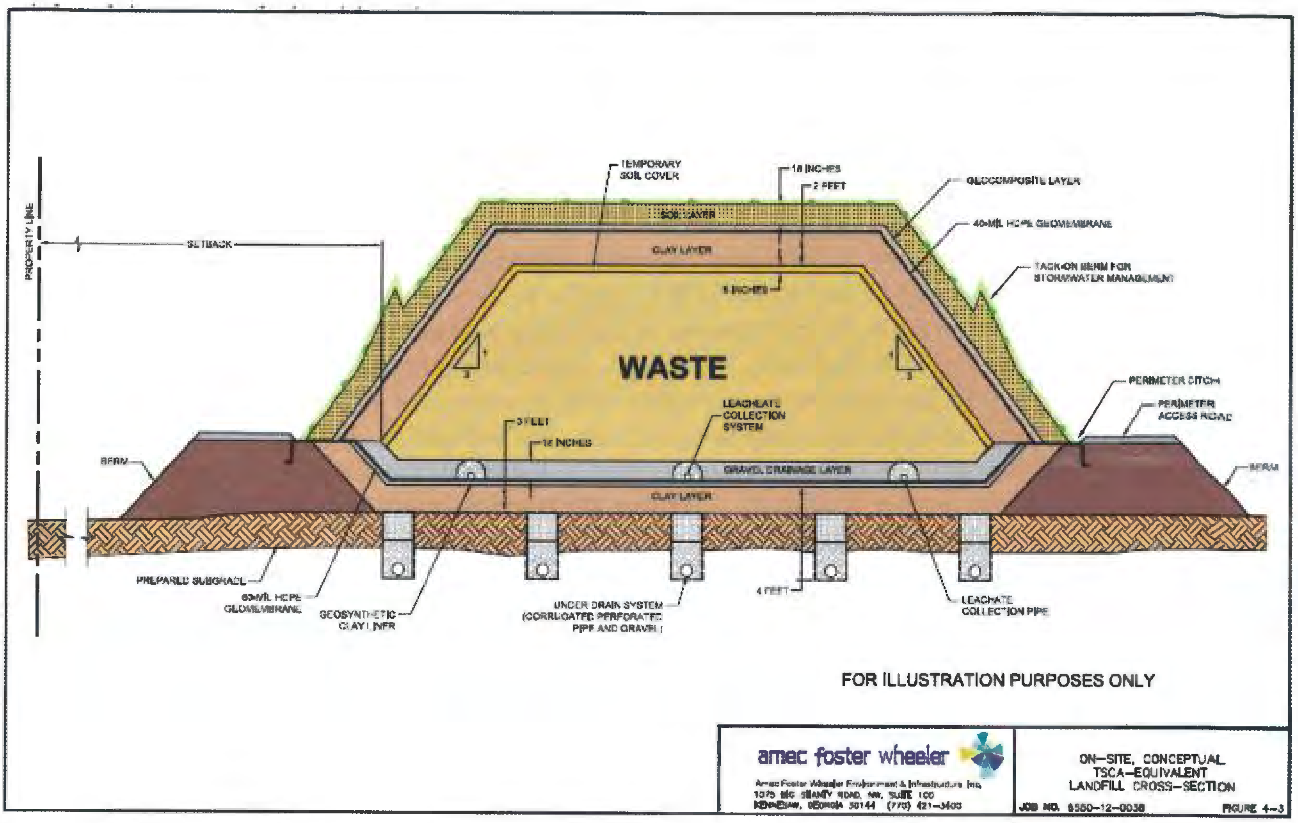
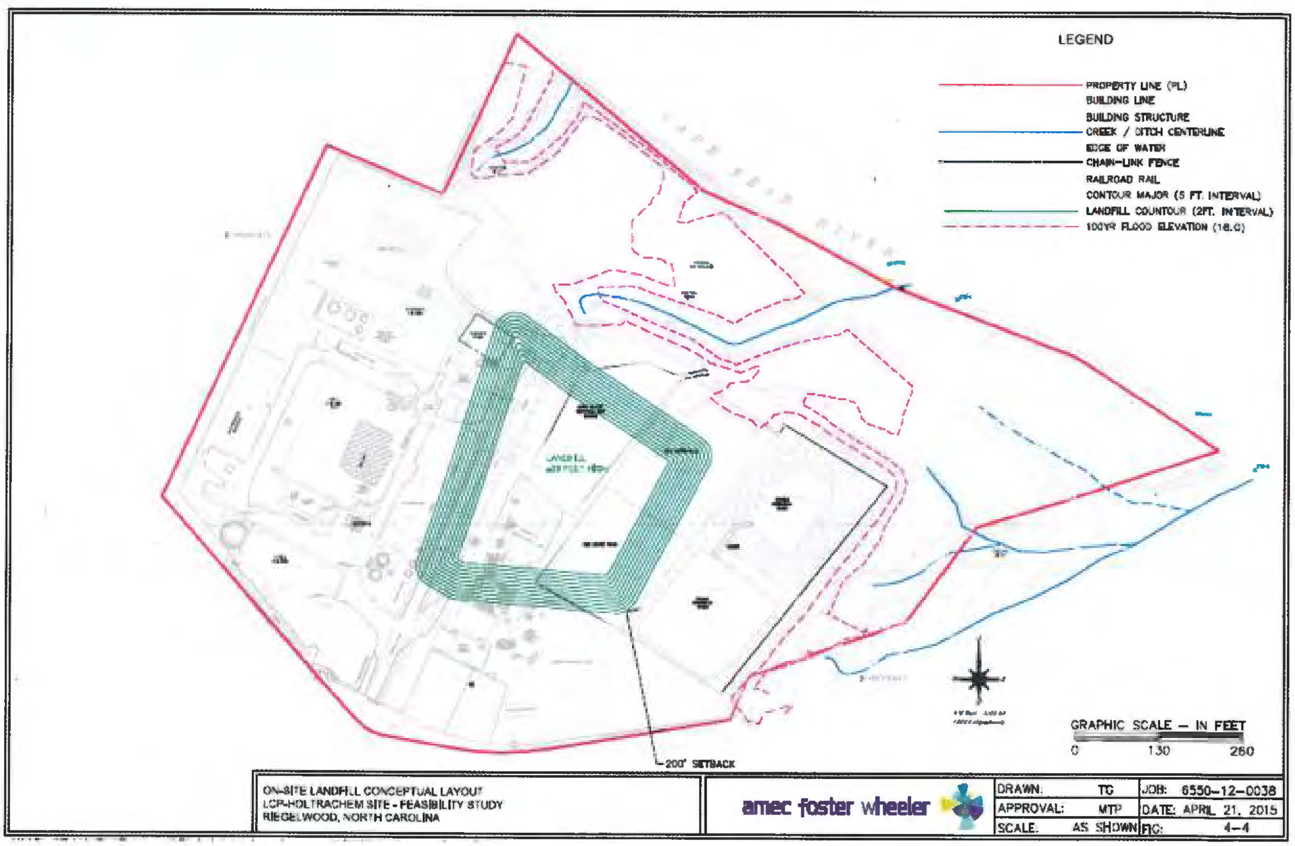
Figure 40: On-site Conceptual TSCA Disposal Unit Cross-Section



Location

The TSCA disposal unit must meet buffer requirements identified in 15A NCAC 13B.0503(2)(f), identified as ARARs. Because of the size of the property and a portion being within a 100-year flood zone there are limited locations on the property where the TSCA disposal unit can be constructed. An example conceptual TSCA disposal unit layout that would meet disposal volume requirements with a footprint allowing for up to a 200-foot setback is shown in **Figure 41**. The selection of the TSCA disposal unit location on the property will be based on the results of pre-design studies including but not limited to geotechnical testing and evaluation, structural evaluation, hydrogeological evaluations, surface hydraulics evaluation, material handling planning, and sequencing of remedial actions. The potential to place the cell on top of the closed RCRA units or to avoid them will be carefully considered in the remedial design, based upon the conclusions of the above evaluations. Should the TSCA disposal unit be placed over these closed RCRA units, its design, construction, monitoring, and maintenance must be compatible with the intended purpose of these RCRA units, their structural capacity/stability, and their associated monitoring/maintenance requirements. The evaluation could result in a determination that the on-site TSCA disposal unit cannot be located at the site due to concerns with structural integrity and prevention of releases, such that another remedial alternative would have to selected through a modification of the remedy.

Figure 41: On-site TSCA Disposal Unit Conceptual Layout



Monitoring and Maintenance
It is also possible that a TSCA disposal unit may extend over the retort and cell building pads where remedial technologies such as ISS or a vertical barrier followed by placement of a soil cap may be implemented. Should the TSCA disposal unit be placed over the retort and cell building pad areas, its design, construction, monitoring, and maintenance must be conducted in a manner that will preserve the protectiveness and effectiveness of selected alternative for the retort and cell building pads.

Long-term monitoring and maintenance for both the on-site TSCA disposal unit and closed-in-place RCRA units would be conducted in accordance with TSCA and RCRA ARARs.

Ancillary Activities
Site preparation activities would include the construction of access roads, support zones, and staging areas for personnel, equipment, and material. Clearing and installation of erosion controls would be required for support and staging areas.

Ancillary activities required to support construction activities include:

- cap/excavation area access and preparation,
- erosion control,
- backfill material delivery and staging,
- excavated material staging and handling,
- cover soil delivery and staging,
- construction waste disposal,
- cap placement verification,
- waste soil transport and disposal,
- stormwater management,
- dust monitoring/control,
- seeding/planting, and
- restoration, as necessary.

Ambient air would be monitored for dust during construction. Dust control measures would be implemented, and would include wetting roads, stockpiles, and staging areas. Real-time air monitoring would be performed during construction to verify compliance with ARARs.

Site-wide long-term maintenance and inspection would be required to evaluate backfill erosion and to verify cap, TSCA disposal unit, and previously closed RCRA unit performance over time. Long-term monitoring of groundwater would also be required to confirm TSCA disposal unit and closed RCRA unit integrity and compliance with ARARs. Periodic maintenance would be carried out as needed to preserve or restore the integrity of these systems. ICs and ECs would be employed to limit risks to human and ecological receptors. ICs would consist of deed and land use restrictions in a recorded a Notice and/or restrictive covenant. ECs would consist of warning signs and fencing. The site is currently fenced along the west, south, and east property boundaries.

