission
[illegible]
[illegible]
[illegible]
[illegible]


Ocean Hwy
25
Terry Creek Rd
Frederica Rd
F J Torras Causeway
© 2015 Google
Goo

Comments on
Terry Creek Superfund Site Outfall Ditch/Operable Unit 1
Proposed Plan Fact Sheet June 2015
Prepared by Environmental Stewardship Concepts, LLC
September 2, 2015

Introduction

This *Proposed Plan Fact Sheet* is a summary of the findings in the *Focused OU1 Remedial Investigation/Feasibility* released in December, 2014. ESC has commented previously on several documents leading up to this Proposed Plan and will repeat these comments here, where necessary. Overall, the major issues still exist and EPA is urged to not accept this cleanup option as adequate or final.

Regarding the cleanup options, the Proposed Plan still fails to offer as the preferred alternative a quadruple box culvert, increased amount of sediment removal, use of an activated carbon cap for deeper sediments, or consider biodegradation via bioremediation methods. EPA needs to address: **Why does the preferred alternative not include the four box culvert, relocation of the ditch, substantially greater sediment removal and biodegradation?**

The Remedial Investigation is wholly inadequate in determining the full nature and extent of the contamination in terms of spatial and depth distribution, chemical composition, toxicity, contamination distribution through all environmental media and risks to human health and ecological receptors. Bioassays need to be conducted for sediments (surface and deep), pore water, surface water, plant matter as food and prey items.

The *Feasibility Study* presumes a remedy in the design and stated purpose, and fails to offer a full range of remediation alternatives for analysis. In this regard, the Feasibility Study does not meet regulatory requirements.

Environmental Justice issues at Terry Creek

This Proposed Plan fails to meet the intent or specific requirements of the Environmental Justice Executive Order or the EPA Strategic Plan on EJ, or the practices that have been conducted by EPA at other CERCLA sites where there are EJ issues. There is no estimation of cumulative risks, no Environmental Justice Analysis, and no specific assessment of exposures and risks from contaminated fish (and other seafood) consumption to the fishing public. As a result, the Proposed Plan should be withdrawn and corrected in order to complete the necessary work to achieve EJ goals.

Why did EPA not conduct an EJ analysis?
Why did EPA fail to consider the fish consumption exposures of the African American community in Brunswick?
How will this Proposed Plan address EJ problems that exist in Brunswick now and in the future?

Presidential Executive Order 12898 of 1994 indicates that all federal agencies will take steps to achieve environmental justice and in section 1-101 directs:

"...each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations"

Section 3-3 specifically directs each agency to conduct analyses accordingly:

> "(b) Environmental human health analyses, whenever practicable and appropriate, shall identify multiple and cumulative exposures. "

The Executive Order further directs agencies to specifically address issues concerning consumption of fish and wildlife (in Section 4-4).

Brunswick is predominately African American, with 11% Latino, both minority communities. The US census for 2010 indicates that Glynn County is 33.3% non-white, but Brunswick City is approximately 59% African American, shown in the tables below.

Glynn County-Brunswick, GA Census Data
Glynn County
http://quickfacts.census.gov/qfd/states/13/13127.html
Brunswick
http://quickfacts.census.gov/qfd/states/13/1311560.html

Demographics (2010)	City of Brunswick	State of GA
White alone	31.4%	59.7%
Black/African American alone	59.2%	30.5%
Hispanic/Latino	11.3%	8.8%
White alone (not Hispanic or Latino)	27.5%	55.9%
Asian alone	0.6%	3.2%
American Indian/Alaska Native alone	0.3%	0.3%
Native Hawaiian/other Pacific Islander alone	0.1%	0.1%
Two or more races	2.0%	2.1%

Demographics (2009-2013)	City of Brunswick	State of GA
Language other than English spoken at home (age 5+)	13.9%	13.3%
High School graduate or higher (age 25+)	78.1%	84.7%
Bachelor's degree or higher (25+)	12.3%	28%
Per capita money income in past 12 months (2013 dollars)	$17,232	$25,182
Median household income	$29,106	$49,179
Persons below poverty level	37.9%	18.2%

The facts are that the population has been exposed to releases of contaminants from this site for a period approaching 100 years, exposures from all pathways over the entire period have not been characterized and are likely substantial, the population is predominately African American, fish consumption has not been analyzed at this site, all chemicals have not been assessed, notably dioxins, and the current Proposed Plan will leave substantial contaminated sediment in place.

In the professional judgment of ESC, LLC, the Plan will result in continued health risks to the population, disproportionately so for the African American anglers.

Chemical contamination at the Terry Creek Site, OU1

This particular site has been contaminated with pesticide residues, wastes, products and by-products of chemical synthesis and manufacturing processes conducted over a period of approximately 100 years. The RI/FS and Proposed Plan focus on a specific category of chlorinated camphenes with no consideration of other pesticide manufacturing processes, products, wastes or by-products. This omission is so serious that even known contaminants of chlorinated camphene production, i.e. dioxins, are omitted from serious consideration and evaluation at the site. For this reason alone, the RI must be considered inadequate and rejected until such time as all chemical contaminants, including and especially dioxins, are fully characterized at the site.

Why has EPA not included dioxins and furans in the RI analysis as contaminants?
Will EPA require measurement of dioxins/furans in sediment, soil and groundwater at the site?

Chlorinated camphene

Much is discussed in the RI, the FS and the Proposed Plan about toxaphene, a particular commercial formulation of chlorinated camphenes, in bulk synthesis. This discussion diverts the Agency and the public from the critical question of the toxicity of the environmental media at the site. EPA needs to know the sediment toxicity, pore water toxicity, surface water toxicity, and biota toxicity to humans and the full range of ecological receptors (mammals, birds, fish, reptiles, invertebrates, etc.).

What is the toxicity of site environmental media, including sediment (surface and at depth), pore water, surface water, and biota?

Chlorinated camphenes are equated with technical toxaphene, erroneously; the two terms do not refer to the same chemical(s). Furthermore, the documents make a series of false assumptions about the chemical composition of sources, wastes, by-products, effluents and receiving waters over a period of many decades of activity at the plant that is the source of contamination at this site. Any estimate of current conditions based on past activities is mere speculation owing to the absence of critical information on the complete chemical composition of waste streams, receiving water hydrodynamics, pH, salinity, temperature, sediment load, dissolved organic carbon content, particulate organic carbon content and other factors. In short, the only scientifically defensible method to assess chemical contamination at the OU1 site is to make measurements using the EPA approved method.

Methods of measuring chlorinated camphenes (toxaphene)
The Proposed Plan seeks to continue the obfuscation of measuring chlorinated camphenes in the body of the text and in Appendix A of the RI/FS. Three different methods are available and have been used to measure concentrations of this group of compounds, Method 1, Method 2 and EPA Method 8276. Only one method, EPA Method 8276, is officially promulgated for applications such as Terry Creek. In fact, sediment samples from Terry Creek were used in the validation of the EPA Method 8276.

Appendix A of the RI/FS was conducted and prepared by Hercules consultants Geosyntec, with other labs completing the lab work. This Appendix indicates that EPA Method 8276 is the most sensitive method, but calls on using Method 2 in addition to Method 8276, because of consistency with historical sampling that used Method 2. The problem lies in the cover letter that states the Appendix recommended against using Method 8276, when such a statement is not made in the Appendix. This document is not Agency policy and not an official document on measuring chlorinated camphenes.

The body of the Proposed Plan continues the obfuscation in text that the risks and toxicity is overly complicated. The complication is created by the PRP. EPA has an approved method (Method 8276) and the data obtained by other methods is insufficient for an accurate site assessment, a point supported by the RI/F Appendix A data.

All of the data given in the Proposed Plan were obtained using Method 1 or Method 2, or both, and thus underestimates by 4-10 fold. These data are clearly inadequate to make remedial design conditions, and not sufficient for estimating health risks.

Why does EPA accept the data using measuring methods that are inaccurate and that underestimate concentrations of contaminants?

Will EPA use EPA Method 8276 exclusively for this site in the future?
Given that most of the data in the RI are not accurate measures of environmental contamination, how will EPA handle the inaccurate data to determine remediation requirements?

Dioxins/furans
The documents ignore dioxins and furans, known contaminants of the processes at this facility at this site and listed in the documentation for the waste disposal pit 009 for this plant. Reports from the waste pit show elevated levels of dioxins/furans in the solid/sludge material and even in groundwater. Dioxins/furans do not dissolve in groundwater because they do not dissolve in pure or distilled water; dioxins are highly hydrophobic and dissolve in organic solvents, such as the benzene that contaminates groundwater at the 009 site. The presence of dioxins/furans in sludge waste and groundwater at the disposal site indicates that the source is equally contaminated, at least.

The scientific literature on dioxins and furans is abundant and has documented the multiple human health and ecological effects of exposures to these chemicals. An updated literature search on dioxins for the last few years and extending back to earlier literature. Additionally, EPA is still working on the Dioxin Reassessment, although the IRIS listing for non-cancer health effects was published in 2012. The EPA official position on dioxin toxicity has developed over the years, but has not fundamentally changed since the early years of the reassessment. Basically, dioxin is a complete carcinogen, causes a host of non-cancer effects at low doses over short term exposures, and some non-cancer health effects display linear no-threshold response characteristics.

How will EPA incorporate the IRIS RfD into the Terry Creek site remediation?
Will EPA establish a PRG for dioxins in fish, in surface waters and in sediments?

The literature search results are given at the end of this document.

Groundwater contamination

How is the remediation method expected to keep groundwater contamination from remobilizing? The groundwater is now a source of contamination that needs to be addressed so that it does not re-contaminate the site once it is remediated. The upper surficial aquifer is primarily unconfined with only some isolated areas that are under semi-confined conditions. This geologic structure indicates the possibility for vertical movement in the groundwater. In the most recent groundwater monitoring report, there are still exceedances of VOCs at the former toxaphene surface impoundment within the upper surficial aquifer. Monitoring wells near the OU1 Outfall Ditch (MW-29D and -38D) show increasing trends in contaminants of concern including benzene, chlorobenzene and xylenes. The metals barium and chromium also continue to be a problem in the groundwater.

Previous Comments

From our comments on the *Draft Focused Remedial Investigation/Feasibility Study Report Operable Unit 1 (OU1) Outfall Ditch,* February 2014:

General Comments

Environmental Stewardship Concepts has previously commented on the *Focused Remedial Investigation/Feasibility Study Work Plan* (January 2012) and the *Remedial Alternative Screening Technical Memorandum* (December 2012) for OU1 at Terry Creek. Many of the comments from these previous documents are still not addressed, and as such, are reiterated in this review of the Draft RI/FS. This RI/FS is incomplete and inadequate for a variety of reasons that are explained below. EPA is urged to insist on a revision to this draft.

In an EPA document, *Ombudsman Report: More Information is Needed on Toxaphene Degradation Products* (USEPA 2005), the Office of Inspector General contends that more information is needed on toxaphene degradation products and that EPA should validate, approve, and use the gas chromatography with negative ion mass spectroscopy (NIMS) method that can test for these products. [Method 8276 has been finalized, as of October 2012; Revision 1 is dated July 2014 and is attached here for reference.] The EPA's report further states "Academia and the European Union have successfully used the NIMS method for at least 5 years to test for toxaphene degradation products in the environment," i.e. since the year 2000. As the method is currently being used, validation and approval steps would not be a difficult or lengthy process for the EPA.

Important in the assessment of toxaphene to human and ecological health is that receptors are exposed to the degradation products [present in the environment], not the original technical toxaphene mixture as originally synthesized or released. Degradation is assumed to be minimal or non-existent, yet no data are available to confirm these assumptions under conditions at Terry Creek over the time period applicable to this site. It should be further determined which toxaphene congeners pose the most risk to human health, where p26, p50, p62, p40, p41, and p44 have been found in fish tissues (Fiolet and van Veen 2001) or soil (Maruya 2001a) or both. Where some congeners are easily metabolized and excreted, others are poorly metabolized and not readily excreted, accumulating in the body (Maruya 2000). Studies indicate that only five (p26, p50, p40, p41, and p44) of the 200 congeners of toxaphene are not easily metabolized by the human body, these contributing to the long-term chronic toxaphene exposure in humans.

The potential exposure pathways are also important to the assessment of toxaphene degradation products in ecological and human risk assessment. Scientific investigations indicate that the main exposure contributing to human health risk is from fish consumption and potential sources of drinking water (Fiolet and van Veen 2001, Buranatrevedh 2004). Additionally, babies are exposed to toxaphene degradation products *in utero* as well as after birth through mother's milk. Jacobson (1996) indicates that developing embryos are the most susceptible to organochlorines, such as toxaphene, among others, which has been linked to impaired cognitive development (i.e. low IQ scores).

The Inspector General's report directly addresses Terry Creek, noting Method 8081's failure to detect toxaphene's degradation products in any fish samples taken in 1997. When the same samples were re-analyzed in 2001 by Dr. Maruya of the Skidaway Institute of Oceanography, the NIMS method found toxaphene congener concentrations of up to 1,420 ppb (2001b).

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Specific Comments

In reviewing the *Draft Focused Remedial Investigation/Feasibility Study*, several of our previously submitted comments for OU1 Terry Creek documents, *Focused Remedial Investigation/Feasibility Study Work Plan* (January 2012) and the *Remedial Alternative Screening Technical Memorandum* (December 2012), still apply and are listed here, followed by comments on the current 2015 documents: the RI/FS, Appendix A to the RI/FS and the Proposed Plan.

Focused Remedial Investigation/Feasibility Study Work Plan (January 2012):

- Dioxin concentrations need to be measured in all sediment samples, as well as in pore water, suspended sediment and animal tissue, owing to the presence of dioxin in toxaphene products.
- The report claims that EPA Method 8276 is not necessary because of previous data collection, as explained on page 14: "Since Method 1 is the most widely used method and is analogous to the SW 846 Method 8081B, the data from this method is what will be used to inform remedial decisions at the Site." [now page 17]." This statement is factually incorrect. Method 8276 is the official and approved method for measuring chlorinated camphenes or toxaphene.
- **Why does EPA not simply rely on the Method (Method 8276) that has been promulgated by the agency for measuring toxaphene?**
- The Work Plan for the RI/FS also anticipated leaving contamination in place that may pose continued risks to ecological receptors, indicated by the suggestion that the remediation may take the form of a performance based, rather than a standards-based or risk-based cleanup. The Work Plan needs to provide a method by which the remediation will be protective of ecological systems and human health.

Remedial Alternative Screening Technical Memorandum (December 2012)

- The RI/FS report basically discounts or ignores the chemicals besides toxaphene that are present as site contaminants. This omission underestimates the risks from chemicals to humans and ecological receptors.

- The RI/FS is correct that there is not enough sediment deposition to apply any form of natural recovery (an unproven approach for many situations, especially with chemicals that do not degrade naturally like toxaphene).
- Alternative and *in situ* methods could have been considered in the FS part of the report, but were completely absent. New methods may have advantages that are not possible with conventional approaches.
- Ultimately, none of the alternatives will bring this site to a conclusive cleanup if the *ongoing source of toxaphene is not remediated successfully, and this report* does nothing to address this most important issue.
- The considerable discussion over toxicity values for toxaphene or chlorinated camphenes, presents an issue that remains unresolved. EPA needs to take a position on this matter and insist that the values developed and used by EPA are the ones that the company will ascribe to and use.
- In a similar manner, the methods for measuring toxaphene present a problem that needs to be resolved by the Agency. It is unclear what EPA testing method was used for "Method 1 Technical toxaphene" and no explanation is given to how "Method 2 Total Area Under the Curve (TUAC)" was calculated. Hercules did run some samples under Method 8276, which is a more improved method over Method 8081 for testing for weathered toxaphene, but these results are not given in the report. Hercules needs to use Method 8276 for the remaining samples. More discussion on this point is presented in these comments.
- The text says that the detailed Conceptual Site Model is "under development" and will be in the final RI/FS report, contrary to guidance and standard. That is not the way to proceed. EcoRA guidelines from 1998 clearly state that the CSM comes first. Also see Glen Suter et al. textbooks on general Ecological Risk Assessment and ecological risk assessments for contaminated sites. The proposition that a conceptual site model is not prepared at a later time, but is supposed to be prepared at the outset. The RI/FS must include a conceptual site model.
- The plan calls for composite samples (page 24), which is inappropriate for characterizing the distribution, nature and extent of contamination, as EPA guidance dictates.
- This RI/FS wholly ignores conducting a Human Health Risk Assessment, with no mention of human health risks in a specific context. The RI/FS must, at the very least, include a summary of human health risks by noting the exposure pathways, types of health effects, what is known of dose-response relationships and a characterization of risks. But to completely exclude a section on human health is not acceptable. Any examination of the nature and extent of contamination demands an analysis of human health effects.

- The report only contains an Ecological Conceptual Site Model, with no reference to an analysis of human health.
- The area surrounding the Outfall Ditch is too residential to be cleaned up to a non-residential standard.
- The RI/FS alternatives do nothing to permanently remove contaminated sediments, only to ineffectively, remove contact with the contaminated sediment. The capping remedies require monitoring in perpetuity, which would greatly increase their costs. These costs are not adequately and fully characterized.
- The RI/FS on page 38 indicates that dioxins were measured in two sediment samples, which is consistent with information that dioxin is a contaminant of toxaphene production. The next statement that the dioxin in sediment samples must be derived from other sources is not credible and needs to be removed.
- Any discussion about construction times, possible contamination during construction, and difficulties of remediating the existing ditch without re-routing, are all trivial. For a remediation project of this small scale (as compared to the Hudson River which is undergoing dredging), a greater amount of sediment removal must be a larger part of the alternatives.
- If shallow groundwater in the vicinity of the ditch likely discharges into the Outfall Ditch and Dupree Creek, then groundwater needs to be better characterized and analyzed as a possible source of contaminants. The groundwater plume associated with the plant, while being managed under RCRA, is wholly dismissed and mentioned only once in the RI/FS.
- **How will EPA address the problem of recontamination by existing and future groundwater contamination of OU1, the Outfall Ditch?**
- The Ecological Conceptual Site Model only contains very general reference to groups of wildlife, not taking any one species specifically as a representative in that environment to determine its actual exposure pathways. Specific receptors can and should be used in the ecological risk assessment.
- The ecological risk assessment fails to consider the accumulation of toxaphene or chlorinated camphenes in marsh grass, *Spartina alterniflora* as a component in the exposure analysis and trophic transfer of toxaphene. ESC has previously submitted material on this point.
- Only one of the wildlife groups under consideration includes prey as a exposure pathway. This limited approach is wholly insufficient as prey items are a major source of contaminant exposure for chemicals such as chlorinated camphenes and dioxins that are bioaccumulative. For these chemicals, the food consumption pathway is considered the most significant of possible exposure pathways. In the present case, with no empirical data on exposures, there is no reason to conclude otherwise.

- **Why has EPA not insisted that site data on exposures be collected by the PRP?**
- **Does EPA assume that exposures to all receptors are as given in the Exposure Factors Handbook?**
- The SLERA and the determination as to whether a BERA should follow must include the data analyzed under the approved EPA Method 8276.
- Comparison of toxaphene and chlorinated camphenes found in fish pre- and post-remediation should not have been used to relax fish consumption guidelines when the post-remediation (2001) included different areas and species sampled than the pre-removal (1997) effort.
- The Outfall Ditch is being prioritized as a source of toxaphene to be remediated, but the larger issue is still the source of toxaphene to the Outfall Ditch, which has not been documented as remediated since the completion of corrective actions in 2010 on the Plant and the N-Street Ditch that feed into the Outfall Ditch. There was no reduction in fish tissue toxaphene in 2011. Additional testing must be done to confirm any measurable impact from the corrective actions.
- **What is the depth of contamination across the entire site? Has EPA accepted a depth at which no contamination occurs, and is therefore "clean?"**
- The NIMS method (Method 8276) has been performed in consideration of planning for OU2 and OU3, but is not relied upon for OU1, according to the Proposed Plan. As the Outfall Ditch is the source issue, environmental media in the ditch must be analyzed with the best/most sensitive congener evaluation available (Method 8276)
- The RI/FS contains the laboratory results of toxaphene breakdown products using the outdated methods, not the official EPA Method 8276, but the evaluation of the data will be performed under "separate cover" which means that the results will not adequately inform this remediation effort at the Outfall Ditch. The full data set and evaluation need to be included here. Appendix A seems to present
- It is unclear if there was ever any dredging of the triple box culvert at any time in its history. A disadvantage of a culvert is the need for periodic cleanout of the silting sediment.
- It is unclear how the accumulated volume of sediment since the previous removal was calculated (estimated to be: Pre-weir = 7500 cy and post-weir = 10,500 cy)
- The seepage rate (net gain of groundwater into the Outfall Ditch) pre-weir is 1,352 gpd and post-weir is 2,593 gpd. This information indicates a lot of seepage from groundwater into the Outfall Ditch not to be considered a contaminated source

- Net groundwater discharged into the Outfall Ditch may be substantial, based on the area being a "gaining" area, but this section seems to downplay the potential VOC contribution of groundwater.
- Section 8.3.2 of the FS explains the Remedial Action Objectives. All four are objectives to reduce exposures with no objective for removal of the source material or eliminating toxicity. The completion exclusion of removal as an objective seems completely inconsistent with EPA directives and guidance to treat or remove toxicity before relying on covering the source. This RI/FS lacks consideration of removal or treatment options. As a result, this Proposed Plan is deficient in failing to present appropriate remedies of a sufficient range and that satisfy ARARs.
- Section 8.3.4 of the FS on page 60 refers to MNR associated with reductions in surface sediment toxaphene concentrations, but fails to note that toxaphene degradation in the sediment is sufficiently slow that burial is the process that takes place. Wisely, MNR is not considered any further.
- Similarly, in Section 8.3.4 on pages 60-61, the RI/FS discounts removal because it is too difficult and too expensive, but fails to provide any substantive or meaningful support for this position. The RI/FS needs to give more than token consideration to removal.
- There is no consideration given to bioremediation, despite the fact that Hercules has conducted pilot studies with new methods for bacterial degradation.
- There is no discussion of testing excavated material for contaminants that is temporarily stockpiled to be used as backfill.
- A report of this size and importance (the RI/F) should have an Executive Summary and an Abbreviations page to make the material more accessible to the public.
- The preferred alternative uses armoring of remaining contaminated sediments left in place to prevent erosion, disturbance etc. This approach is not practical in the long term for a site that is basically a tidal salt marsh zone for several reasons. First of all, sea level rise will inundate the location. Second, changes in flow patterns and erosion in nearby areas will alter the existing flow patterns and the "new" flow patterns that are to be put in place with the remediation. Finally, extreme weather events such as hurricanes, floods and localized flooding will erode the stability of the armored area, exposing contaminated sediments. The armoring will have to be inspected annually and repairs made as needed.
- **If or when the site is disrupted or inundated, will EPA insure that further remedial actions are taken to address recontamination by contaminants left in place? Has EPA accounted for this cost?**

Importance of Seafood Consumption Surveys
Seafood consumption surveys need to be conducted in the Brunswick area. This information is integral to effectively reaching anglers, boaters, and recreationists about the seafood consumption advisories in the area. ESC conducted an analysis of seafood consumption advisories in southeastern states including North Carolina, South Carolina, Florida, Mississippi, and Louisiana. Research has found that fish consumption advisories alone are ineffective at reaching recreational anglers and people who eat fish. Even when advisories are seen, people tend to not always understand, trust, or follow them. Studies have found that differences in fish consumption advisory awareness vary among subpopulations, including gender, ethnicity, geographic area, age, and education. Furthermore, national seafood consumption rates do not always accurately reflect local data.

