July 29, 2013
Environmental Stewardship Concepts, LLC

ESC Comments on:
Draft Feasibility Study LCP Chemical Superfund Site Operable Unit 1 (Estuary)
Brunswick, GA
March 29, 2013

General Comments

The Draft *F*easibility *S*tudy (FS) covered a wide range of topics concerning the remediation options for the estuary that comprises *O*perable *U*nit 1 (OU1) of the LCP Site. Several items raise concerns and warrant attention in the final FS or in the remediation work that follows. The landfill found in the area denoted Domain 3 needs to be sampled, especially where waste is still visible, and properly closed out so as not to continue to be a source of contaminants and a stressor to the Site.

Additionally, the cleanup levels based on *S*urface-*w*eighted *a*verage concentrations (SWACs) and Benthic Community *R*emedial *G*oal *O*ptions (RGOs) need to be chosen before the analysis of alternatives and remedial technologies. In reviewing this FS, we found the approach of mixing cleanup options, acreages, and cleanup levels to be confusing and most unusual. The alternatives should not be a choice between acreage of cleanup, cleanup levels, and the appropriateness of the remedial technologies to achieve that cleanup. The cleanup levels need to be set first, and then the alternative remedies that meet the requirements presented and evaluated on the basis of the CERCLA (*C*omprehensive *E*nvironmental *R*esponse, *C*ompensation, and *L*iability *A*ct) criteria.

Sediment removal is identified as being implementable at the site, so a greater focus on the permanence that sediment removal offers - -compared to capping or thin-cover - -should have greater emphasis in the alternatives. A thin cover of six inches at the site will do little to keep contamination from becoming biologically available as clams and polychaete worms, common benthic invertebrates, can burrow to these depths and have been shown to re-suspend contaminants, making them biologically available to re-contaminate the Site and its wildlife (Sizmur, 2013 and Millward, 2005). Furthermore, this salt marsh experiences high tidal ranges (10 feet or more), flooding and the same type of dynamic physical change as other east coast salt marshes. These dynamic changes do not seem to be considered in the FS.

A re-planting program of *Spartina* post-remediation should be a first step in the monitoring efforts to speed up ecosystem recovery and attract other native plants and wildlife. The FS relied mainly on a study that indicated un-assisted marsh plant re-growth within two years: however, native plant re-growth should not be the only measure of marsh "health." Another indicator of marsh health and the ability to buffer against environmental stressors is the total organic content of the marsh sediment, which remains low in a region of a re-grown marsh area. A further indicator of marsh health is the diversity and abundance of the benthic community. Therefore, the presence of marsh grasses is not the only indicator for a healthy, functioning marsh ecosystem.

Thin Layer Capping in a Salt Marsh

T**hin** ***L*****ayer** ***C*****app**ing (TLC) is a technique which uses a thin layer of capping material with a high sorption capacity to reduce contaminant bioavailability (Naslund et al. 2012) Thin Layer Caps should not be confused with sediment caps, which are predominantly thick (50-100 cm) and more comprehensively studied and utilized at contaminated sites (Palermo et al. 1998). While the FS claims that TLC is a well studied technique, according to McDonough et al., in 2006, fewer than ten thin layer caps or sorbent-amended caps had been placed at contaminated sites in the US. Many of the examples of TLC found in the FS Appendix E, section 3, are actually lakes or bays in the EPA Region 4. As it is stated in the FS, section 6, page 13, OU1 is most comparable to southeast riverine salt marshes not lakes or bays, so these results may be inconclusive for a salt water marsh environment (refer to Table 1).

Naslund et al (2012) studied the effects of thin layer capping with many types of media on the benthic ecosystem and found laboratory studies have reported moderate negative effects on benthic organisms from thin-layer capping, such as disrupted feeding behavior, reduced growth rate, and increased mortality on individual species (Millward et al. 2005, McLeod et al. 2008, Jonker et al. 2009, Paller & Knox 2010). It is important to note that the TLC remedy relies heavily on bioturbation to mix the clean cap material with underlying chemically impacted sediment and facilitate natural recovery (Merritt et al. 2009). The FS agrees that they are relying on bioturbation to jump start natural recovery, but they argue that it will occur only in the upper 15 cm of sediment (Appendix E, p. 14). If bioturbation occurs at unexpected levels, whether it is too much or too little, it could negatively affect the remedy.