9.1.4 Alternative A-4: Combination of Capping and Excavation, Off-site Disposal, and ICs/ECs

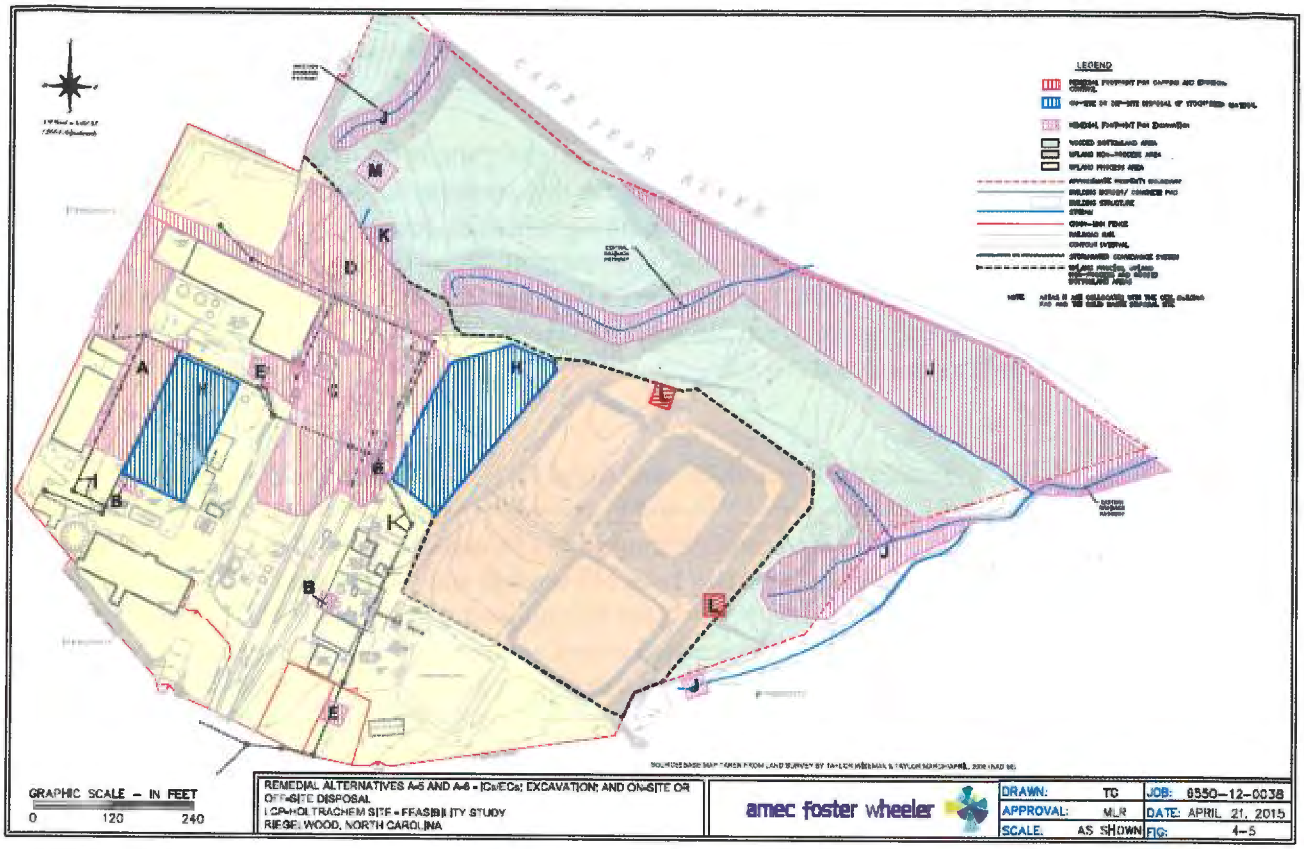
Estimated Costs:	
Capital Cost	$20,453,700
Annual O&M Cost	$31,500
Total Cost	$21,600,000
Total Present Worth Cost	$20,900,000
Estimated Timeframes:	
Construction Timeframe	12 months
Time to Achieve RAOs	12 months

This alternative is the same as Alternative A-3, but with off-site disposal of excavated material in an EPA-approved TSCA chemical waste landfill.

9.1.5 Alternative A-5: Excavation, On-site Disposal, and ICs/ECs

Estimated Costs:	
Capital Cost	$12,851,800
Annual O&M Cost	$31,500
Total Cost	$14,000,000
Total Present Worth Cost	$13,300,000
Estimated Timeframes:	
Construction Timeframe	18-24 months
Time to Achieve RAOs	18-24 months

Figure 42: Alternatives A-5 and A-6



This alternative includes:

- Excavation of contaminated soil in the Upland Process and Wooded Bottomland Areas
- Disposal of excavated material and WWTS in an on-site TSCA disposal unit
- Closure of the stormwater conveyance system
- Decommissioning of the stormwater treatment system and restoration of the site to natural drainage following completion of remedial action
- Implementation of ICs/ECs

This alternative, although titled as excavation, also includes a limited amount of capping in Area L. Capping/erosion control would be implemented in the L areas along the berm of the Upland Non-Process Area. The conceptual remedial plan shown on **Figure 42** identifies remedial areas A through M (minus F and G). **Table 88** on page 161 describes each remedial area. The rationale for selecting areas to be capped or excavated is based on the size/local extent of detected contamination, the magnitude of PCB and mercury concentrations, and the location/exposure risk.

Remedial activities in the Upland Process Area include excavation of soil areas with mercury or PCB concentrations that exceed cleanup levels protective of the industrial or construction worker in accordance with the RAOs. Excavation in the Upland Process Area would also serve to protect the Wooded Bottomland area by preventing contact of Upland Process Area soil with surface runoff and the potential migration of soil into the Wooded Bottomland Area. Areas to be excavated include Areas A, B, C, D, E, J, K, and M. Backfilling of excavated areas to approximately original grade and revegetation would also be included in this overall site remedial alternative. Capping and erosion control would occur in the L Areas, which is located along the steep portion of the Upland Non-Process Area berm. Removal of L Areas is not recommended due to potential instability of the slope during remedial action.

Capping

In Alternative A-5, a cap would be applied over the L Areas along the berm of the Upland Non-Process Area impoundments. The anticipated extent of capping for this scenario is shown on **Figure 42**. The final cap area footprint in some areas would be confirmed during remedial design sampling. The cap composition assumed for costing is a protective underlayment of fill soil (compacted in place), a geosynthetic liner, a protective layer of fill soil on top of the liner soil, plus up to six inches of topsoil to support revegetation. The actual cap composition and soil layer thicknesses would be evaluated during the remedial design to meet site-related ARARs.

Excavation

Alternative A-5 consists of excavating Upland Process Areas A, B, C, D, and E and Wooded Bottomland Areas J, K, and M. Areas A, B, C, D, and E exceed the Upland Process Area Aroclor 1254+Aroclor 1268 surface and subsurface soil cleanup level (11 mg/kg). Areas J exceed the Wooded Bottomland Area Aroclor 1268 sediment cleanup level (47 mg/kg) and the mercury sediment cleanup level (0.75 mg/kg). Areas K and M exceed the Wooded Bottomland Area Aroclor 1254+Aroclor 1268 surface soil cleanup level (21 mg/kg). The anticipated extent of excavation for this scenario is shown on **Figure 42**. The total in-place excavation volume is estimated to be 26,400 yd^3. The actual excavation footprints of the isolated areas would be confirmed during remedial design sampling. Following excavation, clean backfill/topsoil would be placed in the areas to restore the ground surface to approximately pre-excavation grades and the areas would be seeded/revegetated to control erosion.

Removal activities would be conducted as described under Alternative A-2. Excavated and dewatered materials would be disposed in an on-site TSCA disposal unit designed and constructed as described in Alternative A-3.

Stormwater Conveyance System

The stormwater conveyance system (I Areas) would be closed by cleaning and/or sealing off and solidifying the pipes/inlets in place using flowable grout. Solids, if removed during closure of the system, would be dewatered and disposed in an on-site TSCA disposal unit.

Following completion of site-wide remedial activities active stormwater collection and management would no longer be necessary. Therefore, the existing stormwater treatment system would be decommissioned and the site returned to natural drainage. Long-term maintenance would include inspection and repair of erosion controls.

WWTS

WWTS (Areas H) containing PCB concentrations greater than 50 mg/kg are temporarily stockpiled at the Mercury Cell Building pad and the SWDS. Alternative A-5 includes disposal of the WWTS in an on-site TSCA disposal unit. The total volume of the stockpiled soil on both the Mercury Cell Building pad and the SWDS is approximately 23,700 yd^3.

On-site TSCA Disposal Unit and Ancillary Activities
Construction of the on-site TSCA disposal unit and ancillary activities would be performed as described in Alternative A-3.

9.1.6 Alternative A-6: Excavation, Off-site Disposal, and ICs/ECs

Estimated Costs:	
Capital Cost	$25,000,000
Annual O&M Cost	$29,000
Total Cost	$25,900,000
Total Present Worth Cost	$25,400,000
Estimated Timeframes:	
Construction Timeframe	12 months
Time to Achieve RAOs	12 months

This alternative is the same as that for Alternative A-5, but with off-site disposal of excavated material in a EPA-approved TSCA chemical waste landfill. The methods used for capping, excavation, closure of stormwater conveyance system, and ancillary activities are the same as those for Alternative A-5.

Alternatives for soil in Retort Area and Cell Building Pad Area

The following remedial alternatives were developed for soil associated with the Upland Process Area Retort Area and Cell Building pads.

9.1.7 Alternative S-1: No Action

Estimated Costs:	
Capital Cost	$0
Annual O&M Cost	$0
Total Cost	$0
Total Present Worth Cost	$0
Estimated Timeframes:	
Construction Timeframe	0 months
Time to Achieve RAOs	beyond our lifetime

No Action includes no remedial measures or ICs. According to NCP 40 CFR §300.430(e)(6), No Action is retained for detailed analysis and used as a baseline in comparing alternatives.

9.1.8 Alternative S-2: Capping with Vertical Impermeable Barrier Installation and ICs

Estimated Costs:	
Capital Cost	$1,300,000
Annual O&M Cost	see A alternatives
Total Cost	$1,300,000
Total Present Worth Cost	n/a
Estimated Timeframes:	
Construction Timeframe	6-12 months
Time to Achieve RAOs	6-12 months

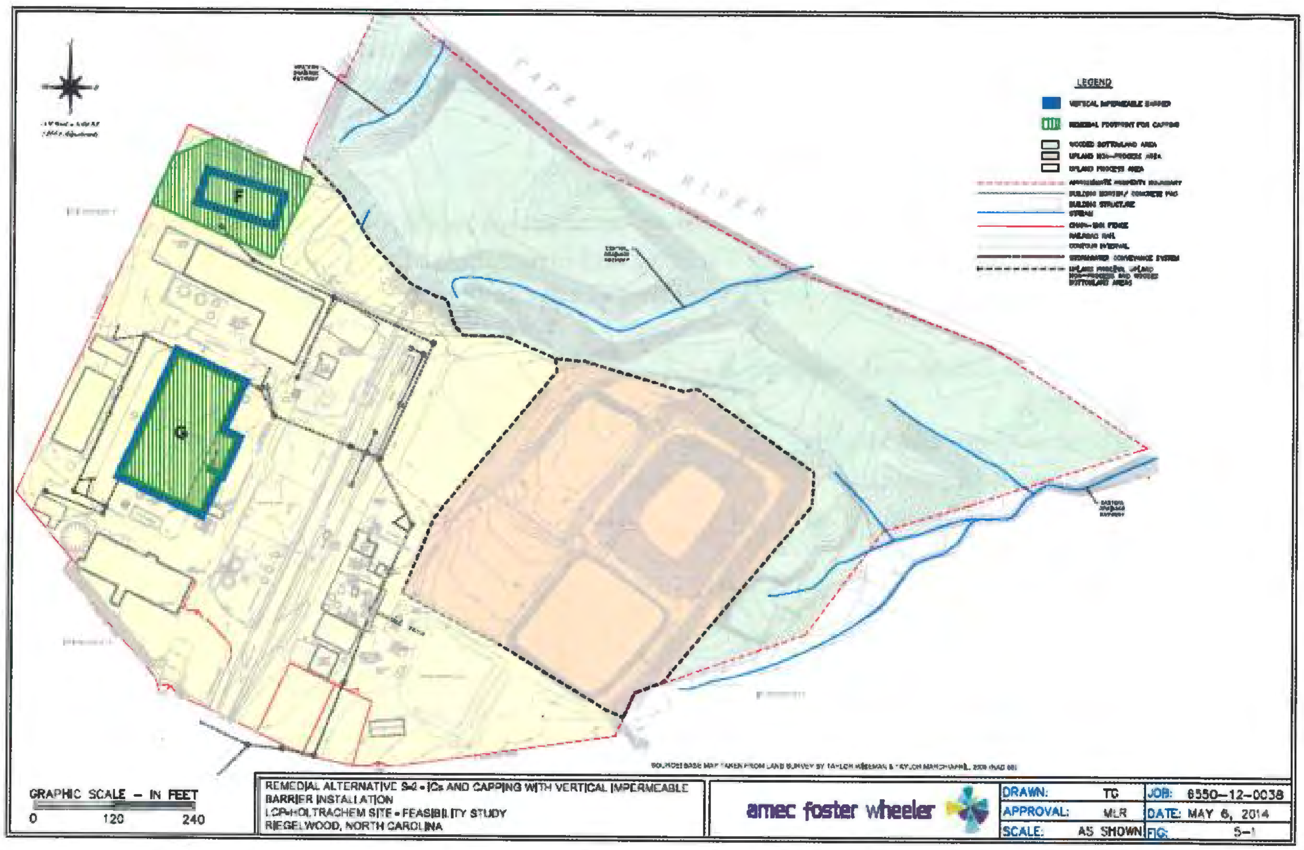
This alternative consists of construction of a vertical barrier, capping of mercury waste and contaminated soils associated with the Retort and Cell Building pads in Areas F and G, and ICs. **Table 88** on **page 161** describes these remedial areas. The remedial footprint for these areas is shown on **Figure 43**. The remedial footprint shown in this figure may be expanded during remedial design to include adjacent areas, such as the MESS.