What will EPA do to include fish consumption information in the effectiveness of the remedy before and after remedial actions?

Signs posted at sites under advisory appear to be one of the most popular methods of dispersing advisories; however, a study conducted in Louisiana found that only 20% of respondents became aware of advisories via signs at landings, boat launches, fishing sites, and bait shops. Targeted outreach to the most exposed and susceptible population is encouraged, particularly during the most popular times for fishing. Mass media and mail-outs were the most effective and preferred methods of receiving advisory info; these methods should be used when resources are available.

In order to provide more accurate, effective fish consumption advisories that reduce regionally specific exposure pathways, clear, targeted education and locally-based advisories should be designed. When possible, target audience members should be involved in the process of crafting and disseminating educational materials. More realistic advisories can be created by basing monitoring and advisory decisions on regional species-specific sportfish consumption levels, not just on contaminant levels alone. Providing clear, culturally tailored health messages regarding fish advisories will promote more informed choices about fish consumption that will minimize potential exposures to environmental pollutants.

Summaries of Fish Consumption Source materials

North Carolina

Bawden et al. (2015): The University of North Carolina (UNC) has been seeking community input on fish consumption advisory educational materials in order to educate recreational anglers and their families about a fish consumption advisory (FCA) related to PCBs. Despite existing educational materials on PCBs, community partners are concerned that many people take home their catch. Research has found that FCAs alone are ineffective at reaching recreational anglers and people who eat fish. It has also found that when FCA messages do reach their target audiences, people do not always trust, understand, or follow them. UNC is working to involve target audience members in the process of crafting and disseminating FCA educational materials, and to evaluate their community-based fish consumption education programs.

They found that minority participants and participants for whom English is not their first language were initially more likely to believe the fish were "somewhat safe" to "very safe" to eat. They were more likely to report consuming fish caught from contaminated locations and to express incorrect info about the health risks posed by contaminated fish. After reading their educational guide, people reported that consuming fish from the contaminated waters to be less safe than before they read the guide. They also recognized that children, and women who are pregnant or breastfeeding, should avoid eating fish from the contaminated waters.

Challenges endured in this study included reaching target populations, educating about carrying advisories at multiple locations with multiple contaminants, and overcoming social desirability bias.

UNC collaborated with several organizations, including the NC Department of Public Health, Neuse Riverkeeper Foundation, and the NIEHS-funded Center for Human Health and the Environment at NCSU.

LePrevost et al. (2013): This study examined the efficacy of a sign designed by the North Carolina Division of Public Health posted along a reservoir (Badin Lake) for increasing anglers' awareness of a fish consumption advisory, with a particular focus on anglers who share their catch with women and children. Shore anglers were significantly less likely to be aware of the term "fish consumption advisory" and of the specific advisory for Badin Lake than boat anglers. The study's findings underscore differences in fish consumption advisory awareness among subpopulations. It also revealed the importance of characterizing the communication needs of shore anglers and anglers who share their catch with sensitive populations for the creation of more targeted communications of fish consumption advisories.

South Carolina

Ellis et al. (2014): Research suggests that African-American fishers in the southeast US consume larger amounts of fish, potentially exposing them to higher environmental contaminant levels. An in-depth study focused on South Carolina's Gullah/Geechee heritage and African-American Sea Island attitudes, perceptions, and cultural beliefs about fishing in one urban and two rural South Carolina coastal. Results indicated that study participants in rural counties had slightly different perspectives of fishing, i.e. fishing as an essential dietary supplement, than in urban counties where fishing was viewed more as relaxation. Major misconceptions existed in all counties between fish consumption advisories related to pollution versus harvesting restrictions association with fishing regulations. Both urban and rural fishers exhibited confusion between fishing regulations and fish advisories. Providing clear, culturally tailored health messages regarding fish advisories will promote more informed choices about fish consumption that will minimize potential exposures to environmental pollutants.

Florida

Krimsky et al. (2015): To address the need for consumer-oriented education, these investigators conducted a survey of Florida seafood consumer preferences, perceptions, and concerns. The majority of respondents who do consume seafood eat it one to two times per week. This pattern is consistent with a 2007 Florida Seafood Study conducted by the Florida Department of Agriculture and Consumer Services (FDACS), which suggests that Floridians consume seafood more frequently than the national average. Based on the results of this study, the following suggestions for seafood educational programs were made:

- Educational materials should provide info on low-cost and seasonal options for Florida seafood commodities to address the fact that higher cost of seafood may be becoming a barrier to increased consumption.

- Educational programs could focus on developing a "train-the-trainer" model for restaurants and retail staff in order to help workers better address customer questions and needs regarding purchasing local seafood.

- General knowledge about seafood is low for Florida consumers, especially regarding the safety of imported seafood. The University of Florida and the Florida Cooperative Extension Service, both of which are recognized as respected outlets for seafood information, have an opportunity to address these gaps.

- Educational programs should utilize appropriate outreach materials, including both traditional (brochures) and non-traditional (internet, social media) strategies.

Schaefer et al (2014): Recent research has demonstrated higher seafood consumption and subsequent increased risk of methylmercury exposure among subpopulations living in coastal areas. Since the study found that mercury contamination is generally higher in Floria compared to all other states, targeted education and local advisories should be designed to reduce regionally specific exposure pathways. Future local consumption advisories may include several of the species identified in this study, particularly for pregnant women. However, there are many well-recognized benefits of fish consumption. The challenge for public health is to find.and recommend the balance between the positive and negative effects of fish and shellfish consumption. The findings of high concentrations of mercury in hair among coastal residents in eastern Florida associated with consumption of locally caught seafood and specific species of fish should be used to develop interventions to reduce exposure among high risk groups.

Mississippi

EPA (2010): EPA's Office of Water, Office of Science and Technology designed and conducted a survey for assessing the awareness and effectiveness of the Mississippi Delta fish consumption advisory issued by the Mississippi Department of Environmental Quality (MDEQ) in 2001. The state-issued advisory recommends that people should not eat more than two meals a month of wild-caught buffalo fish, carp, gar, and large catfish and should not eat any buffalo fish from Roebuck Lake. MDEQ initiated an extensive outreach campaign in 2001 to promote awareness of the advisory by conducting a public media campaign, distributing letters and posters to stores, posting signs at fishing access points, and mailing letters and brochures to churches in the Delta area. They also implemented some aspects of the risk communication outreach campaign, including publishing advisories in the Mississippi Department of Wildlife, Fisheries, and Parks' regulations brochure, posting information on the MDEQ website, and maintaining signs at boat ramps and fishing areas.

The survey results suggested that some respondents, 33-54%, stopped eating or ate less wild-caught large catfish or buffalo fish since learning about the advisory (few ate carp or gar before the advisory). Respondents reported limited changes in their fishing practices and fish preparation and cooking practices since learning about the advisory. Only 10% were found to eat more than the recommended two fish meals per month of wild-caught fish from the Delta area, which would increase their health risks from consuming DDT and toxaphene contaminated fish. About a third of respondents reported eating buffalo fish or wild-caught large catfish.

Louisiana

Katner et al. (2011): This was the first known population-based survey of recreational fishers in Louisiana (n = 1774). The ultimate goal of the study was to obtain data in support of the development of regional advisories for a high exposure population with unique seafood consumption patterns. A survey was mailed to a random sample of licensed recreational fishers to characterize local fishing habits, sportsmen consumption, and advisory awareness. Eight-eight percent of respondents reported eating sportfish. Respondents ate an estimated mean of four fish meals per month, of which, approximately half were sportfish. Over half of all sportfish meals (54%) were caught in the Gulf of Mexico or bordering brackish areas. Sportfish consumption varied by license and gender; the highest was among Sportsman's Paradise license holders and males. Advisory awareness rates varied by gender, ethnicity, geographic area, license type, age, and education. Results were used to identify ways to optimize monitoring, advisory development, and outreach activities.

Lincoln et al. (2011): Methyl mercury exposure assessments among average fish consumers in the US may underestimate exposures among US subpopulations with high intakes of regionally specific fish. The study examined relationships among fish consumption, estimated mercury intake, and measured mercury exposure within recreational anglers in Louisiana. Forty percent of participants had levels >1 ug/g, which approximately corresponds to the US EPA's reference dose. Study participants had relatively elevated hair mercury concentrations and reported consumption of a wide variety of fish, particularly locally caught fish. This group represents a highly exposed subpopulation with an exposure profile that differs from fish consumers in other regions of the US, suggesting a need for more regionally specific exposure estimates and public health advisories.

Gulf Coast

Natural Resources Defense Council (2010): The NRDC conducted a Gulf Coast Seafood Consumption Survey after the BP Deepwater Horizon spill in response to the FDA's protocol for determining seafood safety. The protocol guided the reopening of more than 99% of Gulf waters to fishing. The protocol included several assumptions that were questioned by scientists and Gulf Coast residents. The FDA derived its seafood consumption rates from national rather than local data.

The survey found elevated rates of seafood consumption among the Gulf Coast residents surveyed. Rates of shrimp consumption significantly exceeded the estimate used by the FDA to calculate a safe level of exposure to oil spill-related contaminants-ranging from 3.6 to 12.2 times higher. Some subpopulations reported significantly higher seafood consumption rates than other survey respondents and the FDA estimates. Also, many survey respondents are more vulnerable to contaminants in seafood than FDA accounted for due to smaller body weight. When coupled with increased consumption rates, this can result in a significantly increased dose of contaminants.

Comparative analysis of state fish consumption advisories targeting sensitive populations

Scherer et al. (2008): The study conducted a comparative analysis of advisory websites issued by states to assess health messages that sensitive populations might access. The findings highlight the complexity of assessing and communicating info about multiple contaminant exposure from fish consumption. Communication regarding potential health benefits conferred by specific fish nutrients was minimal and focused primarily on omega-3 fatty acids. The overview highlights a lack of both clarity and consistency in providing the breadth of information that sensitive populations such as pregnant women need to make public health decisions about fish consumption during pregnancy.

Will EPA consider the patterns and importance of fish consumption as an exposure for recreational and subsistence anglers in the Brunswick area?

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Dioxin Literature Review
2011-2015 Literature Search
ESC conducted a scientific literature search on the most recent (2011-2015) dioxin toxicity studies. We also include literature search results from a similar effort completed several years ago for years through 2010, appended at the end of the more recent search.

How does EPA plan to implement the information found in these studies, especially carcinogenicity, into the remediation of the site?

What are the Preliminary Remediation Goals (PRGs) at the site for dioxins/furans in sediment, water, and fish tissue? The Lower Duwamish Waterway Superfund Site created a PRG for surface water for PCB contamination, which became a cleanup level for surface water in the Record of Decision. **Will EPA complete similar action decisions for the Terry Creek OU 1 site for toxaphene, dioxins and furans?**

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GEC
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September 1, 2015

Mr. Scott Martin, Remedial Project Manager
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Superfund Remedial Branch
61 Forsyth Street, SW
Atlanta, GA 30303-8960

Mr. Martin,

The purpose of this letter is to request information, and submit questions and comments to be included in the official record for the Propose Plan for the Terry Creek Dredge Spoil Areas Hercules Outfall Site, Outfall Ditch/Operable Unit One (1).

We trust the comments will help formulate a plan to develop a Proposed Plan that will obtain a timely cleanup and end the risk to human health and the ecosystem upon which the economic future of the Brunswick and Glynn County, Georgia, depend.

Sincerely,

Daniel Parshley, Project Manager

Enclosures

Terry Creek Dredge Spoils Areas Hercules Outfall Site - Comments on the Proposed Plan, Administrative Record, Remedial Investigation, and Feasibility Study

The Proposed Plan for the Terry Creek Dredge Spoils Areas Hercules Outfall Site attempts to answer the question, "What should be done about a ditch with 100 years of waste from a chemical plant?"

The Brunswick, Glynn County, Georgia community has patiently waited 15 years for the EPA to release the Proposed Plan for the Terry Creek Dredge Spoils Areas Hercules Outfall Site (Site). The results of this effort by the EPA is an apparent agreement between the EPA and Hercules Incorporated for a predetermined Remedial Action for the Outfall Ditch that solely benefits the company at the economic expense of the community and leaves potential health risks for generations to come.

The Administrative Record for the site has many comments from stakeholder agencies expressing concerns about the Proposed Plan, which are similar or the same as those expressed by the Glynn Environmental Coalition (GEC). Very basic and simple questions that need to be answered about every toxic waste site were apparently ignored in favor of rushing forward with a plan to remove a small part of the contaminated sediments and either rebuild or reroute the existing drainage ditch so the 100 years of wastes and poisons from the Hercules Plant can be left in place and covered.

Was the vertical extent of the contamination in the outfall ditch delineated?

How much separation is there between the bottom of contaminated sediments in the drainage ditch and the top of the contaminated groundwater underneath the Site?

Does the contaminated groundwater underneath the outfall ditch have the capability to re-mobilize the chemicals in the outfall ditch?

What is the EPA's reasoning for not analyzing for dioxin for the entire vertical depth of the contaminated sediments in the outfall ditch?

What is the horizontal extent of the contamination at the Site, including the areas proposed for re-routing the outfall ditch?

Why did the EPA choose to use an analytical method the EPA Office of Inspector General found inappropriate?

Why does the Propose Plan reference seafood sampling results that demonstrated the inability of the Toxaphene Task Force method (Method 1) to identify polychloro camphene?

Why does the EPA interject studies and reports from the now discredited Weinberg group and the discredited journal, *Regulatory Toxicology and Pharmacology*?

Why did the EPA add excavation of the sediments as a proposed remedial option (Alternative 2) after the analytical work was done for the Remedial Investigation?

Why did the EPA allow Hercules to sample for dioxin in a manner that would look at newly deposited sediments instead of the vertical extent of the historical contamination?

Why has the EPA interjected arguments developed by the Weinberg Group for the continued delay of the investigation and cleanup of the remaining operable units at the site, and was the toxaphene toxicological work undertaken by the Weinberg Group in 2006-7 ever competed? If not, why not?

The EPA July 30, 2015 presentation to the community, the Remedial Investigation, the Feasibility Study, the Administrative Record, and the Proposed Plan fail to present even the most basic information needed to evaluate a remedial plan for the Outfall Ditch. Considering this is the results of a 15 year effort, the level of incompetence in putting together and executing an even a minimally acceptable sampling and analysis plan is very troubling. A strong argument can be made for bringing in an outside firm like Black and Veatch to complete a competent investigation, produce an analysis of remedial options in a Feasibility Study, and design a protective Remedial Action Plan that does not leave potential risks to human health, the estuary, and the economy of the community going forward into the future for generations to come.

The July 30, 2015 EPA meeting revealed that the Proposed Plan was developed without consulting the community to ascertain what future land use would be likely in the area around the Hercules Outfall Ditch. Instead of speaking to the community, the EPA acted only in the interests of Hercules Incorporated by developing and presenting the least expensive and lease protective remedial options. Furthermore, the EPA was using misleading language in the Propose Plan such as "environmental controls" instead of institutional controls, which would economically restrain the future use of the area and result in adverse economic impacts to surrounding properties.

What is the EPA's definition of "Environmental Controls?

The EPA Proposed Plan shows no sensitivity to the surrounding community which is primarily minority and low income. It is extremely doubtful a similar remedial plan would be proposed for the community blessed with greater economic resources. At no point in the July 30, 2015 EPA meeting was there any indication that the EPA had planned the proposed remedial action with input from other than Hercules and stakeholder agencies.

The EPA's arrogance was further demonstrated by the meager 45 minutes allowed to the community and community leaders to voice their concerns about the Proposed Plan. The EPA and Hercules gets 15 years to produce the Propose Plan and the EPA is willing to give the community 45 minutes their time. Shameful, absolutely shameful. The combination of exclusion of the community from the decision-making process concerning the remedial options that would be compatible with future land use projections of the City of Brunswick and Glynn County has left no other option than to attempt to put all our concerns in writing in the very minimal time the EPA has allowed for public comment. The shameful conduct of the EPA reared its ugly head again when they refused to provide the community with the modest time extension requested for the public comment period on the Proposed Plan.

With a 100-year-old wastewater ditch from a chemical plant sitting in the community, one would think the EPA's answer to what to do about it would be clean it up. To the contrary, the EPA plan advocates for leaving poison in our community, limiting the future use of the property, and leaving a significant risk in the community for generations to come. Further amplifying this risk is the proposed limit of 30 years of monitoring for the Site after the remedial action is completed.

Will the wastes the EPA proposes to leave in place continue to be toxic for more than 30 years?

The data presented in the Remedial Investigation indicates the vertical extent of contamination in the outfall ditch is not been delineated. **Can the EPA evaluate the number of years the wastes remaining in place will be toxic without knowing what chemicals are present and the vertical extent of contamination?**

The EPA appears to have a serious hang-up about gaining consensus on the toxicity of toxaphene in all the possible perpetuations and formulations theoretically possible as a pre-condition to taking any action at the Terry Creek Dredge Spoil Areas Hercules Outfall Site. EPA Region 4 has not shown the ability to describe or articulate clearly about the polychloro camphene pesticide manufactured at the Brunswick, Glynn County, Georgia Hercules plant site. With the help of the Weinberg Group and their associates, the EPA and Hercules appear to have concocted an obtuse argument for the sole purpose of delaying any meaningful cleanup of the Terry Creek Dredge Spoils Areas and in particular the Outfall Site. The EPA and Hercules appear to be rehashing all the doubt and confusion they have inserted into the Administrative Record for the Terry Creek Dredge Spoil Areas Hercules Outfall Site. A closer look at the Weinberg Group's involvement at the Terry Creek Site and the ramification of their action will be discussed in the Specific Comments Section. Since the Weinberg Group has been exposed by the Energy and Commerce Committee Congressional Inquiry, the tactics of this consultant and the relevance to the Terry Creek Site should be examined and addressed in the EPA Responsiveness Summary. Notable is the 3-4 year study of toxaphene toxicity by the Weinberg Group appears to have been abandoned around the time of the Energy and Commerce Committee Congressional Inquiry, but the Proposed Plan still references the need for this data as a pre-condition for continuing risk based remedial plans for the Site. The same scrutiny should be directed towards efforts to continue the Toxaphene Task Force Method (Method 1) 10 years after being found inappropriate by the EPA Office of Inspector General. Overall, the Proposed Plan appears to be based upon arguments by consultants and articles in a journal that have been repudiated by many agencies and a Congressional Committee. In a nutshell, the sleaze factor surrounding the Proposed Plan and the argument contained therein are overwhelming.

The question to be answered in the Proposed Plan is what to do with 100-year-old ditch that transferred waste from a chemical plant to our estuary. Like every other hundred-year-old chemical plant ditch, there will never be a consensus on the toxicity of all the poisons mixed up in the ditch over the past hundred years. The EPA has the audacity to represent that meaningful work will take place to resolve uncertainties concerning potential health impacts from the different polychloro camphene chemicals found in Terry Creek and Dupree Creek. The reality of the situation is the EPA is not taking any current action to complete this work, which is a de facto admission by the EPA that they have no goodwill or intent of ever completing the toxicology and risk assessment work. The past 15 years of minimal action by the EPA to address risk from specific Parlars, and EPA Region 4's history of fighting against implementing the approved analytical method for polychloro camphene, underscores their recalcitrance in the matter of defining risk to humans and biota. In fact, when the most noteworthy omissions from the Administrative Record are any ecological or human health risk assessments to help drive remedial actions at the Terry Creek Dredge Spoil Areas Hercules Outfall Site, the competence of EPA Region 4 to developing a lucid Proposed Plan comes into question. Even if the EPA did complete analysis of the individual chemicals and risk to public health it would leave similar studies to be conducted on all the different trophic levels within the estuary. Common sense is no longer driving the cleanup of the Terry Creek Site and has been replaced by obtuse arguments. For example, at a minimum we would expect results from observed toxicity of the sediments in the Outfall Canal throughout the vertical extent of contaminated sediments. Simple and basic work is repeatedly ignored at the site. Just as the GEC has noticed the lack of basic and credible sampling and risk analysis, the Administrative Record is full of similar such concerns from the stakeholder agencies.