While the studies cited in the FS Appendix E, section 3, appear very positive, they focus on the short term regrowth of plants and marsh cover. While short term growth rates are one possible indicator of site recovery, it is important to look at the long term sustained growth. In fact, case studies indicate a fertilizer effect is noticeable for approximately three years after placement of cover materials (King et al 1982). In the future, marsh dieback - - noted as prevalent in portions of the estuary in the FS (p 98) - - may hinder the marsh vegetation recovery, and the fertilizer effect is not a long term guarantee for recovery.

Specific Comments

- This report should have an Executive Summary to make it more accessible to the community.

2.2.3 Estuary Hydrology

- "The marsh removal action included backfill to pre-excavation elevations and replanting, so hydrologic changes were temporary."
    - The FS needs to present data to support this.

- "These major alterations occurred more than 10 years ago, and the Site is currently assumed to be in a state of geomorphologic equilibrium."
  - An equilibrium state is unlikely in just 10 years, and some data need to be provided to support this point

2.2.4 Estuary Sediment Transport Processes

- "Dominant source of suspended sediment to estuary is Turtle River because no tributaries flow directly into the estuary."
  - What about the suspended sediment from Site stormwater runoff?
- "Deeper bed scour may occur in some localized areas of the creek channels during rare storms (e.g. hurricane storm surge)."
  - Unfortunately, hurricanes and large storm surges are not rare in the Brunswick region and will likely become more common as global warming brings about an increase in large storm events (refer to Figure 1, USGS, 2012).

2.2.5 Site Uses

- "Recreational and navigational use of OU1 is infrequent due to the difficulty in navigation of small crafts; the effects of remedial actions on those types of uses do not need to be evaluated."
  - The FS needs to provide some data in support of this observation and conclusion, or actually collect information on use of the waterbody by recreational users.

2.3.1 OU1 and Wildlife

- "Based on visual observations from a January 2012 site visit, the Site appears to be a functioning habitat with an undisturbed plant community of *S. alterniflora* and occasional patches of black needle rush (*Juncus roemerianus*)."
  - At best, "visual observation" is a rudimentary method of assessing a marsh. Please elaborate. The problems here are that a single observation in January does not provide much information and cannot address energy flux, species abundance and diversity, biological condition of the flora and fauna (disease, parasitic loads, growth rates, etc.) which are necessary data for assessing this marsh as habitat.
- "Horne et al. (1999) also noted the low representation (less than 3% of the total community) of amphipods in both the Site and a reference area. Another benthic community survey of the Site conducted in 2000 did not identify any amphipods at the Site or reference locations (Black and Veatch 2011)."
  - This finding/observation is disturbing because of the role that amphipods play in estuarine ecosystems and that amphipods are commonly sensitive to environmental conditions. Is there any explanation for this result, or further data collected, in the Black and Veatch report (2011) that explains these observations?

2.3.3 Marsh Dieback

- "Another potential source of stress to the Site may be a former county landfill that is located within Domain 3. Along the margins of landfill, *Spartina* is sparse and debris is scattered. Although the landfill is no longer operational, it does not appear that closure has occurred and areas of exposed waste are visible."

- This landfill needs to be properly closed and monitored. The current condition, as described in the FS report raises serious issues and concerns about an "open" and "not yet properly closed" landfill with uncertain or unknown waste contained therein.