This alternative provides containment of soils with mercury or PCB concentrations that exceed cleanup levels protective of the industrial or construction worker in accordance with the RAOs in these areas. It also protects the Wooded Bottomland Area by preventing contact of Upland Process Area soil with surface runoff and the potential migration of soil into the Wooded Bottomland Area. The purpose of the cap and vertical barrier is to isolate the soils associated with the Retort and Cell Building pads both horizontally and vertically. Historically, these soils have not served as a source of mercury or PCBs to groundwater. This alternative serves as an added measure so that they do not become a source in the future.

Vertical Impermeable Barrier Installation

Alternative S-2 consists of the installation of a vertical impermeable barrier around the outside of the pads. A vertical barrier would span a combined linear distance of approximately 1,100 feet around the areas of the pads. The barriers would be constructed using augers or other soil mixing equipment to inject and mix low permeability slurry (e.g., bentonite-cement) into the soil in sequential, overlapping vertical sections. The barriers would be keyed into the underlying Peedee Formation. Depths to the Peedee Formation are approximately 15 and 10 feet in Areas F and G, respectively.

Figure 43: Alternative S-2



Capping

In Alternative S-2, a cap would be installed following vertical perimeter barrier installation. The total cap area for this alternative is estimated to be about 1.3 acres. The final cap area footprint would be confirmed during remedial design sampling and may be expanded from that shown in **Figure 43**.

Capping would be achieved by placing a clay/geomembrane or equivalent RCRA cap system with a vegetated cover over Areas F and G. Before cap placement, the area would be prepared by leveling in-ground structures. The cap composition assumed for costing is a protective underlayment of fill soil (compacted in place), a geosynthetic liner, a protective layer of fill soil on top of the liner soil, plus up to six inches of topsoil to support revegetation. The actual cap composition and soil layer thicknesses would be evaluated during the remedial design and will comply with RCRA ARARs for a hazardous waste landfill final cover as well post-closure care requirements.

The cell pit area is east of the Cell Building pad as shown on **Figure 43**. It could potentially contain mercury residuals; however, no specific data are available to confirm the presence of mercury above cleanup levels. The cell pit would be drained, the stormwater would be managed through the existing stormwater collection and treatment system, the pit concrete surfaces would be sealed, and the pit would be backfilled with structural fill to prevent water accumulation following completion of remedial activities. A clay/geomembrane or equivalent cap would be placed over the area to isolate the contaminated soil and will comply with RCRA ARARs for a hazardous waste landfill final cover as well post-closure care requirements. The actual cap composition and soil layer thicknesses would be evaluated during the remedial design.

Cap placement activities would be conducted using standard construction equipment (e.g., backhoes, bulldozers, graders, drill augers, etc.). Topographic survey and GPS instrumentation would be used to confirm extents and final grades of cap emplacement.

<u>Ancillary Activities</u>
Site preparation activities would include the construction of access roads, support zones, and staging areas for personnel, equipment, and material. Clearing and installation of erosion controls would be required for support and staging areas. Ancillary activities required to support construction activities would include:

- remediation area access and preparation,
- erosion control,
- cap material delivery and staging,
- construction waste disposal,
- cap placement verification,
- storm water management,
- dust monitoring/control,
- seeding/planting, and
- restoration, as necessary.

Ambient air would be monitored for dust during construction. Dust control measures would be implemented, and would include wetting roads, stockpiles, and staging areas. Real-time air monitoring would be performed during construction activities to verify compliance with ARARs.

Long-term inspections would be required to verify cap and barrier performance over time. Periodic maintenance would be carried out as necessary to preserve or restore the integrity of these systems. ICs would be employed to limit risks to human and ecological receptors. ICs would consist of deed and land use restrictions in a recorded a Notice and/or restrictive covenant. Monitoring wells/piezometers within and outside the vertical barrier would be monitored for hydraulic pressure differences.

9.1.9 Alternative S-3: In-Situ Stabilization, Capping and ICs

Estimated Costs:	
Capital Cost	$2,900,000
Annual O&M Cost	see A alternatives
Total Cost	$2,900,000
Total Present Worth Cost	n/a
Estimated Timeframes:	
Construction Timeframe	6-12 months
Time to Achieve RAOs	6-12 months

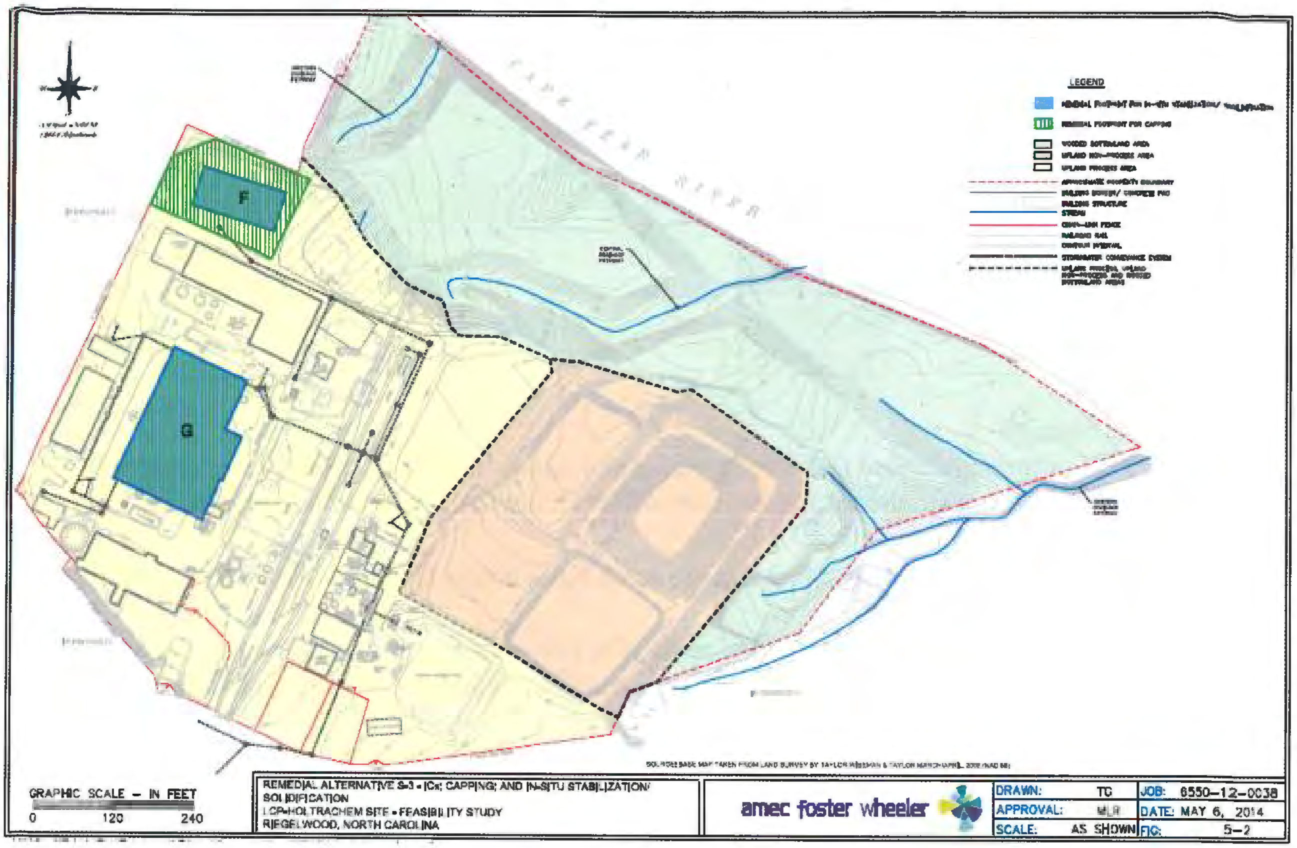
This alternative consists

- Treatment of mercury waste and contaminated soil, considered to be principal threat waste (PTW), located beneath the former mercury cell building and former retort pad via In-Situ Stabilization (ISS)
- Capping of the areas treated by ISS that meets RCRA Subtitle C landfill final cover ARARs

Table 88 on **page 161** describes these remedial areas. The remedial footprint of these areas is shown on **Figure 44**. The remedial footprint shown in this figure may be expanded during remedial design to include adjacent areas, such as the MESS.

This alternative treats soils under and around the pads (10-foot buffer beyond the pad edge). Soil outside this buffer zone in Area F would be capped. Together, ISS and capping protects industrial/construction workers through solidification/stabilization of soil with mercury or PCB concentrations that exceed cleanup levels protective of the industrial or construction worker in accordance with the RAOs in these areas. It also protects the Wooded Bottomland Area by preventing contact of Upland Process Area soil with surface runoff and the potential migration of soil into the Wooded Bottomland Area. The purpose of the ISS is to treat and isolate the mercury waste and contaminated soils through encapsulation. Historically, these soils have not served as a source of mercury or PCBs to groundwater. This alternative would serve as an added measure so that they do not become a source in the future.

Figure 44: Alternative S-3



ISS

Alternative S-3 consists of ISS of the mercury waste and contaminated soil under and around the Retort Area and Cell Building pads in Areas F and G. The footprint of the both ISS areas would be capped to minimize infiltration and potential for leaching of contaminants. ISS reagents such as portland cement or lime/pozzolans (e.g., fly ash and cement kiln dust) or other agents would be selected to reduce the leachability of COCs through encapsulation, binding, and/or limiting the hydraulic conductivity of the final solidified matrix. A treatability study would be performed during remedial design to develop a suitable mix design to achieve post-solidification leachability goals and establish parameters for field performance testing (e.g., compressive strength, hydraulic conductivity, and /or wet/dry cycle durability). Various mix agents, such as sulfides and activated carbon, will be evaluated during the treatability study to select the optimum mixing agent.

