MCNAIR
ATTORNEYS

Celeste T. Jones

cjones@mcnair.net
T (803) 753-3255
F (803) 753-3278

May 2, 2011

Via E-mail (Jones.kima@EPA.gov)

Kim A. Jones
US Environmental Protection Agency
Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, GA 30303-8960

Re: Sangamo - Weston/Twelve Mile Creek/Lake Hartwell Superfund Site-Operable, Unit One, Pickens County, South Carolina

Dear Ms. Jones:

I received your letter dated April 22, 2011 and the enclosed correspondence from Kestrel Horizons, LLC (Kestrel). We are in the process of preparing comments and other information relating to the information submitted by Kestrel and hope to have this information to you by mid-May, 2011.

Please do not hesitate to contact me if you have any questions.

Very truly yours,

McNAIR LAW FIRM, P.A.

Celeste T. Jones

CTJ/pkj

cc: Craig Zeller, EPA
Anna Thode, DOJ

McNair Law Firm, P. A.
1221 Main Street
Suite 1800
Columbia, SC 29201

Mailing Address
Post Office Box 11390
Columbia, SC 29211

mcnair.net

10820845

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

APR 22 2011

SENT VIA EMAIL

Ms. Celeste T. Jones
McNair Law Firm
1221 Main Street
Columbia, South Carolina 29201

Re: Sangamo -Weston /Twelve Mile Creek/Lake Hartwell Superfund Site-Operable Unit One, Pickens, Pickens County, South Carolina

Dear Ms. Jones:

Please find enclosed correspondence received by the United States Environmental Protection Agency (EPA), Region 4 on April 21, 2011 from Kestrel Horizons, LLC, (Kestrel) regarding issues related to the flood plains of the Twelve Mile River being restored by your client Schlumberger Technology Corporation (Schlumberger). As you are aware, the restoration of natural resources is being conducted pursuant to a Consent Decree entered on May 30, 2006, which was filed jointly by the Federal Trustees, the South Carolina Trustees and the Georgia Trustees.

The enclosed correspondence includes the summary of conditions and issues related to sampling recently completed by Kestrel on behalf of concerned citizens. In this regard, please review the enclosed correspondence and forward to EPA any comments or other information you deem appropriate relating to the information submitted by Kestrel.

Please do not hesitate to contact me, if you have questions at (404) 562-9553. If you have technical questions, please contact Craig Zeller, Remedial Project Manager at (404) 562-8827.

Sincerely,

Kim A. Jones

cc: Craig Zeller, EPA
Anna Thode, DOJ

Memorandum

To: Mr. Paul League, Esq., SC DNR for distribution to Twelve Mile River Natural Resource Trustee Representatives and others, as appropriate
Ms. Gwendolyn Keyes Fleming, Administrator, US EPA Region IV
Ms. Daphne Neel, Chief, SC DHEC Bureau of Land and Waste Management
Mr. John E. Frampton, Director, SC DNR
Colonel Jeffrey M. Hall, Commander, US Army Corps of Engineers, Savannah District
Mr. J. Chappell Hurst, Jr., Administrator, Pickens County

From: Kestrel Horizons, LLC - William A. Stephens, P.E., David G. Nichols, P.G. Christopher Suttell, P.G.

Date: April 20, 2011

Subject: Twelve Mile River—**Notification of Imminent Threat to Public Safety** and Urgent Issues Related to Floodplains of Twelve Mile River from State Highway 137 (aka Norris Highway) to Woodside II Dam

---

Executive Summary

This memorandum summarizes the conditions and issues related to floodplains of the Twelve Mile River for the reach of the river being restored by Schlumberger under an agreement with the Natural Resource Trustees under the authority of the United States District Court for the District of South Carolina, Judge G. Ross Anderson, Jr., presiding. This memorandum notifies the agencies that we believe an ***imminent and serious threat to public safety exists due to the undermining of the floodplains by the Schlumberger dredging.*** The memorandum also discusses the results of sampling recently completed, discusses potential threats to human health and the environment, and provides recommended actions.