2.3.4 Overview of Restoration and Recovery

- "The *b*aseline *e*cological *r*isk *a*ssessment (BERA) found no evidence that the function of marsh grasses and the microbiotic community at the Site differs from that of similar marsh habitats along the southeast coast." However, "… *t*otal *o*rganic *c*arbon (TOC) is low (<2.5%) when compared to other areas of the marsh. The percent of fine materials in the sediment of the remediated area is also low relative to other areas of the marsh; percent fines influence the benthic community habitat."
    - Function of a marsh ecosystem includes the presence of a viable invertebrate community. As demonstrated in a previous benthic survey in 2000, no amphipods were found at the Site. This would indicate a lack of function in the marsh. "Facilitative interactions may occur among salt marsh fauna when *S. alterniflora* is present, in the form of a "habitat cascade" that increases invertebrate abundance and biodiversity in a positive feedback loop. For example, *S. alterniflora* facilitates the presence of mussels in New England salt marshes, which in turn facilitates the presence of other invertebrates (e.g. barnacles and amphipods) through increased attachment and crevice space. (McFarlin thesis)

2.4 Summary of Remedial Investigation Results

- "When reviewing the results of any risk assessment it is important to recognize that the risk estimates are intended to facilitate those determinations, but are not necessarily predictive of adverse health effects for any person or ecological receptors. For example, given that the current rate of cancer in the US is between one-in-two and one-in-three, predictions of cancer risks associated with chemical exposures within the acceptable range of one-in-ten-thousand to one-in-one-million are not discernible from the background incidence of cancer."
    - The background occurrence of cancer is not directly relevant to the purpose of this report for various reasons. First, the remediation must be based on achieving a reduction of cancer risk from site-related activities and chemicals to an excess risk of not greater than 1/10,000, and preferably lower. Second, the discussion of national or background cancer rates distract from the site specific cancer risk estimates. Third, the comment raises the topic of cumulative risks to the community that derive from years of site-related activities and community conditions that exacerbate the site risks. The discussion of "background incidence of cancer" should be removed or an entire section on cumulative risk should be added to the RI/FS (*R*emedial *I*nvestigation/*F*easibility *S*tudy).

2.4.1 OU1 Delineation of Chemicals in Sediment and Surface Water

- Elevated mercury levels are found near the landfill. This area should be investigated for depth and breadth of contamination.

Depth profiling efforts up to 8 feet only occurred in Domain 1 in 1997, whereas the rest of the site has not had any testing greater than 1 foot in depth. These Domain 1 depths were also not analyzed for *p*olycyclic *a*romatic *h*ydrocarbons (PAHs). Further sampling remains to be done here.

- *C*ontaminant *of* *C*oncern (COC) concentrations in surface water: Table 2-3, Figures 2-15 A and B
  - This entire section would benefit from more explanation and more explanation on the accompanying data presentations.
  - The two sampling locations on Troop Creek and Crescent River are more accurately described as "reference" rather than "control" locations. Recommend terminology change.
  - The section on COCs in surface water is limited to two compounds or groups: Aroclor 1268, *P*olychlorinated *B*iphenyl (PCBs) and mercury, yet Table 2-4 indicates 10 chemicals or groups in sediments and /or fish tissues. The text needs to at least explain how many and which chemicals were on the list to be measured, but not found, or why the other chemicals were not measured.
- There seems to be no difference between the two graphic displays titled "Dissolved Mercury Surface Water Concentrations" on Figure 2-15A. This apparent error seems to be duplication of the figure on the page and needs to be corrected.
- Figures 2-15A tabular data has no units of measurement shown for the table, the reader is left to assume the units are ng/L, as in the figures. This table has a value of 10 for station C-29 in the year 2000 that seems should be underlined, bold and highlighted in blue.
- Initial statistical analysis of the data in 2-15A and B indicates significantly higher total of dissolved mercury in the study creeks compared with the reference creeks, which is a point not made in the text and an important one.
- The EPA NRWQC (*N*ational *R*ecommended *W*ater *Q*uality *C*riteria) is 37.6 times higher than the Georgia standard and the FS should note why there is such a difference.
- The tabular data on Figures 2-1 5 A and B needs more explanation on the figure so that the reader does not need to look elsewhere for explanation; the figures need to stand alone.

2.4.2 Human Health Risk Assessment

- "Sediment samples from Purvis Creek and the Turtle River were excluded as these areas remain inundated at low tide and afford no opportunity for human exposure."
  - Sediment contact may still take place among fishermen and waders at low tide.

