

**Memorandum For: Rachael Thompson, Executive Director
Glynn Environmental Coalition
Brunswick, Georgia**

**From: Frank Anastasi, P.G., Community Technical Advisor
Brunswick GA Superfund Sites
Glynn County, Georgia FA**

Date: June 30, 2025

**Subject: Review of U.S. EPA's Record of Decision for The Cell Building
Area Soil, Operable Unit 2, LCP Chemicals Site, Brunswick
GA**

This memorandum summarizes the *Interim Early Action Record of Decision, LCP Chemicals Georgia Superfund Site. Operable Unit 2 – Site Groundwater and Cell Building Soil* (the ROD) that was signed by U.S. Environmental Protection agency (EPA) in March 2025. This review summarizes the selected remedial action to treat mercury in the subsurface soil beneath this part of the LCP Chemicals Superfund Site (referred to as the cell buildings area, or CBA).

EPA determined that an interim remedy to treat the mercury there was appropriate as an “early action” to address risks posed by the mercury in the subsurface. At the CBA, elemental mercury in the subsurface is a continuing source of dissolved-phase mercury in ground water. The goal of the interim action is to render the elemental mercury insoluble, so that the residual mercury will no longer be a source of ground water contamination. Site-wide, ground water is contaminated by numerous contaminants of concern, including mercury, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and metals. The site-wide ground water contamination will be addressed later in a separate action.

The CBA soil contamination has been studied in the site Remedial Investigation (RI) and additional sampling, which defined the nature and extent of the mercury in subsurface soil. A Focused Feasibility Study (FFS) was then conducted to identify and evaluate potentially effective remedial alternatives. The previous step in the process was the July 1, 2024 Proposed Plan, in which EPA presented a detailed evaluation of the most promising remedial alternatives, and suggested that In-situ Chemical Sequestration (ICS) appeared to offer the most promise.

GEC participated in public availability sessions held by EPA to inform the community about the proposed remedy, as detailed in the Proposed Plan for the interim action, in Brunswick on July 16 and 17, 2024 and in a public meeting on July 18, 2024. The public comment period on the proposed interim action was held from July 5, 2024 to September 5, 2024. Comments received by EPA from stakeholders are detailed in the ROD's

Responsiveness Summary (Appendix A), and summarized beginning on p. 17 of this memorandum.

On May 20, 2025 following release of the ROD, EPA returned to Brunswick for a public meeting to explain the status of all of the Brunswick Superfund sites, including details on the OU2 CBA soil ROD. These events were well attended, and GEC and members of the community were briefed by both EPA staff and GEC's Executive director and its Technical Advisor about the selected remedy and the process for implementing it.

Background

The 813-acre LCP site is located between the Turtle River and New Jesup Highway, just northwest of the Brunswick city limits. The northern boundary of the site runs along Blythe Island Highway and the southern boundary meets with the property line of the active Georgia Pacific Pulp and Paper Mill. The lead Responsible Party (PRP) for this site, Honeywell, maintains a website at <http://www.lcpbrunswickcleanup.com/index.cfm>.

Industrial activity at the site dates from the 1920s through 1994, including oil refining, coal-fired power plant, and chemical and paint/varnish manufacturing plants. This contaminated soil, ground water, surface waters/creeks, and marshlands with polychlorinated biphenyls (PCBs), VOCs, PAHs, metals, and dioxins.

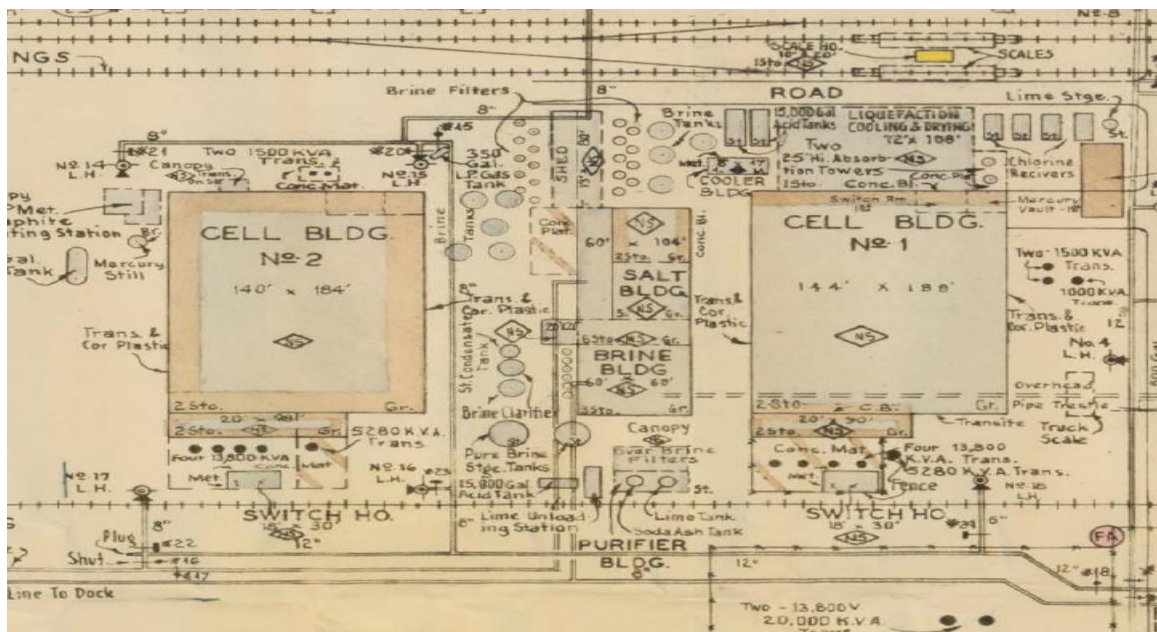
The site cleanup is being managed by EPA in three parts: Operable Unit 1 - Marsh and Estuary; Operable Unit 2 - Cell Buildings Area and Ground Water; and Operable Unit 3 - Upland Soils and Sediments (at old industrial areas).

EPA's website contains details the cleanup projects at <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.docdata&id=0401634>.

The early action for the CBA soil is a major element of addressing risks from ground water contamination. The ROD details the risks associated with the ground water and the CBA soil contamination (see Section 7). Risks for residential and site worker exposure scenarios exceeded EPA's acceptable levels, and thus warrant remediation; risks for a potential future recreational use scenario (golf course operations) were acceptable. If the potential golf course development is built, however, a Soil Management Plan will be developed to provide protection for workers involved in the golf course construction.

It is important to understand that the remedial action is only an *interim* action; it is not the final action to be taken to address site-wide ground water contamination. The State of Georgia's Environmental Protection Division (GAEPD) concurs with the selection of the interim action.

From 1944 to 1994, the “mercury cell process” was used to make sodium hydroxide (caustic), hypochlorite (bleach), chlorine gas, and hydrogen gas by immersing graphite and mercury in salty solutions at two “cell buildings”. From 1979 to 1994, hydrochloric acid was also made by reacting chlorine and hydrogen. Mercury, which is liquid under ambient conditions, was lost to the environment during operations. An historical diagram showing the layout of the processing facilities at the CBA is shown below. ROD Sections 2.1.3 and 2.2.2 provide details on the historical operations and resulting contamination at the CBA.



Leaks and spills of caustic solutions containing mercury, sodium hydroxide, sodium chloride brine, and bleach contaminated the sediments and ground water surrounding the cell buildings. Some liquid mercury was removed from the process equipment and from spaces beneath and between the building slabs after the cell buildings were demolished, and a soil cover was placed over the footprint of the buildings.