The Administrative Record contains documents referencing the agreement between the EPA and Hercules to circumvent the Superfund process and implement an Outfall Ditch remedy without identifying the vertical and horizontal extent of contamination, while limiting sampling to technical toxaphene as described by the Toxaphene Task Force (Method 1), the same discredited method by the EPA Office of Inspector General and many other agencies.

Do we need to know just how poisonous every chemical in the poisonous polychloro camphene chemical mixture is to develop a remedial plan? No, we don't and it is extremely likely the thousands upon thousands of potential chemical combinations theoretically possible from the manufacturer of polychloro camphene will ever be analyzed for their toxicity to humans and the remaining biosphere. The EPA's effort to identifying risk of the polychloro camphene to humans and other ecological receptors as a precondition for a remedial action or remedial response at the Terry Creek Site is preposterous and borderline ridiculous. Toxic sites nationwide contaminated with polychloro camphene have been remediated. The underlying problem appears to be all the arguments that been interjected by EPA Region 4, Hercules, and the discredited consulting firm, the Weinberg Group.

It is notable that neither the EPA nor Hercules bothered to complete the ecological risk assessment. The reason why is pretty obvious. It is general community knowledge that boats tied up near the Hercules plant outfall to kill everything growing on the bottom of the boat. Beyond a shadow of a doubt, the poison from the Hercules plant is an efficient killer in the marine environment. The polychloro camphene mixture was also widely used as a piscicide to kill fish in lakes Just another reason to stop this foolishness about trying to figure out what is or is not toxaphene and how poisonous is the poison and get on with removing 100 years of waste from the Hercules chemical plant wastewater ditch based upon competent delineation and characterization of the wastes, including the observed toxicity testing so noticeably missing from the Remedial Investigation and Feasibility Study.

The EPA needs to stop the hypnotic transfix on technical toxaphene, degraded toxaphene, whether toxaphene, and move on to removing the polychloro camphene manufacturing wastes that was released out of this outfall ditch, in addition to all the other chemicals deposited over the past hundred years the plant operated. It was pesticide manufacturing waste and all the other chemical discharged from the Hercules chemical plant over the past hundred years that need to be delineated both vertically and horizontally, characterized for treatment options, and a removal action plan implemented without further delay.

The Proposed Plan and What the EPA Proposes

There's really two issues being addressed in the Proposed Plan. The first is making a decision about where and how the new outfall ditch is constructed. This decision appears to be fairly straightforward. Alternative Five, the four boxes culverts, will reroute the existing outfall ditch allowing the old outfall ditch to be cleaned up. In addition, Alternative Five allows the greatest number of options for future use and development of the property, provided the poison is cleaned up. Without removal of the wastes accumulated over the past 100 years in the Outfall Ditch, the community will be left with economically harmful restrictions such as limited land use and the potential for wastes to be reintroduced should the Institutional Controls fail to limit development or be retained in the Community's Institutional Memory. For example, another site where Hercules is a party, the 4th Street Landfill, the restrictions on human access to the site was implemented as Institutional Controls and lasted around 6 weeks. The 4th Street Landfill was opened and utilized as parking for the football stadium. The history of Institutional Controls in Brunswick, Glynn County, Georgia, indicates a lack of adherence and being a bad fit for this community.

But, the EPA proposes leaving the poison in the old outfall ditch, and leaving the community with all the problems that it causes. According to the EPA, the Outfall Ditch Site will not be usable for residential development. The documents for the site also warned about future development and bringing the poison to the surface again. The only way this problem will be removed from the community is to remove the poison in the outfall ditch from our community. As previously stated, Institutional Controls have not been shown to be effective in protecting human health or restricting inappropriate uses of property in Brunswick, Glynn County, Georgia.

Notable are the "Institutional Controls" at the Terry Creek Site to educate the public about the risk of consuming seafood from the area or to make fishers aware about the seafood advisory are minimal or non-existent. The GEC does do outreach to the Terry Creek area with the seafood advisory developed in conjunction with the Glynn County Health Department, Georgia Department of Public Health, Coastal Resources Division and Environmental Protection Division of the Georgia Department of Natural Resources, and our partners at the University of Georgia Marine Extension and Sea Grant. With 126 locates where the GEC reaches out to fishermen and our limited budget to do so, our effort is at best described as a small piece of the resources needed for this problem.

Where can the EPA's plan be found for the "Institutional Controls" for fishermen and others potential impacted by the Terry Creek Site until such time as the remedial actions are implemented and seafood is no longer under a consumption advisory?

What is the budget designated by the EPA or Hercules for the "Institutional Controls" to address risk to those fishing and consuming seafood from the Terry and Dupree Creek Area?

What portion of the budget is directed to seafood consumption advisory signs in the Terry Creek, Dupree Creek, and Back River area?

What portion of the budget is focused for direct outreach and contact with habitual fishers from the Terry Creek Area?

Should a chemical plant clean up its waste outfall every hundred years? Is the EPA suggesting the answer to this question is no and just cover it up?

Yes, without doubt, a chemical plant should clean up its wastes and poison from their outfall ditch every hundred years. Any other option should not even be considered as part of any Remedial Investigation or Feasibility Study. The fact that the EPA is considering leaving 100 years of waste from a chemical plant in place and on top of the contaminated groundwater plume without knowing the vertical depth of contaminated sediments is beyond comprehension. The EPA's proposed plan leaves significant questions about the decision-making process at EPA Region 4 and their ability to plan and implement viable remedial actions.

The EPA's and Hercules continued use of the Toxaphene Task Force analytical method, also known as Method One, for the Remedial Investigation and Feasibility Study decision-making suggests an arrogance and insubordination to the findings of the EPA Office of Inspector General that determined an appropriate analytical method for polychloro camphene was needed to replace the Toxaphene Task Force method. Obviously, the inverse of the EPA Office of Inspector General's statement is the Toxaphene Task Force method is inappropriate.

Since the EPA documents contain statements like "what is toxaphene", I will start my specific comments with a detailed description of the polychloro camphene invention patented by Hercules Incorporated, which was manufactured at the Brunswick, Glynn County, Georgia, plant site, and the source of the wastewater discharged from the outfall ditch.

Specific Comments

Hercules Patent for Polychloro Camphene Insecticide – Description, Process, and Wastewater

Hercules patents the polychloro camphene invention on August 28, 1951, Patent Number 2,565,471. The invention was described as, "...an insecticidal composition and more particularly to an insecticidal composition containing a polychloro camphene as the toxic ingredient. "

Was the pesticide patented under Patent Number 2,565,471 by Hercules Incorporated manufactured at the Brunswick, Georgia, Hercules Plant?

Is the name of the pesticide in the Patent called polychloro camphene?

Was polychloro camphene pesticide manufactured in Brunswick, Glynn County, Georgia from 1948 until 1980?

Was the polychloro camphene produced at the Brunswick, Glynn County, Georgia Hercules Plant sold under many names and synonyms?

8001-35-2, Alltox, Geniphene, Phenacide, Toxadust,toxakil, Toxaphene, Chlorinated Camphene, Octachlorocamphene, Camphochlor, Agricide Maggot Killer, Alltex, Allotox, Crestoxo, Compound 3956, Estonox, Fasco-Terpene, Hercules 3956, M5055, Melipax, Motox, Penphene, Phenacide, Phenatox, Strobane-T, Toxadust, Toxakil, Vertac 90%, Toxon 63, Attac, Anatox, Royal Brand Bean Tox 82, Cotton Tox MP82, Security Tox-Sol-6, Security Tox-MP cotton spray, Security Motox 63 cotton spray, Agro-Chem Brand Torbidan 28, and Dr Roger's TOXENE, Camphechlor , Camphechlore , Camphene, chlorinated ,, Camphofene huileux , Chem-Phene , Chlorinated camphene (content of combined chlorine, 67-69%) , Chlorinated camphene, technical , Chlorinated camphenes , Chlorocamphene , Clor Chem T-590 , Compound 3956 , Coopertox , Cristoxo , Cristoxo 90 , ENT-9735 , Gy-Phene , Hercules toxaphene , Kamfochlor , M 5055 , Melipax , Motox , NCI-C00259 , Octachlorocamphene , Phenacide , Phenatox, Toxaphene (Technical chlorinated camphene (67-69% chlorine)) , TOXAPHENE (CA DPR Chem Code Text) , Toxaphene (Campechlor) , Toxaphene (Camphechlor) , Toxaphene (Polychlorinated camphenes)

The Polychloro camphene was reported to have been produced in many different formulations. Are the preceding names under which the Patent protected polychloro camphene pesticide was sold?

The specific toxic chemicals being patent protected by Hercules were described in Patent Number 2,565,471, as an insecticidal composition and more particularly to an insecticidal composition containing a polychloro camphene as the toxic ingredient.

> Now in accordance with this invention it has been found that insecticidal compositions containing as a toxic ingredient a polychloro camphene, having a chlorine content of from about **40% to about 75%**, possess an unusual degree of insecticidal activity.

Because of the very high killing power of the polychloro camphenes, extremely dilute solutions of these toxicants are effective. (emphasis added)

Using the atomic weights of Carbon (12.01), Hydrogen (1.0), and Chlorine (35.4) the relative mass percent of each can be calculated from the description of chlorine content in the Hercules patent for polychloro camphene.

Number of Chlorine Moieties	Formula	Molecular Weight	Chlorine Molecular Weight	Percent Chlorine
1	C10 H15 Cl1	165.5	35.4	21.3%
2	C10 H14 Cl2	204.9	70.8	34.5%
3	C10 H13 Cl3	239.3	106.2	44.3%
4	C10 H12 Cl4	273.7	141.6	51.7%
5	C10 H11 Cl5	308.1	177.0	57.4%
6	C10 H10 Cl6	342.5	212.4	62.0%
7	C10 H9 Cl7	376.9	247.8	65.7%
8	C10 H8 Cl8	411.3	282.2	68.8%
9	C10 H7 Cl9	445.7	318.6	71.4%
10	C10 H8 Cl10	480.1	354.0	73.7%
11	C10 H9 Cl11	514.5	389.4	75.6%

The Hercules Patent, Number 2,565,471, describes any molecule of between 3 and 10 Chlorine moieties being the toxic ingredient of the invention.

Does the Hercules Patent, Number 2,565,471, describes any molecule of between 3 and 10 Chlorine moieties being the toxic ingredient of the invention?

Does the Hercules Patent, Number 2,565,471, very high killing power of the polychloro camphene, in extremely dilute solutions?

Does the Hercules Patent, Number 2,565,471, describe polychloro camphene as toxicants?

Does the Hercules Patent, Number 2,565,471, describe polychloro camphene as toxicants in the pesticide when chlorinated to between 3 and 10 chlorines per camphene?

Does the Hercules Patent, Number 2,565,471, specify any specific ratios of specific chemicals from the chlorination of camphene in the final product?

Does the Hercules Patent, Number 2,565,471, describe a chemical formula?

Can the Hercules Patent, Number 2,565,471, be describe more accurately as a recipe for the production of a polychlorinated camphene pesticide with a wide range of chemical components with 3 to 10 chlorine moieties?

Does the Hercules Patent, Number 2,565,471, describe a mixture of chemicals resulting in a chemically nonspecific product?

How many <u>individual chemicals</u> can be produced by the process described in the Hercules Patent, Number 2,565,471?

What is the number of <u>chemicals compositions</u> that can be obtained from the process described in the Hercules Patent, Number 2,565,471?

In accordance with the invention it was found that insecticidal compositions containing as a toxic ingredient a polychloro camphene, having a chlorine content of from about 40% to about 75% possess an unusual degree of insecticidal activity (pesticide). The killing power of the polychloro camphene in extremely dilute solutions of these toxicants and effectiveness was also noted.

Does the Hercules Patent, Number 2,565,471, claim killing power of polychloro camphene at extremely dilute solutions?

Does the EPA feel Hercules exaggerated the killing power of Hercules Patent, Number 2,565,471 with chlorine at 40 % to 75%?

The polychoro camphene invention was further described by the preferred total Chlorine percentages of the mixture of polychloro camphene.

> **Any polychloro camphene containing from about 40 to about 75%** of chlorine may be used as the toxic ingredient of the insecticide compositions of this invention. (emphasis added)
>
> And,
>
> The chlorinated camphene in accordance with this invention should contain an amount of chlorine of about 40% to about 75%, preferably from about 60% to about 72%.

Does the EPA agree Hercules Patent, Number 2,565,471, describes a pesticide manufacturing process to produce a pesticide formulation with a polychloro camphene between 40% and 75%?

In the process of reaching the goal an average of 60% to 72% chlorine attached to camphene, were polychloro camphene with more than 72% and less than 60% produced?

Does the goal of an average of 60% to 72% chlorine attached to camphene bracket polychloro camphene with between 6 and 9 chlorine per camphene?

Does the EPA have a sample of the pesticide produced each year at the Hercules plant?

How many samples does the EPA have of the pesticide produced at the Brunswick, Glynn County, Georgia, Hercules Plant, and what is the year of manufacture of each?

What was the variability between batches or production runs of the polychloro camphene pesticide at the Brunswick, Glynn County, Georgia, Hercules Plant?

Is the following definition of pesticide called toxaphene (the Patented Hercules pesticide called polychloro camphene) accurate?

> The bulk of the compounds (mostly chlorobornanes, chlorocamphenes, and other bicyclic chloroorganic compounds) found in Toxaphene have chemical formulas ranging from C10H11Cl5 to C10H6Cl12, with a mean formula of C10H10Cl8.[3]The formula weights of these compounds range from 308 to 551 grams/mole; the theoretical mean formula has a value of 414 grams/mole.
> Source: http://www.worldofchemicals.com/chemicals/chemical-properties/toxaphene.html

Does the definition of "Toxaphene" include a range of polychloro camphene with 5 to 12 chlorines per camphene?

What does the word "mean" mean in the "Toxaphene" definition?

Does the word "mean" mean there are chemicals with less chlorine and more chlorine per camphene?

Does formula weight of these compounds ranging from 308 to 551 grams/mole describe polychloro camphene with 5 to 12 chlorines per camphene?

Does the described formula weight of these compounds ranging from 308 to 551 grams/mole describe polychloro camphene with 5 to 12 chlorines per camphene describe the definition of Toxaphene?

Does the definition or the Hercules Patent for polychloro camphene designate as specific chemical composition of the individual polychloro camphene chlorine weights in the pesticide?

Is "Technical Toxaphene" any formulation of polychloro camphene with a chlorine weight of around 40% to 75% chlorine per camphene, and preferably around 60% to 72% by weight of chlorine, and the toxic ingredients of the invention are polychloro camphene with 3 to 11 chlorines?

Polychloro Camphene Manufacturing and Wastewater Production

Patent Number 2,565,471. The invention was described as, "...an insecticidal composition and more particularly to an insecticidal composition containing a polychloro camphene as the toxic ingredient. "

The polychloro camphene manufacturing process and how the wastewater was produced are described in Patent Number 2,565,471 for the invention described as, "...an insecticidal composition and more particularly to an insecticidal composition containing a polychloro camphene as the toxic ingredient. " Two washings of the final product took place, with water washing being the final wash before drying the polychloro camphene. After camphene was chlorinated, the process moved on to distillation and washing.

> The carbon tetrachloride was removed from each of these samples by distillation under reduced pressure. An opaque, waxy solid remained in each case. This was dissolved in petroleum ether and the solution was washed with a sodium bicarbonate solution, **then with water** and finally was dried over sodium sulfate. (emphasis added)

From the washing process, the Hercules Plant effluent was produced and released from the Outfall into Terry and Dupree Creeks. Significant amounts of pesticide manufacturing wastes were deposited during the 38 years of pesticide manufacturing in Brunswick, Glynn County, Georgia.

Does the EPA agree the Brunswick, Glynn County, Georgia Hercules Plant released the wastewater from the manufacturing of polychloro camphene to the Outfall Ditch?

Has the EPA compared the wastewater with the polychloro camphene product to determine of the waste stream had the same chemical composition as the pesticide product?

How many samples does the EPA have of the pesticide manufacturing wastewater and the corresponding final polychloro camphene product?

From how many batches of production runs were the samples obtained?

During the 1948 to 1980 production run of polychloro camphene, how many years' worth of wastewater characterization does the EPA have for the Terry Creek Dredge Spoil Areas Hercules Outfall Site, and how often during the year was the data collected?

Does the EPA have the Hercules quality control data from the production of polychloro camphene?

Has the EPA asked for the Hercules quality control data from the production of polychloro camphene? If not, why not?

Would the Hercules quality control data from the production of polychloro camphene be helpful in understanding the composition of the pesticide manufacturing wastes discharged in to Terry and Dupree Creeks?

What is the variability in the chemical composition of the wastewater stream from the Hercules Plant from 1948 to 1980?

Does the goal of an average of 60% to 72% chlorine result in a production target of 6 to 9 chlorine per camphene specified in Hercules Patent, Number 2,565,471?

Do the polychloro camphene manufacturing wastes in Terry and Dupree Creeks predominantly contain the production target of 60% to 72% chlorine?

Will the EPA describe how the polychloro camphene manufacturing wastes entered the wastewater stream in future Terry Creek Dredge Spoil Areas Hercules Outfall Site documents?

<u>Solubility of Polychloro Camphene in Wastewater</u>

Do the different polychloro camphene chlorine weights result in different solubility for each in water?

If so, would the less chlorinated polychloro camphene (with less chlorine moieties) be more soluble in water? If not, why not?

Can these different polychloro camphene solubility's be used to predict the likely wastewater composition from the Hercules Plan during pesticide production?

Would information about the polychloro camphene manufacturing wastes provide information important in measuring any breakdown in the environment, and determining if the polychloro camphene at the Terry Creek Outfall site is consistent with what was discharged during pesticide production?

The EPA and Hercules have described the compositions of polychloro camphene as degraded or weathered but have never described the nature and composition of the wastewater stream from the Hercules Plant during manufacturing and final production. In addition, the rate of degradation cannot be determined without a clear description of the wastewater discharge at the time of release.

Did Reimold (1974) and Maruya (1999) essentially describe the same chemical composition of polychloro camphene in the sediments from Terry and Dupree Creeks?

If the observed chemical composition of polychloro camphene and Terry and Dupree Creek are remaining the same for an extended period of time, what evidence does the EPA have to support the formation of subcategories called degraded toxaphene and whether toxaphene?

What specific chemicals are present in EPA's definition of degraded toxaphene?

What is the metric being used by the EPA to quantify the rate of degradation in "degraded toxaphene"?

What are the differences in the chemical composition of degraded toxaphene and weathered toxaphene?

What are the differences in the chemical composition of degraded toxaphene and weathered toxaphene?

Are the terms degraded toxaphene and weathered toxaphene being used to describe the polychloro camphene chemicals that bioaccumulate? If so, what are the specific definitions of degraded toxaphene and weathered toxaphene bioaccumulation by species?

What specific chemicals are present in EPA's definition of weathered toxaphene?

What specific polychloro camphene must be present to meet the EPA's definition of weather toxaphene?

Is weather toxaphene the same as the polychloro camphene that bioaccumulate in biota? If so, what are the different polychloro camphene compositions of "weathered toxaphene" by species?

What is the metric being used by the EPA to quantify the rate of degradation (or "weathering") in "weathered toxaphene"?

Do all of the polychloro camphene chemicals being described in the sediments fall within the range of patent protected toxic ingredients of the patented Hercules invention for a polychloro camphene pesticide?

If not, what are the other chemicals present, and have they been identified and quantified?

EPA Terminology for Polychloro Camphene

The EPA has implemented a broad range of names and synonyms for the polychloro camphene patented and produced by Hercules. The most commonly used synonym is toxaphene but several more have been added over the years such as degraded toxaphene, weathered toxaphene, and technical toxaphene. Often these synonym terms are applied to polychloro camphene chemicals that are specifically (or selectively) bioaccumulated in one species or another. Often the discussion is incomplete and focuses only on fish and humans to the disregard of the remaining biosphere, including the well documented levels of polychloro camphene in the marsh cord grass, Spartina. In other instances the synonyms are applied to sediments and sludge's from polychloro camphene manufacturing with the assumption (conjecture) that the observed chemicals have somehow been altered in the environment without presenting any evidence to support the claim other than it is the author's best guess at explaining what is being observed. The more likely scenario is the observed chemical composition reflects the variability of batches or production runs of polychloro camphene, which reinforces the argument for vertical delineation of the pesticide manufacturing wastes in the Outfall Ditch before covering. Actually, the vertical delineation of the outfall ditch might be the best opportunity to describe the breadth and scope of polychloro camphene manufactured at the Hercules plant, and characterize the waste for treatment or disposal characterization. What is important about the polychloro camphene synonyms is that they all are still describing the polychloro camphene pesticide patent protected by Hercules Incorporated.

Does the EPA agree that the synonyms toxaphene, degraded toxaphene, and weathered toxaphene all describe chemicals within the scope of the Hercules Patent for polychloro camphene pesticide? If not, what chemicals are being excluded? Have any of the chemicals being excluded been documented to NOT have been manufactured at the Hercules Plant?

If the EPA disagrees, what are the polychloro camphene chemicals in the Outfall Ditch that do not fall under the definition presented in the Hercules Patent and what percent of the total volume do they represent?