- "The biological dataset used in the HHBRA (*H*uman *H*ealth *B*aseline *R*isk *A*ssessment) included samples of finfish and shellfish likely to be consumed (e.g. spot, striped mullet)."
  - The study should also indicate if these consumable fish were of legal catch size.
- "The biological dataset also included samples of breast tissue from clapper rail, a small game bird inhabiting coastal marshes, where were collected from the estuary adjacent to the Site in 1995 (i.e. prior to remediation of Domain 1)."
  - This species should be re-sampled for levels after Domain 1 remediation.
- High quantity fish consumer (40 meals per year for 30 years for adults) is not that much more consumption than the Recreational fish consumer (26 meals per year for 30 years for adults).
  - The High quantity fish consumer number of meals should be increased based on detailed surveys of local fishermen at the Site. This number is based on a DHHS (*D*epartment of *H*ealth and *H*uman *S*ervices, 1999) survey based on mercury and not PCBs.
  - What is the number of meals for each child receptor?
- Shellfish consumer (19 meals per year for 30 years for adults) should also be broken down into Recreational and High quantity consumers.
  - What is the number of meals for each child receptor?
- If clapper rail is not commonly consumed, why is it being considered?
- "Calculated upper-bound *e*xcess *l*ifetime *c*ancer *r*isk (ELCR) estimates less than 1×10^{-6} are considered to be insignificant, and ELCR estimates greater than 1×10^{-4} may require further characterization, but not necessarily remedial action or other risk reduction measures (US EPA 1991)."
  - This text seems to present to essential message of the EPA Guidance, but would be improved with a fuller explanation and what it means.

2.5 Marsh Hydrodynamics

- "…sediment bed in the creeks is predominantly composed of clayey silts (i.e. cohesive sediment bed), minimal erosion expected to occur during typical tidal conditions within the creek channel. Bed scour may occur in some localized areas of the creek channels during rare storms (e.g. hurricane storm surge).
  - Strong storms, and their storm surges, are no longer that rare due to climate change (refer to Figure 1, USGS, 2012).

3.2 RAOs (*R*emedial *A*ction *O*bjective)

- 1. Mitigate potential COC releases of contaminated in-stream sediment deposits and prevent such releases from entering Purvis Creek
  - This text is somewhat vague without a timeline: What are the evaluation endpoints to achieve this RAO? More specificity is needed to determine the achievement of this RAO. There is no "Evaluation of this RAO includes…"

- 2. Reduce exposure to piscivorous bird and mammal populations from ingestion of COCs in prey exposed to contaminated sediment in the estuary to acceptable levels considering spatial forage areas of the wildlife and movement of forage prey
  - Monitoring to what end? More specificity, as seen in RAO 5
- 4. Reduce ecological risks to benthic organisms exposed to contaminated sediment to levels that will result in self-sustaining benthic communities with diversity and structure comparable to that in appropriate reference areas
  - May require more specificity than “Evaluation of this RAO involves monitoring biological communities following remedy implementation.” Monitor communities until what? The selection of reference areas becomes an issue, as often is the case.
- 6. Meet and sustain the applicable USEPA and State of Georgia Water Quality Standards for protection of aquatic life in the estuary, using total or dissolved phase mercury and PCB measures
  - The RAOs have not consistently met the PCB standards for either the USEPA NRWQC of the Georgia *W*ater *Q*uality *S*tandards (WQS), or the results have been unclear, primarily because laboratory detection limits routinely exceed the criterion.
    - What is the action to be taken to resolve this? It would seem that the samples need to be measured using another lab or better techniques, or with specifying lower detection limits (in the contract?).

3.3 Remedial Goal Options (RGOs)

- Following RGOs (SWAC RGO; Benthic RGO) in mg/kg:
  - Mercury: 1-2; 4-11
  - A1268: 2-4; 6-16
  - Lead: NA (why?); 90-177
  - Total PAHs: NA (why?); 4
- The FS text at this point does not give any explanation why there is no SWAC RGO for lead or PAHs, please explain or insert.

3.4 Development of *S*ediment *M*anagement *A*reas (SMAs)

  - For post-remedy surface sediment COC conc., regional background values were employed. The regional background value was based on data from the Blythe Island marsh located across the Turtle River. Background values were 0.3 mg/kg for mercury and 0.2 mg/kg for A1268.
    - Is Blythe Island far enough away to be used as background? Affected by any other industry? Are these background values relevant?