The contaminated ground water around the cell buildings had an extremely high pH, and also contained large amounts of salts and dissolved solids. This dense ground water sunk through the sands of the Satilla (approx. 15 to 50 feet deep), spread out laterally, and settled on top of a variably cemented sandstone that lies about 50 feet deep. Some contamination then migrated through the sandstone into the underlying water-bearing sands of the Ebenezer. Ground water in the Ebenezer does contain dissolved mercury at levels above natural background (up to 25.2 micrograms per liter (ug/L, or ppb)).

The following figure from the ROD shows the general hydrogeology beneath the CBA.

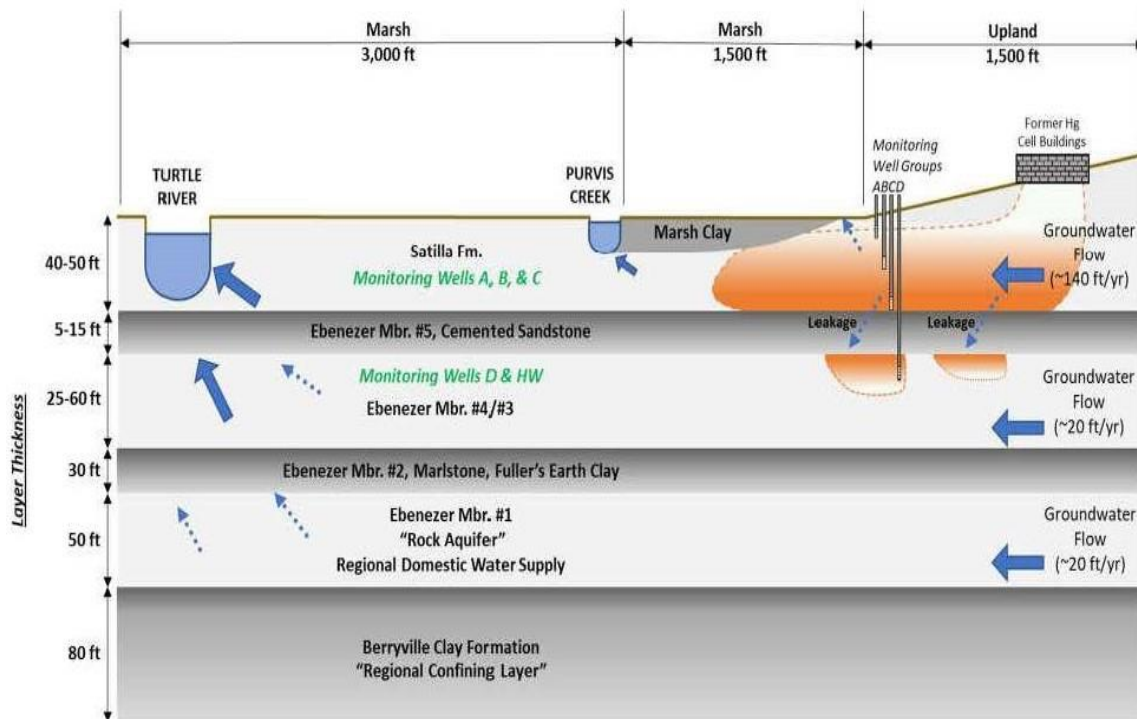


Figure 5-4 Generalized Hydrogeologic Setting Surficial Aquifer System

Mercury in Ground Water at the Site

The Remedial Investigation (RI) completed in 2022 documented site-wide ground water contamination. The RI Report presented information about mercury in ground water in Section 5.5.2.5 (beginning on p. 64), including Figures 5.15A – 5.15D, which show dissolved mercury in the shallow Satilla and deeper Ebenezer aquifers. A five to ten foot thick layer of variably cemented sandstone lies between these two water bearing strata. The following excerpt from that section of the RI report details that contamination.

“Mercury spatial distribution mirrors that of metals such as arsenic and chromium across all portions of the Satilla with increasing concentration and extent vertically in the Middle and Lower Satilla. Exceedances of the mercury MCL are centered in the area of the former CBA and overall the condition is essentially fully bounded in the downgradient direction (one marsh well, MW-313B, exhibits a concentration slightly above the MCL).

Beneath the sandstone layer, mercury detection above the MCL occurs in six wells (highest concentration is 25.2 µg/L in HWWest2) with the recent 2020 showing mercury concentrations consistent with historical concentrations. The condition is bounded horizontally within the Ebenezer Formation by well MW-101D.” RI Report figures reproduced on the following pages depict the observations of mercury at monitor wells in the Lower Satilla and in the Ebenezer.

Site-wide Ground Water Contamination

Site-wide ground water contamination is part of OU2 therefore it is explained in the ROD (Section 5.3.1), although this interim action does not address site-wide ground water contamination. Groundwater data from the most recent sampling events in 2017, 2018, 2019, and 2020 was evaluated to characterize the nature and extent of the ground water contamination.

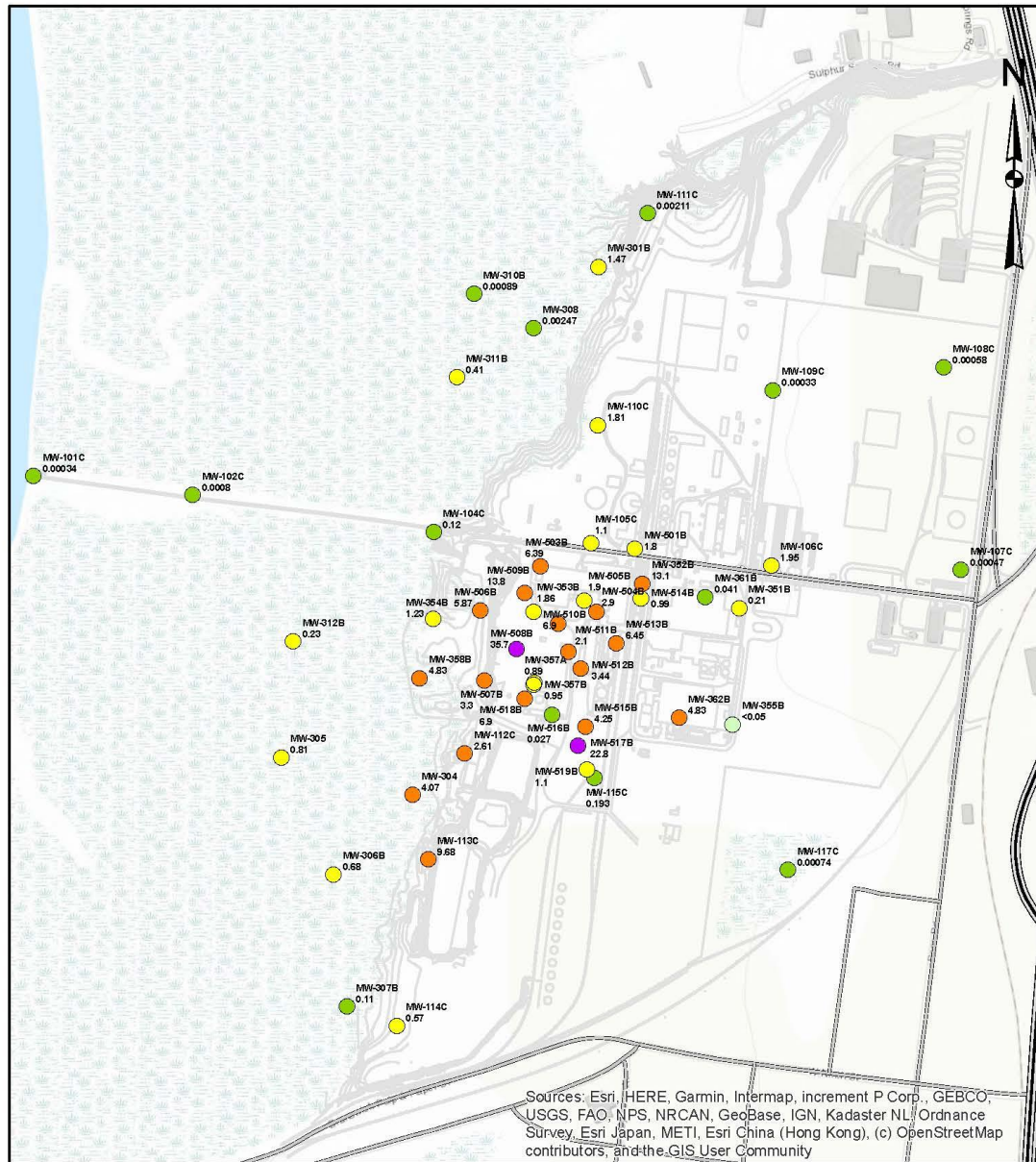
The 2022 RI report details the ground water contamination investigation and findings regarding contaminants other than mercury. That is summarized below for general interest, and it will factor into the ultimate remedy for site-wide ground water.