During field implementation, the ISS agents are injected into the subsurface environment and mixed with the soil using augers or other soil mixing equipment. The outside clean perimeter of the ISS area may be augured first to act as a vertical barrier and avoid migration of COCs during implementation. Performance sampling is conducted at a pre-specified frequency, with samples collected from various depth intervals during mixing. The individual samples are visually examined to confirm mix homogeneity and then composited into cylinders representing the depth range of the aliquots. The cylinders are cured and analyzed per the performance testing plan.

The cell pit in Area G would be drained and the collected stormwater would be managed through the existing stormwater collection and treatment system. The pit concrete would be pulverized and solidified as part of the ISS area. The addition of solidification agents and physical mixing may increase the volume of the treated soils, and this volume would be solidified and remain within the treated area footprint. The potential increase in volume will be considered during the design phase. The total treated in-situ volume is estimated to be 15,500 yd^3.

Capping

In Alternative S-3, a cap would be installed over Areas F and G following ISS implementation. The total cap area for this alternative is estimated to be about 1.3 acres. The final cap area footprint would be confirmed during remedial design sampling and may be expanded from that shown in **Figure 44**, as appropriate.

Capping would be achieved by placing a clay/geomembrane or equivalent cap system with a vegetated cover over Areas F and G. Before cap placement, the area would be prepared by leveling in-ground structures. A composite clay/geomembrane/cover soil or equivalent cap would be placed over the area to isolate the waste and contaminated soil and will comply with RCRA ARARs for a hazardous waste landfill final cover as well post-closure care requirements. The cap composition assumed for costing is a protective underlayment of fill soil (compacted in place), a geosynthetic liner, a protective layer of fill soil on top of the liner soil, plus up to six inches of topsoil to support revegetation. The actual cap composition and soil layer thicknesses would be evaluated during the remedial design.

Cap placement activities would be conducted using standard construction equipment (e.g., backhoes, bulldozers, graders, drill augers, etc.). Topographic survey and GPS instrumentation would be used to confirm extents and final grades of cap emplacement.

Ancillary Activities

Site preparation activities would include the construction of:

- access roads,
- support zones, and
- staging areas for personnel, equipment, and material.

Clearing and installation of erosion controls would be required for support and staging areas.

Ancillary activities required to support construction activities include:

- area access and preparation,
- erosion control,
- reagent material delivery and staging,
- construction waste disposal,
- stormwater management,
- dust monitoring/control,
- seeding/planting, and
- restoration, as necessary.

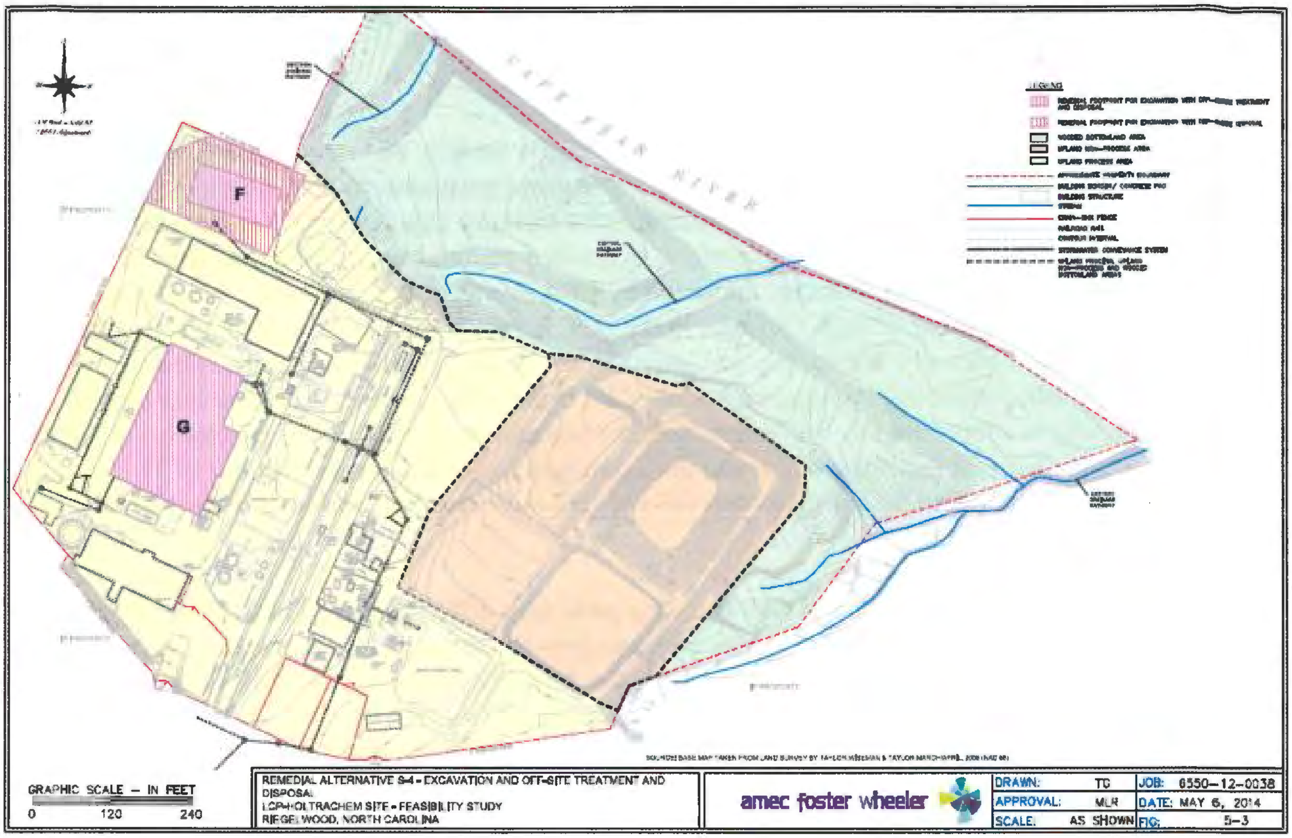
Ambient air would be monitored for dust during construction. Dust control measures would be implemented, and would include wetting roads, stockpiles, and staging areas. Real-time air monitoring would be performed during construction activities to verify compliance with ARARs. Inspections would be required to verify system performance over time. ICs would be employed to limit risks to human and ecological receptors. ICs would consist of deed and land use restrictions.

9.1.10 Alternative S-4: Excavation and Off-site Treatment and Disposal

Estimated Costs:	
Capital Cost	$56,000,000
Annual O&M Cost	see A alternatives
Total Cost	$56,000,000
Total Present Worth Cost	n/a
Estimated Timeframes:	
Construction Timeframe	7-8 years
Time to Achieve RAOs	7-8 years

This alternative includes ICs, excavation of the soils associated with the Retort Area and Cell Building pads in Areas F and G, and off-site treatment and disposal of excavated material. **Table 88** on page 161 describes these remedial areas. The remedial footprint of these areas is shown on **Figure 45**. This alternative involves removal, treatment, and disposal of soils with mercury or PCB concentrations that exceed cleanup levels protective of the industrial or construction worker in accordance with the RAOs in these areas. It also protects the Wooded Bottomland Area by preventing contact of Upland Process Area soil with surface runoff and the potential migration of soil into the Wooded Bottomland Area.

Figure 45: Alternative S-4



Excavation

Alternative S-4 consists of excavating the soils that exceed the cleanup levels for the UPA. Excavation depths are 15 and 10 feet near the Retort and Cell Building pads, respectively. The total in-place excavation volume is estimated to be 25,000 yd^3. Approximately 15,500 yd^3 of the mercury wastes and contaminated soil beneath the Retort Area and Cell Building pads would go to an off-site approved RCRA treatment and disposal facility; 9,500 yd^3 of the excavated volume from around the Area F Retort pad would go to an off-site, EPA-approved landfill for TSCA and/or RCRA waste. As part of remediation in the former Cell Building area, the cell pit would be drained and the collected stormwater would be managed through the existing stormwater collection and treatment system. The pit concrete would be demolished and managed as part of the excavated waste material. Following excavation, clean backfill/topsoil would be placed in the areas to restore the ground surface to approximately pre-excavation grades, and the areas would be seeded/revegetated.

Removal activities would be conducted using standard construction equipment (e.g., backhoes, bulldozers) equipped with GPS instrumentation to monitor the removal progress and confirm that excavations meet the established horizontal and vertical goals. Shoring of the excavated area would be required until the area is backfilled. Backfill would be placed to predetermined elevations using conventional earthmoving equipment. Seeding and erosion controls would be implemented upon verification that backfill design elevations have been met.

Where required, excavated soil would be stockpiled within a materials staging area prior to transportation. Potentially impacted stormwater would be managed through the existing stormwater conveyance and treatment system.

Off-site Treatment and Disposal

If excavated waste and soils are hazardous due to characteristic toxicity and mercury is present at concentrations greater than or equal to 260 mg/kg, EPA requires treatment by retorting/incineration before disposal in accordance with land ban restrictions for mercury characteristic hazardous waste as defined in 40 CFR §268.40 and §268.48. Therefore, excavated material would be transported to an off-site retort/incineration and disposal facility approved by EPA to accept both mercury- and PCB-containing wastes. The number of such facilities in the U.S. is very limited. One retort facility operated by Waste Management Mercury Waste, Inc. in Union Grove, Wisconsin, has been identified as willing to accept mixed waste containing both mercury and PCBs if the PCB concentrations are less than 50 mg/kg. This facility is approximately 985 miles from the site and has a maximum capacity of 40 yd^3 of material per week. Disposal facilities may reject the excavated material upon profiling if PCB concentrations are greater than 50 mg/kg so that off-site treatment and/or disposal options are not available.

Soil associated with the Retort Area and Cell Building pads may differ in quality in that they potentially contain higher mercury concentrations that may be hazardous by toxicity characteristic. Therefore, this soil would be handled differently than the soil outside the Area F Retort pad. The soil beneath the Retort Area and Cell Building pads would go to an off-site treatment and disposal facility; and the soil outside of the Area F Retort pad would go to an off-site EPA-approved TSCA and/or RCRA landfill.

Ancillary Activities

Site preparation activities would include construction of

- access roads,
- support zones, and
- staging areas for personnel, equipment, and material.

Clearing and installation of erosion controls would be required for support and staging areas.

Ancillary activities required to support construction activities include:

- excavation area access and preparation,
- erosion control,
- backfill material delivery and staging,
- long-term excavated material staging and handling while awaiting transport (see Implementability discussion below),
- construction waste disposal,
- waste soil transport and disposal,
- stormwater management,
- dust monitoring/control,
- seeding/planting, and
- restoration, as necessary.

Ambient air would be monitored for dust during construction. Dust control measures would be implemented, and would include wetting roads, stockpiles, and staging areas. Real-time air monitoring would be performed during construction activities to verify compliance with ARARs.

9.2 Applicable or Relevant and Appropriate Requirements (ARARs)

NCP §300.430(e)(9)(iii)(B) states: "*Compliance with ARARs.* The alternatives shall be assessed to determine whether they attain applicable or relevant and appropriate requirements under federal environmental laws and state environmental or facility siting laws or provide grounds for invoking one of the waivers under paragraph (f)(1)(ii)(C) of this section."