3.4.2 Sediment Management Area 2

- Figure 3-6 needs the Benthic Community RGOs changed to reflect the “additional protective” level noted in the text, rather than a repeat of those RGOs for Figure 3-5.

4.0 Identification and Screening of Remedial Technologies

- This FS assumes that the current fish advisories will be used in conjunction with other remedial actions at the site
    - This FS then assumes that Institutional Controls for fish consumption will remain in effect in perpetuity and not on the temporary basis which CERCLA Guidance is often interpreted. If the agencies and *p*otentially *r*esponsible *p*arties (PRPs) are going to assume permanent fish consumption advisories, then additional community education and remediation, perhaps, needs to be considered.

4.2.3 Natural Recovery

- Applicability to site is low; deposition rates are low; only source of uncontaminated suspended sediment to the estuary is Turtle River; *M*onitored *N*atural *R*ecovery (MNR) has not adequately reduced surface sediment to achieve RAOs in those areas
    - So it would make sense that MNR should be dropped entirely from consideration and not used in combination with other remediation technologies.
- Evaluation against major screening criteria
    - Effectiveness….“If combined with other remedial technologies that are effective at reducing exposures to COCs, the effectiveness of MNR can be targeted for less-contaminated areas and can be demonstrated by long-term monitoring of sediment, chemical, geochemical and biological conditions”
        - This statement does not mesh well with previous section on lack of MNR effectiveness in a marsh setting, a point with which this review by ESC, LLC agrees entirely.
    - Implementability… “MNR is readily implementable for this site because upland contaminant sources have been controlled, and because it requires no action beyond detailed site characterization, monitoring, and possible execution and maintenance of institutional or engineering controls.”
        - Also, doesn’t match with “Applicability to Site” info.
    - Cost… “MNR has a relatively low cost compared to other, more active remedial technologies. However, monitoring costs associated with MNR can be significant, particularly if monitoring is required over a large area and long duration. Even when considering monitoring and institutional control costs, costs for MNR are generally low compared to other sediment remedies.”
        - Lower cost has not proven true at other sites, largely due to monitoring, sometimes in perpetuity, only low up-front costs
- MNR: not retained as sole remedy but may be evaluated as a component of other remedies, particularly for long-term management of areas with relatively low COC conc.
    - A caveat should also note that MNR does not work in a low deposition marsh!

4.2.4 Thin-cover placement

- “Acceleration of recovery can occur through several processes, including increased dilution through bioturbation of clean sediment mixed with underlying contaminants

(USEPA 2005) and by rapidly providing a cleaner sediment surface and benthic environment."
    - This point is an incorrect outcome of bioturbation for contaminants that do not degrade naturally or at all, such as mercury and PCBs. It has recently been noted that polychaete worms, common benthic organisms, can actually stir up mercury, creating the chance for methylation by bacteria to make the mercury bioavailable again within the benthic environment, resulting in biomagnifications of methyl mercury up the food chain (Sizmur 2013 and Millward 2005).
- "Dredged sediment is likely to be better suited for marsh restoration than quarried sand. Dredged sediment is more likely to be organic-rich and will likely contain nutrients that support plant and wildlife growth; quarried sands tend to be virtually absent of natural organic matter."
    - Appropriate chemicals/contaminant testing of this location where the dredge material will be taken from needs to take place to ensure the use of clean sediment.
- "Monitoring program needed; includes bathymetric surveying and visual observation to evaluate thin cover integrity and the potential for displacement, shifting or erosion; biological monitoring may be conducted to evaluate biological recovery of the thin cover surface, and surface sediment sampling may be conducted to monitor surface sediment deposition and recontamination potential."
    - Time scales for thin-cover monitoring and biological monitoring should be decided and put in place previous to thin cover being used. As with statistics, the monitoring should be designed before the work is initiated.