Benzene, toluene, ethylbenzene, and xylenes (BTEX), and benzene-based compounds are the most common VOCs in ground water. Chlorinated carbon compounds are not as common. Of the VOCs detected from 2017 to 2020, benzene and chlorobenzene levels exceeded ground water standards in more than ten percent of samples.

In general, VOCs are detected more frequently in the shallow Satilla Formation. Most VOCs were not detected in the deeper Ebenezer unit below the variably cemented sandstone, however trace levels of BTEX and benzene-based compounds were detected there.

Polycyclic aromatic hydrocarbons (PAHs), another class of contaminants, were detected in the Satilla, with higher concentrations of PAHs in wells located along or near the marsh-upland border near known petroleum sources associated with the former canal and west of the CBA.

A weathered petroleum smear zone is present there, caused by former refinery operations which occurred across the CBA footprint. The primary PAHs are benzo(a)anthracene, naphthalene, and 1-methylnaphthalene. The primary metals in ground water, other than mercury, are arsenic, beryllium, chromium, lead, selenium, and vanadium. Some or all of these metals are directly related to former industrial operations such as petroleum refining.



0 250 500 1,000
Feet

Note: Non-detect results with a laboratory detection limit above the MCL/RSL are illustrated with this symbol (⊗). The detection limit value is shown and the symbol is color-coded based on the detected result color scale.

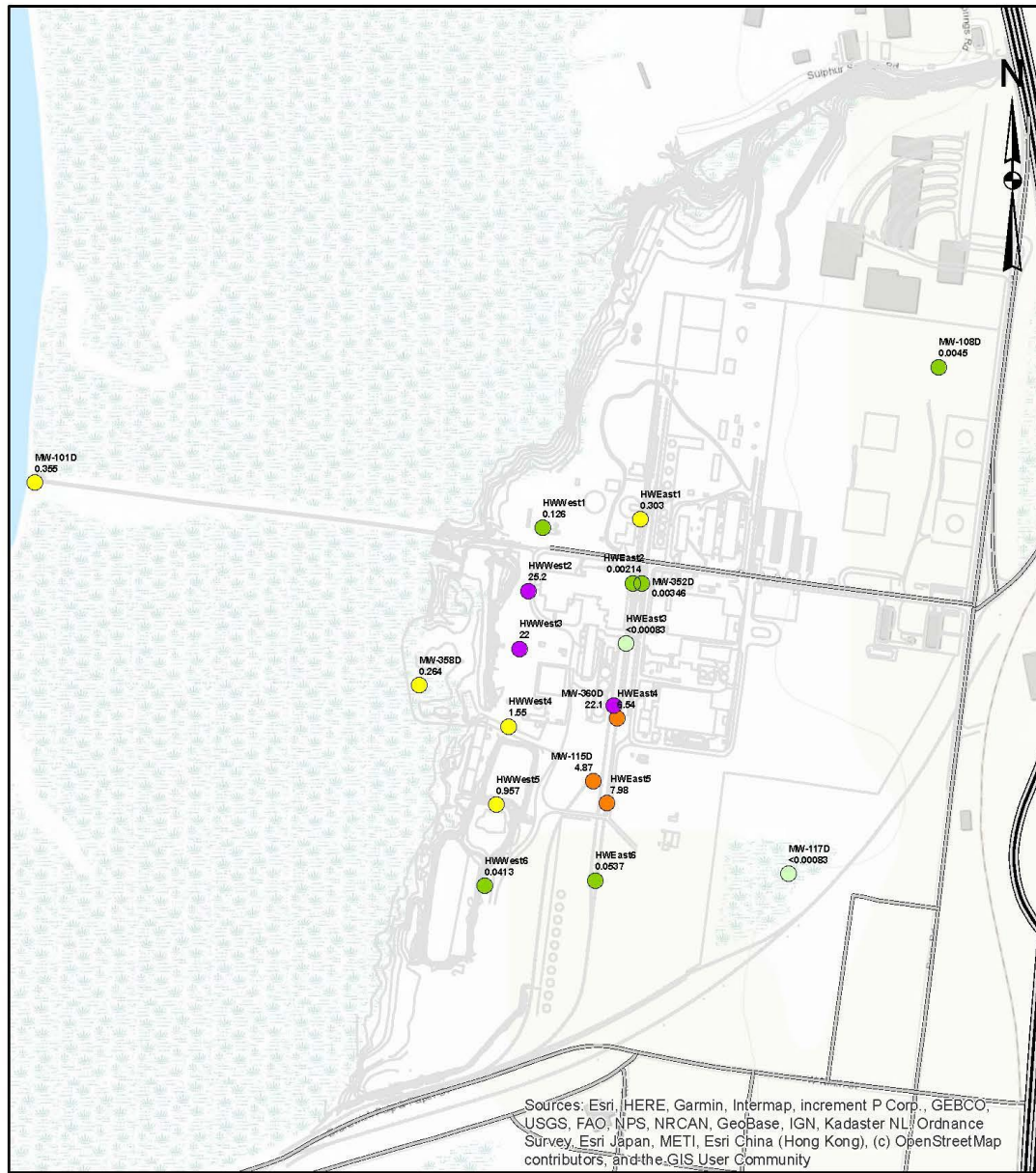
Result (µg/L)

- ND
- <0.2
- 0.2 - 2
- 2 - 20 (>MCL)
- 20 - 162

**Groundwater Mercury:
Lower Satilla
LCP Chemicals Site
Brunswick, GA**



Figure No.5.15C



0 250 500 1,000
Feet

Note: Non-detect results with a laboratory detection limit above the MCL/RSL are illustrated with this symbol (X). The detection limit value is shown and the symbol is color-coded based on the detected result color scale.