We have prepared this summary as concerned citizens and professionals for the use of the various regulatory agencies and the Natural Resource Trustees in reviewing the progress of the restoration project and serious developments which have come to light in recent months. Judge Anderson suggested that concerns such as the ones expressed in this memorandum should be directed to the Natural Resource Trustees.

Kestrel Horizons, LLC has provided substantial consulting services to Upstate Forever, the Pickens County Soil and Water Conservation District, and the Lake Hartwell Association on issues relating to the Twelve Mile River project. We have, among other things, reviewed the status and scope of the dredging operation being conducted by Schlumberger; collected, analyzed and evaluated samples from both the floodplain above the Woodside I dam and

also from within the channel and floodplain above the Easley-Central Water District dam, and have assessed the physical condition of the floodplain along the river in the project area.

This document describes the imminent and serious threat to public safety which exists due to the undermining of the floodplains by the Schlumberger dredging. This is no longer the "theoretical discussion" it may have been perceived to be when Bill Stephens of Kestrel Horizons and Dr. Larry Dyck met with the Natural Resource Trustees and Judge Anderson's advisors (the Special Receivers) in January, 2011. The potential imminent threat to public safely is now a reality, as is the threat of environmental damage and a delay or reversal of the natural recovery process of the upper reaches of Lake Hartwell.

Notification of Imminent Threat to Public Safety

We now recognize that some of the serious matters to be addressed may fall outside the purview of either Judge Anderson or the Natural Resource Trustee Representatives; rather they may fall within the authority of the regulatory operations of various government agencies. We have therefore provided this document to appropriate management personnel of Pickens County, the South Carolina Department of Health and Environmental Control, the South Carolina Department of Natural Resources, the US Army Corps of Engineers, (Savannah District), and the US Environmental Protection Agency (Region IV) for the purposes of alerting officials who are in a position of addressing imminent threats to public safely.

In accordance with the ethical standards required of Professional Engineers and Professional Geologists licensed to practice in South Carolina, we hereby notify you of what we believe constitutes an imminent threat to public safety and a potential threat to human health and the environment:

> ***Any person standing on the floodplains along the Woodside I and Woodside II impoundments (Highway 137 bridge to Woodside II Dam) is at imminent risk of injury or death due to the instability of the floodplain terraces caused by the Schlumberger dredging. No security fencing or warning signs have been erected, and the banks are collapsing such that large trees have now tumbled into the river. This situation could quickly transition from nuisance to tragedy. We urge the appropriate agency to step forward to address this threat before an avoidable tragedy occurs.***
>
> ***We believe that the conditions and contents of the floodplains along the Woodside I and Woodside II impoundments also represent a potential threat to human health and the environment.***
>
> ***Further details are provided in this memorandum.***

Major Conclusions

The major conclusions of this analysis are as follows:

1. The floodplain sediments of Twelve Mile River from the Highway 137 Bridge to the Woodside II Dam have been undermined for nearly 1.5 miles of river bank – on both sides of the river – such that an imminent threat to public safety now exists.
2. The regulatory approvals for the Schlumberger project were based, in large part, on the Arcadis drawings, which incorrectly represent the floodplain terraces as being composed of bedrock. In fact, the floodplains are composed of an estimated 230,000 to 255,000 cubic yards of sediment which has become unstable due to Schlumberger's dredging. Of that estimated quantity, approximately 185,000 cubic yards lies behind the boundary Arcadis represents as "bedrock".
3. Sampling of fine-grained sediments just above the Woodside I Dam before the floodplain sediments collapsed into the river revealed PCB concentrations from 9 to 54 parts per million (ppm). The typical regulatory threshold for concern in residential and recreational land uses is 1 ppm. Left exposed, these sediments may pose a long-term risk to the health of residents and others. Left to collapse into Twelve Mile River, these sediments may delay the natural recovery process of the lower reach of Twelve Mile River (downstream of Woodside II) and the upper portion of Lake Hartwell.
4. Floodplain soils which have not collapsed likely include 15% to 25% fine-grained sediments in layers. These sediments may total 35,000 to 65,000 cubic yards and may average 10 to 20 ppm PCBs. Only sampling of these sediments can determine the quantities and concentrations involved. These sediments all lie on the private properties of approximately 20 property owners who are not represented in the restoration project, except by the regulatory agencies involved in the various federal, state, and local permitting and approval processes.
5. The Woodside II Dam is creating a large sedimentation basin which is catching much of the floodplain sediments that are collapsing. These sediments are filling the channel voids created by the dredging of the Woodside II Dam impoundment, which means that more extensive dredging of the newly deposited sediments will be required to meet the dredging performance standards of the restoration project.
6. The focus on maintenance releases of sediments from the Easley-Central Water District (ECWD) Dam are inconsequential and divert attention away from errors and deficiencies in the design and conduct of the Schlumberger project. The actual release of sediment from the ECWD pool is negligible compared to the quantities of sediment Schlumberger is now and will be dealing with in the restoration project. ECWD should be allowed to manage its operation in accordance with its standard procedures and without any further interference from Schlumberger and representatives of the federal government