4.2.5 Sediment Cap

- Controlled placement of suitable materials over contaminated sediment. Capping is a relatively mature, proven technology.
    - Multiple references would be beneficial to the validity of this statement. Much of the application of capping has been in pen waters, rather than in intertidal salt marshes.
- "For complex contaminants – reactive caps involving reagents (activated carbon, organo-clays, or other natural or synthetic sorbents) added to decrease contaminant flow through the cap, enhance certain physical or geochemical properties or otherwise treat target contaminants. For the purposes of this FS, geosynthetics and reactive cap materials are not considered necessary and thus are not included in the evaluation of sediment caps."
    - Activated carbon should be considered, this treatment seems to enhance cap effectiveness
- "A monitoring program is commonly required when a cap is used to remediate contaminated sediment sites"
    - Same comments here as for those listed above for thin cover

- "Sediment capping leaves contaminants in place and could result in potential restrictions on future use of the Site. Because sediment caps are thicker than thin covers, impacts to site hydrology and ecology (Footnote 6) can be more significant and can have a longer lasting impact than MNR or thin cover placement"
  - Footnote 6: "Sediment capping can impact the site hydrology and ecology if bed-elevations change (e.g. subtidal areas may be converted to intertidal areas and intertidal areas may be converted to upland areas). Initial impacts to marsh ecology would result from placement material, though the marsh could recover with time."
    - Source for this assertion? Over what time scale? Thick layer or conventional capping could also be used to create grass hummocks and provide additional habitat complexity, a point not considered in the FS.
- Sediment capping results in unavoidable disruption of the benthic environment; incorporating reagents add implementation challenges (e.g. placement of geosynthetics or reagents, blending of reagents with cap materials)
  - Not aware of these "implementation challenges" … source for this assertion? The text also omits the context that any and all options for remediation, including no action will have an impact.

4.2.6 Sediment Removal and Disposal/Treatment

- The following statements within this section indicate more of a focus on a cost analysis (which has its own section) rather than a method analysis for this site' cleanup:
  - "Dewatering, treatment and disposal of dredged materials to process the sediment may be the rate-limiting step when planning the overall schedule"
  - "Dredged sediments dewater using passive or active methods"
  - "Additives may enhance dewaterability, but expensive"
  - "Ex situ sediment treatment technologies have limited proven reliability at full-scale and tend to be have very high costs"
- Effectiveness
  - "However sediment removal typically relies on natural recovery processes or post-removal backfill to achieve long-term, site-specific RGOs… However, considering that natural deposition rates at OU1 are slow, the removal alternatives proposed for the Site do not rely on natural recovery. Instead backfilling is proposed to accelerate natural recovery and achieve RGOs"
    - Don't see how this is an issue, as it is portrayed

5.0 Development of Remedial Alternatives

- The cleanup levels that would determine the areas of cleanup (the Sediment Management Areas in this report) should be determined BEFORE and screened AGAINST the alternatives, not used within the confines of the Remedial Alternatives.

- SMA-1 through SMA-3 were described in depth, but then Domain areas are referenced in this section instead. This is confusing to the reader and consistency should be maintained throughout.

5.1.2 Marsh Creeks and Ditches

- **“Sediment removal is a viable technology for all creeks and ditches, and sediment capping is** feasible for creeks and ditches provided that its implementation does not restrict water conveyance capacity; The results of the hydrologic model analysis indicate that cap armoring is generally needed in the creeks, rendering thin-covering placement ineffective for creeks and ditches”
    - o If sediment removal is viable in the creeks, why make an argument for the cap armoring instead which is not as reliable or permanent a remedial solution.
- “Marsh plants and benthic animals are destroyed during dredging and they are covered by capping. However, recovery is expected to occur within approximately two years.”
    - o A re-planting process of native plants to promote growth, along with the accompanying monitoring program would create new habitat faster.

5.2 Elements Common to All Remedial Alternatives

- “Institutional Controls, namely fish advisories already in place for Purvis Creek and the Turtle River system and an existing commercial fishing ban for Purvis Creek, will be maintained. With time, if and when fish chemical concentrations fall below the criteria to maintain the fish advisories and/or commercial fishing ban, the State of Georgia may elect to remove the advisories and/or commercial fishing ban. “
    - o Why is the fishability of this marsh not a priority? To set cleanup standards specifically based on reduction of fish concentrations?
- “Where incorporated as part of a remedial alternative, sediment removal entails the excavation or dredging of 18 inches of sediment and backfilling with 12 inches of clean material.”
    - o Shouldn’t removal be based on “dredge till clean” sediment? There has been no discussion of this different approach.
    - o Why is the fill not put the marsh back to original grading?