Result (µg/L)

- ND
- <0.2
- 0.2 - 2
- 2 - 20 (>MCL)
- 20 - 162

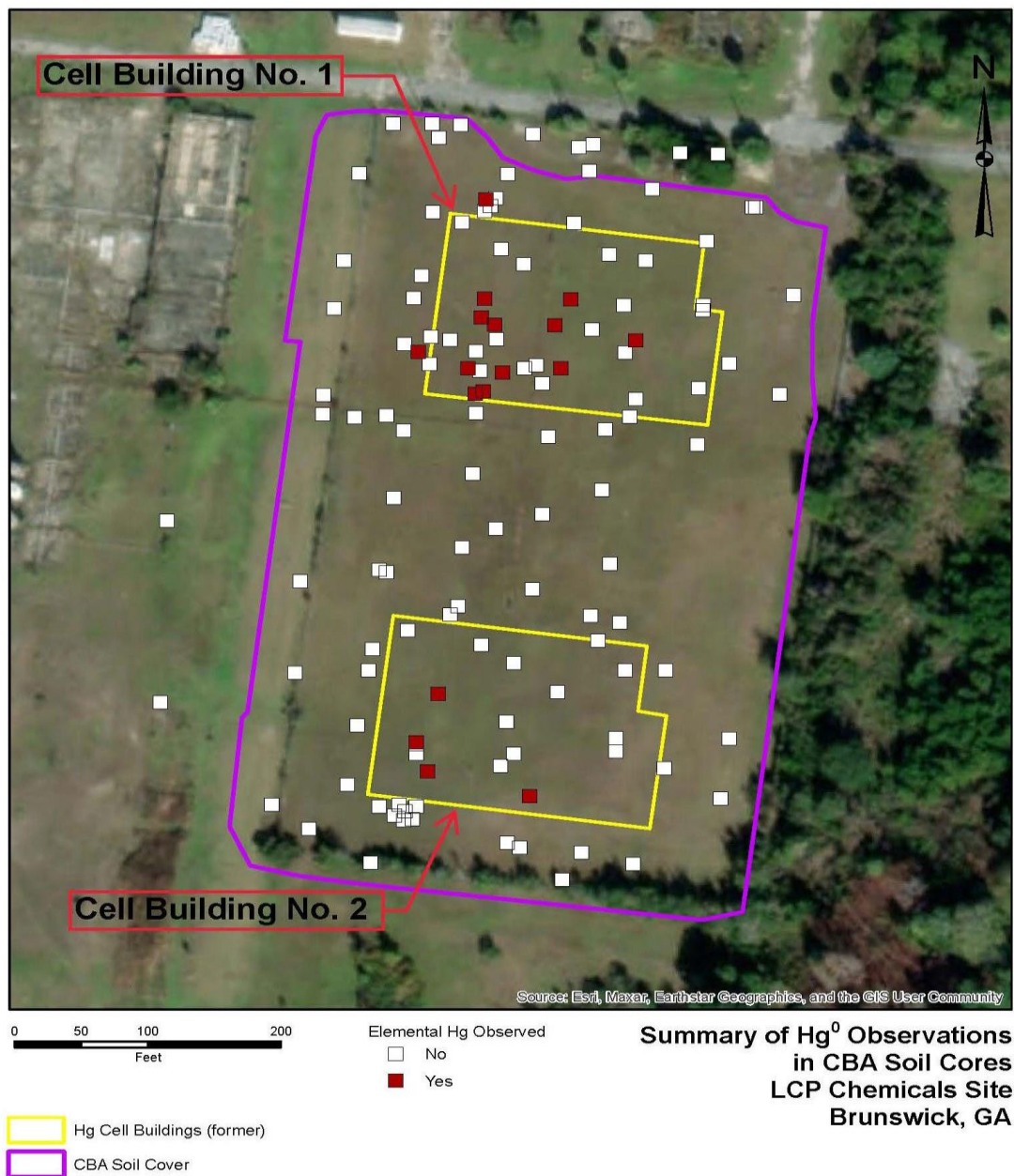
**Groundwater Mercury:
Ebenezer Formation
LCP Chemicals Site
Brunswick, GA**

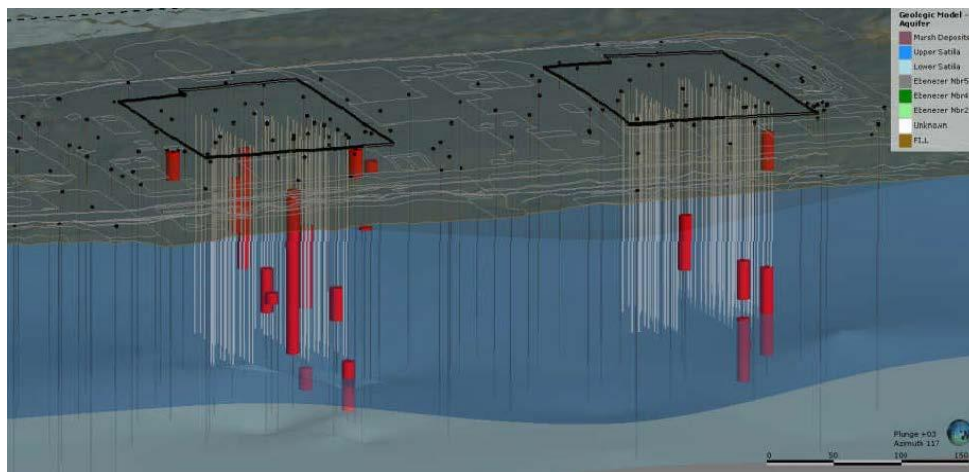


Figure No.5.15D

Mercury in Soil Beneath the Cell Buildings

Elemental mercury remains present underground in certain locations. Small discrete droplets or beads of mercury were observed in the sands up to 50 feet below ground. The beads of mercury were very small, ranging up to 2 millimeters in size. Some small, localized deposits of mercury beads, ranging from less than 1 to 3 inches thick, were found in circular to elliptical shaped deposits resting upon clay layers. Areas where mercury was found beneath the cell buildings, and the depths of mercury occurrence, are depicted in the following figures. ROD Section 5.3.4 details the mercury extent in soil.





A photograph of the beads of elemental mercury in a soil core sample from the ROD appears below.



Remedial Action Objectives

EPA developed Remedial Action Objectives (RAOs) to describe what the planned action is expected to accomplish to protect human health and the environment. The RAOs are based on results of the Human Health Risk Assessment; focus development and evaluation of remedial alternatives; and are the basis for Remedial Goals (RGs). The RAOs as presented in the ROD are:

- **RAO1:** Prevent human exposure by direct contact to the surficial and subsurface soil across the CBA to mercury through ingestion and dermal contact above levels protective of commercial, industrial, and recreational use of the area.
- **RAO2:** Treat to reduce the leachability potential of mercury, elemental mercury beads (Hg⁰), and mercury partitioned to the aquifer matrix of the surficial aquifer to achieve a 90 percent reduction of leached mercury (dissolved phase in groundwater) as a performance standard. For the RG or cleanup level for mercury in the dissolved phase in groundwater, the EPA is using the 95 percent Upper Confidence Limit (UCL) Exposure Point Concentration (EPC) in the RI (Table 7.6 of the RI) of 32 µg/L. A 90 percent reduction of this value results in an RG of 3.2 µg/L for mercury.

The ROD explains how achieving the RAO2 goal will be assessed. For the Remedial Goal RG or cleanup level for RAO2, the EPA will utilize multiple lines of evidence to demonstrate the efficacy of the mercury sequestration technology for the aquifer matrix and a 90 percent reduction of dissolved-phase mercury as a performance standard.

- The first line of evidence will be a series of controlled bench/laboratory scale evaluations to identify the most suitable mercury sequestration chemistry under site specific conditions utilizing site soils from the CBA and site ground water sourced from an up-gradient well not impacted by mercury.
- For the second line of evidence, bench-scale treatments that achieve the performance goal will be subjected to chemical and spectroscopic test methods to confirm the transformation and sequestration of mercury in the laboratory-treated CBA soils and assess the permanence of the treatment (e.g., post-treatment leachability via the EPA's Leaching Environmental Assessment Framework ("LEAF")).
- The third line of evidence will be following full-scale implementation of the ICS treatment. The success of the selected mercury sequestration amendment will be assessed by tracking amendment distribution (using the expanded monitoring well network and tracers) and monitoring the dissolved-phase mercury condition across the treatment footprint to confirm that the Remedial Goal or cleanup level of 3.2 µg/L has been met. Further details on the methods and analysis will be developed in a pilot study work plan and in the Remedial Design.