<u>Polychlorinated Camphene Analytical Standards</u>

Much has been written in the Hercules 009 Landfills Superfund Site documents and the Terry Creek Dredge Spoils Area Hercules Outfall Site documents concerning the variability among laboratory standards of polychloro camphene, which are commonly referred to as technical toxaphene. Literature concerning the manufacturing of polychloro camphene, the range of analytical standards for polychloro camphene, and the uncertainty associated with the chemical composition resulting from the polychloro camphene manufacturing process has been widely documented in peer-reviewed journals. In all cases and across all of the variability's observed in the various polychloro camphene standards the different chemical compositions were ALL technical toxaphene.

Does EPA agree that the broad range of specific chemical combinations found in the technical toxaphene analytical standards are a good indicator of the breath and scope of chemical combinations that can be reasonably expected from the manufacturing process used by Hercules to produce polychloro camphene?

Does the wide breadth and scope of technical toxaphene analytical standards contained the chemicals described in the Hercules patent for polychloro camphene?

Has the EPA looked at technical toxaphene standards to determine if a specific standard closely matches the polychloro camphene chemical combinations being observed at the Terry Creek Site?

Does the EPA have descriptions for the chemical composition and variability of polychloro camphene manufactured from 1948 to 1970?

<u>Analysis of Toxaphene Residues in Sediment and Fundulus from Terry/Dupree Creek 31 July 1998 (AR Reference - September 17, 1998 letter from L. Francendese, EPA Region 4)</u>

Conclusions
• Surface sediments and resident fish (Fundulus sp.) from the Terry/Dupree Creek tidal marsh system contain polychlorinated camphenes that are found in technical toxaphene.
• Prominent PCCs include **hexa-, hepta-, octa-chlorinated congeners. In general, these congeners eluted in the early part of the chromatographic region where PCCs in unmodified technical toxaphene elute**
• The most prominent PCC detected in the majority of samples was a compound, tentatively identified as 2-exo, 3-endo, 6-exo, 8,9, 10- hexachlorobornane ("Hx-Sed" or B6-923), thought to be a breakdown product of a previously characterized toxaphene component known as "toxicant B"
• In general, the PCC profile in Fundulus resembled that of the corresponding sediment, indicating that sediment is a likely source of these PCCs. (emphasis added)

There has been a marked attempt by EPA Region 4 and Hercules to redefine what is "toxaphene", by asking the question, "What is toxaphene?', and otherwise obfuscate, confound, and cause doubt and confusion at every turn. Taken as a whole, the actions of EPA Region 4 and Hercules would be worthy of a second look by the EPA Office of Inspector General and the US Department of Justice. The above communication from Leo Francendese, EPA On-Scene Coordinator at the Terry Creek Site, shows how a clear situation and unambiguous problem has been confounded by EPA Region 4 and Hercules, mainly using the redefinition of polychloro camphene to the ambiguous terms of "weathered toxaphene" and "degraded toxaphene". Without doubt, the Terry Creek Site is contaminated by the pesticide product patented and manufactured by Hercules, and there is no ambiguity about what is in the outfall, marsh, or the seafood.

Do the surface sediments and resident fish (Fundulus sp.) from the Terry/Dupree Creek tidal marsh system contain polychlorinated camphene that are found in technical toxaphene?

Do the prominent polychloro camphene include hexa-, hepta-, octa-chlorinated congeners that, in general, eluted in the early part of the chromatographic region where PCCs in unmodified technical toxaphene elute?

<u>31 July 1997, K. Maruya to L Francendese - Aroclor 1268 and Toxaphene: Markers of Chemical Contamination in a SoutheasternU.S. Estuary, KEITH A. MARUYA* AND RICHARD F. LEE Skidaway Institute of Oceanography, 10 Ocean Science Circle, Savannah, Georgia 31411</u>

Both PCBs and toxaphene were produced and used as technical mixtures; the chlorination of PCB formulations ranged from 20% to 68% *(14)* whereas technical toxaphene consists primarily of bornane and bornene structures with 6-10 Cl atoms resulting in a complex mixture that is —70% chlorine by weight *(15)*. **Because manufacturing processes were for the most part nonspecific, these mixtures contained many different congeners,**

none of which accounts for more than 15% of the total by weight *(16-18)*. In the environment, the difficulty encountered in comparing residues to source material and/or pure, unmodified standards is exacerbated by **selective PCB/PCC transport,** transformation, uptake and accumulation processes *(19, 20)*. *The* Thus, PCB/PCC profiles in contaminated aquatic biota are quite complex making it difficult to determine sources, fates, effects and the effectiveness of remediation strategies.

We assessed concentrations and profiles in representatives of a simple estuarine food web to determine the pathway of contaminants into biota.

In addition, there was a shift toward the earlier eluting peaks in these complex toxaphene-like signatures (Fig. 5).

Earlier studies found enrichment of higher chlorinated (i.e. octa- and nona-) toxaphene components in fish muscle and fatty tissues *(30, 38)*. However, the profile of toxaphene compounds in the present study reflected a pronounced shift toward earlier eluting PCCs (assumed to contain fewer chlorines) relative to our toxaphene standard. (emphasis added)

Was the problem encountered caused by use of an analytical toxaphene standard that did not match the specific chemical profile encountered at the Terry Creek Site?

Do other analytical toxaphene standards more closely match the chemical profile of polychloro camphene and polychloro camphene manufacturing wastes?

Were the manufacturing processes for the most part nonspecific, these mixtures contained many different congeners, none of which accounts for more than 15% of the total by weight, and these mixtures contained many different congeners?

What are the range of polychloro camphene produced from manufacturing processes that were for the most part nonspecific?

Are the earlier studies discussed above from the Terry Creek Site? If not, does it indicate a different congener profile was being encountered at the Terry Creek Site?

What are the ramifications to the Terry Creek Site from selective polychloro camphene transport, transformation, uptake and accumulation processes in seafood, benthic biota, and plants?

The study noted," However, the profile of toxaphene compounds in the present study reflected a pronounced shift toward earlier eluting PCCs (assumed to contain fewer chlorines) relative to our toxaphene standard." **Are there toxaphene standards that more closely match the congener profile at the Terry Creek Site? If so, why are they not used?**

Does the toxaphene standard used influence the quantification or identification of earlier eluding polychloro camphene?

What is the name of the company of companies providing the "technical toxaphene" analytical standard used at the Terry Creek Site?

What is the congener profile of the "Technical Toxaphene" analytical standard being used by the methods referenced in the Remedial Investigation and Feasibility Study, Method 1, Method 2, and Method 3? And,

Are all three methods using the same toxaphene analytical standard and who is the provider? What is the description of the toxaphene analytical standard?

Who makes the decision about which toxaphene analytical standard is used for the analysis by the three analytical methods described in the Remedial Investigation and Feasibility Study?

Keith A. Maruya, Tina L. Walters, Randall O. Manning, Residues of toxaphene in finfish and shellfish from Terry and Dupree Creeks, Georgia, U.S.A., Estuaries, August 2001, Volume 24, Issue 4, pp 585-596.

Abstract

To better characterize human health risks associated with potentially contaminated seafood, 56 composite samples of edible tissue of several finfish and shellfish species were analyzed for residues of toxaphene using gas chromatography with electron capture and negative ion mass spectrometric detection (GC-ECD and GC-ECNI-MS). Toxaphene in these samples, collected in 1997 near a former toxaphene plant in Brunswick, Georgia, were previously reported as non-detectable using non-selective techniques. Estimated total toxaphene concentrations (ΣTOX) ranged from less than 0.01 to 26 $\mu\ g^{-1}$ on a wet tissue basis. Smaller, bottom dwelling finfish such as croaker, mullet, and spot exhibited the highest ΣTOX (0.76–26 $\mu g\ g^{-1}$), larger predatory fish including seatrout contained intermediate levels (0.08–4.4 $\mu g\ g^{-1}$), and shellfish (blue crab and shrimp) contained the lowest levels (<0.01 to 0.27 $\mu g\ g^{-1}$). For a given species, samples from the site furthest from the toxaphene plant had lower ΣTOX than samples from the other 3 sites. On a congener specific basis, levels ranged from <0.0025 to 3.5 $\mu g\ g^{-1}$. Congener distributions were, in general, dominated by 2-exo, 3-endo, 6-exo,8,9,10-hexachlorobornane (Hx-Sed) and 2-endo,3-exo,5-endo,6-exo,8,9,10-heptachlorobornane (Hp-Sed), breakdown products of Cl_8–Cl_{10} toxaphene homologs. Other prominent congeners confirmed by GC-ECNI-MS included Parlar numbers 26, 40/41, 42, 44, 50, 62, and 63, as well as several unidentified Cl_6–Cl_9 homologs. Minor differences in congener distribution among species and sampling locations suggested that exposure regimes and/or intrinsic biotransformation capabilities were not uniform. These results indicate that toxaphene residues were detectable in all species surveyed and at concentrations higher than estimated previously.

Were the same seafood samples tested by the Toxaphene Task Force Method (Method 1) where no toxaphene was reported as present re-tested by the Method 3, Negative Ion Mass Spectroscopy (NIMS) and toxaphene found in all samples?

Why is the EPA allowing an analytical method, Method 1, be used to guide the Remedial Investigation and the decision-making at the Terry Creek Site?

Is the reason Method 1 is being used at the Terry Creek Site because it has been demonstrated to NOT find the chemicals of concern?

<u>**Administrative Record**</u>

The Administrative Record (AR) contains communications, comments, and other documents concerning the Terry Creek Site and development of the Proposed Plan for the Outfall Ditch. In the absence of a Human Health Assessment, Ecological Risk Assessment, or data describing the vertical and horizontal extent of the contamination in the Outfall Ditch, the AR was reviewed to gain and greater understanding about how such a deficient Remedial Investigation and Feasibility Study were developed. Many of the comments from the stakeholder agencies reflect the same concerns expressed by our community, technical advisor Dr. Peter deFur, and others.

<u>**May 21, 2010, Jan Simmons GA-EPD to Scott Martin EPA**</u>

> "While the concrete channel may provide a protective remedy, the contamination will remain, therefore, it would appear prudent from a long-term management standpoint to remove contaminated sediments to eliminate long term monitoring and maintenance." "Note that, to address long-term management, any remedy that does not address remediation to residential standards will need to include Institutional Controls (IC) to supplement the suggested remedial alterative for OUl."

We agree with the Jan Simmons at the Georgia Environmental Protection Division (GA-EPD) concerning removal of the contaminated sediments and eliminating long-term monitoring. **Does the EPA agree removal of the contaminated sediments will remove the need for long-term monitoring?**

What analysis did the EPA perform to quantify the economic impacts to the community (Glynn County and the City of Brunswick) from leaving the contaminated sediments in place?

What factors did the EPA consider as part of the economic analysis?

Where can the economic analysis of the impacts to the community from the Proposed Plan remedial options be found?

Were the benefits to the community and Hercules weighted, and if so, where can this analysis of economic benefits to both parties be found?

Did the EPA consider the economic ramifications of the proposed remedy on the community, or only Hercules/Ashland?

On what dates and locations did the economic analysis (concerning either or the City of Brunswick and Glynn County, and Hercules Incorporated/Ashland) take place and where can the results of these analysis be found?

What were the Environmental Justice considerations that went into the remedy selection process?

What are the names of the people and affiliations of those who evaluated the Environmental Justice considerations that went into the remedy selection process?

> <u>TO: Scott Martin, EPA RPM FROM: Tom Dillon, Ph.D. SUBJECT: NOAA Comments on Terry Creek OUl Focused RI/FS WP (7/2010) DATE: September 15, 2010</u>
>
> However, the WP lacks any rationale for why multiple methods are proposed. There may be sound, legitimate reasons for doing so; they just are not spelled out in the WP. §3.2.1.1 indicates Methods 1 and 2 will be used to analyze all sediment samples for toxaphene. An unspecified subset of sediment samples will be analyzed for toxaphene using the SW 846 Method 8276. The WP does not indicate why only a subset of samples is being relegated to a published EPA standard analytical method which the WP acknowledges as having "... *better specificity and sensitivity when quantifying individual congeners* ..." (§2.3).

Like Dr. Dillon from NOAA, we do not understand why the EPA implemented three different analytical methods for polychloro camphene at the Terry Creek Site. Utilizing three analytical methods obviously would cost more so it appears there was a compelling reason.

What are the rational for using multiple analytical methods for polychloro camphene?

Did the EPA require Hercules/Ashland to use multiple analytical methods for polychloro camphene?

Would the cost for using three different analytical methods been better utilized by fully determining the vertical and horizontal extent of contamination in the Outfall Ditch? If not, why not?

Did the EPA Office of Inspector General (EPA OIG) find Method 1 (the Toxaphene Task Force Method) inappropriate?

What was the decision-making process that led to using a method found to be inappropriate by the EPA OIG?

Are there email communications between the EPA and Georgia Environmental Protection Division discussing NOT testing (retesting) areas were the Toxaphene Task Force method was used previously?

Is the Terry Creek Site one of the sites where the Toxaphene Task Force analytical method was used in the past?

Is the use of the Toxaphene Task Force analytical method an extension of the agreement described in the June 29, 1993 letter from Marshall Steinberg, Vice-President, Hercules Health and Environment; to Harold Reheis, Director of the Georgia Environmental Protection Division, and Patrick Tobin, Action Director of EPA Region 4?

Did the June 29, 1993 letter from Marshal Steinberg describe an agreement between Hercules, the Georgia Environmental Protection Division, and EPA Region 4 to set criteria to limit the reporting of the quantity of polychloro camphene present?

Did the June 29, 1993 letter from Marshal Steinberg describe an agreement between Hercules, the Georgia Environmental Protection Division, and EPA Region 4 to use an analytical method that would not quantify or report chemicals that were present?

Did the EPA Office of Inspector General describe in great detail how chemicals were NOT being reported in his report Appropriate Testing and Timely Reporting Are Needed at the Hercules 009 Landfill Superfund Site, Brunswick, Georgia, Report 2005-P-00022 September 13, 2005?

Why does the EPA still insist on using an analytical method that has been repeatedly shown to under report, or report as not present, the amount of chemicals in samples?

Did the EPA Office of Inspector General found appropriate testing was needed in 2005?

Did the EPA Office of Inspector General explain in great detail how the Toxaphene Task Force method did not report polychloro camphene chemicals produced at the Hercules Plant?

Did the EPA Office of Inspector General explain in great detail how the Toxaphene Task Force method did not report the most prevalent polychloro camphene present in the Hercules 009 Landfill Superfund Site and Terry Creek Site, Hep-Sed and Hex-Sed?

Why does the EPA NOT want the quaintly of Hep-Sed and Hex-Sed reported in samples from the Terry Creek Site?

<u>8 February 2012 - From Cristin Krachon Project Scientist to Scott Martin</u>

> The comment is for the TAUC quantitation technique used for Method 8081 be included in the SOP for Method 8276. However, TAUC quantitation will not be performed under Method 8276 and is therefore not included in the SOP. Per our telephone conversation on January 17, 2012, you indicated that this would be acceptable.

After finding comments about using three different analytical methods at the Terry Creek Outfall Site, it was very confusing to see communications about limiting the quantity and quality of polychloro camphene data being produced under the EPA approved analytical method (Method 3). After the great effort and expense of analysis by three different methods, the rational for limiting the quality and quantity of data needs to be explained.

Does the acronym TAUC stand for Total Area Under the Curve?

Does TAUC report all the polychloro camphene present in the sample?

Does the TAUC Method report "Total Toxaphene" and Apparent Toxaphene" used by the Food and Drug Administration?

Does the U.S. Food and Drug Administration, in the "apparent toxaphene" method, instructs to include all peaks, and notes that relative heights and widths of matching peaks in the residue and reference standard will probably differ?

How does limiting the reporting of TAUC make the data more robust?

Was the reason for excluding TAUC by Method 8276 to avoid discovery of an under quantification of polychloro camphene by the Method 8081 TAUC?

Does the EPA have records of the decisions made via telephone in writing and incorporate them into the Administrative Record (AR)?

Where in the AR can the decision to excluded TAUC analysis by Method 8276 be located?

Did the 10 samples analyzed by EPA Method 8276 show an under quantification of polychloro camphene by the Toxaphene Task Force method?

> **Administrative Record document described as 15 July 2013 – Letter from Gregory Roush, Geosyntec; to Scott Martin, EPA RPM.**
>
> EPA General Comment No. 3 - With the exception of No Action, the remedial alternatives are primarily remedial technologies and process options that do not necessarily have to be used as standalone remedies. One or more of these technologies could be packaged into comprehensive remedial alternatives that achieve RAOs, satisfy ARARs, and satisfy the nine criteria of the National Contingency Plan (NCP) more effectively than each technology would alone. For example, sediment removal could be implemented in conjunction with Alternative 4A: Sheet Pile Channel.

We agree with the EPA concerning the combining of remedial alternatives to achieve RAOs, satisfy ARARs, and satisfy the nine criteria of the National Contingency Plan (NCP) more effectively than each technology would alone. Specifically, implementing Alternative 5, re-routing the outfall ditch through four box culverts followed by implementation of Alternative 2 appears to meet the criteria, provided the vertical and horizontal extent of contaminated sediments are determined and guides the removal action.

Why does the Proposed Plan not include the combination of alternatives packaged into a comprehensive remedial alternatives that achieve RAOs, satisfy ARARs, and satisfy the nine criteria of the National Contingency Plan (NCP)?

What was the decision-making process the EPA used to exclude implementation of Alternative 5 followed by Alternative 2 in the Proposed Plan?

Were the only remedies considered by the EPA those that leave contaminated sediments in place?

Did the EPA have an agreement with Hercules/Ashland to produce a Remedial Investigation and Feasibility Study that considered only remedies that left a significant amount of the sediments in place?

Was Alternative 2 added to the remedies to be included in the Proposed Plan late in the process?

On what date was Alternative 2, removal of the sediments, added to the Proposed Plan?

Is the data presented in the Remedial Investigation sufficient to implement Alternative 2?

> EPA General Comment No. 4 - Any remedial action that leaves contamination in place and does not allow for unlimited use/unlimited exposure (UUIUE) will result in the need for institutional controls.
> Response: Comment is acknowledged, and the need for institutional controls will be included in the evaluation of remedial alternatives presented/discussed in the Focused RI/FS.

Even though the response to EPA General Comment No. 4 indicates institutional controls will be included in the evaluation of remedial alternatives in the Proposed Plan, the term "institutional controls" is not used other than in the definitions section. The Proposed Plan appears to skirt the institutional controls issue and the ramifications by using the term "environmental controls", which is not in the definitions section.

What was the EPA's rational for using the undefined term "environmental controls" instead of the defined term "institutional controls"?

Why did the EPA not define "environmental controls" in the Proposed Plan?

Did the obtuse nature of the EPA's use of "environmental controls" mask the actual meaning of the term, which appears to be "institutional controls"?

The response clearly states, "...need for institutional controls will be included in the evaluation of remedial alternatives presented/discussed in the Focused RI/FS."

At the time the response was written, were there any proposed remedies that did not need institutional controls?

> **<u>Specific Comments - 15 July 2013 – Letter from Gregory Roush, Geosyntec; to Scott Martin, EPA RPM.</u>**
>
> EPA Specific Comment No. 1 - Section 2.1: The 7/23/10 response to comments stated that the deeper sediment cores would be collected to "evaluate sediment stability, vertical concentration profiles and the change in toxaphene concentrations over time; specifically in the last 10 years since the removal action was completed." **Based on the new bathymetric survey, very few of the deeper samples extended below sediment that has accumulated since the removal action, making comparison to previous data difficult. Also the deeper sampling did not fully define the vertical extent of contamination.** Additional sampling may be necessary to fully define the extent of contamination in OUl. (emphasis added)

We agree with the EPA concerning the need for a full delineation of the vertical extent of contamination in the Outfall Ditch, and strongly agree that vertical concentration profiles and the change in toxaphene concentrations over time need to be produced without further delay.

Please explain why the EPA has been unable to obtain sampling and analysis compliance from the Responsible Party?

What is the EPA decision-making process to resolve Responsible Party noncompliance, and at what point does the EPA have another party collect the data and bill the Responsible Party?

Does the EPA have the authority to contract for the remedial investigation and feasibility study and bill the recalcitrant Responsible Party?

Why has the EPA presented a Proposed Plan when the most basic information, which the EPA has already identified as being needed for a viable remedial investigation, has not been produced?

> EPA Specific Comment No. 4 - Section 2.1, footnote 1, states that a limited number of samples were analyzed for toxaphene congeners using Method 8276, and that the data are intended for informational purposes only and will not be utilized in the RI/FS process. The data will be provided in a separate document. These data should be included as part of the remedial investigation document.

What is the rational for sampling by the EPA approved method for polychloro camphene and then not utilizing the data?

For what informational purposes is the Method 8276 (Method 3) data intended?

What is the rational for excluding the Method 8276 data from the Remedial Investigation?

> EPA Specific Comment No. 8 - Section 4.4.3: It is difficult to agree with eliminating sediment removal based on implementation challenges when it has been implemented successfully at the site before. While it is agreed that removal alone will likely not achieve RAOs in the long term, it could be used in conjunction with other remedial technologies to develop remedial alternatives.

We agree with the EPA in that sediment removal has been implemented successfully and demonstrated to be effective at the Terry Creek Site. The possibility of not achieving RAO's should not deter efforts to reduce the risk to human health and the environment through a removal action.