There are three broad categories of ARARs: chemical-specific, location-specific, and action-specific. Lead and support regulatory agencies may, as appropriate, identify additional advisories, criteria, or To-Be-Considered (TBC) guidance for a particular site. TBCs are not legally binding and lack the status of ARARs. The remedial alternatives are screened against their ability to meet ARARs and TBCs.

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 CFR § 300.5. See also 40 CFR §§ 300.400(e)(1) & (2). In addition, CERCLA actions must only comply with the "substantive requirements," not the administrative requirements of regulations. Administrative requirements include permit applications, reporting, record keeping, and consultation with administrative bodies. Although consultation with state and federal agencies responsible for issuing permits is not required, it is recommended to consult with the agencies for determining compliance with certain requirements, such as those typically identified as Location-Specific ARARs.

Applicable requirements, as defined in 40 CFR § 300.5, means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental, state environmental, or state facility siting laws that specifically address a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstance at a CERCLA site. Only those state standards that are identified by the state in a timely manner and that are more stringent than federal requirements may be applicable. *Relevant and appropriate requirements*, as defined in 40 CFR § 300.5, means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental, state environmental, or state facility siting laws that, while not "applicable" to a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well-suited to the particular site. Only those state standards that are identified by the state in a timely manner and that are more stringent than federal requirements may be relevant and appropriate.

Per 40 CFR § 300.400(g)(5), only those state standards which are promulgated, are identified in a timely manner, and are more stringent than federal requirements may be applicable or relevant and appropriate. For the 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.

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. The To-Be-Considered (TBC) category consists of advisories, criteria, or guidance that were developed by EPA, other federal agencies, or states that may be useful in developing CERCLA remedies. See 40 CFR § 300.400(g)(3). TBCs can be used in the absence of ARARs, when ARARs are insufficient to develop cleanup goals, or when multiple contaminants may be posing a cumulative risk.

In accordance with 40 CFR § 300.400(g), EPA and NCDEQ have identified the potential ARARs and TBCs for the evaluated alternatives. The majority were included in the FS. The final ARARs for the selected remedy are included in **Appendix A – ARARs.**

9.3 Common Elements and Distinguishing Features of Each Alternative

9.3.1 Components

Components common to all active remedial alternatives include ICs such as deed restrictions and ECs such as erosion control and fencing. Each remedial alternative also includes long-term monitoring for site media including groundwater and surface water. In addition, the former RCRA units that were closed will be monitored and maintained in accordance with RCRA ARARs for post-closure care of a hazardous waste surface impoundment. The components and distinguishing features for the A-alternatives and S- alternatives are summarized in **Table 89** and **Table 90** respectively.

Table 89: Alternatives A1-A6 Common Elements and Distinguishing Features

<table>
<tr><th rowspan="2">Remedial Area</th><th rowspan="2">Area Description</th><th>A-1</th><th>A-2a</th><th>A-2b</th><th>A-3</th><th>A-4</th><th>A-5</th><th>A-6</th></tr>
<tr><th>NO ACTION</th><th>CAPPING WITH LIMITED EXCAVATION, OFF-SITE DISPOSAL, AND ICs/ECs</th><th>same as 2a except for H area</th><th>COMBINATION OF CAPPING AND EXCAVATION, ON-SITE DISPOSAL, AND ICs/ECs</th><th>COMBINATION OF CAPPING AND EXCAVATION, ON-SITE DISPOSAL, AND ICs/ECs</th><th>EXCAVATION, ON-SITE DISPOSAL, AND ICs/ECs</th><th>EXCAVATION, OFF-SITE DISPOSAL, AND ICs/ECs</th></tr>
<tr><td>A</td><td>Area west of CBP (PCB 25-49 mg/kg)</td><td>nothing</td><td colspan="4">cap</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td></tr>
<tr><td>B</td><td>Southwest corner of WWTP</td><td>nothing</td><td colspan="2">excavate, off-site disposal</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td></tr>
<tr><td>C</td><td>Membrane Plant Ancilliary Areas (PCB 25-49 mg/kg)</td><td>nothing</td><td colspan="4">cap</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td></tr>
<tr><td>D</td><td>Fill Area (PCB >50 mg/kg)</td><td>nothing</td><td colspan="2">cap</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td></tr>
<tr><td>E</td><td>Areas Northeast of Cell Building Pad</td><td>nothing</td><td colspan="2">excavate, off-site disposal</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td></tr>
<tr><td>H</td><td>Waste Water Treatment Solids</td><td>nothing</td><td>off-site disposal</td><td>LTTD treatment</td><td>on-site landfill</td><td>off-site disposal</td><td>on-site landfill</td><td>off-site disposal</td></tr>
<tr><td>I</td><td>Stormwater Conveyance System</td><td>nothing</td><td colspan="6">cleaned and sealed</td></tr>
<tr><td>J</td><td>Wooded Bottomland Areas (Including Drainage Pathways)</td><td>nothing</td><td colspan="2">excavate, off-site disposal</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td></tr>
<tr><td>K</td><td>Wooded Bottomland Area (North of Fill Area)</td><td>nothing</td><td colspan="2">excavate, off-site disposal</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td></tr>
<tr><td>L</td><td>Areas Northeast Corner of ONP and Southeast Corner of NRB</td><td>nothing</td><td colspan="6">cap/erosion control</td></tr>
<tr><td>M</td><td>Wooded Bottomland Area (North of Fill Area)</td><td>nothing</td><td colspan="2">excavate, off-site disposal</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td><td>excavate, on-site landfill</td><td>excavate, off-site disposal</td></tr>
<tr><td rowspan="2">Threshold criteria</td><td>1. Protectiveness</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td>2. ARAR compliance</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td rowspan="5">Balancing criteria</td><td>3. Long-term</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td>4. TMV</td><td>No</td><td>TMV</td><td>TMV</td><td>TM</td><td>TMV</td><td>TM</td><td>TMV</td></tr>
<tr><td>5. Short-term</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td>6. Implementability</td><td>0 months</td><td>12 months</td><td>12 months</td><td>18-24 months</td><td>12 months</td><td>18-24 months</td><td>12 months</td></tr>
<tr><td>7. Cost</td><td>$ -</td><td>$ 19,700,000</td><td>$ 21,300,000</td><td>$ 13,300,000</td><td>$ 21,600,000</td><td>$ 14,000,000</td><td>$ 25,900,000</td></tr>
<tr><td rowspan="2">Modifying Criteria</td><td>8. State Acceptance</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td>9. Community Acceptance</td><td colspan="7">No Comments received from community members.</td></tr>
<tr><td colspan="9">Notes:
ECs = Engineering Controls
ICs = Institutional Controls
LTTD = low temperature thermal desporption
mg/kg = milligrams per kilogram
TMV = toxicity, mobility, volume</td></tr>
</table>

Table 90: Alternatives S1-S4 Common Elements and Distinguishing Features

Remedial Area	Area Description	S-1	S-2	**S-3**	S-4
		NO ACTION	CAPPING WITH VERTICAL IMPERMEABLE BARRIER INSTALLATION AND ICs	**ISS, CAPPING, AND ICs**	EXCAVATION AND OFF-SITE TREATMENT AND DISPOSAL
F	Retort Area	nothing	capping, vertical barrier	capping, ISS	excavate, off-site Treatment and disposal
G	Cell Building Pad				
Threshold criteria	1. Protectiveness	No	Yes	Yes	Yes
	2. ARAR compliance	No	Yes	Yes	Uncertain
Balancing criteria	3. Long-term	No	Yes	Yes	Yes
	4. TMV	No	TM	TM	TMV
	5. Short-term	No	Yes	Yes	Yes
	6. Implementability	0 months	6-12 months	6-12 months	7-8 years
	7. Cost	$ -	$ 1,300,000	$ 2,900,000	$ 56,000,000
Modifying Criteria	8. State Acceptance	No	Yes	Yes	Yes
	9. Community Acceptance	No comments received from community members.			

Notes:
ICs = Institutional Controls
ISS = In-Situ Stabilization
TMV = Toxicity, Mobility, Volume

9.3.2 Volumes

Table 91 illustrates the distinguishing differences regarding volumes to be capped, excavated, off-site treatment or disposal, and on-site TSCA disposal unit.

Table 91: Volume Comparisons by Remedy Mode

Alternative	Acres Capped	Excavated Volume (yd^3)	WWTS Volume (yd^3)	Off-site Disposal or Treatment (yd^3)	On-site TSCA Disposal Unit (yd^3)
A-1	0	0	23,700	0	0
A-2	2.4	10,900	23,700	34,600	0
A-3	1.7	15,400	23,700	0	39,100
A-4	1.7	15,400	23,700	39,100	0
A-5	0.02	26,400	23,700	0	50,100
A-6	0.02	26,400	23,700	50,100	0
S-1	0	0	N/A	0	0
S-2	1.3	0	N/A	0	0
S-3	1.3	0	N/A	0	0
S-4	0	25,000	N/A	25,000	0
Notes:					
N/A	not applicable (addressed in A- alternatives)				
WWTS	Wastewater Treatment Solids				
yd^3	cubic yards				

9.3.3 Costs and Timeframes

Table 92 illustrates the similarities and differences in timeframes and estimated costs.

Table 92: Estimated Cost and Timeframes

	Estimated Costs				Timeframes (years)	
	Capital	Annual O&M	Total	Total Present Worth	Construction	To Achieve RAOs
A-1	$0	$0	$0	$0	0	beyond our lifetime
A-2a	$18,647,700	$31,500	$19,700,000	$19,000,000	1	1
A-2b	$20,180,300	$31,500	$21,300,000	$20,600,000	1	1
A-3	$12,122,700	$36,500	$13,300,000	$12,600,000	1.5-2	1.5-2
A-4	$20,453,700	$31,500	$21,600,000	$20,900,000	1	1
A-5	$12,851,800	$31,500	$14,000,000	$13,300,000	1.5-2	1.5-2
A-6	$25,000,000	$29,000	$25,900,000	$25,400,000	1	1
S-1	$0	*	$0	$0	0	beyond our lifetime
S-2	$1,300,000	*	$1,300,000	N/A	0.5-1	0.5-1
S-3	$2,900,000	*	$2,900,000	N/A	0.5-1	0.5-1
S-4	$56,000,000	*	$56,000,000	N/A	7-8	7-8

Notes:	
*	Annual O&M costs are included in the A- alternatives
N/A	Not Applicable
RAOs	Remedial Action Objectives

9.3.4 NCP Criteria

All of the alternatives except for the No Action alternatives are protective of human health and the environment.

All alternatives comply with ARARs, with the waiver invoked in this ROD for Alternatives A-3 and A-5. The waiver used is TSCA regulation 40 CFR §761.75(c)(4) for construction of a chemical waste landfill. The necessity for this waiver is due to not meeting the 50-foot depth requirement from the TSCA disposal unit bottom liner to groundwater. Due to the engineered design of the TSCA disposal unit and natural clay formation present at the site, potential releases of PCBs will be addressed in a manner that does not present an unreasonable risk of injury to human health and the environment under TSCA and will be protective of human health and the environment under CERCLA.

All of the alternatives reduce mobility to some extent. S-3 which includes ISS as on-site treatment, will reduce toxicity and mobility of PTW in areas F and G. In addition, alternatives A-2, A-4, A-6 and S-4 also reduce volume due to off-site transportation, treatment and disposal.