As noted in the Proposed Plan and in the ROD, a third RAO to address potential elemental mercury emissions from the CBA had been considered. However, additional sampling for mercury vapor as reported in the FFS has indicated this is not an ongoing or potential future risk that needs to be addressed based on soil gas and ambient air sampling results.

Remedial Alternatives

The following two active Remedial Alternatives were compared to Alternative 1 – No Further Action, as required by the Superfund process.

- Alternative 2. In-situ Biological Treatment with a Soil Cover
- Alternative 3. In-situ Chemical Sequestration and Soil Cover

The alternatives are compared in ROD Table 12-1 which is reproduced on the following page and detailed below.

Table 12-1
Summary of Comparative Analysis of Remedial Alternatives

Remedial Alternative	Overall Protection of Human Health and Environment	Compliance with ARARs	Long-term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume via Treatment	Short-term Effectiveness	Implementability	Total Present Worth
1. No Further Action	No	No ARARs for no action					\$225,000
2. In-situ Biological Treatment and Soil Dermal Cover	Yes for alternatives 2 and 3 Prevents direct contact because the Hg ⁰ condition is beneath concrete foundation slabs and the soil cover.	Yes for Alternatives 2 and 3	 Biological treatment may convert mercury to species that are retained in the biomass or are more easily removed from water by another technology, such as adsorption or precipitation. In situ treatment application of this technology is considered innovative and not yet proven.	 Unknown and requiring testing to verify efficacy	 It is assumed that maintenance injection at some point into the future will be necessary to revitalize the applied microbial population	 The technology would be implemented by direct injection into the soil and shallow aquifer through conventional means. It is able to perform this function in the presence of the dense array of subsurface pilings present beneath the CBA.	\$5,903,000
3. In-Situ Chemical Sequestration and Soil Dermal Cover	Additionally, treatment of the Hg ⁰ further reduces the mercury vaporization potential.		 The ICS approach for Hg ⁰ at full-scale is novel compared to more traditional approaches, and data for the technology is generally limited to bench-scale or pilot-scale evaluations. The bench-scale work has reported effective conversion of Hg ⁰ that will be evaluated under Site-specific condition in bench-scale and maybe pilot scale studies to established design parameters.	 Yes The ICS approach is innovative. While the available data indicates it will be effective, Site specific testing will be necessary to verify full efficacy.	 It is assumed that the initial ICS injections will be sufficient.	 This technology is readily implemented through direct injection where the liquid reagent is able to effectively mix and disperse through the aquifer matrix, mineralizing the outer surface of the Hg ⁰ beads (as an insoluble mercuric sulfide mineral). It is able to perform this function in the presence of the dense array of subsurface pilings present beneath the CBA. It is highly unlikely the mineral form will be reversed in the current/future geochemical environment. Periodic groundwater monitoring is already planned to confirm that this will be the case and the final remedy for OU2 will take the results of the groundwater monitoring into consideration.	\$5,434,000

Notes:
Not acceptable More acceptable

Note: information in this table has been updated based on the approval of the FFS

Alternative 2 – In-situ Biological Treatment and Soil Cover

This alternative involves in-situ application of a biological agent (or substance to induce biological activity) into the areas containing beads of elemental mercury. It is based on wastewater treatment techniques for dissolved-phase mercury. It would be innovative to apply it to elemental mercury beads in saturated soil. This alternative, therefore, would require studies and field testing to verify that it could work.

Bench-scale and field studies would test biological agents for effectiveness, and a treatability study would be necessary before the technology could be implemented. The delivery method would depend on the results of the treatability study. EPA assumed that the biological agents would be delivered using injection wells. EPA considers the subsurface obstructions and pilings beneath the CBA to not preclude such injection.

Injection points and/or substance volumes could be modified to maintain loading targets. EPA assumed a second round of injection at some point into the future would be necessary to revitalize the microbial population in the subsurface.

This alternative also includes the use and improvement of the soil cover with additional clean soil to ensure a minimum of 24 inches in thickness across the CBA. Land use restrictions established under the existing Site ICs would be maintained. A vapor intrusion assessment would be required if a building was proposed to be built over the CBA. The existing ICs include the industrial zoning and the Uniform Environmental Covenant with the state of Georgia.

Alternative 2 includes 30 years of performance monitoring including groundwater monitoring until the Final ROD for OU2 is implemented. MNA evaluation is no longer included in the alternatives for this Interim Remedy.

The costs of this alternative are explained in ROD Section 10.7.2, as summarized below.

- Capital Cost: \$3,737,000
- 30-yr O&M Cost: \$2,166,000
- 30-yr O&M Cost, seven percent discount: \$893,448

The total estimated cost is \$4,630,448 with the seven percent discount and is based on study and implementation of biological treatment, annual inspection of the UEC (e.g., land use restriction), annual groundwater monitoring, and enhancement and maintenance of the CBA soil dermal cover for a 30-year period. The cost includes an assumed maintenance injection at some point into the future to revitalize the applied microbial population. The cost framework and basis are provided in the FFS Report, and updated to reflect eliminating MNA from all alternatives.

Alternative 3 – In-situ Chemical Sequestration (ICS) and Soil Dermal Cover

This alternative is an ICS approach designed to sequester elemental mercury (chemically alter and “fix” the elemental mercury in an insoluble form) in the CBA soil, thereby eliminating further dissolution of elemental mercury into the ground water. Polysulfide and/or other amendments would be injected into the saturated Satilla sands; the sulfides would react with mercury to form insoluble mercury sulfide minerals cinnabar and meta-cinnabar. Historical ground water monitoring demonstrates that some degree of natural in-situ mercury sequestration is occurring at the CBA. Mercury and sulfide concentrations and other geochemical evidence indicates some natural formation of mercury-sulfide compounds. This increases confidence that ICS would be successful at the CBA.

The ICS technology has been demonstrated and is better understood than biological treatment as with Alternative 2. Alternative 3 would require bench-scale pilot testing and full treatability study, but likely less extensive testing than Alternative 2. An advantage of ICS is the technology is implemented with conventional injection wells or direct injection technology as a liquid slurry into the subsurface. The subsurface obstructions and pilings beneath the CBA do not preclude the ICS injection and distribution. Injection points and/or amendment volumes can be modified to maintain loading targets.

As with Alternative 2, additional clean fill soil will be used to ensure a minimum 24 inches of thickness of the cover throughout the CBA. A vapor intrusion assessment would be required if a building was proposed to be built over the CBA. The existing ICs would be maintained, including the industrial zoning and the Uniform Environmental Covenant with the state of Georgia.

Alternative 3 would include two years of post-injection performance monitoring. Performance monitoring would be implemented following the subsurface amendments and cover maintenance. MNA evaluation is no longer included in the alternatives for this Interim Remedy.

The costs of this alternative are explained in ROD Section 10.7.2, as summarized below.