Terry Creek Site and Dioxin and Furan

Is beyond comprehension that Hercules would make a statement about dioxin having never been detected in any of the solid waste management units (SWMU) covered by the facilities RCRA permit. Not only has dioxin been found in the SWMUs on the Hercules Plant Site, but as also been found at the Hercules 009 landfill Superfund Site and other places where toxaphene manufacturing sludge was disposed. The EPA should rebuke this less than truthful statement in the strongest terms. The EPA should also rebuke Hercules for including such a statement and demand that it never is included in another document for the Terry Creek Site. The inclusion of such a statement questions to credibility of all those associated with the Remedial Investigation and Feasibility Study. The EPA's propensity to look at the Terry Creek Site with blinders was evident at the July 30, 2015 meeting in Brunswick Georgia concerning the Proposed Plan. The community was concerned about the groundwater plume emanating from the plant site and underneath the Terry Creek Site and want to know what the implications were to the cleanup of the Site and if the groundwater contamination had the capability of mobilizing the contaminants. Obviously this is a great question to ask at this time considering the EPA is proposing to leave the contamination in place for the foreseeable future. Rather than address the community's concerns, the EPA had the audacity to say that groundwater contamination was a RCRA matter. If the EPA had looked at the source of Terry Creek contamination, which is the Hercules Plant Site; had the EPA taken the time to look at the analytical results for the sludge basins on the plant site, and the Hercules 009 Landfill Superfund site where toxaphene manufacturing sludge from the early 1970s till 1980 were disposed, it would've been clear from the data that dioxin is a well-documented contaminant in the pesticide manufacturing sludge and wastes.

Not only has dioxin been found associated with sediments and sludge, dioxin has been found in the groundwater associated with the former toxaphene impoundments at the Hercules plant site (RFI Table E-4-3). Similarly, dioxin was found in surface water at the Hercules 009 Landfill Superfund Site (Remedial Investigation Table 3-4). Dioxin was also found in the stream sediment adjoining the Hercules 009 Landfill Superfund Site (Remedial Investigation, Table 3-4). Dioxin was found in groundwater at the Hercules 009 Landfill Superfund site, also. And of course, dioxin was found in the toxaphene pesticide manufacturing waste sludge within the landfill. In every case where dioxin was sampled, dioxin was found associated with polychloro camphene manufacturing wastes.

What action will the EPA take to refute the continued assertion by Hercules Incorporated that dioxin was not produced with polychloro camphene pesticide?

Will the EPA incorporate dioxin and furan data from the sludge basins on the Hercules Plant site and the Hercules 009 Landfill Superfund Site into the body of knowledge for the Terry Creek site?

<u>**Administrative Record - RI/FS Work Plan April 2000**</u>

8.2.3.1.2 Attributes Deserving Consideration in Future Risk Management Decisions - Similarly, dioxins may not be associated with the Hercules facility, and dioxins have never been detected in any of the SWMUs covered by the facility's RCRA permit. Further, dioxins appear to be widely distributed in Brunswick-area marshes, with higher concentrations found on the west side of the city than on the east side, where the Hercules discharge enters the marsh system [USEPA, 1999c]. Thus, any risk management of dioxins should consider alternatives beyond source control involving the Hercules facility. (Has dioxin been tested for in Hercules Plant SWMUs? What were the detection limits?)

Will the EPA include a statement in the description of the Terry Creek Site to include unequivocally that dioxin is associated with the Hercules facility and dioxins/furans have been detected in the solid waste management units on the plant site, and dioxin has been found in the sludge from the polychloro camphene manufacturing process at the Hercules 009 Landfill Superfund Site?

As noted by our technical advisor under the EPA Technical Assistance Grant program, Dr. Peter deFur with Environmental Stewardship Concepts, the RI/FS on page 38 indicates that dioxins were measured in two sediment samples, which is consistent with information that dioxin is a contaminant of toxaphene production. The next statement that the dioxin in sediment samples must be derived from other sources is not credible and needs to be removed.

Will the EPA order Hercules and Ashland to remove all statements from Terry Creek Site documents concerning dioxin and furan not been produced at the Hercules plant?

<u>**Administrative Record**</u>

<u>**RI/FS Work Plan April 2000**</u>

6.2.2 ; RI Sampling - Creek sediment samples from areas expected to contain high concentrations of toxaphene (based on previous sampling results) will also be analyzed for dioxin at EPA's request. The number and location of these samples will be decided and included as part of Step 3 of the ecological risk assessment process.

Was step three of the ecological risk assessment process completed?

Was step three of the ecological risk assessment process avoided in order to avoid sampling for dioxin per the EPA's request?

As the dioxin sampling discussed in the remedial investigation and feasibility study work plan dated April 2000 been rescheduled?

Does the EPA agree the dioxin and furan sampling at the Terry Creek Site is deficient and significantly more data is needed before a Proposed Plan can be considered or implemented?

> 7.4.2 RI Sampling - Selected samples will also be analyzed for dioxin using Method 8081, the location and number of which will be determined during Step 4 of the Ecological Risk Assessment Process.

Was Step 4 of the ecological risk assessment process ever completed?

Is there an association between step four of the ecological risk assessment process not being completed and the failure test for dioxin?

Is Method 8081 the appropriate method for analysis of dioxin? If not, what is the appropriate method?

> 8.2.2.3.8 Overview of Screening Tables - Table 8-11 presents screening data for dioxins in sediment. In one background sample and one sample collected by USEPA [1997a], dioxin did not exceed the Region IV screening value. However, an additional sample collected in 1995 by the Brunswick Initiative does exceed the Region IV screening value. Only one sample was included from the Brunswick Initiative due to its proximity to the Hercules Facility. Tables 8-9, 8-12, 8-14, and 8-16 present comprehensive lists of all constituents analyzed for in surface water, sediment, subsurface soil, and surface soil, whether the constituent was detected or not.

The sampling for dioxin extending back to 1997 establish probable cause to believe dioxin and furans are associated with the manufacturing processes that took place over the past hundred years at the Hercules plant?

> 8.2.3.1.2 Attributes Deserving Consideration in Future Risk Management Decisions - Similarly, dioxins may not be associated with the Hercules facility, and dioxins have never been detected in any of the SWMUs covered by the facility's RCRA permit. Further, dioxins appear to be widely distributed in Brunswick-area marshes, with higher concentrations found on the west side of the city than on the east side, where the Hercules discharge enters the marsh system [USEPA, 1999c]. Thus, any risk management of dioxins should consider alternatives beyond source control involving the Hercules facility.

Will the EPA require all references to dioxin not being associated with the Hercules facility be removed from documents concerning the Terry Creek site?

ADMINISTRATIVE ORDER ON CONSENT FOR REMOVAL ACTION U.S. EPA Region 4 CERCLA Docket No. 98-04-C

The Administrative Order on Consent for the Terry Creek Site summarized how the area became contaminated and the investigations that led to the site being listed.

> **III FINDINGS OF FACT** - Hercules produced toxaphene, a chlorinated camphene pesticide, at its Brunswick facility from 1948 until it ceased its manufacture in December 1980.
>
> In 1994, tests of sediments taken by the U.S. National Oceanic and Atmospheric Administration from estuarine settings including the Terry Creek/Back River area indicated that sediments in Terry Creek **showed significant specific sediment toxicity not shown in other areas of the Brunswick/St. Simon's estuary**. (emphasis added) Subsequent analysis by EPA in 1997 revealed toxaphene in sediments in estimated concentrations of 1,300 ppm.

Has the EPA or any of the stakeholder agencies conducted additional specific sediment toxicity sampling in the vicinity of the Terry Creek Site since 1994? If not, why not?

Is the observed toxicity from the sediments important data to have in order to complete the ecological risk assessment?

Is observed toxicity data important to develop remedial action goals protective of human health and the environment?

> **Scott Martin/R4/USEPA/US 02/12/2008 01:51 PM To Lavon Revells/R4/USEPA/US@EPA, Shen-Yi Yang/DC/USEPA/US@EPA Subject Re: Question about the Total Area under the Curve**
>
> Lavon,
> As I understand it the TAUC method is used as sort of a "worst case scenario" method. I think it came about during work at Terry Creek in an attempt to further answers the "what is toxaphene" question. I think it is just being used within Region 4 right now.

Has EPA Region 4 considered reading the Hercules Patent for polychloro camphene so they can understand and answer the question, "What is Toxaphene"?

Is EPA Region 4 the only EPA Region that uses their version of total area under the curve (TAUC)?

Is EPA Region 4 the only EPA Region that uses the Toxaphene Task Force method, also known as Method One?

What is the analytical method used by other EPA Regions to delineate and plan cleanups of sites with polychloro camphene contamination?

Why is the EPA Region 4 trying to answer the question at Terry Creek, what is toxaphene?

Other than EPA Region 4, are there other EPA Regions trying to answer the question, what is toxaphene?

Have other EPA Regions produced final cleanup goals for Sites with Toxaphene? If so, what were the Action Levels for soil, sediment, and water?

Has EPA Region 4 gathered any data from the other EPA Regions that have produced successful Remedial Action plans for toxaphene contaminated sites? If so, which ones are being considered as guidance for the Terry Creek Site?

Does the Hercules patent for their polychloro camphene pesticide describe what toxaphene is? If not, what is the difference between the pesticide with polychloro camphene patented by Hercules and what EPA Region 4 refers to as toxaphene?

WORK PLAN FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY July 2001

Since the Proposed Plan for Operable Unit One is intertwined with the other operable units at the Terry Creek Site, Operable Unit Two and Operable Unit Three, and these documents have been included in the Administrative Record as part of the Proposed Plan for Operable Unit One, the following questions are submitted for an EPA response.

> Comment 2.- In addition, EPA has indicated that additional dioxin analyses are needed, but there is no indication of any dioxin analyses in Section 7.

Has dioxin analysis been added to section 7 of the remedial investigation and feasibility study work plan?

> Comment 57 - Table 7-1 - This table does not include all the samples and analyses to be conducted. In particular, background samples and dioxin analyses are missing.
> Response 57 - Table 7-1 will be modified to address previous omissions as well as additional sampling proposed in response to USEPA's comments contained herein.

Have the background samples and the dioxin analysis been added to table 7-1?

> 7.4.2 RI Sampling - In addition, five creek sediment samples from areas expected to contain high concentrations of toxaphene (based on previous sampling results) will also be analyzed for dioxin.

Have five Creek sediment samples been added for dioxin analysis in the remedial investigation?

FOCUSED REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN OPERABLE UNIT 1 (OU1) OUTFALL DITCH January 2012

3.2.1.1 Site Characterization - Dioxins, as requested will also be analyzed for in select samples.

Did the EPA specify the select sample locations for dioxin analysis? If not who selected the locations and the number of samples to be tested for dioxin?

4.2.1.1 Shallow Sediment - Additionally, one composite sample from a post-weir and pre-weir transect will also be analyzed for dioxins. These data will be used to evaluate the presence of leachable compounds that may affect remedy design and selection, and to evaluate whether other COPCs may be present that may affect the remedial investigations at OU2 and OU3.

Why sample for dioxin only from 0 to .5 feet and .5 feet to 2 feet?

Are samples from 0 to .5 feet and from .5 feet to 2 feet located in sediments that of accumulated since the removal action in 1999 – 2000?

Was the EPA's rationale for not testing for dioxin throughout the vertical extent of polychloro camphene manufacturing wastes located in the Outfall Ditch?

Would dioxin data be helpful in determining the additive of toxic effects from polychloro camphene manufacturing wastes and other byproducts such as dioxin?

Have observed toxicity sampling been designated for the sediments in the Outfall Ditch? If not, why not?

Does the EPA agree it would be helpful to have observed toxicity data from the Outfall Ditch to quantify both human health risk and ecological risk from the undescribed chemical wastes the EPA proposes to leave in place?

Would observed toxicity data be helpful in developing Institutional Controls, if needed, for the final proposed remedy?

5.1.4 Summary of Other Compounds in Sediment

"Table 5-2 summarizes the detections for the additional compounds analyzed. Most other compounds detected in sediment were detected at estimated concentrations between the respective method detection limits (MDL) and the reporting limits (RL). These concentrations are not quantifiable but contain that a given compound is present. These low-level detections included metals, pesticides, polyaromatic hydrocarbons

(PAHs) and volatile organic compounds (VOCs). Dioxins were also measured and detected in two sediment samples. These compounds are addressed as part of the SLERA presented in Section 7 and .Appendix E. **Dioxins are not known to have been used or produced at the Plant. Since dioxins are ubiquitous in the environment, it is likely that the dioxins are present in the Outfall Ditch sediments due to other anthropogenic sources. (emphasis added)**

Will the EPA order Hercules to remove all statements arguing that dioxin was not produced at the plant during polychloro camphene manufacture from Terry Creek Site documents?

Why did the EPA not refute the statement, Dioxins are not known to have been used or produced at the Plant," back and 2000 when the Remedial Investigation Work Plan was being developed?

RI/FS, December 14, 2014

Table 1 - OUl Focused SLERA, Summary of Analytical Data Evaluated

(2) Deeper sediment samples were also analyzed for dioxins/furans. The results of this analysis are discussed in the SLERA uncertainty section.

What is the depth of "deeper sediment samples were also analyzed for dioxins/furans"?

Did the deeper sediment samples analyzed for dioxins/furans extend the entire vertical depth of contaminated sediments? If not, why not, and what was the decision making matrix used for to establish the sampling depths in the Outfall Ditch?

7.2.3.3 SLERA I uncertainty Assessment

The final component of Step 2 is to describe potential uncertainties associated with the SLERA. These uncertainties are included in Section 4.4 of the SLERA in .Appendix E.

'With regard to the specific remedy, risk-based numeric cleanup goals cannot be developed **because toxicity reference values for weathered toxaphene congeners have not been developed**. .As a result, defined goals for remedy success (i.e.. risk-based cleanup goals) cannot be developed and the volume of sediment to be removed under a dredging removal scenario cannot be quantified. **Therefore, a performance-based remedial goal that focuses on eliminating direct exposure to contaminates in the Outfall.** (emphasis added)

Ditch and eliminating the transport of contaminants to Dupree Creek and other downstream locations is recommended. This approach is consistent with the SEPA's Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (USEPA. 2005) and the Principles for Managing Contaminated Sediment Risks at Hazardous

Waste Sites (USEPA. 2002), which collectively, highlight the consideration of separating the management of source areas with the most elevated concentrations of constituents from other, less concentrated areas.

Was the Weinberg Group hired by Hercules around August 2007 to produce the toxicological work?

Was the August 23, 2008 email between David Clay, EPA Region 4; and Greg Luetscher, EPA Region 4, about the Weinberg Group and state that the work could take 2-4 years?

What was the final product produced by the Weinberg Group and when was it received by the EPA?

Why do the EPA and Hercules still contend this work must be completed before doing more work at the Terry Creek Site?

Does either Hercules or the EPA currently have toxicology work underway concerning polychloro camphene (also known as Toxaphene)?

If not, why is the toxicology work underway concerning polychlorinated camphene (also known as Toxaphene) not being done or being delayed?

Is delay of work at the Terry Creek the reason the toxicology work is not underway concerning polychlorinated camphene (also known as Toxaphene)? If this is not the reason, what is delaying the remedial activities at the Terry Creek Site?

8 FEASIBILITY STUDY

8.1 Purpose of the QUI Feasibility Study
The purpose of a feasibility study is to facilitate USEPA's selection of a Remedial Action Alternative for OU 1 at the Site. The National Contingency Plan (NCP) dictates that the selected alternative be protective of human health and the environment while complying with ARARs. The Focused FS for OIU provides an analysis of alternatives that are assembled based on the results of the Focused RI and the **SLERA presented within the previous section of this document.**

Table 7-3. Constituent Screening - Outfall Ditch Surficial Sediment
Terry Creek Superfund Site - Brunswick, Georgia
Footnote (9) Per the Work Plan, the **SLERA utilizes Method 1 toxaphene results**. The SLERA HQ is based on the EPA EcoTox SQB.

Table 7-5. SLERA Detected Constituent Screening - Outfall Ditch Pore Water
Terry Creek Superfund Site - Brunswick, Georgia
(10) Per the Work Plan, the **SLERA utilizes only toxaphene samples analyzed using Method 1.** Uncertainty associated with the results is discussed in the SLERA uncertainty section. (emphasis added)

Why is EPA Region 4 using Method 1, the Toxaphene Task Force method, when it has been demonstrated to NOT find toxaphene or polychloro camphene at 52 times the EPA DO NOT EAT level in biota?

Word escape me to explain how dumbfounded I am to see the EPA present a document with analysis by the Toxaphene Task Force method, an analytical method that has been discredited from within the EPA, other agencies, credible chemists, and from the environmental community as a whole. This is not a recent development and the analytical methods used by EPA Region 4 have been repudiated for over decade. The matter would not be so serious if there was not a large subsistence fisher population drawing their daily protein from these waters and taking the seafood home to those families. Shameful and despicable are far too tame of words for people who knowingly manipulate analytical data and sample analysis for no other reason than the financial wellbeing of the polluting company at the expense of those with minimal resources.

APPENDIX E - FOCUSED SCREENING LEVEL ECOLOGICAL RISK SSESSMENT TERRY CREEK OUl RI/FS

2.2.1 Site Operating History - Untreated wastewater from the production of toxaphene was discharged through the Outfall Ditch into Dupree Creek until 1972.

The Site Operating History state, "Untreated wastewater from the production of toxaphene was discharged through the Outfall Ditch into Dupree Creek until 1972," but the chemical composition and general characterization of this waste can't be found.

How was the waste stream formed?

Were there other manufacturing processes at the Hercules Plant from 1909 to 2015 that contributed to the waste stream?

What are the chemicals and wastes released in the wastewater over the 106 year history?

What documentation is being used to describe the waste stream and chemicals in the wastewater?

Has a comprehensive list of chemical, processes, and products produced at the Hercules plant been placed in the Terry Creek Site Administrative Record? If not, why not?

2.2.4 Fish Tissue Analysis

The release of toxaphene via the Outfall Ditch has resulted in detectable concentrations of toxaphene and chlorinated camphene (weathered toxaphene) in the tissues of aquatic organisms living in Terry and Dupree Creeks. A study from 1974 indicated that the body burden of fish species were in the part per million range (Reimhold and Dunint, 1974). Prior to the removal action the Georgia Department of Natural Resources (GDNR) conducted a study in 1997 which, at first, indicated that fish and shellfish did not contain detectable concentrations of **technical toxaphene as quantified by the Task Force Method.** However, re-analysis of these samples using more sophisticated analytical methods (see Section 2.3) indicated that toxaphene residues were present at detectable concentrations in fish (Maruya. 2000). These detected concentrations caused GDNR to put specific fish consumption guidelines in place that recommended the limited consumption of certain fish species in the area (Maruya et al. 2001).

Historically. Analytical method SW-846 Method 8080 employing gas chromatography (GC) for separation and ECD (electron capture detector) for detection, was used for the analysis of TT. It became evident in the early 1990s that the interpretation of chromatograms was subjective and therefore, guidance for interpreting the toxaphene chromatograms was developed. The Toxaphene Task Force was convened by chemists from USEP.A. Georgia Environmental Protection Division (EPD) and Hercules, and chartered to develop what is now **known as the Task Force Method, or Method 1.**

For the OIH Focused RI ES. toxaphene samples were analyzed using Method I and Method 2. Since Method I is the most widely used method and is analogous to the SW 846 Method 808IB the data from this method are evaluated in the SLERA and will be used to inform remedial decisions OU1. Selection of this method is appropriate for OU1 because it is the only method for which there are screening criteria available for which to compare the results.

The Appendix E- Fish Tissue Analysis section discusses the use of the Task Force Method, or Method 1, analytical method, the failure to find the chemicals of concern in seafood. The section ends with a ridicules statement about being, "...the only method for which there are screening criteria available for which to compare the results." An analytical method that fails to find the chemical of concern does not produce any data which to compare results.

Does the EPA agree that an analytical method that does not find the chemicals of concern will not produce data which to compare results?

How much does Method 1 under quantify the amount of polychloro camphene, as described in the Hercules Patent?

<u>Administrative Record Doc # - 10784161 Doc Date 06/09/2015 Discussion of seafood sampling results</u>

Clearly, the entire Proposed Plan is built around a Work Plan designed to be misleading and produce deceptive data, which could lead to the false belief the Terry Creek Site is not dangerous. Both the Glynn Environmental Coalition and the EPA Office of Inspector General have described how the Toxaphene Task Force method, or Method 1, analytical method threatens the health and welfare of our community. The GEC submits the following comments and references concerning the Task Force Method, or Method 1, analytical method. As the title infers, there can be no other conclusion about the intent of those using Method 1, other than to hide the poison.

How to Hide the Poison
Under-Quantification of Polychlorinated Camphene (Toxaphene) in Brunswick, Glynn County, Georgia.
January 2001

Summary

The U.S. EPA, Georgia EPD, and Hercules Inc. met as the "Toxaphene Task Force" (TTF) and developed a method for identifying and quantifying the pesticide toxaphene in Brunswick, Georgia. The TTF method has threatened human health by failing to detect or significantly under quantifying toxaphene levels present in the environment. U. S. EPA and the Agency for Toxic Substance and Disease Registry toxicologist have documented why the TTF method fails to produce data that is useful in making their decisions and recommendations to protect human health. Analysis for toxaphene by gas chromatography with electron capture negative ionization mass spectrometric detection (GC-ECD and GC-ECNI-MS) has produced the data needed for toxicologist to make decisions protective of human health.