Major Recommendations

Our major recommendations are as follows:

1. Residents owning property along the section of Twelve Mile River from Highway 137 to the Woodside II Dam should be notified immediately by the appropriate governmental agency or agencies as to the safety hazards created by the Schlumberger project on their properties. Fencing and warning signs should be erected immediately to notify residents and the general public of the hazards and risks created by defective design and deficient implementation of the restoration project.
2. On the basis of three lines of evidence: our direct observation of the conditions of the Woodside project area, the results of PCB sampling of the Woodside I sediments, and the results of last year's sampling of the lower floodplain sediments above the ECWD dam, work by Schlumberger on the dredging project should be suspended immediately.
3. A modified restoration plan should be established and implemented immediately which will adequately protect public safety and health and the environment, and which will achieve the restoration goals of the Consent Decree and the Record of Decision.

Introduction

The major topics of this memorandum are as follows:

1. Discussion of Sediment Sampling and Results
2. Actual vs. Represented Conditions of the Floodplains
   - Bedrock
   - Soils/Sediments
   - PCB Concentrations
3. Consequential Risks and Potential Natural Resource Damages from Errors, Omissions, and Misrepresentations in the Approved Plans

1. Discussion of Sediment Sampling and Results

The following is a summary of sediment sampling for PCBs from a bank along the exposed floodplain upstream of the former Woodside I dam. In addition, it provides a preliminary estimate of the volume of sediment and the amount of PCB contamination within the reach of the Woodside I and II dams.

Ten sediment samples were collected and analyzed as part of a limited investigation conducted and directed by the Pickens Soil and Water Conservation District, the Lake Hartwell Association, Upstate Forever and Kestrel Horizons, LLC and funded by Upstate Forever. This investigation is <u>not</u> part of study relating to the Easley-Central Water District dam; the results of that study should be available by the end of April.

Dr. Larry Dyck and William Stephens of Kestrel presented these concerns to members of the Natural Resource Trustee Council for Lake Hartwell and Twelve Mile River (NRTs) at various times including, most recently, at a meeting at Hickory Knob, SC in January, 2011. Regulatory response to these concerns has not prompted action to address these issues and dredging and dam removal procedures have continued uninterrupted. For these reasons the parties identified above decided to proceed with sampling of sediments without involvement by responsible party(ies) or government agencies.

On February 19, 2011, Dr. Larry Dyck, Harry Morris, P.G., and Bill Stephens, P.E. (both of Kestrel Horizons, LLC) collected ten sediment samples on an approximate 150 foot stretch of river upstream of the Woodside I dam on the north side of the river. The work was performed with permission of the property owner, Mrs. Nelle Ball, and was paid for by Upstate Forever. The sampling locations are presented on Figure 1.