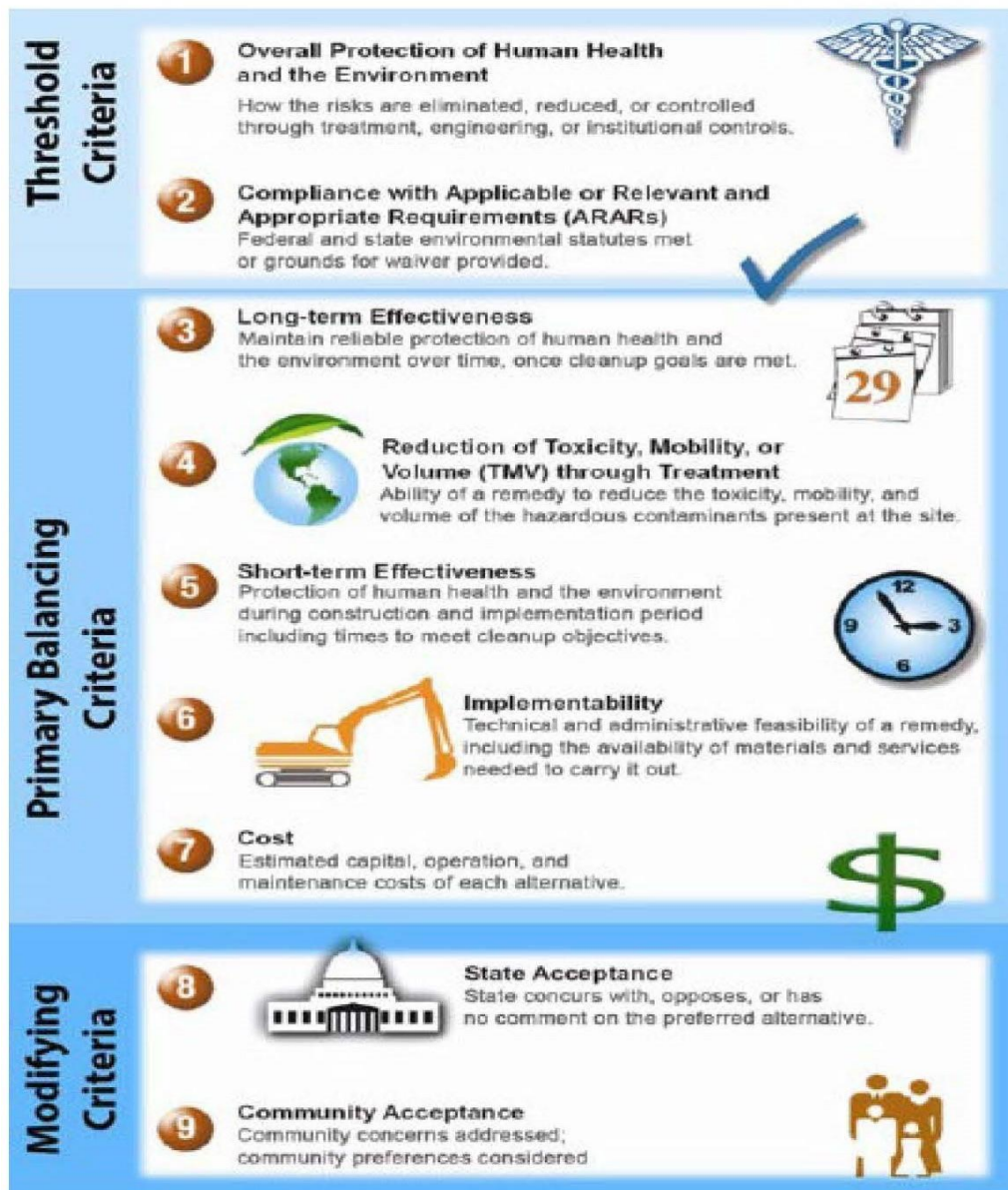
- Capital Cost: \$4,502,000
- 30-yr O&M Cost: \$210,000
- 30-yr O&M Cost, seven percent discount: \$86,863

The estimated cost for Remedial Alternative 3 is \$4,588,863 comprised of ICS pilot study work and completion of the ICS treatment for the two treatment zones with a two-year performance monitoring period, as well as the other obligations, inspection of adherence to the UEC (e.g., land use restriction), and enhancement and long-term maintenance of the CBA soil dermal cover as outlined for Remedial Alternative 2. The cost framework and basis are provided in the FFS Report. These were updated due to eliminating MNA from all alternatives.

Evaluation of Alternatives

EPA evaluates remedial alternatives against nine specific criteria as required by Superfund regulations. Section 10 of the ROD presents the detailed evaluation of the alternatives.

EPA determined that Alternative 3 represents the “best” alternative, recognizing tradeoffs between protection of human health and the environment, implementability, cost, effectiveness, and the other evaluation criteria. The following graphic from the previous Proposed Plan depicts these evaluation criteria.



Selected Alternative

The EPA's Selected Alternative for the Site is Alternative 3 – In-situ Chemical Sequestration (a form of chemical treatment) and Improvement and Maintenance of the Existing Soil Cover, and Institutional Controls (in the form of the existing Environmental Covenant and Zoning restrictions). This alternative includes improvement and maintenance of the existing soil cover to a minimum of 24 inches over all portions of contaminated soil to minimize water infiltration (by being graded to promote runoff) and to limit inadvertent human intrusion activities. The cover does not meet landfill final cover requirements and is not intended to prevent leaching of COCs into groundwater. The final remedy for OU2 will evaluate the need to modify the cover. OU2 will require a final ROD in the future to fully address all COCs in groundwater. Performance monitoring would be implemented following the subsurface amendments and cover maintenance. ICs would continue to be maintained to restrict land use to non-residential of the area. The proposed ICS design layout is shown on ROD Figure 12-1 as reproduced below.

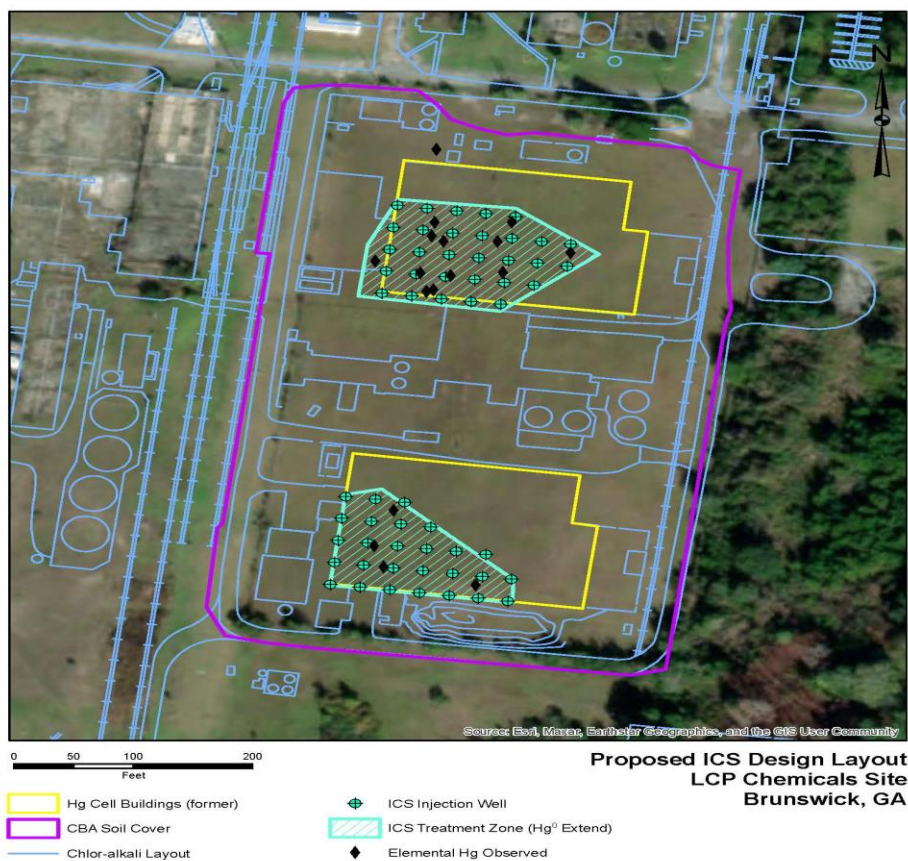


Figure No. 12-1

Pilot Testing for ICS

The first step of this action will be a detailed review of the scientific literature on ICS and the site conditions in which it will be performed. Pilot testing to support the remedial design and selection of specific ICS amendments and strengths will be planned and conducted. EPA outlined a framework for the development of the ICS remedial alternative to be completed as a series of site-specific studies and bench-scale testing (see ROD Section 12.2.1-12.2.4.), as summarized below.