5.4.1 Sediment Removal and Backfilling

- Why remove 18 inches of sediment and only put back 12 inches in backfill? To maintain appropriate hydrology of the marsh, shouldn’t it be put back to its original grading?

5.7.2 Sediment Capping

- The analysis in Appendix G shows that a 6 inch base chemical isolation layer with up to 6 inches of coarse sand to gravel armoring adequately protects against chemical migration through the cap, as well as erosive forces under extreme storm events.
    - o Has there been a biological impact assessment of this in terms of whether it is conducive to re-growth of plants and re-population by native organisms? It may withstand the flow/hydrologic issues, but has it been tested to indicate whether it will successfully become biologically active?

5.8.4 Short and long term monitoring requirements for Remedy Alternative 6

- Although caps are designed to withstand high-energy event flows, they may require repair or periodic replenishment if damaged by erosion or unexpected environmental conditions (e.g. extreme storms), particularly if such events occur before marsh grasses are restored.
  - Then re-planting should be put in place to accelerate this process and ensure success of the caps. In addition, fewer caps with higher elevation, creating grassy upper intertidal habitat would address this issue at least in part.

6.2.4 Reduction of toxicity, mobility or volume

- The thin cover is not intended as an absolute chemical barrier, but as a layer to jump start ongoing natural recovery processes, and therefore, some bioturbation beyond the cover depth does not diminish the effectiveness of this remedy and thus does not preclude its beneficial use as a protective remedy.
  - Incorrect. Bioturbation can lead to mercury etc. becoming biologically available.

7.0 Conclusions

- "The SMA-1 remedies and the dredge-only remedies have a greater impact on habitat than the SMA-2 and SMA-3 remedies and those that incorporate capping and thin-cover placement, respectively. Habitat disturbance is proportional to the remedial footprint and is more substantial for removal and capping compared to thin cover placement."
  - Faulty logic

Appendix A

- "At five of the new well locations (DP-1, DP-2, DP-3, DP-5, DP-6), paired wells were completed, with one set at approximately 14 ft below ground surface (ft bgs), the "A" well, and one set at approximately 28 ft bgs, the "B" well.
  - The reason for these specified depths should be discussed and what hydrogeologic layer they are sampling from, as well as the depths of the already in place monitoring wells.

TABLES

Table 1-Sites with Thin Layer Caps or Sorbent-Amended Caps

Cap Type	Contaminant or Purpose	Location
Apatite/sand	Sequester heavy metals	Anacostia River, Washington DC
AquaBlock/sand	Hydraulic control	
Coke/sand	Sequester PCBs and PAHs	
AquaBlock	Evaluate installation techniques	Ottawa River, OH
AquaBlock	Evaluate installation techniques	Fort Richardson, AK

Activated Carbon-RCMa	Sequester PAHs	Stryker Bay, Duluth MN
Organoclay-bulk and in RCM	Contain creosote NAPL	Portland, OR
Sand/topsoil-30 cm		
Granular bentonite		
Sand/soil/bentonite slurry		Grasse River, Massena NY (Alcoa, 2003)
Aquablock	Contain PCBs	