Fine-grained materials were targeted for the samples because previous sediment sampling indicated that PCBs tend to accumulate in sediments comprised of fine-grained material as opposed to coarser grained material. Five of the ten sediment samples (BK-1, BK-2, BK-3, BK-4, and BK-5) were collected from a layer of fine grained materials that outcropped on the steep slopes of the floodplain bank that were exposed following dredging of the channel and partial lowering of the water level prior to removal of the Woodside I dam. One sediment sample, BK-4U, was collected from a sedimentary layer atop the layer discussed above and contained more sandy material. The four remaining samples (BK-0S, BK-1S, BK-3S, and BK-5S) were collected from a narrow backwater swale on top of this floodplain bank, which contained some fine-grained organic materials but was comprised predominantly of sandy material.

Samples were analyzed for PCB content using EPA Method 8082A by Shealy Environmental Laboratories, Inc. in Cayce, S.C. The sediment samples were collected in a manner consistent with EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. Documentation of field activities was completed using bound logbooks. Chain of custody records will be provided in the final analytical report after Level IV data validation is completed.

Sample Results and Discussion

PCBs were detected in each of the ten samples. Five of the six samples collected from the bank with the fine-grained materials had PCB concentrations far in excess of one part per million (ppm), which is the sediment cleanup goal for PCBs ordinarily used by DHEC and EPA. **The highest PCB concentration of 54 ppm detected in sediment sample BK-5 is the highest known concentration of total PCBs ever detected upstream of the Woodside II dam and would have been among the highest collected in the 1991-92 Remedial Investigation of the entire Lake Hartwell Watershed (EPA's Operational Unit 2).** The samples collected from the backwater swale above the exposed bank were below one ppm.

The analytical results for the samples are summarized below, in Table 1.

Table 1

Sample Identifier	Sample Location	Sample Date	Total PCBs (mg/kg)
BK-1	Fine grained sediment layer in bank.	02/19/11	**10.650**
BK-2	Fine grained sediment layer in bank.	02/19/11	**9.670**
BK-3	Fine grained sediment layer in bank.	02/19/11	**17.700**
BK-4	Fine grained sediment layer in bank.	02/19/11	**28.500**
BK-5	Fine grained sediment layer in bank.	02/19/11	**54.000**
BK-4U	Coarse grained sediments in bank.	02/19/11	<0.450
BK-0S	Sediment in top 6" of floodplain swale.	02/19/11	<0.800
BK-1S	Sediment in top 6" of floodplain swale.	02/19/11	<0.510
BK-3S	Sediment in top 6" of floodplain swale.	02/19/11	<0.690
BK-5S	Sediment in top 6" of floodplain swale.	02/19/11	<0.680

Key:

Greater than 1 mg/kg

< = Less than listed concentration

Fate and Estimated Quantity of Contaminated Sediments

Visual observation of the banks above the Woodside I Dam during and after dam removal confirmed that bedrock does not extend to the edge of the river shoreline as depicted in the final plans prepared by Arcadis for the project, which form the basis of approvals by the Natural Resource Trustees as well as by DHEC, the U.S. Army Corps of Engineers, and Pickens County. Instead, significant quantities of floodplain sediment extend along large portions of the river shoreline to unknown depths terminating at bedrock. As shown in the photographic log presented as Attachment A, a dramatic change in the shoreline occurred after the February 19, 2011 PCB sampling event. The photographic log confirms that floodplains are eroding rapidly and collapsing as water levels change in the un-impounded river. These photographs combined with the sampling results clearly indicate that significant quantities of PCB-laden sediments have not been removed from the river and that PCB-laden sediments have mobilized downstream, possibly into Lake Hartwell.

2. Actual vs. Represented Conditions of the Floodplain

- **Bedrock**

  The final plans prepared by Arcadis for the project which form the basis of approvals by the Natural Resource Trustees as well as DHEC, the US Army Corps of Engineers, and Pickens County represent that bedrock rises nearly vertically from the bottom of the channel to the top of the banks of the river. (See Figure 2) **Thus, a critical element of the restoration plan is fatally flawed.**

As Kestrel and Dr. Dyck have predicted for nearly a year, the floodplains are not composed of bedrock, but rather of thick sediments. The thickness of the floodplain sediments likely varies from approximately five to twenty feet or more, depending on the location and the actual bedrock configuration. This means that the "boundary conditions" of Arcadis' restoration design are radically different than those described in the Arcadis drawings and narratives.