All of the alternatives include minimal to moderate short-term risks. These risks are primarily to impacts to ecological receptors, risks to the public during transportation of wastes to disposal facilities.

All of the alternatives are implementable, however implementation of alternative S-4 will be difficult due to the treatment facility's limitations on how much waste they can accept/treat per day and the large volume estimated under this alternative.

Alternative costs range from $0 to $25.9 million for the overall site alternatives and $0 to $56 million for the S- alternatives.

Remedial Action timeframes range from 12 to 24 months of the overall site alternatives and 6 months to 8 years (S-4) for the S- alternatives.

NCDEQ supports EPA's selected remedy. EPA did not receive any comments from community members regarding the proposed remedy.

9.4 Expected Outcomes of Each Alternative

After completion of the remedial action, the land use will be limited to industrial use or ecological habitat for each alternative. This is primarily due to being surrounded on three sides by IP and the fourth side bordering the Cape Fear River. As discussed in **Section 6.0,** groundwater at the site cannot be used for potable purposes. This will remain the same after completion of the remedial action, regardless of which alternative is selected.

10.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 400.430(f)(5)(i) of the NCP requires that the ROD explain how the nine evaluation criteria in NCP §300.430(e)(9)(iii) were used to select the remedy. The nine criteria are divided into three categories: threshold criteria (must be met), balancing criteria (basis for alternative selection), and modifying criteria (applied after the public comment period ends for the Proposed Plan). The specific evaluation criteria that fall under each of these categories are listed below:

Threshold Criteria
- Overall protection of human health and the environment
- Compliance with ARARs

Balancing Criteria
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost

Modifying Criteria
- State Acceptance
- Community Acceptance

The remedial alternatives were evaluated for the criteria and then compared with one another to identify their respective strengths and weaknesses. Reduction of toxicity, mobility and volume has been evaluated with and without treatment in the FS, with the understanding that EPA has a preference for treatment, when applicable. **Table 93** and **Table 94** summarize the comparative analysis for the A-alternatives and the S-alternatives, respectively.

Sections 10.1 through **10.9** discuss each criterion in detail. As recommended in Highlight 6-23 in *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, the discussion of each criterion presents each alternative in decreasing order from the most to least advantageous. Where alternatives have equal advantages, they are listed in numerical name order.

Table 93: Comparative Analysis Summary for A-1 through A-6

Remedial Area	Area Description	A-1 NO ACTION	A-2a CAPPING WITH LIMITED EXCAVATION, OFF-SITE DISPOSAL, AND ICs/ECs	A-2b same as 2a except for H area	A-3 COMBINATION OF CAPPING AND EXCAVATION, ON-SITE DISPOSAL, AND ICs/ECs	A-4 COMBINATION OF CAPPING AND EXCAVATION, ON-SITE DISPOSAL, AND ICs/ECs	A-5 EXCAVATION, ON-SITE DISPOSAL, AND ICs/ECs	A-6 EXCAVATION, OFF-SITE DISPOSAL, AND ICs/ECs
Threshold criteria	1. Protectiveness	No	Yes	Yes	Yes	Yes	Yes	Yes
	2. ARAR compliance	No	Yes	Yes	Yes	Yes	Yes	Yes
Balancing criteria	3. Long-term	No	Yes	Yes	Yes	Yes	Yes	Yes
	4. TMV	No	TMV	TMV	TM	TMV	TM	TMV
	5. Short-term	No	Yes	Yes	Yes	Yes	Yes	Yes
	6. Implementability	0 months	12 months	12 months	18-24 months	12 months	18-24 months	12 months
	7. Cost	$ -	$ 19,700,000	$ 21,300,000	$ 13,300,000	$ 21,600,000	$ 14,000,000	$ 25,900,000
Modifying Criteria	8. State Acceptance	No	Yes	Yes	Yes	Yes	Yes	Yes
	9. Community Acceptance	No Comments received from community members.						

Notes:
ECs = Engineering Controls
ICs = Institutional Controls
LTTD = low temperature thermal desporption
mg/kg = milligrams per kilogram
TMV = toxicity, mobility, volume

Table 94: Comparative Analysis Summary for S-1 through S-4

Remedial Area	Area Description	S-1 NO ACTION	S-2 CAPPING WITH VERTICAL IMPERMEABLE BARRIER INSTALLATION AND ICs	S-3 ISS, CAPPING, AND ICs	S-4 EXCAVATION AND OFF-SITE TREATMENT AND DISPOSAL
Threshold criteria	1. Protectiveness	No	Yes	Yes	Yes
	2. ARAR compliance	No	Yes	Yes	Uncertain
Balancing criteria	3. Long-term	No	Yes	Yes	Yes
	4. TMV	No	TM	TM	TMV
	5. Short-term	No	Yes	Yes	Yes
	6. Implementability	0 months	6-12 months	6-12 months	7-8 years
	7. Cost	$ -	$ 1,300,000	$ 2,900,000	$ 56,000,000
Modifying Criteria	8. State Acceptance	No	Yes	Yes	Yes
	9. Community Acceptance	No comments received from community members.			

Notes:
ICs = Institutional Controls
ISS = In-Situ Stabilization
TMV = Toxicity, Mobility, Volume

10.1 Overall Protection of Human Health and the Environment

NCP §300.430(e)(9)(iii)(A) states: "*Overall protection of human health and the environment.* Alternatives shall be assessed to determine whether they can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site by eliminating, reducing, or controlling exposures to levels established during development of remediation goals consistent with §300.430(e)(2)(i). Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs."

Table 95 provides a summary comparison of each alternative regarding the criteria of overall protection.

Table 95: Criteria 1 – Overall Protection Summary

Alternative		Overall Protection?
Overall Site Alternatives		
A-1	No Action	No
A-2a	Capping with Limited Excavation, Off-site Disposal, and ICs/ECs	Yes
A-2b	same as A-2a except for WWTS treated with LTTD	Yes
A-3	Combination of Capping and Excavation, On-site Disposal and ICs/ECs	Yes
A-4	Combination of Capping and Excavation, Off-site Disposal, and ICs/ECs	Yes
A-5	Excavation, On-site Disposal, and ICs/ECs	Yes
A-6	Excavation, Off-site Disposal, and ICs/ECs	Yes
Soil Beneath Retort Pad and Mercury Cell Building Pad Alternatives		
S-1	No Action	No
S-2	Capping with Vertical Impermeable Barrier Installation and ICs	Yes
S-3	In-Situ Stabilization, Capping and ICs	Yes
S-4	Excavation, Off-site Treatment and Disposal	Yes

Notes:
Green background indicates that the alternative meets the criteria of that column
Red background indicates that the alternative does not meet the criteria.
ECs = Engineering Controls
ICs = Institutional Controls
LTTD = low temperature thermal desorption
WWTS = Waste Water Treatment Solids

10.1.1 A- Alternatives

All of the A- alternatives, except A-1, provide overall protection. Further discussion on each alternative follows.

Alternative A-2 provides overall protectiveness. Capping isolates and prevents erosion and direct exposure of human and ecological receptors to COCs in soil. Excavation and backfilling remove COC-impacted material and protect human and ecological receptors from potential exposure to residual COCs in soil and sediment. Alternative-2b includes a smaller volume of contaminated material that would be transported through communities to an off-site landfill. Therefore, it presents less of a short-term risk to community members than Alternative-2a. ICs control access and further limit exposure to human receptors.

Alternative A-3 provides overall protectiveness. Capping isolates and prevents erosion and direct exposure of human and ecological receptors to COCs in soil. Excavation and backfilling remove COC-impacted material and protect human and ecological receptors from potential exposure to residual COCs in soil and sediment. Containment of excavated material in an on-site TSCA disposal unit prevents its erosion and migration, and precludes further exposure to human and ecological receptors. On-site disposal limits the short-term impacts to community members. ICs control access and further limit exposure to human receptors.

Alternative A-4 provides overall protectiveness. Capping isolates and prevents erosion and direct exposure of human and ecological receptors to COCs in soil. Excavation and backfilling remove COC-impacted material and protect human and ecological receptors from potential exposure to residual COCs in soil and sediment. Contaminated material would be transported through communities to an off-site landfill; therefore, it presents short-term risks to community members. ICs control access and further limit exposure to human receptors.

Alternative A-5 provides overall protectiveness. It includes the largest volume excavated to remove COC-impacted material. Excavation and backfill protect on-site human and ecological receptors from potential exposure to residual COCs in soil and sediment. Containment of excavated material in an on-site TSCA disposal unit prevents erosion and migration, and precludes further exposure to human and ecological receptors. On-site disposal limits the short-term impacts to community members. ICs control access and further limit exposure to human receptors.

Alternative A-6 provides overall protectiveness. Excavation and backfilling remove COC-impacted material and protect human and ecological receptors from potential exposure to residual COCs in soil and sediment. This alternative includes the largest volume of contaminated material that would be transported through communities to an off-site landfill; therefore, it presents short-term risks to community members. ICs control access and further limit exposure to human receptors.

10.1.2 S- Alternatives

All of the S- alternatives, except S-1, provide overall protectiveness. Further discussion on each alternative follows.

Alternative S-2 provides overall protectiveness. Containment by a vertical barrier/cap system isolates and prevents erosion and direct exposure of human and ecological receptors to mercury and PCBs in soil. It would also control migration of mercury and PCBs in groundwater. ICs control access and further limit exposure to human receptors.

Alternative S-3 provides overall protectiveness. ISS treats the soil to eliminate potential future mobility and prevent erosion and potential exposure to COCs in soil to human receptors. ICs control access and further limit exposure to human receptors.

Alternative S-4 provides overall protectiveness. Excavation, treatment, disposal, and backfilling remove COC-impacted material and protect human and ecological receptors from potential exposure to residual COCs in soil. The long duration to implement the remedy and the volume of contaminated material that would be transported off-site makes this alternative have the highest level of short-term risk to workers and community members. ICs control access and further limit exposure to human receptors.

10.2 Compliance with Applicable or Relevant and Appropriate Requirements

NCP §300.430(e)(9)(iii)(B) states: "*Compliance with ARARs.* The alternatives shall be assessed to determine whether they attain applicable or relevant and appropriate requirements under federal environmental laws and state environmental or facility siting laws or provide grounds for invoking one of the waivers under paragraph (f)(1)(ii)(C) of this section."

Section 9.2 explains the different types of ARARs. The majority of ARARs developed for all of the alternatives evaluated are included in the FS. Those were refined further for the selected remedy and are included in **APPENDIX A – ARARs.**

Table 96 summarizes whether or not each alternative complies with ARARs. The evaluation is described further in **Sections 10.2.1** and **10.2.2**.