FIGURES

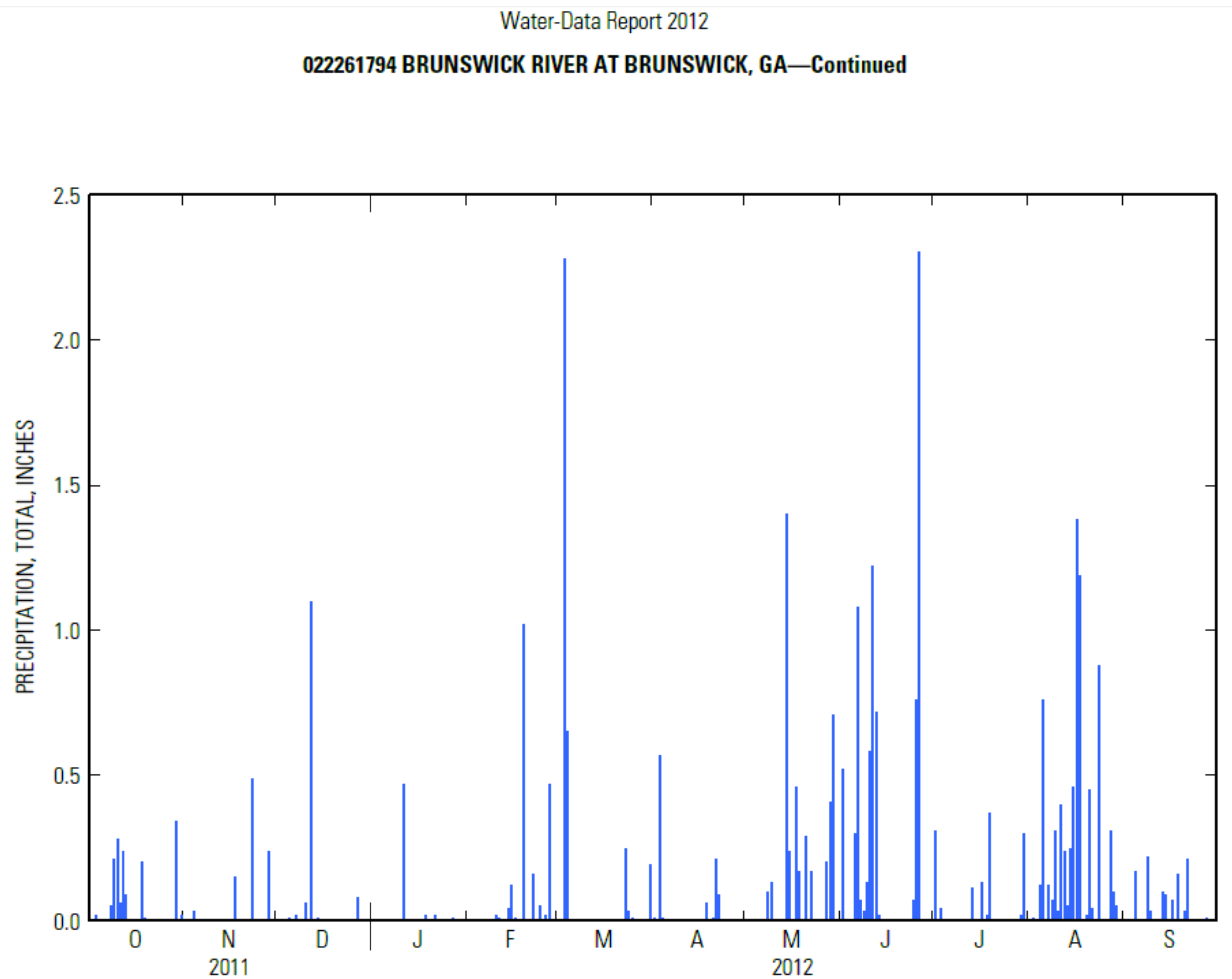

Figure 1: USGS Precipitation Graph (October 2011-September 2012 (USGS, 2012)

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These comments are being submitted to the EPA. A copy of these comments will be posted on the *G*lynn *E*nvironmental *C*oalition (GEC) website (http://www.glynnenvironmental.org/) and highlights included in a newsletter, sent to GEC subscribers and also posted on the GEC Website.

This report was produced by Environmental Stewardship Concepts, LLC (ESC, LLC) for and in cooperation with the Glynn Environmental Coalition. As a Technical Advisor, ESC, LLC provides independent analysis of the reports and data related to the Superfund Sites referenced to help support a well-informed community.

This project has been funded wholly or partly by the U.S. Environmental Protection Agency under Assistance Agreement Numbers 198448298, 198453298, 199485001 to The Glynn Environmental Coalition, Inc. The contents of this document do not necessarily reflect the views and policies of the U.S. Environmental Protection agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.