- **Soils/Sediments**

Under Arcadis' plan, the "Adaptive Management" element of the plan (allowing nature to take its course for a year, and then adapting the restoration plan accordingly) would be understood to have resulted in a limited quantity of sediments from the bedrock face near the banks eroding into the channel and being carried downstream.

Accurate estimates of the actual quantity of sediments in the floodplains can only be developed by the use of accurate bedrock mapping and surface topographic mapping. Arcadis has the topographic mapping needed, as can be seen on the Arcadis drawings. Apparently, Arcadis does not have accurate information on the bedrock surfaces under the floodplains; to obtain that information, probes installed through the floodplain (similar to those installed as part of the Feasibility Investigation for the Restoration of the ECWD reach) could be installed at each transect shown on the Arcadis drawings to complete the missing bedrock and sediment information.

We have used the transects shown in Figures 2 and 3 to calculate the range of likely quantities of sediment (in cubic yards) in the floodplains of the Woodside I and Woodside II pools:

Floodplain Section	Estimated Quantity Behind Boundary Designated as "Bedrock"	Likely Quantity of Sediment	Likely Maximum Quantity of Sediment
Woodside I North Side	34,000	61,000	69,000
Woodside I South Side	80,000	80,000	85,000
Woodside II North Side	22,000	24,000	27,000
Woodside II South Side	49,000	68,000	74,000
Totals	**185,000**	**229,000**	**255,000**

The estimates are based on re-interpretations of two Arcadis cross-sections that were considered representative of typical cross-sections of the river channel within the Woodside I and II pools. The reinterpretations are a more accurate representation of actual site conditions with regard to floodplain sediment thickness and bedrock elevations than the Arcadis drawings.

Our estimates suggest floodplains contain between approximately 185,000 and 255,000 cubic yards of sediment within the reach of the Woodside I and II dams. Assuming fine-grained material comprises approximately 15 to 25% percent of floodplain sediments, and the average total PCB concentration is between 10 to 20 mg/kg, we estimate that unexcavated floodplains contain between 60 and 270 gallons (or approximately 770 to 3400 pounds) of PCB fluid. This means that the remaining floodplain sediments on private property within the Woodside I and Woodside II impoundments may account for 0.2 to 0.85 percent of the 400,000 pounds of PCBs reportedly released by Sangamo Weston to Town Creek. This contamination may affect between 30,000 and 65,000 cubic yards of fine-grained sediments within the floodplains.

Photographs taken on February 19, 2011 and again on March 16 and 17, 2011 demonstrate the reason for serious concern over the critical discrepancy between the structural conditions of the floodplains as represented in the Arcadis plans and reality. This section of the north bank of Twelve Mile River immediately behind the Woodside I Dam is shown in the February 19, 2011 photos shortly after the water level was lowered to facilitate the dam removal. Note that no rock outcroppings are visible and that a sandy upper layer is underlain by a layer of darker sediments like those encountered by Schlumberger's contractor during the dredging of the channel.

Note that in the March 16 and 17, 2011 photos the light colored sandy sediments and the darker colored sediments have disappeared. These materials were not removed by Schlumberger's contractor – they sloughed into the channel and were swept downstream.

In the few weeks since those photos were taken, large portions of the floodplain sediments have continued to collapse into the channel and several large trees have either collapsed, or are about to collapse, into the river. This process will continue until most of the floodplain sediments have either been swept away or have begun to form a new floodplain at a lower elevation. The new floodplain at a lower elevation will contain a much smaller quantity of soils than the current impoundment-induced floodplain, so most of the sediment will have no place to go but down the river. Fortunately, the Woodside II Dam impoundment will capture most of these sediments, so there is still time to dredge and remove them. Once the dam is dismantled, however, it will be too late.

- **PCB Concentrations**

The focus of regulatory discussions regarding PCB concentrations in sediments appears to have been on the sediments to be dredged from the channel beneath the water surface. That makes sense, given that Arcadis' drawings indicated that near-vertical bedrock would be encountered near the banks of the channel. As the Arcadis cross sections are incorrect, there are large quantities of sediment in the floodplains.