Background

The Glynn Environmental Coalition (GEC) is located in Brunswick, Glynn County, Georgia, where an insecticide mixture of polychlorinated camphene (PCC), commonly called toxaphene, was manufactured by Hercules Incorporated. Manufacturing of PCC took place at Hercules Incorporated, Brunswick, Georgia, from 1948 to 1980.[1] PCC is defined as camphene with 67% to 69% chlorine by weight, and is a complex mixture of over 670 separate chemicals. [2],[3],[4] During the period PCC was manufactured, PCC manufacturing wastes and PCC was discharged into the estuary by way of Dupree and Terry Creek at a rate of 250 to 300 pounds of PCC per day.[5] Fugitive emissions of PCC contaminated wind-blown dust, water runoff, and vehicle traffic distributed PCC throughout the neighborhoods around the Hercules Plant site. [6] In addition, significant amounts of PCC were deposited into at least four landfills and dumps in Glynn County.[7], [8]

In 1991, chemists from the EPA, EPD, and Hercules Inc., performed a limited study and developed a set of guiding principles for the determination of PCC in groundwater, soil, and manufacturing waste sludge samples from the Brunswick, Georgia, area.[9], [10] The results of this limited study was the development of the "Toxaphene Task Force" (TTF) methodology for the identification and quantification of PCC. The TTF methodology was further modified in August 1997. [11] Even though the August 1997 modifications were proposed for only specified areas and only for soil and groundwater, the method has been used at Sites throughout Glynn County and has been used to determine PCC's in fish tissue for human health determinations.[12] The August 1997 method is also referred to as the "Hercules Protocol".[13]

The ability of the agreed upon TTF method to accurately identify and quantify PCC has been questioned by the Agency for Toxic Substance and Disease Registry (ATSDR) and the EPA.

Statement of the Problem

The method developed by the TTF for the identification and quantification of PCC in Brunswick, Georgia, seriously underestimates the true amount present, and excludes the PCC chemicals that health officials are most concerned about. Specifically, the TTF method fails to report the "total toxaphene" and "apparent toxaphene" that are the basis of recommendations by the EPA, Food and Drug Administration (FDA), and ATSDR toxicologist to protect human health and establish cleanup levels at PCC contaminated sites.

Local, State and Federal health officials rely upon the accuracy of data gathered on PCC levels to make recommendations to minimize or eliminate exposure of citizens through consumption of contaminated seafood, water, or contact with contaminated soil, sediments, and sludge. Based on PCC data collected, interim actions are recommended to protect the public in the form of seafood consumption advisories, and emergency removal actions, while long-term remedies are developed. High quality and accurate data is crucial in taking short-term actions and recommendations, and developing long term remedial plans.

Health officials from the EPA and ATSDR have identified the TTF method as seriously flawed in providing data meaningful to their deliberations on the potential health ramifications from the consumption of PCC contaminated seafood, and exposure to PCC contaminated air, soil, sludge, sediments, and water. The EPA and ATSDR are specific in the type and quality of data needed to make decisions protective of human health and the environment. Likewise, the

EPA and ATSDR have been specific in the ways the TTF method has threatened human health by failing to detect and understating actual PCC levels present. Most notable is that the TTF method excludes the fraction of the 670+ PCC chemicals that are of concern in making health based recommendations. Recent re-analysis of samples has shown that the TTF method failed to identify the presence of PCC in seafood at levels 52 times the EPA "do not eat" recommendation. The TTF method has failed to accurately identify PCC in many other samples, or to significantly understate actual levels of PCC present.

Discussion

Formation of the Toxaphene Task Force began at meeting on September 30, 1991, at the Georgia EPD. It was agreed that previously the regulatory agencies and Hercules had used a procedure that identified "apparent toxaphene" when analyzing environmental samples.[14] Analysis for "apparent toxaphene" is the criteria used by the U.S. Food and Drug Administration (FDA) to make health based recommendations for maximum levels of PCC in food.[15] It was agreed that if the U.S. EPA, Georgia EPD, and Hercules agreed upon the method and the findings of the task force, it would be used by the EPA for any work relating to the Superfund Site[16] or any RCRA matters pertaining to the Hercules facility involving toxaphene. It was proposed that those in attendance meet again to review the work of the task force and to discuss whether the samples do, in fact, reflect toxaphene or some other product. Clearly, a decision was made at the meeting to develop a PCC analytical method different from the health-based method currently in use.

The report of TTF, released June 4, 1993, was described as a very limited study of toxaphene analysis of real samples collected at the Hercules facility in Brunswick, Georgia.[17] The TTF method was designed to identify and quantify "technical toxaphene", instead of the "total toxaphene" or "apparent toxaphene" used by toxicologist in determining the potential risk to human health and the environment.

The TTF made specific changes in the identification and quantification of PCC that result in a significant reduction of "total toxaphene" and "apparent toxaphene". Quantification was limited to the 4-6 major peaks on the "back half" of the toxaphene chromatogram while many of the prominent PCC's found in the "front half" are associated with unmodified technical toxaphene.[18],[19],[20],[21] The TTF further excluded PCC from the quantification process by eliminating any peak which is larger in proportion to the other component peaks in the sample than in the toxaphene standard.[22] The U.S. Food and Drug Administration, in the "apparent toxaphene" method, instructs to include all peaks, and notes that relative heights and widths of matching peaks in the residue and reference standard will probably differ. [23]

One chemist from the U.S. EPA noted that the "latter peaks" in samples were decreased and the "early peaks" were increased in environmental samples from Brunswick, and that the TTF method may seriously underestimate the true concentration of toxaphene.[24],[25] Because early and disproportionate peaks are eliminated from the quantification in the TTF method, it produces much lower PCC quantification results than those found using the U.S EPA approved Contract Laboratory Program (CLP) analytical method. The U.S. EPA Region 4 Environmental Services Division Laboratory analyzed split samples by the TTF method and a contracted laboratory by the U.S. EPA approved CLP method. Results showed that the TTF method either failed to detect PCC or only identified as little as 3.2% of the PCC present.[26]

Seafood samples collected in 1997 by the Georgia Department of Natural Resources, and analyzed by the Georgia Environmental Protection Division using the TTF method, were re-analyzed by the Skidaway Institute.[27] While PCC was not detected in any sample (n=56) using the TTF method, Skidaway detected PCC in every sample up to 26 parts per million (PPM). Even when the EPA "do not eat" levels of 0.5 PPM was exceeded by 52 times, PCC was reported as "not detectable" in fish by the TTF method.[28] The Food and Drug Administration (FDA) has a maximum allowable PCC level of 5 PPM in commercially caught seafood sold in the United States, until revoked in 1993.[29] In addition, in setting the FDA level, it makes the assumption that the seafood will be diluted in the Nation's food basket. The FDA also explicitly states that FDA maximum allowable levels are not to be applied to a seafood source consumed by the local population. The TTF method failed to find PCC at over five-times the FDA commercial level, yet commercial seafood harvest continues within the areas. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), food tolerance restrictions for toxaphene (PCC) range from 0.1 to 7 ppm. Therefore, the failure of the TTF method to detect toxaphene at levels meaningful to the protection of human health and the environment presents local health threats and may have national significance.

ATSDR evaluated the data produced by the TTF method and found many concerns over it use.[30] The TTF method failed to accurately identify and quantify a known amount of the PCC in the calibration standard. They found that the composition of the weathered PCC in fish differs from that in the technical-grade PCC, and the PCC adsorbed on soil may have a different bioavailability than technical-grade PCC. In addition, the TTF method seems to eliminate the option to conduct a total area method that estimates the PCC concentration from all peaks in the chromatogram.[31] The ATSDR concluded that the use of the "back half" peak method (TTF method) is likely to result in significant underestimation of PCC concentration, and the estimated dose could be 10 times higher if historical data are taken into account for dose estimation.[32] ATSDR recommended that sensitive and specific methods, such as electron capture negative ion mass spectrometry (GC-ECNIMS) be used for the evaluation of toxaphene in fish and sediment.

Local, State, and Federal health officials depend on PCC data from the EPA, EPD, and Hercules Incorporated, in preparing remedial plans and making recommendations to potentially exposed citizens around contaminated areas. In addition, the Georgia EPD will NOT make a consumption recommendation without data.[33] An analytical method that fails to find the chemical of concern or that seriously understates the actual levels present fails to protect human health. Bad data leads to bad decisions and recommendations by local, State, and Federal officials that result in health threatening exposure of the citizenry. The integrity of the Nations food basket is compromised by flawed analysis that allows contaminated seafood to be harvested and sold.

Corrective action plans required by the EPA and EPD are promulgated on protection of human health and the environment. Remedial actions that are based upon faulty or inaccurate data will fail to fulfill the intent of the law, which is to protect human health. Any analytical method that fails to find the chemical(s) of concern (COC) at levels meaningful to the protection of public health is a threat to public health. When a method is represented to be accurate at levels meaningful to public health and fails to detect COC's, and the COC is reported as not present, public health is jeopardized by the false belief that the seafood, soil, water, or sediments are safe to consume or be exposed.

Conclusions

The Glynn Environmental Coalition (GEC) believes that the U.S. EPA, Georgia EPD, and Hercules have entered into an agreement that failed to identify and under reported PCC levels present. This agreement has led to data that is a threat to human health and the environment because health agencies are making seafood consumption and soil, sediment, and sludge exposure recommendations based upon flawed data. In addition, remedial actions by the U.S. EPA and Georgia EPD will not be protective of human health and the environment because cleanup levels will not accurately reflect true levels of PCC present.

Recommendations

The GEC is seeking the following remedy for PCC sampling that has not produced data meaningful to the protection human health.

1.) Order that all future PCC analysis and quantification be done using Gas Chromatography with Electron Capture and Electron Capture Negative Ionization Mass Spectrometric Detection (GC-ECD and GC-ECNI-MS) for environmental samples such as fin- and shellfish or other biota, soil, sediment, sludge, and water.

2.) Order that all analysis and quantification report "total" PCC levels present.

3.) Order sampling, analysis, and quantification of PCC by GC-ECNI-MS in all areas and media previously analyzed and quantified by the TTF method in Brunswick, Glynn County, Georgia.

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Environmental Justice and Use of the Task Force Method, or Method 1, Analytical Method

The continued use of the Toxaphene Task Force Method, or Method 1, for more than a decade after being refuted by many agencies and organizations, the EPA Office of Inspector General, and the science community raises significant questions. As noted in the letter that follows:

> The stubborn insistence by Region 4 to continue to rely on a biased and unscientific method that has been rejected by the ATSDR and the OIG can cynically be viewed as a blind, ideological adherence to fiction in the face of facts. The result of these actions, whether ignorant or intentional, is a failure to provide the protection for human and environmental health that is promised in the mission[17] of the EPA.

The ramifications of EPA Region 4's insistence upon using the Toxaphene Task Force method, or Method 1, for an additional decade questions whether our community is receiving Environmental Justice from EPA Region 4. The appearance is EPA Region 4 is engaged in an active campaign to deny Environmental Justice to the City of Brunswick, and Glynn County.

Is the Toxaphene Task Force Method, or Method 1, use anywhere besides the Terry Creek Site?

The Glynn Environmental Coalition and organizations across the country looked at the "Toxaphene Task Force method, or Method 1" issue. The comments from Jennifer Sass, Ph.D., are just a relevant to the Terry Creek Site, which is referenced, and are as relevant today as when written and submitted to the EPA Office of Inspector General. Since the "Toxaphene Task Force method, or Method 1", is a key issue raised by the Glynn Environmental Coalition, and an issue that has been raised for well over 15 years, we request the comments By Dr. Sass and the references be put into the official comments on the Terry Creek Outfall Plan. Furthermore, the EPA should answer the question, **"How does continued use of the Toxaphene Task Force method, or Method 1, address Environmental Justice issues raises in the letter by Dr. Sass?**

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Public Interest Comments on the Office of Inspector General Reports:

Appropriate Testing and Timely Reporting are Needed at the Hercules 009 Landfill Superfund Site, Brunswick, Georgia[1]

Report 2005-P-00022; September 26, 2005
Report 2005-P-00022 (Addendum); September 13, 2005

and

More Information is Needed on Toxaphene Degradation Products[2]
Report No. 2006-P-00007, December 16, 2005

We, the supporters of this letter, advocate on behalf of our millions of members for regulations that provide protection to communities, workers, and wildlife. We do not have any financial interest in the subject of this letter.

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Summary

The Office of the Inspector General, at the request the Glynn Environmental Coalition, has reviewed claims that a Glynn County, GA Superfund site contaminated with Toxaphene is receiving inadequate clean up. At the heart of the dispute is a testing method that fails to detect most of the toxic congeners and degradation products of toxaphene, thus underestimating the extent of contamination. Use of the biased testing method was approved by a closed partnership between EPA Region 4, the Georgia Environmental Protection Division (GaEPD) and Hercules, Inc. that failed to include community representatives. Both the OIG and a previous review by the Agency for Toxic Substances and Disease Registry(2002), have recommended that EPA should discard this flawed method in favor of established tests that identify toxaphene degradation products.

The Glynn County contaminated sites, predominately populated by low-income African-American families, provide EPA with an immediate opportunity to work with the community, apply appropriate scientific methods, and force the stringent clean up that was promised to the community over two decades ago when this site was listed as a National Priority Superfund site.

History of the site[3]: ***twenty years is too long***

Hercules Inc., a former pesticide plant, manufactured toxaphene as an insecticide at its plant in the city of Brunswick, Glynn County, Georgia, from 1948 to 1980. In these comments, we will use the term "polychlorinated camphene" (PCC) to describe toxaphene, a mixture of over 670 chemicals of concern, and its residues and conversion products.

The Hercules 009 Landfill Superfund Site in the city of Brunswick, in Glynn County, Georgia operated from 1975 until 1980, and was listed on the National Priorities List (NPL) in 1984, over 20 years ago[4]. The Brunswick area has a commercial fishing port and a thriving seafood industry, as well as recreational fishing and crabbing. [9]

The Hercules 009 Landfill is described as a 16.5 acre property that is bordered by Georgia State Highway 25 on the west; an automobile dealership on the north; a juvenile slash pine forest on the east; and several homes, a church, a school, and a strip shopping center to the south/southeast of the property.[5]

Until required by the Clean Water Act to treat waste water in 1972, Hercules reportedly released up to 200-300 pounds of PCC per day as waste water,[6] ranged from 2,332 parts per billion (ppb) in 1970 to 6.4 ppb in 1974.[7] PCC has been reported at levels exceeding 15,000 parts per million (ppm) at the Hercules 009 Landfill Site.[8] In 1976 PCC discharge was restricted to a daily maximum of 1 pound per day and a daily average of 0.5 pounds per day. Subsequent discharge was limited to 0.00081 ppm, though violations were recorded.[9]

In July 1988, Hercules and EPA entered into an Administrative Order on Consent for conducting a remedial investigation/feasibility study (RI/FS)[10] to assess the risk to human and environmental health and evaluate treatment approaches.[11]

In 2002, the Agency for Toxic Substances and Disease Registry (ATSDR), an agency of the U.S. Department of Health and Human Services, conducted a public health assessment of some of the Hercules waste areas in Brunswick.[12] In that report, ATSDR recommended limiting consumption of fish from the contaminated areas.

Both the ATSDR and the Office of the Inspector General (OIG) specifically identified the method advocated by EPA Region 4 and Hercules as insensitive, inadequate, and likely to significantly underestimate contamination levels, and instead recommended the use of pre-validated and scientifically accepted measurement methods. [13] [14]

Current clean up issues: *intentionally insensitive methods fail to detect contamination*

The Hercules Landfill Superfund Site and five other sites contaminated by PCC in Glynn County, Georgia are slated for a sub-standard clean up that will leave at risk the community and the environment. This is being pushed through because of a closed partnership between EPA Region 4 and Hercules that excluded community participation. This pairing of between state regulators and the regulated industry was self-titled the Toxaphene Task Force. Among numerous biased and discredited pronouncements of this task force was use of a measurement method that failed to detect most of the over 600 congeners, residues, and degradation products of PCC contamination. The Region 4 assessment, relying on the flawed method, was strongly criticized by the ATSDR in a 2002 report as underestimating the exposure.[15] The OIG specifically noted that the methods used by Region 4 and Hercules are not designed to measure toxaphene degradation products, and instead recommended established testing methods that specifically test for toxaphene degradates.[16]

The stubborn insistence by Region 4 to continue to rely on a biased and unscientific method that has been rejected by the ATSDR and the OIG can cynically be viewed as a blind, ideological adherence to fiction in the face of facts. The result of these actions, whether ignorant or intentional, is a failure to provide the protection for human and environmental health that is promised in the mission[17] of the EPA.

Hazard information: ***Toxaphene is persistent, bioaccumulative, and banned***

Toxaphene is a toxic chlorinated-hydrocarbon persistent bioaccumulative banned pesticide. It is a mixture of over 670 chemicals of concern, and is approximately 40 to 75% chlorine by weight. In 1982 toxaphene was restricted in the US, and then fully banned in 1990. Although it has low solubility in water, it is readily adsorbed in soil and sediments, and bioconcentrates in aquatic organisms including fish. It is highly acutely toxic to fish, even at concentrations that are low parts per billion (ppb; one ppb is one part in 10^9, or roughly a drop in an Olympic-sized swimming pool) or high parts per trillion (ppt; one ppt is one part in 10^{12}, or roughly one second in 320 centuries).[18] [19] [20]

In its 2002 report of the Brunswick area, ATSDR described the relevant toxicity literature. Animal testing that pre-birth and post-natal exposure to toxaphene may interfere with normal development.[21] When pregnant rats were fed a diet contaminated with toxaphene, effects included poor righting ability and poor swimming ability, compared with healthy control animals.[22] The exposed rats eventually attained normal swimming ability. ATSDR also noted that, "when the rats took a maze test at the age of 70 days, those previously exposed to PCC components had difficulty remembering the path leading to the food". ATSDR recommended that, "pregnant women and nursing mothers should avoid consuming large quantities of contaminated fish and, obviously, avoid ingesting contaminated soil" to protect the developing fetus and child. ATSDR warned that exposure to PCC through contaminated fish and surface soils, should also be minimized in infants and young children.[23] Air exposures should also be considered hazardous; PCC is up to 8% in soils at the Hercules Plant.

National interest: ***a bad job here may lead to failed clean-ups nationally***

NPL sites are the most serious sites across the country, slated for possible long-term cleanup by EPA's Superfund program. Altogether, there are 1,246 final sites across the country, of which 18 sites across 9 states include toxaphene as a contaminant.[24] Therefore, the level of clean up that EPA will require at this site is likely to impact requirements across the country.

The document record is clear that it is the intention of Hercules to submit its toxaphene review to the EPA database, the Integrated Risk Information System (IRIS), which contains EPA's scientific positions on potential human health effects from environmental contaminants. While not an enforceable regulatory standard *per se,* information on IRIS is considered by regulators at the state and federal level and others worldwide to set pollution cleanup standards and various exposure standards for air, water, and soil.

Hercules advocated a reduction in the cancer potency factor 10-fold on the IRIS database[25] from 1.1 mg/kg/day to 0.11 mg/kg/day, and stated that it has already gone so far as to submit its proposed factor to Office of Solid Waste and Emergency Response (USEPA/OSWER), based on "new information"[26] citing a 1998 report. This would likely severely impair clean-up action at contaminated sites all over the country.

In addition to weakening the cancer potency factor, Hercules also proposed to weaken the non-cancer "safe" level, known as a Reference Dose (RfD), posted on the IRIS database. In its comments to ATSDR, Hercules states that it has submitted an alternative RfD of 0.0007 mg/kg/day for the IRIS database.[27] This is approximately 3-fold more permissive than the old IRIS RfD of 0.00025 mg/kg/day (IRIS, 1993), which has now been removed from the IRIS database. Hercules specifically notes that use of its alternate RfD value would raise the screening level from 3 ppm to 7.5 ppm toxaphene in fish.[28]

It should be extremely concerning to taxpayers that a scientific article that proposes to disregard all but a handful of PCC congeners is co-authored by scientists from EPA Region 4 and the Georgia Environmental Protection Division (Simon and Manning, 2006). Though no source of funding is disclosed, it is published in a journal, *Regulatory Toxicology and Pharmacology*, well-known to be biased towards industry perspectives. In fact, in 2002 the journal was targeted in a letter by over forty scientists, including noted international experts and journal editors, citing concerns about, "apparent conflicts of interest, lack of transparency, and the absence of editorial independence".[29] Specifically, their letter cites, "the journal's apparent bias in favor of industries that are subject to governmental health and environmental regulations". The letter goes on to identify financial supporters of the journal sponsor, including, the American Chemistry Council, Dow AgroSciences, R.J. Reynolds Tobacco Co., and others. Moreover, the letter identified a "significant percentage" of the editorial board with financial ties to companies whose products are the subjects of studies published in the journal. Is it any wonder, then, that this article advocating a weakening of cancer potency of toxaphene found its way to this journal? But, the fact that the authors are public employees suggests a disconcerting level of partnership between Hercules and the regulatory agencies.

Environmental Justice: ***EPA fails to act on Executive Order 12898***

The State and Federal agencies charged with the protection of human and environmental health are faced with a moral test of deciding whether to unfairly burden Glynn County families with health risks that they are not likely to bear themselves, and that are not shared equally across the nation.

Glynn County is comprised of 72% white population and 26.5% black population, more diverse than the National average of 80% white and 13% black (2004 Census data).[30] However, the Brunswick city has a total population of approximately 15,600 people, of which 36% are white and 60% are black (2000 Census data as reported by ATSDR).[31]

(data are rounded off)	Brunswick city (2000 data) [32]	Glynn County (2003/4 data)[33]	US (2003/4 data)[34]
White persons	36%	72%	80%
Black persons	60%	27%	13%
Median household income	$22,000 ($18,400 for black; $27,900 for white[35])	$38,000	$43,000
Persons living in poverty	30%	15%	12.5%

The county has approximately 27,000 households (2000 data), with The county The county has approximately 27,000 households (2000 data), with a median household income of $38,600, less than the National median of $43,300 (2003 data). However, Brunswick City has a median household income of only $22,200 (2000 data), much lower than the county and national. This leaves 15% of Glynn County residents living below poverty (2003 data), more than the National average of 12.5%. However, 30% of Brunswick City residents live below poverty (2000 census data). In summary, Glynn County residents are more likely to be black and/or to be poor than the average American.