- Detailed assessment of the CBA ground water
- Refinement of the CBA geochemical model
- Bench-scale studies of ICS amendments
- ICS design

These framework steps are the anticipated plan, which is subject to change as the pilot studies and Remedial Design are developed and implemented. While not included in the ROD, the preceding FFS contained some detailed information about the anticipated pilot testing for the ICS technology. That information is summarized below for the most complete description of the expected remediation project.

Appendix C of the FFS presents an outline of the pilot testing that will be performed to determine the appropriate chemical amendment make-up and the volumes of chemical amendment that will need to be injected into the subsurface to effectively treat the mercury.

Pilot testing would follow four sequential steps:

- Detailed assessment of CBA ground water
- Refinement of CBA geochemical model
- Bench-scale studies of ICS amendments
- ICS design

A detailed chemical profile would be developed for CBA ground water. Sampling and laboratory analysis would determine major ions, dissolved mercury and other metals, natural organic matter, and geochemical parameters such as pH, oxygen reducing potential, temperature, alkalinity.

Geochemical modeling was performed in the FFS to predict the stability of mercury in the aquifer. The information gained by the detailed chemical profiling would be used to model mercury stability more thoroughly. Also, variations of amendments and amendment doses would be assessed to support the bench-scale pilot testing design.

Laboratory bench testing of chemical amendments would be performed to evaluate reactivity and suitable concentrations in the presence of site-specific geochemical conditions present in the CBA treatment zones. Tested amendments would include sodium

polysulfide, colloidal sulfur, iron sulfide, and potentially one or more non-sulfur-based amendments. Soil cores from the CBA containing elemental mercury would be subjected to the various amendments to observe how well each amendment converts mercury into mercury sulfide.

The ICS process would be designed after bench testing demonstrates adequate formation of mercury sulfide. The process for implementing ICS at the CBA would be tailored to the specific ICS treatment zones, and a final design would be prepared and submitted in the overall CBA Remedial Design package for EPA and GAEPD review and approval.

EPA's Responsiveness Summary (ROD Appendix A) – Stakeholder Comments

EPA was in Brunswick to explain the Proposed Plan and the remedial alternatives, and discuss citizens' concerns, at two availability sessions held on July 16 and 17, 2024. Additionally, a formal presentation was made at a public meeting held on July 18, 2024. GEC and its Technical Advisor participated in these events and helped the community understand the Proposed Plan and the remedial alternatives. These meetings were held as required to facilitate public comment during the official comment period ended on September 5, 2024.

The Responsiveness Summary details the comments that were made at the public meeting, those received afterwards via email or regular mail, and EPA's responses.

Comments at Public Meeting

The issues raised in the meeting appear in Appendix A as comments 2.1 through 2.9. I have summarized them and EPA's responses, as follows.

- Price of the polysulfide injection amendment - EPA stated that the price presented on the presentation table was missing a zero.
- Climate Vulnerability Assessment - EPA indicated that this assessment is prepared by an EPA Headquarters contractor and reviewed by EPA Headquarters with input from EPA Region 4 staff. Weather patterns, sea levels, wetlands, wind directions, and flood zones are considered. Statistical models of storm intensity are evaluated. The impact of these factors on the remedy is considered. On some sites, older remedies have to be changed based on the assessment. The results of the assessment will be shared with stakeholders and will be used to ensure the implemented remedy addresses vulnerabilities.
- Would polysulfide be a toxin requiring cleanup? - Polysulfides are unstable and the expectation is that excess polysulfides would transform to sulfate which is common in the environment, particularly in the salt marsh.

- Unaccounted for mercury - EPA acknowledged that a lot of the mercury was taken off site during the removals that occurred in the 1990s, but there was not an accurate accounting for what had been left on site based on the initial release. Estimates of the mercury volume are based on limited details, so broad assumptions have to be made.
- Evidence of elemental mercury in the Ebenezer formation - Elemental mercury has been detected in soil samples upper part of the surficial aquifer (Satilla), but soil samples haven't been collected from the Ebenezer. EPA doesn't want to puncture the cemented sandstone layer between the Ebenezer and the Satilla which could potentially spread the elemental mercury to the Ebenezer. In Ebenezer wells outside the CBA, dissolved mercury has been detected in ground water. This dissolved mercury in the Ebenezer will have to be addressed in the final site remedy. The presence of elemental mercury in the Ebenezer has not been confirmed.
- Monitor the Ebenezer formation for impacts from the remedy - EPA explained that the current remedy proposed is focused on the elemental mercury in the Satilla; the Ebenezer monitoring will occur in a later phase. Once a legal agreement is reached with other responsible parties, the final site remedy will be implemented. This will include [monitoring for] impacts to the Ebenezer. EPA hopes that the Ebenezer monitoring can get started during remedy, especially for the wells near the sub-building portion of the CBA. The Ebenezer data show two areas where leakage through the cemented sandstone is apparent. Monitoring of the Ebenezer will focus on these areas.
- Older wells in the Ebenezer located outside the CBA used as injection wells – Older monitoring wells are often not built for injection. EPA doesn't want to puncture the cemented sandstone layer which could potentially spread mercury to the Ebenezer. Injection wells could be installed outside the CBA using drilling methods to seal the sandstone layer from the Satilla. Other remedies include flow through walls to treat contaminated groundwater or slurry walls to contain contaminated groundwater. All of these remedial options are on the table [for a site-wide ground water remedy].
- Elemental mercury along the CBA pilings - It is possible that LCP unknowingly smeared elemental mercury by driving the piles in the CBA. Elemental mercury has a high surface tension and doesn't like to move. There are other ways the mercury could have migrated, but the pile driving is a possibility.
- ROD should be clear that the remedy is for the Satilla and that issues in the Ebenezer are not addressed – [The CBA soil] remedy is focused on the Satilla. The ROD will be a more detailed document and will indicate that the remedy is only for the contaminant source in the Satilla and that the final remedy will address all OU2 groundwater. The source area will be addressed first, the remaining contamination will be addressed later.

Comments after Public Meeting

The remaining comments received after the meeting (2.10 through 2.27), and EPA's responses, are presented in the rest of Appendix A. I have summarized them below.