Table 96: Criteria 2 – Compliance with ARARs Summary

Alternative		Compliance with ARARs?
Overall Site Alternatives		
A-1	No Action	No
A-2a	Capping with Limited Excavation, Off-site Disposal, and ICs/ECs	Yes
A-2b	same as A-2a except for WWTS treated with LTTD	Yes
A-3	Combination of Capping and Excavation, On-site Disposal and ICs/ECs	Yes
A-4	Combination of Capping and Excavation, Off-site Disposal, and ICs/ECs	Yes
A-5	Excavation, On-site Disposal, and ICs/ECs	Yes
A-6	Excavation, Off-site Disposal, and ICs/ECs	Yes
Soil Beneath Retort Pad and Mercury Cell Building Pad Alternatives		
S-1	No Action	No
S-2	Capping with Vertical Impermeable Barrier Installation and ICs	Yes
S-3	In-Situ Stabilization, Capping and ICs	Yes
S-4	Excavation, Off-site Treatment and Disposal	TBD - dependent on waste profiling data
Notes:		
Green background indicates that the alternative meets the criteria of that column		
Yellow background indicates that additional information is needed to ensure the alternative complies with ARARs.		
Red background indicates that the alternative does not meet the criteria.		
ARARs = Applicable or Relevant and Appropriate Requirements		
ECs = Engineering Controls		
ICs = Institutional Controls		
TBD = to be determined		
TSCA = Toxic Substances Control Act		

10.2.1 A- alternatives

All alternatives except for A-1 comply with ARARs. For alternatives A-3 and A-5, a waiver under TSCA regulation 40 CFR §761.75(c)(4) is being applied at this site for the TSCA chemical waste landfill requirement of a depth of 50 feet between the TSCA disposal unit bottom liner and groundwater.

10.2.2 S- alternatives

Alternatives S-2 and S-3 comply with ARARs. Alternative S-4 complies with ARARs with uncertainty. If PCB concentrations in excavated material exceed 50 mg/kg, compliance by treatment and disposal facilities may not allow off-site retort/incineration. The concentrations of PCBs in these soils are not fully known because no samples beneath the pads are available. Therefore, compliance with ARARs is not certain. Alternative S-1 does not comply with ARARs.

10.3 Long-Term Effectiveness and Permanence

NCP §300.430(e)(9)(iii)(C) states: "*Long-term effectiveness and permanence.* Alternatives shall be assessed for the long-term effectiveness and permanence they afford, along with the degree of certainty that the alternative will prove successful. Factors that shall be considered, as appropriate, include the following:

> (*1*) Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities. The characteristics of the residuals should be considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, and propensity to bioaccumulate.
>
> (*2*) Adequacy and reliability of controls such as containment systems and institutional controls that are necessary to manage treatment residuals and untreated waste. This factor addresses in particular the uncertainties associated with land disposal for providing long-term protection from residuals; the assessment of the potential need to replace technical components of the alternative, such as a cap, a slurry wall, or a treatment system; and the potential exposure pathways and risks posed should the remedial action need replacement."

Table 97 summarizes whether or not each alternative provides long-term effectiveness and permanence and includes the volume of contaminated material that will be treated or disposed. The evaluation is described further in **Sections 10.3.1** and **10.3.2**.

Table 97: Criteria 3 – Long-Term Effectiveness and Permanence Summary

Alternative		Volume Treated or Disposed*	Long-Term Effectiveness
Overall Site Alternatives			
A-1	No Action	-	No
A-2a	Capping with Limited Excavation, Off-site Disposal, and ICs/ECs	34,600	Yes
A-2b	same as A-2a except for WWTS treated with LTTD	34,600	Yes
A-3	Combination of Capping and Excavation, On-site Disposal and ICs/ECs	39,100	Yes
A-4	Combination of Capping and Excavation, Off-site Disposal, and ICs/ECs	39,100	Yes
A-5	Excavation, On-site Disposal, and ICs/ECs	50,100	Yes
A-6	Excavation, Off-site Disposal, and ICs/ECs	50,100	Yes
Soil Beneath Retort Pad and Mercury Cell Building Pad Alternatives			
S-1	No Action	-	No
S-2	Capping with Vertical Impermeable Barrier Installation and ICs	-	Yes
S-3	In-Situ Stabilization, Capping and ICs	25,000	Yes
S-4	Excavation, Off-site Treatment and Disposal	25,000	Yes

Notes:
* volume units are cubic yards
Green background indicates that the alternative meets the criteria of that column
Red background indicates that the alternative does not meet the criteria.
ECs = Engineering Controls
ICs = Institutional Controls

10.3.1 A- alternatives

Alternatives A-2 through A-6 are effective and permanent long-term remedial solutions. They all reduce risks at the site to varying degrees. The controls needed are adequate and reliable.

Alternative A-2 will treat or dispose of approximately 34,600 yd^3 of waste and will cap 2.4 acres. It will require the following controls:

- ICs to limit disturbance of the backfill/cover soil in excavated areas;
- ICs to limit disturbance of the caps
- inspections/maintenance of erosion controls and revegetated areas; and
- groundwater monitoring to confirm remedy protectiveness.

Alternative A-3 will treat or dispose of approximately 39,100 yd^3 of waste and will cap 1.7 acres. It will require the following controls:

- ICs to limit disturbance of the backfill/cover soil in excavated areas;
- ICs to limit disturbance of the caps
- ICs to limit disturbance of the TSCA disposal unit cap and cover soil
- inspections/maintenance of erosion controls and revegetated areas; and
- groundwater monitoring to confirm remedy protectiveness.

Alternative A-4 will treat or dispose of approximately 39,100 yd^3 of waste and will cap 1.7 acres. This alternative will require the same controls as Alternative A-2.

Alternative A-5 will excavate and place into an on-site TSCA disposal unit approximately 50,100 yd^3 of waste. This alternative will require the same controls as Alternative A-3.

Alternative A-6 will treat or dispose of the highest volume of waste (approximately 50,100 yd^3) at an off-site treatment/disposal facility. The only controls needed will be ICs to limit disturbance of the backfill/cover soil and groundwater monitoring to confirm remedy protectiveness for the closed RCRA units.

10.3.2 S- alternatives

Alternatives S-2 through S-4 are effective and permanent long-term remedial solutions. They all reduce risks at the site to varying degrees. The controls needed are adequate and reliable.

Alternative S-2 is a containment remedy. The contaminated areas would be contained, not treated. The controls needed include:

- long-term maintenance,
- ICs to limit disturbance of the cap,
- inspections/maintenance of erosion controls, and
- groundwater monitoring to confirm remedy protectiveness

Alternative S-3 will utilize a proven treatment technology to treat approximately 25,000 yd^3 of mercury waste and contaminated soil. In-situ solidification/stabilization is a permanent solution and reduces mobility of contaminants. This technology has been used effectively on wastes at the site when the facility was regulated under RCRA. The controls needed include:

- ICs to limit disturbance of the stabilized areas; and
- groundwater monitoring to confirm remedy protectiveness.

Alternative S-4 involves excavation and off-site treatment/disposal of approximately 25,000 yd^3 of contaminated material.

10.4 Reduction of toxicity, mobility, or volume through treatment

NCP §300.430(e)(9)(iii)(D) states: "*Reduction of toxicity, mobility, or volume through treatment.* The degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume of hazardous substances shall be assessed, including how treatment is used to address the principal threats posed by the site. Factors that shall be considered, as appropriate, include the following:

(*1*) The treatment or recycling processes the alternatives employ and materials they will treat;
(*2*) The amount of hazardous substances, pollutants, or contaminants that will be destroyed, treated, or recycled;
(*3*) The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment or recycling and the specification of which reduction(s) are occurring;
(*4*) The degree to which the treatment is irreversible;
(*5*) The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents; and
(*6*) The degree to which treatment reduces the inherent hazards posed by principal threats at the site."

Table 98: Criteria 4 - Reduction of Toxicity, Mobility or Volume via Treatment Summary

Alternative		Treatment?	Volume Treated*	Volume Disposed*	Reduction of TMV?
Overall Site Alternatives					
A-1	No Action	No	-	-	No
A-2a	Capping with Limited Excavation, Off-site Disposal, and ICs/ECs	No	-	34,600	TMV
A-2b	same as A-2a except for WWTS treated with LTTD	Yes	23,700	10,900	TMV
A-3	Combination of Capping and Excavation, On-site Disposal and ICs/ECs	No	-	39,100	TM
A-4	Combination of Capping and Excavation, Off-site Disposal, and ICs/ECs	No	-	39,100	TMV
A-5	Excavation, On-site Disposal, and ICs/ECs	No	-	50,100	TM
A-6	Excavation, Off-site Disposal, and ICs/ECs	No	-	50,100	TMV
Soil Beneath Retort Pad and Mercury Cell Building Pad Alternatives					
S-1	No Action	No	-	-	No
S-2	Capping with Vertical Impermeable Barrier Installation and ICs	No	-	-	TM
S-3	In-Situ Stabilization, Capping and ICs	Yes	25,000	25,000	TM
S-4	Excavation, Off-site Treatment and Disposal	Yes	25,000	25,000	TMV
Notes:					
* volume units are cubic yards					
Green background indicates that the alternative meets the criteria of that column					
Red background indicates that the alternative does not meet the criteria or has the highest costs.					
ECs = Engineering Controls					
ICs = Institutional Controls					
LTTD = low temperature thermal desorption					
TMV = toxicity, mobility, volume					
WWTS = Waste Water Treatment Solids					

10.4.1 A- alternatives

The only A- alternative that includes treatment is alternative A-2b. The remainder of the A- alternatives, except for A-1, reduce toxicity, mobility and/or volume through capping and/or on-site containment in a TSCA disposal unit or off-site containment in an EPA-approved landfill.

Alternative A-2a does not include treatment but would reduce toxicity, mobility and volume at the site. Off-site disposal would reduce the volume of contaminated material at the site by approximately 34,600 yd^3. Capping would reduce mobility of COCs in soil by creating a barrier and preventing contact with surface water and receptors.

Alternative A-2b would reduce toxicity and mobility through treatment. Approximately 23,700 yd^3 of WWTS would be treated via LTTD. Capping of approximately 2.4 acres would reduce mobility of COCs in soil by creating a barrier and preventing contact with surface water and receptors.

Alternative A-3 does not involve treatment but would move the second highest volume of contaminated material into an on-site disposal unit that complies with TSCA ARARs. Approximately 39,100 yd^3 of contaminated soil and sediment would be placed in a constructed TSCA disposal unit. This alternative would reduce mobility of and exposure to the toxicity of COCs in soil by creating a barrier or isolating material in an on-site TSCA disposal unit. These actions, once completed, would prevent contaminant contact with surface water and receptors.

Alternative A-4 does not involve treatment but would reduce toxicity, mobility and volume at the site. Off-site disposal of approximately 39,100 yd^3 of contaminated soil and sediment would reduce the volume of contaminated material on-site. Capping would reduce mobility of and exposure to COCs in soil by creating a barrier and preventing contact with surface water and receptors.

Alternative A-5 does not involve treatment but would move the highest volume of contaminated material into an on-site TSCA disposal unit. Approximately 50,100 yd^3 of contaminated soil and sediment would be placed in an on-site TSCA disposal unit. The disposal unit would reduce mobility of and exposure to the toxicity of COCs in soil by creating a barrier or isolating material in an on-site TSCA disposal unit. These actions, once completed, would prevent contaminant contact with surface water and receptors.

Alternative A-6 does not involve treatment but would remove the highest volume of contaminated material from the site. Approximately 50,100 yd^3 of contaminated soils and sediments would be removed from the site and disposed of in an EPA-approved off-site landfill. Capping in the L Areas would reduce mobility of and exposure to COCs in soil by creating a barrier and preventing contact with surface water and receptors.

10.4.2 S- alternatives

Alternatives S-3 and S-4 are the only S- alternatives that include treatment. Alternative S-2 would reduce mobility via containment. Alternative S-3 would reduce toxicity and mobility via treatment using ISS. Alternative S-4 would reduce toxicity, mobility and volume through excavation and off-site treatment. However, treatment may not be possible if the waste includes concentrations of both mercury and PCBs at levels that require treatment. Facilities currently cannot treat RCRA hazardous waste that also has TSCA PCB waste at concentrations greater than 50 mg/kg.