In addition to the Hercules 009 Superfund site, the Brunswick area is the site of two additional industrial facilities that have been classified as Superfund sites, and 17 other potentially hazardous waste sites.[36] Maybe the unfair distribution of toxic dump sites and other industrial facilities is a significant factor in the higher rate of cancer and other diseases among black residents compared with white residents of Glynn County. In the health service area that extends from Duval County (Jacksonville) FL to Glynn County GA, EPA reports that the overall cancer rate per 100,000 population is 177 for white males compared with 257.7 for black males.[37] The cancer rate for white females is 118.4, compared with 135.1 for black females. Childhood leukemia rates are almost 2-fold higher for black males (14.1 per 100,000), compared with white males (8.9 per 100,000);[38] data for females is similar for white (6.1) and black (4.9) populations.

The EPA provides a description of environmental justice on its website:

> Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.[39]

Despite this laudable and critical recognition of the unfair distribution of risk and disease across this country, a study just released in September 2006 by the Office of the Inspector General is highly critical of EPA's failed record on taking action to correct these injustices.[40] The IG recommended that EPA review its programs appropriately and take action consistent with Executive Order 12898 to address the unfair impact of industrial waste on communities.[41]

Take action now to protect human health

We generally support the OIG reports, and encourage the OIG to issue a strong response to EPA to work with the community, apply appropriate scientific methods, and force the stringent clean up that was promised to the community over two decades ago when this site, predominately populated by low-income African-American families, was listed as a National Priority Superfund site.

Thank you for your consideration of these comments.

Respectfully,

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[1] To whom correspondence should be sent. Full contact information at end of these comments.

[1] summary at http://www.epa.gov/oig/reports/2005/20050926-2005-P-00022-Gcopy.pdf
full report at http://www.epa.gov/oig/reports/2005/20050926-2005-P-00022.pdf
addendum at http://www.epa.gov/oig/reports/2005/20050926-2005-P-00022A.pdf

[2] summary at http://www.epa.gov/oig/reports/2006/20051216-2006-P-00007-Gcopy.pdf
full report at http://www.epa.gov/oig/reports/2006/20051216-2006-P-00007.pdf

[3] EPA. Georgia NPL/NPL Caliber Cleanup Site Summaries. http://www.epa.gov/region4/waste/npl/nplga/herculga.htm

[4] CERCLIS ID GAD980556906

[5] EPA. Georgia NPL/NPL Caliber Cleanup Site Summaries. http://www.epa.gov/region4/waste/npl/nplga/herculga.htm

[6] ATSDR. Public health assessment: Terry Creek dredge spoil areas/ Hercules outfall site, Brunswick, Glynn County,
Georgia. 2002. http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_toc.html

[7] http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_p1.html#backa

[8] EPA. Georgia NPL/NPL Caliber Cleanup Site Summaries. http://www.epa.gov/region4/waste/npl/nplga/herculga.htm

[9] http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_p1.html#backa

[10] Definition of RI/FS http://www.epa.gov/superfund/whatissf/sfproces/rifs.htm

[11] EPA. Georgia NPL/NPL Caliber Cleanup Site Summaries. http://www.epa.gov/region4/waste/npl/nplga/herculga.htm

[12] http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_p1.html#backa

[13] summary at http://www.epa.gov/oig/reports/2006/20051216-2006-P-00007-Gcopy.pdf
full report at http://www.epa.gov/oig/reports/2006/20051216-2006-P-00007.pdf

[14] ATSDR report (2002) Appendix F: Response to comments. ATSDR states, "On April 14, 2000, ATSDR formally received an analytical protocol from USEPA, Region IV describing the "Procedures for the Determination of Toxaphene," a three-page protocol dated August 14, 1997. This protocol, which was intended to be used by USEPA-Region IV and Hercules, employed "the last four to seven peaks in the 'back half' of the toxaphene chromatogram for calibration and quantification of toxaphene."

The "four peak in the back half" methods dates to the packed column days, when there were only several usable peaks shown on the back half of toxaphene chromatogram (USEPA 1986 Method 8080). This "four-peaks-in-back- half" method was precise at that time... This method, however, has lost its precision now because the powerful capillary column in modern gas chromatography instruments generates dozens of peaks in the back half of the chromatogram of toxaphene standard... Although the Method 8081A of January 1995 kept this "four-peaks-in-back- half" method, the method was purged from the official December 1996 version of Method 8081 A, as well as the new Method 8081 B of January 1998. Recently, GA EPD repeated the analysis of 56 samples from the old April 1997 samples with the specific methodology of both GC-ECD and GC-MS at Skidaway Institute of Oceanography.

On June 19, 2000, quantitative data for the 56 samples became available and the PCC concentrations up to 26 ppm was found in fin fish. This work was published in peer reviewed, open literature in September 2001."

http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_p3.html#appf

[15] http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_toc.html

[16] summary at http://www.epa.gov/oig/reports/2006/20051216-2006-P-00007-Gcopy.pdf

full report at http://www.epa.gov/oig/reports/2006/20051216-2006-P-00007.pdf

[17] "The mission of the Environmental Protection Agency is to protect human health and the environment."

http://www.epa.gov/epahome/aboutepa.htm#mission

[18] Maruya KA and Lee RF. Arochlor 1268 and toxaphene in fish from a southern U.S. estuary. Environ Sci Technol 1998;32:1069-75.

[19] ATSDR report. 2002. http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_p1.html#sum

[20] The ATSDR report Appendix F reported that, "The acute LC50 values for other kinds of fish ranged from 2 ppb for basses to 18 ppb for bluegills. PCC in chronic exposure systems were one to three orders of magnitude more toxic to fish than were acute exposure systems. The chronically toxic effects of PCC were observed at 39 ppt in brook trout, and at 36.7 ppt in fathead minnow." http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_p3.html#appf

[21] Agency for Toxic Substances and Disease Registry. Toxicological profile for toxaphene. Atlanta: US Department of Health and Human Services; August 1996.

[22] Olson KL, Matsumura F and Boush GM. Behavioral effects on juvenile rats from perinatal exposure to low levels of toxaphene, and its toxic components, toxicant A, and toxicant B. Arch Environ Contam Toxicol 1980; 9:247-57.

[23] http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_p1.html#backa

[24] Query for toxaphene, September 26, 2006. http://oaspub.epa.gov/oerrpage/basicqry

[25] IRIS database. Toxaphene. http://cfpub.epa.gov/iris/quickview.cfm?substance_nmbr=0346

[26] ATSDR report, 2002. Appendix G. p. 113
http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_p4.html#appg

[27] ATSDR report, 2002. Appendix G. p. 111
http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_p4.html#appg

[28] ATSDR report, 2002. Appendix G. p. 111
http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_p4.html#appg

[29] Axelson O, Balbus JM, Castleman B, Cohen G, Davis D, Donnay A, Doolittle R, Duran BM, Egilman D, Epstein SS, Goldman L, Grandjean P, Hansen ES, Heltne P, Huff J, Infante P,

Jacobson MF, Joshi TK, Ladou J, Landrigan PJ, Lee PR, Lockwood AH, MacGregor G, Melnick R, Messing K, Needleman H, Ozonoff D, Ravanesi B, Richter ED, Sass J, Schubert D, Sharpe VA, Socha A, Suzuki D, Teitelbaum D, Temple NJ, Terracini B, Thompson A, Tickner J, Tomatis L, Upton AC, Wyatt RM, Wigmore D, Wilson T, Wing SB. "Letter to Academic Press and Elsevier Sciences, Inc. Re: Regulatory Toxicology and Pharmacology", November 19, 2002.

[30] http://quickfacts.census.gov/qfd/states/13/13127.html

[31] Census data. Profile of General Demographic Characteristics: 2000. Geographic area: Brunswick city, Georgia.
http://censtats.census.gov/data/GA/1601311560.pdf

[32] Census data. Profile of General Demographic Characteristics: 2000. Geographic area: Brunswick city, Georgia.
http://censtats.census.gov/data/GA/1601311560.pdf

[33] http://quickfacts.census.gov/qfd/states/13/13127.html

[34] http://quickfacts.census.gov/qfd/states/13/13127.html

[35] US Census Bureau. Fact Sheet. Brunswick city, Georgia.

[36] See ATSDR report and Fig 1 map at
http://www.atsdr.cdc.gov/hac/PHA/terrycreek/tcd_f1.gif

[37] Data from the US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, Atlas of United States Mortality (1997). Visualized using EPA enviro-mapper.

[38] National Cancer Institute Cancer Mortality Maps & Graphs. Numbers are per 100,000 population, from 1970-1994.

[39] http://www.epa.gov/compliance/environmentaljustice/

[40] Office of the Inspector General. EPA needs to conduct environmental justice reviews of its programs, policies, and activities.
Report No. 2006-P-00034. September 18, 2006.
http://www.house.gov/apps/list/speech/ca32_solis/ej-epa_report.pdf

[41] Office of the Inspector General. EPA needs to conduct environmental justice reviews of its programs, policies, and activities.
Report No. 2006-P-00034. September 18, 2006.
http://www.house.gov/apps/list/speech/ca32_solis/ej-epa_report.pdf

EPA and Environmental Justice in Brunswick, Georgia

> "Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and **equal access to the decision-making process** to have a healthy environment in which to live, learn, and work." http://www.epa.gov/environmentaljustice/

Since 2000, how many meeting did the EPA have with local officials and citizens in Brunswick, Glynn County, Georgia, during the development of the Proposed Plan for the Outfall Ditch? And,

On what dates and locations did the meetings to provide equal access to the decision-making process take place?

Who did the EPA invite to attend the meetings and was there public notice to involve the community in the Terry Creek Site decision-making process?

Since 2000, how many meetings did the EPA have with Hercules, their contractors, or consultants representing the Responsible Parties? And,

On what dates and locations did the EPA have meetings with Hercules, their contractors, or consultants representing the Responsible Parties?

Administrative Record

Letter from Tim Hasset, Hercules, to Scott Martin, EPA. December 15, 2014

The enclosed document includes that evaluation, and Hercules reiterates its belief that Alternative 4 (Concrete-Lined Channel Rerouted with Limited Sediment Removal formerly Alternative 3) is the best remedy for OU 1.

When did Alternative 3 become Alternative 4?

Did Alternative 3 become Alternative 4 late in the process due to the addition of a sediment removal option, Alternative 2?

Was the Outfall Remedial Investigation Work Plan sampling and analysis plan designed to support a sediment removal option? If not, why not?

If the Outfall Ditch Remedial Investigation Work Plan sampling and analysis plan was designed to support a sediment removal option, why is the vertical extent of contamination not defined in the Outfall channel?

Letter from Tim Hasset, Hercules, to Scott Martin, EPA. December 15, 2014 RESPONSE TO COMMENTS: TERRY CREEK SITE - DRAFT FOCUSED REMEDIAL INVESTIGATION/FEASIBILITY STUDY, OPERABLE UNIT 1 (OU1): OUTFALL DITCH COMMENTS FROM EPA RECEIVED JULY 2, 2014

General Comment No. 1: Hercules Response - There are numerous issues associated with including a removal/dredging alternative for OU1 in the Focused RI/FS Report. First, dredging operations are typically performed to remove sediment containing chemicals of concern above calculated risk-based concentrations. A new analytical method has been developed to analyze weathered toxaphene congeners in abiotic media (sediment) and, **toxicity reference values for these weathered toxaphene congeners to environmental receptors have not been developed**. Therefore, numerical risk-based cleanup goals cannot be developed and the volume of sediment to be removed under a dredging/removal scenario cannot be reliably quantified. Therefore, developing a remedy alternative without clearly defined goals for success (i.e. risk-based cleanup goals) will result in an ambiguous technical approach and huge uncertainties in the associated implementation costs. Additionally, removing sediments to background (non-detect) concentrations is neither practical nor required under the NCP. (emphasis added)

Did Hercules hire the Weinberg Group in 2007 to conduct a toxicological study? (Source: EPA Briefing Summary, August 20, 2007)

Was the toxicological study by the Weinberg Group expected to be complete in 3-4 years?

Was the study completed, and if not, why not?

Are there any ongoing "Weathered Toxaphene" toxicological studies by the EPA or Hercules, and if not, why not?

If there are no other toxicological studies planned or in progress, is " ....toxicity reference values for these weathered toxaphene congeners to environmental receptors have not been developed," an excuse to hold up remedial activities?

What is the definition of "Weathered Toxaphene" by total chlorine weight, number of chlorine per camphene, and the specific chemical composition?

Have other cleanups of toxaphene or polychloro camphene sites been completed by the EPA in the United States, and if so, where are they located and how did they "define goals for success"?

What technologies have been used to cleanup other EPA toxaphene or polychloro camphene contaminated sites?

Secondly, in an effort to keep the project moving forward, and as stated in the Site Management Plan and re-iterated in the Work Plan, Hercules and EPA agreed to perform a Focused RI/FS for OU1 that may allow for the selection of a remedy that is not reliant on the toxaphene analytical methodology, toxicity reference value development, or development of numeric risk-based clean up goals. The remedial action objective defined for the unit would be a narrative, performance based goal (i.e. protectiveness achieved via pathway elimination) versus numerical risk-based concentrations.

Is there any documentation of the Hercules and EPA agreement to abandon a numeric risk-based cleanup goal?

Were the Remedial Investigation Work Plans sufficient to evaluate pathway elimination via removal of the contamination from the Outfall Ditch?

Was the only option the Remedial Investigation Work Plans would fully support the covering of wastes in place and limited sediment removal?

What are the ramifications to the community from leaving the chemical contamination in place, both economically and from an Environmental Justice standpoint?

What inputs from the City of Brunswick Master Plan, Community Development, or the Commission did the EPA factor into the Proposed Plan, and how did these shape the decision-making of the EPA?

> Third, there is no universal remedy applicable to all sediment sites and many risk management decisions for sediment sites include a combination of remedial options. EPA is correct that **Hercules previously performed a large scale dredging operation in the Outfall Ditch in 1999/2000. A substantial decrease in fish tissue concentrations was observed following these removal actions** (Maruya et al, 2005). The selected remedy for the Outfall Ditch should complement the dredging previously performed with the overall goal of achieving further reductions in fish tissue concentrations in the Terry and Dupree Creek system. We believe the alternatives presented in the Focused RI/FS Report complement the removal action previously performed in the Outfall Ditch.

If removal of the contaminated sediments resulted in the desired substantial decrease in fish tissue concentrations following the removal action, why is the EPA considering an unproven approach with the potential to fail?

Why is the EPA considering a Proposed Plan that will essentially forever limit the economic potential of the Brunswick waterfront?

> Finally, other than the no action alternative, some limited sediment removal is included in all of the evaluated alternatives. However, at EPA's request, a new alternative has been added to the Focused RI/FS Report that includes a dredging option to remove sediments from the Outfall Ditch.

On what date was the dredge option to remove sediments (Alternative 2) from the Outfall Ditch added to the Feasibility Study?

Was the dredge option to remove sediments from the Outfall Ditch added to the Feasibility Study to make it appear more than limited sediment removal and covering up the waste was considered?

Does the Administrative Record support the conclusion that the only remedial action considered was limited sediment removal and covering of the remaining wastes?

Is the Proposed Plan a summary of the option considered to implement the pre-determined EPA/Hercules Agreement?

> Comment 2 - The draft RI/FS does not include any human health risk assessment discussion.
>
> Hercules Response to EPA General Comment 2 - Consistent with the Work Plan and subsequent March 2011 Response to Comments letter, the risk assessment was specific to ecological receptors in order to maintain the focused nature of the RI/FS.
> There are currently fish consumption advisories for Terry and Dupree creeks based on fish tissue contaminant levels, including toxaphene. Thus, as a known source of toxaphene, OU1 poses an **indirect risk to human health.** (emphasis added)

Why is the human health risk assessment not discussed?

What institutional controls or environmental controls are the EPA or Hercules implementing to address the human health risk from consumption of contaminated seafood?

As a "...as a known source of toxaphene..." does OU1 poses an <u>indirect</u> risk to human health or is this a <u>completed exposure route</u> via seafood consumption?

Did the Agency for Toxic Substance and Disease Registry (ATSDR) produce a Public Health Assessment (PHA), discuss seafood consumption in the PHA, and make recommendations? What were the recommendations and have they been implemented?

> Specific Comment No. 6: Section 2.1, Page 12: Does sampling data exists which confirms lack of toxaphene contamination in the Trailer Park area?
>
> Hercules Response: This comment is beyond the scope of the OU1 RI/FS, however, Hercules is aware of sampling data within the Trailer Park from 1995 performed by Black & Veatch, as part of the in the Expanded Site Investigation. This data shows a number of samples (N=19) collected from this area. **Concentrations vary from non-detect (N=11), $\leq$ 2 mg/kg (N=5), to one location with 3 samples with concentrations ranging from 6 to 11 mg/kg.**
>
> EPA and Hercules agreed to not consider the Trailer Park as part of the RI due the fact that dredged spoils were placed in the Trailer Park area before the production of toxaphene. From the 2000 RI/FS Work Plan: "The Trailer Park Area was used for Dredge Spoil disposal prior to 1950. Since dredging in the 1940's ended in 1946, before toxaphene production began, the Trailer Park Area was built before toxaphene contaminated soil was dredged from Terry Creek [U.S. Army Corps of Engineers, September 1997]. **Thus, this area will not be considered during the RI."** (emphasis added)

The Hercules comment is similar to the comments concerning dioxin never being produced at the Hercules Plant. This is denial in the face of overwhelming scientific evidence to the contrary. The EPA should not let Hercules eliminate areas from the Terry Creek Site based upon unsubstantiated claims and in the face of contradictory data.

Will the EPA affirm the Trailer Park is contaminated and retain the area as part of the Terry Creek Site and future Remedial Investigations?

Specific Comment No. 18:
Section 8.3.4, Pages 59-60: Screening of in-situ technologies such as in-situ solidification/stabilization or in-situ chemical reduction still is not included as requested by EPA in previous comments on the RI/FS Work Plan and the Remedial Alternative Screening Technical Memorandum. Hercules stated that in-situ treatment technologies would be screened in the 7/23/10 response to comments on the RI/FS Work Plan.

Hercules Response: Previously, Hercules incorporated a carbon amended sand cap as an alternative in the Focused RI/FS in response to EPA comments to include an in situ treatment technology. The sand cap would create a barrier between overlying materials and underlying sediment. The addition of granular activated carbon (GAC) to the sand cap was intended to promote the sorption and permanent in situ sequestration of hydrophobic organic contaminants, similar in concept to cement-based solidification/stabilization technologies.

Does the EPA agree the Hercules response is "unresponsive" and does not address the problem being identified by the EPA, which is: "Screening of in-situ technologies such as in-situ solidification/stabilization or in-situ chemical reduction still is not included as requested by EPA in previous comments on the RI/FS Work Plan and the Remedial Alternative Screening Technical Memorandum"?

Why are the in-situ technologies such as in-situ solidification/stabilization or in-situ chemical reduction still is not included in the Proposed Plan for the Outfall Ditch?

EPD General Comment No. 3:
The recommended Option 3 does not appear to provide significant control of the sediment that will remain in the existing Outfall Ditch. **A soil cover with rip rap on top would be highly susceptible to storm surges, high tidal influences, and rising sea levels over time. Additionally, man-made activities that may occur in the area could easily alter the cover and cause sediment dispersal and contaminant release back into the creek. A final concrete cover over the remaining sediment, similar to the concrete culvert within the Outfall Ditch as mentioned in Option 3A, or a solidification/stabilization procedure on the remaining sediment would be an improvement to a soil/rip rap cover.** Provide detailed discussion on these options.

Hercules Response: ... Additionally, as described in the alternative description, **land use controls would be implemented to prevent manmade activities from occurring** that would jeopardize the integrity of the remedy. (emphasis added)

Is the Hercules response “unresponsive’ to the EPA comment by failing to address, “**A soil cover with rip rap on top would be highly susceptible to storm surges, high tidal influences, and rising sea levels over time. Additionally, man-made activities that may occur in the area could easily alter the cover and cause sediment dispersal and contaminant release back into the creek.”?**

Did the EPA contact the City of Brunswick concerning Hercules proposed land use controls which would be implemented to prevent manmade activities from occurring, and the implication of such a decision upon future planning and development, and economic ramifications? If so, on what dates this these communications take place and with whom?

> EPD General Comment No. 5:
> Although corrective actions have been completed at the "N" ditch and toxaphene plant, remaining sources of toxaphene contamination remain in soils that surround the facility. These contaminants have the potential to be washed overland to the Outfall Ditch or to migrate horizontally in the groundwater and discharge to the Outfall Ditch. Until all of the toxaphene sources at the facility have been addressed, the potential for toxaphene to **be released to the existing Outfall Ditch or a rerouted Outfall Ditch will exist. National Pollution Discharge Elimination System (NPDES) permit sampling has also recorded toxaphene within the last year.**
>
> Hercules Response:
> The RCRA Corrective Action Program was completed in January 2010 **and all major sources of toxaphene** in soils have been removed. Hercules **acknowledges that there may be de minimis amounts of toxaphene remaining in soils**, however, these are being monitored for via NPDES sampling and controlled with upland BMPs at the plant. Sporadic, low concentrations detections of toxaphene do not demonstrate that the N Street Ditch is an ongoing source of toxaphene. (emphasis added

What action is the EPA taking to assure continued releases of toxaphene do not occur from the former Hercules Plant?