- Stakeholders support the ICS remedy as long as pilot studies show that it will be effective; EPA should communicate pilot studies results to the public as they progress. EPA agrees.
- EPA should continue coming to Brunswick to provide updates on project status. EPA agrees.
- A multi-layer hazardous waste type cap would be more protective and could reduce potential for continued ground water contamination. EPA does not see any added effectiveness or protection from such a cap.
- Elemental mercury found north of CBA beyond proposed treatment zone needs to be addressed. It appears to be shallow and therefore could be removed by excavation. EPA agrees, it will be either in the CBA soil remedy or the site-wide ground water remedy.
- Site risks should be managed based on future industrial use. EPA agrees and added that risks will be managed adequately also for recreational use as golf course for adults.
- Ebenezer ground water should be monitored during implementation of the remedy, and ground water between the LCP site and Purvis Creek and the Turtle River should be monitored. EPA has required the responsible parties to implement a site-wide ground water sampling program to start as soon as possible and continue through the CBA soil remedy to factor into the future site-wide ground water remedy selection process.
- Use national drinking water standards as cleanup levels. EPA agrees.
- Recent science indicates that LCP site will have up to 26 flooding events by 2050 due to sea level rise. EPA needs to take this into account. EPA stated that it has performed a Climate Vulnerability Assessment (CVA) for the entire LCP Site, and it will be factored into future actions at the site.
- Robust site-wide ground water monitoring needs to be done. EPA has required the responsible parties to implement a site-wide ground water sampling program to start as soon as possible and continue through the CBA soil remedy to factor into the future site-wide ground water remedy selection process.

- Future use as golf course raises concern over protectiveness for youths. EPA says the plan is to restrict youths from the golf course. ICS and soil cap should provide adequate protection and risk assessment included industrial and (adult) recreational use.
- The public should be kept informed about proposals for future site uses. EPA agrees.
- Concern about deeper regional Floridan Aquifer impact from ICS. EPA pointed out that the Floridan is too deep and separated by clay from shallow ground water to be impacted.

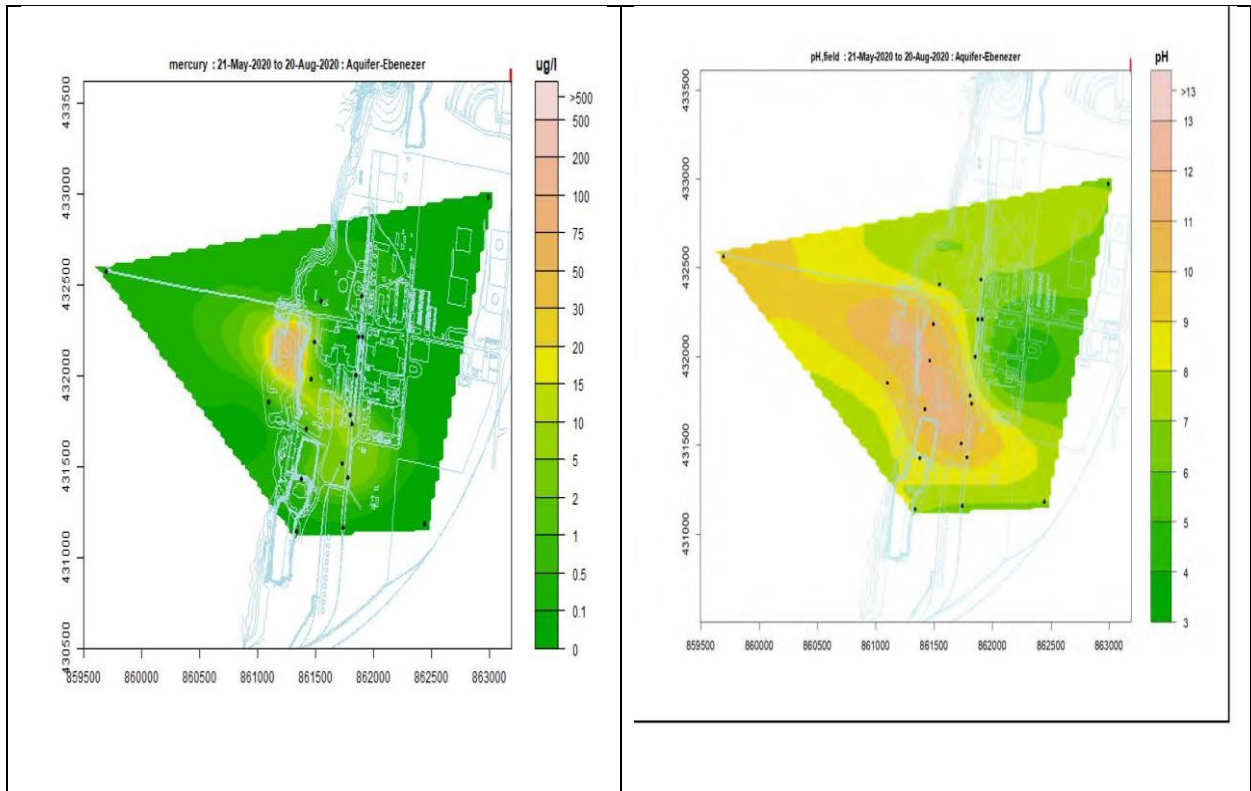
Eventual Decision Regarding Site-wide Ground Water Remediation

At some point in the future, likely after completion of the CBA ICS interim remedial action, EPA will address site-wide ground water contamination by all of the COCs (VOCs, PAHs, and metals). In the ROD, EPA notes that it is reviewing the responsible parties' draft ground water sampling plan which was submitted recently in accordance with 1995 Administrative Order by Consent for Remedial Investigation and Feasibility Study.

EPA is expecting such future ground water sampling results to help gauge the effectiveness of the interim remedial action. This additional ground water data will also better inform understanding of the nature and extent of site-wide ground water contamination and will aid determinations of the ultimate ground water cleanup decision. EPA indicated at the public meeting that "all options are on the table" regarding potential future site-wide ground water remediation.

Furthermore, the ultimate ground water cleanup decision will address not only the shallow Satilla contamination, but also the deeper Ebenezer ground water which contains elevated levels of mercury and other COCs. Ebenezer contamination was a subject of interest to some of the community members who attended the EPA events, and it was discussed in the public meeting. The final and very significant remediation issue at LCP – cleanup alternatives for both the Satilla and Ebenezer ground water – will no doubt be the subject of much community interest and scrutiny in the future.

For illustrative purposes relative to the Ebenezer contamination, the following excerpts from Figures 5.2 and 5.15E from the 2022 Remedial Investigation report are reproduced below. These model plots of dissolved mercury and pH in 2020 indicate apparently significant leakage from the Satilla through the variably cemented sandstone into the Ebenezer (distributions are indicated as relatively similar over the previous 15 years or so based on the figures for this time period presented in the RI report).



Next Steps

Before the CBA soil remedy can be implemented, legal agreements between EPA, Department of Justice, and the responsible parties must be finalized and lodged in court, as required by Superfund regulations. That could take up to one year. Once that has happened, the remedial design of this project can begin. EPA and GAEPD will then review draft design plans, and eventually a final design will be approved. Then the necessary bench-scale and field-testing pilot studies can be done (estimated to take up to nine months as shown in the Proposed Plan); the actual remediation work (injection and soil cover improvements) is estimated to take about an additional eight months to be completed. Two years of performance monitoring would follow completion of the ICS injection.

The site-wide ground water sampling program is being implemented now and will continue through completion of the CBA soil remedy. This program will provide important data to factor into the decision-making for the ultimate site-wide ground water remedy. A Proposed Plan and ROD will be prepared for that remedial action, likely in the next five years or so.

EPA has committed to continue its community outreach activities throughout the process of pilot-testing, design, and implementation of the CBA soil remedy. I expect additional

public availability sessions and public meetings to be held regarding the action in 2026 and 2027.

Closing

I trust that this memorandum will serve as a useful and timely reference for GEC and the community. I have enjoyed supporting GEC and the community at the recent availability sessions and public meetings in Brunswick and helping to keep community stakeholders informed on this aspect of the LCP Site cleanup. I look forward to continuing this support through pilot testing, design, and implementation of the CBA soil remedy over the next few years. If you have any questions, feel free to contact me at (301) 309-0061.