10.5 Short-Term Effectiveness

NCP §300.430(e)(9)(iii)(E) states: "*Short-term effectiveness.* The short-term impacts of alternatives shall be assessed considering the following:

(*1*) Short-term risks that might be posed to the community during implementation of an alternative;
(*2*) Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures;
(*3*) Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation; and
(*4*) Time until protection is achieved."

Table 99: Criteria 5 – Short-term Effectiveness Summary

Alternative		Short-Term Effectiveness
Overall Site Alternatives		
A-1	No Action	not effective; no negative short-term effects
A-2a	Capping with Limited Excavation, Off-site Disposal, and ICs/ECs	short-term impacts to ecological receptors. Short-term risk to public during transportation to disposal facilities
A-2b	same as A-2a except for WWTS treated with LTTD	short-term impacts to ecological receptors. Short-term risk to public during transportation to disposal facilities
A-3	Combination of Capping and Excavation, On-site Disposal and ICs/ECs	minimal risk to worker; short-term impacts to ecological receptors.
A-4	Combination of Capping and Excavation, Off-site Disposal, and ICs/ECs	short-term impacts to ecological receptors. Short-term risk to public during transportation to disposal facilities
A-5	Excavation, On-site Disposal, and ICs/ECs	minimal risk to worker; short-term impacts to ecological receptors.
A-6	Excavation, Off-site Disposal, and ICs/ECs	short-term impacts to ecological receptors. Short-term risk to public during transportation to disposal facilities
Soil Beneath Retort Pad and Mercury Cell Building Pad Alternatives		
S-1	No Action	not effective; no negative short-term effects
S-2	Capping with Vertical Impermeable Barrier Installation and ICs	minimal risk to worker; short-term impacts to ecological receptors.
S-3	In-Situ Stabilization, Capping and ICs	minimal risk to worker; short-term impacts to ecological receptors.
S-4	Excavation, Off-site Treatment and Disposal	short-term impacts to ecological receptors. Short-term risk to public during transportation to disposal facilities
Notes:		
Green background indicates that the alternative meets the criteria of that column		
Yellow background indicates that the alternative meets the criteria of that column, but not as well as alternatives with green background		
Red background indicates that the alternative does not meet the criteria.		
ECs = Engineering Controls		
ICs = Institutional Controls		

10.5.1 A- alternatives

Alternative A-1 does not provide short-term protectiveness. The other A- alternatives provide short-term effectiveness as discussed below.

Alternative A-2 is an effective short–term remedial solution. Capping and excavation provide immediate risk reduction. Minimal risk to workers would be expected during construction activities. Localized, short-term impacts on the ecological community would be limited to the Wooded Bottomland Area and would be mitigated through restoring and revegetating to initiate habitat recovery. Risk to workers would be managed through safe work practices and appropriate personal protective equipment (PPE). Air monitoring would be required during earthmoving activities, and dust would be controlled through dust suppression practices. Short-term risk of releases and public exposure during transportation of contaminated material over long distances to disposal sites is limited to the relatively small volume of material excavated.

Alternative A-3 is an effective short-term remedial solution. Capping and excavation provide immediate risk reduction. Minimal risk to workers would be expected during construction activities. Localized, short-term impacts on the ecological community would be limited to the Wooded Bottomland Area and would be mitigated through restoring and revegetating to initiate habitat recovery. Risk to workers would be managed through safe work practices and appropriate PPE. Air monitoring would be required during earthmoving activities, and dust would be controlled through dust suppression practices.

Alternative A-4 is an effective short–term remedial solution. Capping and excavation provide immediate risk reduction. Minimal risk to workers would be expected during construction activities. Localized, short-term impacts on the ecological community would be limited to the Wooded Bottomland Area and would be mitigated through restoring and revegetating to initiate habitat recovery. Risk to workers would be managed through safe work practices and appropriate PPE. Air monitoring would be required during earthmoving activities, and dust would be controlled through dust suppression practices. Transportation of contaminated material over long distances to disposal sites increases short-term risk of releases and public exposure.

Alternative A-5 is an effective short-term remedial solution. Excavation provides immediate risk reduction. Minimal risk to workers would be expected during construction activities. Localized, short-term impacts on the ecological community would be limited to the Wooded Bottomland Area and would be mitigated through restoring and revegetating to initiate habitat recovery. Risk to workers would be managed through safe work practices and appropriate PPE. Air monitoring would be required during earthmoving activities, and dust would be controlled through dust suppression practices.

Alternative A-6 is an effective short–term remedial solution. Excavation provides immediate risk reduction. Minimal risk to workers would be expected during construction activities. Localized, short-term impacts on the ecological community would be limited to the Wooded Bottomland Area and would be mitigated through restoring and revegetating to initiate habitat recovery. Risk to workers would be managed through safe work practices and appropriate PPE. Air monitoring would be required during earthmoving activities, and dust would be controlled through dust suppression practices. Transportation of contaminated material over long distances to disposal sites increases short-term risk of releases and public exposure.

10.5.2 S- alternatives

Alternative S-1 does not provide short-term protectiveness. The other S- alternatives provide short-term effectiveness and risks as explained below.

Alternative S-2 is an effective short term remedial solution. Capping provides immediate risk reduction. Minimal risk to workers would be expected during construction activities. Risk to workers would be managed through safe work practices and appropriate PPE. Air monitoring would be required during earthmoving activities, and dust would be controlled through dust suppression practices.

Alternative S-3 is an effective short term remedial solution. ISS provides immediate risk reduction. Minimal risk to workers would be expected during construction activities. Risk to workers would be managed through safe work practices and appropriate PPE. Air monitoring would be required during implementation activities, and dust would be controlled through dust suppression practices.

Alternative S-4 is an effective short–term remedial solution; however, potential for exposure to waste material and physical hazards are acknowledged. Potential risk to workers would be expected during construction activities due to the potential for direct contact and inhalation of air borne particles. This risk would be managed through safe work practices and appropriate PPE. Air monitoring would be required during earthmoving activities, and dust would be controlled through dust suppression practices. Transportation of contaminated soils over long distances to disposal sites increases short-term risk of releases and public exposure.

10.6 Implementability

NCP §300.430(e)(9)(iii)(F) states: "*Implementability.* The ease or difficulty of implementing the alternatives shall be assessed by considering the following types of factors as appropriate:

(*1*) Technical feasibility, including technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy.

(*2*) Administrative feasibility, including activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for off-site actions);

(*3*) Availability of services and materials, including the availability of adequate off-site treatment, storage capacity, and disposal capacity and services; the availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; the availability of services and materials; and availability of prospective technologies.

Table 100: Criteria 6 - Implementability Summary

Alternative		Implementability
Overall Site Alternatives		
A-1	No Action	Yes
A-2a	Capping with Limited Excavation, Off-site Disposal, and ICs/ECs	Yes
A-2b	same as A-2a except for WWTS treated with LTTD	Yes
A-3	Combination of Capping and Excavation, On-site Disposal and ICs/ECs	Yes
A-4	Combination of Capping and Excavation, Off-site Disposal, and ICs/ECs	Yes
A-5	Excavation, On-site Disposal, and ICs/ECs	Yes
A-6	Excavation, Off-site Disposal, and ICs/ECs	Yes
Soil Beneath Retort Pad and Mercury Cell Building Pad Alternatives		
S-1	No Action	Yes
S-2	Capping with Vertical Impermeable Barrier Installation and ICs	Yes
S-3	In-Situ Stabilization, Capping and ICs	Yes
S-4	Excavation, Off-site Treatment and Disposal	Difficult
Notes:		
Green background indicates that the alternative meets the criteria of that column		
Red background indicates that the alternative does not meet the criteria.		
ECs = Engineering Controls		
ICs = Institutional Controls		

10.6.1 A- alternatives

Alternative A-1 is "No Action". Therefore, it is the easiest to implement.

Alternative A-2a is the 2nd easiest to implement. This alternative includes excavation and off-site disposal of the lowest volume of wastes compared to the other alternatives. It includes long-term monitoring plus inspections and maintenance of ECs. Access roads and staging areas would need to be constructed to implement work. Implementation materials and equipment are readily available and techniques are commonly applied. Long-haul distances to an off-site EPA-approved landfill would be anticipated. Time to complete implementation is estimated at approximately 12 months, assuming continuous 24-hour/7 days per week operation and limited downtime.

Alternative A-2b is the most difficult to implement. WWTS will be treated by LTTD so that the treated residual can be beneficially reused on-site. This alternative includes long-term monitoring plus inspections and maintenance of ECs. Access roads and staging areas would need to be constructed to implement work. Implementation materials and equipment are readily available and techniques are commonly applied. Long-haul distances to an off-site EPA-approved landfill would be anticipated. Time to complete implementation is estimated at approximately 12 months, assuming continuous 24-hour/7 days per week operation and limited downtime.

Alternative A-3 implementation is straightforward and includes long-term monitoring plus inspections and maintenance of on-site TSCA disposal unit and RCRA units, in addition to and ECs. Access roads and staging areas would need to be constructed to implement work. Implementation materials and equipment are readily available and techniques are commonly applied. Time to complete implementation is estimated at approximately 18 to 24 months.

Alternative A-4 implementation is straightforward and includes long-term monitoring plus inspections and maintenance of ECs. Access roads and staging areas would need to be constructed to implement work. Implementation materials and equipment are readily available and techniques are commonly applied. Long-haul distances to an off-site EPA-approved landfill would be anticipated. Time to complete implementation is estimated at approximately 12 months.

Alternative A-5 implementation is straightforward and includes long-term monitoring plus inspections and maintenance of the on-site TSCA disposal unit and RCRA units, in addition to ECs. Access roads and staging areas would need to be constructed to implement work. Implementation materials and equipment are readily available and techniques are commonly applied. Time to complete implementation is estimated at approximately 18 to 24 months.

Alternative A-6 implementation is straightforward and includes long-term monitoring plus inspections and maintenance of ECs. Access roads and staging areas would need to be constructed to implement work. Implementation materials and equipment are readily available and techniques are commonly applied. Long-haul distances to an off-site EPA-approved treatment/disposal facility would be anticipated. Time to complete implementation is estimated at approximately 12 months.

10.6.2 S- alternatives

Alternative S-1 is "No Action". Therefore, it is the easiest to implement.

Alternative S-2 implementation is straightforward and includes long-term monitoring plus inspections and maintenance. Access roads and staging areas would need to be constructed to implement work. Implementation materials and equipment are readily available and techniques are commonly applied. Time to complete implementation is estimated at approximately 6 to 12 months.

Alternative S-3 implementation is straightforward using conventional equipment and stabilization agents. Access roads and staging areas would need to be constructed to implement work. Implementation materials and equipment are readily available and techniques are commonly applied. Time to complete implementation is estimated at approximately 6 to 12 months.

Alternative S-4 is the most difficult to implement. Implementation is difficult because of extensive excavation/shoring required to excavate down to the Peedee Formation (10 to 15 feet), extremely long-haul distances, and the limited availability of treatment facilities that will incinerate/retort soils that contain both PCBs and mercury. Waste treatment and disposal facilities may reject the excavated material if PCB concentrations are greater than 50 mg/kg, so that off-site treatment and disposal is not available. Time to complete implementation may require up to 7 to 8 years due to the limited throughput capacity of the identified retort facility.