What level of toxaphene constitutes “de mimimis” amounts?

What is the range of levels of toxaphene wastes on the former Hercules Plant Site in sediments, soil, and groundwater?

> EPD Specific Comment No. 5:
> Section 7.3 SLERA Summary and SMDP
> The rationale presented for **not performing a BERA is insufficient and unjustifiable.** This section states, "Given the magnitude of HQs for toxaphene, it is unlikely that the potential for ecological risk can be attributed to the conservative assumptions or uncertainties of the SLERA discussed in Section 4.4 of the SLERA in Appendix E. ...it is unlikely that a BERA will provide significant refinement of potential risks predicted by the SLERA approach or contribute useful information for remedial actions at the Outfall

Ditch." Based on review of the site-specific information and estimated hazards, the EPD does not concur with the conclusions of the report. Pursuant to the ERAGS document, there is an 8-Step process that should ensue which further refines and characterizes risk for the Outfall Ditch. Based on the results of Table 7-1, several constituents had an HQ greater than 1. The EPD is recommending the site move forward to Step 3 of the Ecological Risk Assessment (ERA). The site may also elect to move to Step 8 which involves balancing risk reductions associated with remediation of the site with the potential effects of the remediation itself.

Hercules Response:
Human health and ecological risks will be evaluated in detail during the implementation of the RI/FS for OU2 and OU3. However, as stated in the Site Management Plan, due to the analytical methodology issues associated with toxaphene and in an effort to keep the project moving forward, Hercules and EPA agreed to perform a Focused RI/FS for OU1 that may allow for the selection of a remedy that is not reliant on the toxaphene analytical methodology, toxicity reference value development, or development of numeric risk-based clean up goals. The remedial action objective defined for the unit would be a narrative, performance based goal (i.e. protectiveness achieved via pathway elimination) versus numerical risk-based concentrations. Further, the approved Focused RI/FS Work Plan described the likelihood that the focused SLERA would result in significantly elevated ecological Hazard Quotients for both sediment and surface water and that potential ecological risks would be addressed through a performance-based remedy that achieves ecological protectiveness through the elimination of exposure pathways for ecological receptors in OU1. (emphasis added)

The lack of any ecological data is startling. The Glynn Environmental Coalition agrees with the Georgia Environmental Protection Division (GA-EPD) in that, "The rationale presented for not performing a BERA is insufficient and unjustifiable." Not only is it unjustifiable, but the lack of any observed toxicity data or any other ecological data to get an idea about the state of the ecological health of the Terry Creek area questions the competence of all involved with the Terry Creek Site. The GA-EPD should be protesting, and the EPA should be taking action immediately to have the data obtained, regardless of whether Hercules feels it is needed or not. Obviously, Hercules is in a time-warp and not cognoscente about generations of people eating seafood contaminated with the poison so proudly patented by Hercules as polychloro camphene.

Will the EPA order Hercules to obtain ecological samples, perform observed toxicity sampling, or have the work completed and bill the Responsible Party as the EPA has the power to do under CERCLA?

Has the Remedial Investigation and Feasibility Study been modified to address the comments by the GA-EPD?

What ecological sampling, other than seafood, does the EPA have scheduled for the Terry Creek Site?

In detail, what are the institutional controls being implemented to address human consumption of seafood from the Terry Creek, Dupree Creek, and Back River fishing areas?

NOAA Resource Damages Claim

Noted in the Administrative Record for the Terry Creek Site Proposed Plan is the April 7, 1995 – Letter from Douglas F. Mundrick, Chief, South Superfund Remedial Branch USEPA Region IV, from Harold Reheis, GA-EPD Director concerning Terry Creek Resource Damages Claim. The Resource Damages Claim process at the Terry Creek Site was initiated in 1995.

Has the EPA taken the data needs of the National Oceanic and Atmospheric Administration (NOAA) for the Resource Damages Claim into consideration when developing remedial investigation plans?

What data has the EPA included in the Remedial Investigation, Feasibility Study, or Remedial Design in support of the Resource Damages Claim?

Has the EPA stayed in contact with the Resource Damages Claim stakeholder agencies and addressed sampling and analysis needed for a National Resource Damages Assessment (NRDA)?

Terry Creek 2006 T 040 302bD2C 049LCO00, 009 Landfill 2006 T 040 302DD2C 0425FE00, March 2006 - Update for the RA Re : 009 Audit. Toxaphene. and Brunswick

6. EPD's RCRA Correction Action at the Hercules Brunswick facility is dependent on Region 4's lead concerning toxaphene. The Region is in contact with EPD.

Why is EPD's RCRA Correction Action at the Hercules Brunswick facility is dependent on Region 4's lead concerning toxaphene? Please explain in detail.

What was EPA Region 4's lead concerning toxaphene and what action did it entail, and what action did EPA Region 4 take since 2006 in this lead role?

Was EPA Region 4 the lead to establish the Toxaphene Task Force, Method 1, as the analytical method for the former Hercules Plant site and the Terry Creek Site?

What is the EPA Region 4 involvement in the former Hercules Plant RCRA investigation and remedial activities?

9. The Program anticipates an upcoming high level of interaction with EPA National, ATSDR and Hercules concerning the validation of the 'new method' and continued efforts to evaluate human health risk. Hercules has proposed a national panel with an intent to move the best available science forward. Both these efforts will take place while the Program executes the interim strategy outlined above.

What were the EPA Region 4 efforts to evaluate human health risk?

What were the results of EPA Region 4's efforts to evaluate human health risk?

Was a national panel with intent to move the best available science forward formed, as proposed by Hercules? If so, what were the results and were the results implemented by Hercules or the EPA?

> 10. Kiwanis Club of Brunswick, the Brunswick News, and the GEC have all requested an audience with the Region concerning toxaphene and have been put on hold until the March 22nd completion date of the Response to the OIG Audit at 009, In the event of another extension, the Region will continue to hold the course.

While the community was "...put on hold..." by EPA Region 4, did the EPA continue to meet with Hercules or their consultants and contractors? If so, on what dates did these meetings take place and are records from these meetings in the Administrative Record for the Terry Creek Site?

> Immediate Steps Forward:
> 1. Write Extension letter to the OIG after receiving Hercules' request.
> 2. Provide FYI copy of our Response to the Final Audit at 009
> 3. Obtain the delivery status of Hercules' comments to the Final Audit at 009.

Do the EPA Region 4 records appear to be centered around meetings with Hercules and avoiding meetings with the community?

Were the requests from Hercules acted upon during the first quarter of 2006 while the requests from the community were put on hold?

Was the extension of the time period to respond to the EPA Office of Inspector General by EPA Region 4 in response to a request by Hercules?

Did EPA Region 4 and Hercules work closely or together to formulate a response to the EPA Office of Inspector General?

At what point in time did the Weinberg Group become involved in the Terry Creek Site?

Did the Weinberg Group help formulate the arguments being put forth by the EPA and Hercules in the Proposed Plan for the Terry Creek Site?

EPA COMMENTS ON THE PRELIMINARY DRAFT FOCUSED REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN OPERABLE UNIT 1 (OUl): OUTFALL DITCH TERRY CREEK DREDGE SPOILS/HERCULES OUTFALL BRUNSWICK, GEORGIA
MAY 2010

> EPA Comment - 2. There are multiple references in the plan that state the purpose of the focused remedial investigation/feasibility study (RI/FS) is to develop alternatives to achieve protectiveness via pathway elimination/physical isolation/capping (see pages 15, 16, and 19). **The plan should not predetermine a remedy**, and these references should be removed. EPA notes that section 6.3 does include multiple remedial options including no further action, removal, and containment. The plan should also evaluate monitored natural recovery and in-situ treatment options. (emphasis added)

Why were the In-Situ options not presented in the RI/FS?

Did EPA Region 4 repeatedly tell Hercules to include the In-Situ option for consideration and evaluation in the RI/FS?

Was there an agreement between the EPA and Hercules after these comments to eliminate In-Situ as an option?

Were in-situ options presented in the Outfall Ditch Proposed Plan? If Not, why not?

> EPA Comment - 6. The suitability and accuracy of the **task force method for toxaphene has been questioned due to its inability to detect or underestimate toxaphene** concentrations. Therefore Method 1 and Method 2 should not be solely relied on. It is indicated in the work plan that the GC-ECD/NIMS method will be used for a limited number of samples only for information purposes. As of this writing, the GC-NIMS Method 8276 for the toxaphene **congeners is an official EPA method and should be utilized on a larger scale.** (emphasis added)

Why was the discredited Toxaphene Task Force (TTF) method the primary guiding analytical method for the RI/FS?

Did the EPA note, "...the task force method for toxaphene has been questioned due to its inability to detect or underestimate toxaphene concentrations"?

When did the EPA approve the TTF method for use at the Terry Creek Site for the 2014 RI/FS?

Does the EPA agree Method 8276 is an official EPA analytical method?

Did the EPA recommend Method 8276 be utilized on a larger scale at the Terry Creek Site?

Were there agreements between the EPA and Hercules to minimize use of EPA Method 8276? If so, when were the agreements made and where can the documentation be found?

If there were not agreements, please explain how and why a Remedial Investigation and Feasibility Study progressed to the Proposed Plan stage without data produced under the EPA approved analytical method?

> **<u>August 12, 2014 letter from GA-EPD to Mr. Timothy D. Hassett, Hercules</u>**
>
> GA-EPD Comment 1. The document does not present any assessment-specific endpoints for the protection of fish and other aquatic biota and plants from contaminants associated with sediments in the Outfall Ditch even though the screening-level estimates for multiple contaminants indicate that further evaluation may be necessary to assess the potential for adverse impacts to these receptors. It is pertinent that the RI/FS provide ecological endpoints to aid in risk management decision-making.

What are the ecological end point being targeted by the RI/FS for OU1?

What is the level of ecological and human health risk the RI/FS expects to achieve?

Over what time period are the expected reductions in ecological health risks expected to take place?

Over what time period are the human health risk reductions expected to be obtained?

Does the EPA have guidance documents for fish advisories driven by polychloro camphene (also known as toxaphene) (EPA 1999)?

Does the EPA fact sheet, "Toxaphene Update: Impact on Fish Advisories" have data to set remedial goals for seafood (EPA, 1999)?

Does the EPA also have fact sheets concerning fish consumption for dioxins/furans, mercury, and PCBs?

Does the EPA have data from fish from Terry Creek for dioxins/furans, mercury, and PCBs?

Have dioxins/furans, mercury, and PCBs been found in Terry and Dupree Creek sediments?

If so, has the EPA evaluated the polychloro camphene, dioxins/furans, mercury, and PCBs in developing the seafood consumption advisory for Terry and Dupree Creeks, and the surrounding area?

> EPA Comment • Provide the regulatory framework for the project, identify lead regulatory agency, identify stakeholders and input to key decisions.

Who are the stakeholders referred to in the above statement?

AR Document 10784170, Doc Date 10/06/1999, A RE-EVALUATION OF FISH ADVISORIES BASED ON WEATHERED TOXAPHENE IN FISH AND CHANGING LEVELS OF TOXAPHENE RESIDUES IN FISH NEAR BRUNSWICK, GA

> The 2006 EPD fish advisories are based on the use of the cancer slope factor for technical toxaphene provided in EPA's toxicity database, the Integrated Risk Information System (IRIS). The fish advisories presented in this report as considerably less stringent.

Has the EPA IRIS database been used to set fish advisories in Terry Creek?

Is the EPA IRIS database the current document used to set fish advisories in Terry Creek? If not, why not?

> The major factor driving the reduction in fish advisory levels is the use of a new reference dose for weathered toxaphene. The development of this reference dose was presented in Simon and Manning (2006) and is supported by work performed by European Union scientists in support of the European Union report "Monitoring, Analysis, and Toxicity of Toxaphene" (MATT, 2000). The European scientists who developed MATT (2000) have recently submitted for peer review and publication the animal testing work supporting the development of the reference dose in Simon and Manning (2006).

What are the differences in the seafood consumption advisories before and after the application of, "...major factor driving the reduction in fish advisory levels is the use of a new reference dose for weathered toxaphene"?

What is the definition of the term "weathered toxaphene" referenced in this document in terms of the polychloro camphene by chlorine weight, number of chlorine per camphene, and mole weight?

Did the EPA abandon using the IRIS database for fish consumption advisories? Was the change only in EPA Region 4?

Does Simon and Manning (2006) base their speculation on polychloro camphene manufacturing wastes?

Were the MATT, 2000, fish dosed with polychloro camphene manufacturing wastes?

What is the relevance of Simon and Manning (2006) to the ecological risk assessments?

Does Ted Simon list the Weinberg Group as one of his clients?

Was Simon and Manning (2006) written while Ted Simon was working for EPA Region 4?

Was Ted Simon working for the EPA and Hercules (or one of Hercules' consulting firms) when Simon and Manning (2006) was written or when published?

> If this high concentration sample is removed from the calculation, no advisory is needed.

Does the EPA advocate for the removal of seafood sampling data in order to eliminate consumption advisories?

Who hired Ted Simon to produce this report?

Who paid Ted Simon to produce this report?

> The use of this reference dose indicates that the weathered toxaphene in fish around Terry and Dupree is about twenty to eighty fold less toxic than suggested by the cancer slope factor on IRIS (USEPA, 1991).

Did EPA Region 4 use the recommendations presented by Ted Simon or use the EPA IRIS database for seafood advisories in the Terry Creek Area from 2006 until now, or at any time?

Did EPA Region 4 use the recommendation presented by Ted Simon in any way at the Terry Creek Site?

> It is important to note that reductions in fish advisories are also based on different analytical results. Those published by DNR are based on analyses of total toxaphene whereas those presented in this report are based on the sum of the concentrations of p-26, p-50 and p-62 or ∑3PC.

Does the EPA recommend using total toxaphene for seafood advisories?

What are the seafood advisories based upon the total toxaphene and,"...those presented in this report..."?

What are the quantified differences between the two methods when applied to seafood advisories?

Did the method proposed by Ted Simon only address the carcinogenic risks from the polychloro camphene in seafood from Terry Creek or include non-carcinogenic risks, too?

Did Ted Simon address non-cancer risk to the kidney, liver, children, and pregnant women?

Did Ted Simon include the additive effects from the other chemicals like dioxin/furans, mercury, PCBs (and Aroclor 1268 in particular) and the implications for added cancer risk and other non-carcinogenic risks?

Were the results of Simons and Manning, 2006 the discussion of data produced by others with no data of their own, or any data from the Terry Creek site which included the full scope of contaminants?

> **Toxaphene - Terry Creek, Brunswick, Georgia H. T. DeRigo, Biologist, Env Res. Sec, 16 June 1971**
>
> 2. I was informed by telephone this morning by Mr. Ledbetter, Georgia Water Quality Control Board, that in 1966 the discharges from the Hercules Power Company, released into Dupree Creek, contained approximately 230-300 pounds of Toxaphene per day. Under an abatement program, the company still discharges a fair amount of the insecticide to the ecosystem. However, with the completion of their treatment in 1972, the amount of Toxaphene will be reduced to less than one pound per day.

Using the estimate above, what is the quantity of toxaphene pesticide released to Terry and Dupree creeks?

In addition to the toxaphene pesticide released, what was the quantity of other manufacturing wastes and the composition of these wastes over the past 106 years?

Have a vertical profile cores been taken from the Outfall Ditch to characterize the scope of chemicals deposited in the ditch over the 106 year history of the ditch being used for chemical plant wastes? If not, why not?

Weinberg Group, Hercules, and Science for Sale

The Science Fraud Industry: Weinberg Group Inc.— September 16, 2014

> There are "scientific" consulting firms that are hired by the makers of such products to "help . . . deal with scientific questions about the safety or health consequences of their products." In short, they produce fraud science asserting that dangerous products are safe.
>
> There are a few firms, but among the worst is the Weinberg Group. Weinberg has been hired by DuPont, the tobacco industry, makers of Agent Orange, and makers of asbestos to "develop legal defense campaigns, ostensibly based on science, to sway juries during trials, to counteract potential regulatory oversight, and to influence [public opinion] about the health effects of products," reported Environmental Science & Technology Online News (ES&T).
>
> A 2003 letter that was confirmed to authenticate a relationship between Weinberg and DuPont illustrates Weinberg's practice of falsifying science and purchase of scientific opinion.
>
> P. Terrence Gaffney, Esq., VP of Product Defense at Weinberg, wrote Jane Brooks, VP of Special Initiatives at DuPont, to explain to her how his company will purchase scientific opinion to avoid regulation and legal action concerning DuPont's

perfluorochemicals (PFCs), a heat resistant chemical found in fabrics, teflon, and food wrappers and containers. http://ringoffireradio.com/2014/09/the-science-fraud-industry-weinberg-group-inc/

The appearance of the Weinberg Group and the timing of their appearance into the Terry Creek Site records should be examined. The product of the Weinberg Group is well known, and appears to have firmly interjected their brand of science into the Terry Creek Site records, as have the unseemly characters who provide their services to this consulting firm of ill repute.

The tactics and services provided to Dupont appear to have been provided to Hercules and whole-heartedly embraced by EPA Region 4 instead of rejecting and expunging them from the Administrative Record for the Terry Creek Site.

The antics of the Weinberg Group are now legendary. The Weinberg Group has been exposed for what they are and do. But, the legacy of these despicable practices lives on in dark places that still need to be brought into the light of day. These practices need the disinfection of the sun of day.

The Weinberg Group emerges on the scene in EPA communications by March 2006 as a consultant to Hercules.

Did the Weinberg Group either directly or through Hercules provide the EPA Region 4 response to the EPA Office of Inspector General (EPA OIG) concerning the report, Appropriate Testing and Timely Reporting Are Needed at the Hercules 009 Landfill Superfund Site, Brunswick, Georgia?

Was Ted Simons working for the Weinberg Group when the Simon and Manning, 2006 paper was written?

Reference to the Weinberg Group producing the toxaphene toxicological work appear in August 2007 EPA email communications and the EPA's August 13, 2007, "Path Forward" for the Terry Creek Dredge Spoils, Brunswick, Georgia. In the August 20, 2007 EPA Briefing Summary for the EPA Regional Administrator, Hercules and the Weinberg Group were reported as undertaking the toxicological study for.

By the December 13, 2007 Briefing Summary to the EPA Regional Administrator, Hercules and the Weinberg Group were reported as undertaking the toxicity analysis.

On August 21, 2007, Dr. James C. Lamb from the Weinberg Group presented their plan via Power Point for Toxaphene Risk Assessment: re-Evaluation and Data Development. As part of the Power Point presentation, a Scientific Advisory Panel (SAP) was listed, including Dr. Ted Simon.

Was Dr. Ted Simon hired or contracted by the Weinberg Group or through Hercules to work with the Weinberg Group?

Is this why Dr. Ted Simon lists the Weinberg Group as one of his clients (http://ted.wixsimon.com/clients/)?

Was "weathered toxaphene" defined by the Weinberg Group as P26, P50, P62, HxSed, HpSed, and mixtures to model weathered toxaphene?

What were the "mixtures to model weathered toxaphene" referenced in the Weinberg Group Power Point?

What is the definition of "weathered toxaphene" presented by the Weinberg Group?

Did EPA Region 4 adopt the "weathered toxaphene" definition presented by the Weinberg Group?

If EPA Region 4 did not adopt the definition of "weathered toxaphene" presented by the Weinberg Group, what is EPA Region 4's definition of "weathered toxaphene" by chemical composition, chlorine weight of the polychloro camphene, and any other metrics to define what comprises "weathered toxaphene"?

Does all the "weathered toxaphene" fall under the Hercules patent for polychloro camphene, and if not, which chemicals do not fall under the patent but are considered "weathered toxaphene"?

Administrative Record - Account Number: DT 2007 T 04D 302DD2C 049LBD0 - 2007 –

Is Hercules Inc., noted as have hired the Weinberg Group to develop toxicity information relating to toxaphene breakdown products?

What is the definition of "breakdown products"?

What is the specific chemical composition of the group of polychloro camphene defined as "breakdown products" for which the Weinberg Group was developing toxicity information?

Did EPA Region 4 receive work plans for these toxicity studies?

Are the work plans for the toxaphene breakdown products toxicity studies in the Terry Creek Site Administrative Record?

Were these toxicity studies of toxaphene breakdown products ever completed? If not, why not?

If not, why does the EPA still reference these toxicity studies in the Proposed Plan many years after projected completion date in 2011?

Congress: Science for Sale?
Feb. 6, 2008, By JUSTIN ROOD http://abcnews.go.com/Blotter/story?id=4252096

Congress is investigating a Washington, D.C.-based firm which critics charge "manufactures uncertainty" on behalf of chemical companies to help keep their products free from government bans or other restrictions.

"The tactics apparently employed by the Weinberg Group raise serious questions about whether science is for sale at these consulting groups," said Rep. John Dingell, D-Mich., chair of the Energy and Commerce Committee, in a statement Wednesday. His panel is heading up the probe.

Did the Weinberg Group come under investigation by the Energy and Commerce Committee for a "Science for Sale" scheme in 2008?

Is it true that the Weinberg Group wrote, "We will harness...the scientific and intellectual capital of our company with one goal in mind -- creating the outcome our client desires"?

Why is any mention of the Weinberg Group not found in the Administrative Record after February 2008?

Were the toxicological studies the Weinberg group was working on ever completed?

Was another firm contracted to complete the toxicological studies work since 2008?

If not, why is the lack of this data being cited in the Proposed Plan as the reason to not move forward with risk-based remedies at the Terry Creek Site?