The results of last year's PCB analyses of the floodplain sediments upstream of the Easley-Central Dam ranged from less than 0.05 ppm to over 25 ppm. These results are consistent with preliminary laboratory results from samples collected as part of the Feasibility Investigation for Twelve Mile River – ECWD Reach Dam Removal and River Restoration Project. Concentrations of PCBs greater than 1 ppm in the sediments were largely associated with silt and clay-sized particles rather than sand-sized particles, as has been documented in technical literature and at other PCB sites. ECWD borings have shown that most of the channel sediments are comprised of sand sized particles; whereas fine-grained materials occur most often on the adjacent floodplains and in the channel sediments adjacent to the inside of the sweeping curve of the channel.

3. Consequential Risks and Potential Natural Resource Damages from Errors, Omissions, and Misrepresentations in the Approved Plans

Figure 4 is included to provide a composite picture of the serious issues discussed in this memo.

The following conclusions are drawn from observations and recent sediment sampling data:

1. The condition and extent of the floodplain sediments indicate that the floodplain sediments pose an imminent threat to public safety. Property owners and the public should be immediately warned through the posting of signs, and other appropriate measures, about the imminent threat. Fencing should be erected, as necessary.
2. The collapse of major sections of the banks and large trees is sufficient cause alone to require protection for public safety purposes. Permitting the uncontrolled collapse of nearly 1.5 miles of unstable river banks on private property while allowing Schlumberger to represent it as "Adaptive Management" would constitute a total misuse of legitimate Adaptive Management concepts.
3. The sampling results of the Woodside I sediments, together with the condition and extent of the floodplain sediments, indicate that a potential threat to human health and the environment exists.

a. Samples from the darker fine-grained sediments contained 9.67 to 54 mg/kg (parts per million) total PCBs.
b. The average concentration of total PCBs of the fine-grained samples taken is 24.1 mg/kg.
c. The fine-grained sediments are a substantial portion of the floodplain sediments, likely comprising 15% to 25% of the total sediment volume.
d. The level ordinarily used by DHEC and EPA to identify materials which may cause an unacceptable risk to human health for residential and recreational land uses is 1 mg/kg; the levels of PCB in the Woodside I sediments are up to 54 times that level.
e. The fine-grained sediments containing PCBs in the exposed sediments of the Woodside I floodplain are unprotected and subject to erosion, transport, and direct contact.
f. Left exposed, these sediments may pose a long-term risk to the health of residents and others. Left to collapse into Twelve Mile River, these sediments may delay the natural recovery process of the lower reach of Twelve Mile River and the upper portion of Lake Hartwell.

4. The condition and extent of the floodplain sediments, together with the results of sampling of the sampling of floodplain sediments above the Woodside I Dam and the lower floodplain sediments of the Easley-Central dam, are sufficient cause for concern to require an immediate suspension of the operations of the Schlumberger project to enable detailed examination and investigation of the conditions of the floodplain sediments and bedrock locations of the Woodside I and Woodside II Dam pools. A modified restoration plan, which requires the characterization and removal of the majority of the floodplain sediments (including especially PCB contaminated sediments), should be established and implemented.
5. Since the contaminated and potentially contaminated sediments are on private property, appropriate agencies of state and/or federal government should take action to inform property owners and to seek consent as may be required by law, to sample the sediments and to cause the responsible party(ies) to take necessary action to protect human safety, health, and the environment.

Photo 1: North floodplain terrace bank located just upstream of Woodside I Dam; water in the impoundment had been lowered about 10 feet and revealed banks interbedded with strata comprised of sand (tan color) and fine-grained (dark colored) material. Photo made Feb. 1, 2011

Photo 2: Sediment sampling activities on the north floodplain terrace bank, just upstream of the Woodside I Dam. Sampling focused on the dark, fine grained sediment; sampling visible in the lower left. Photo made Feb. 19, 2011

Photo 3: Bank along the north floodplain terrace, located just upstream of Woodside I Dam; note the dark, fine grained sediment layer located within sandy (tan) bank.
Photo taken Feb. 19, 2011.

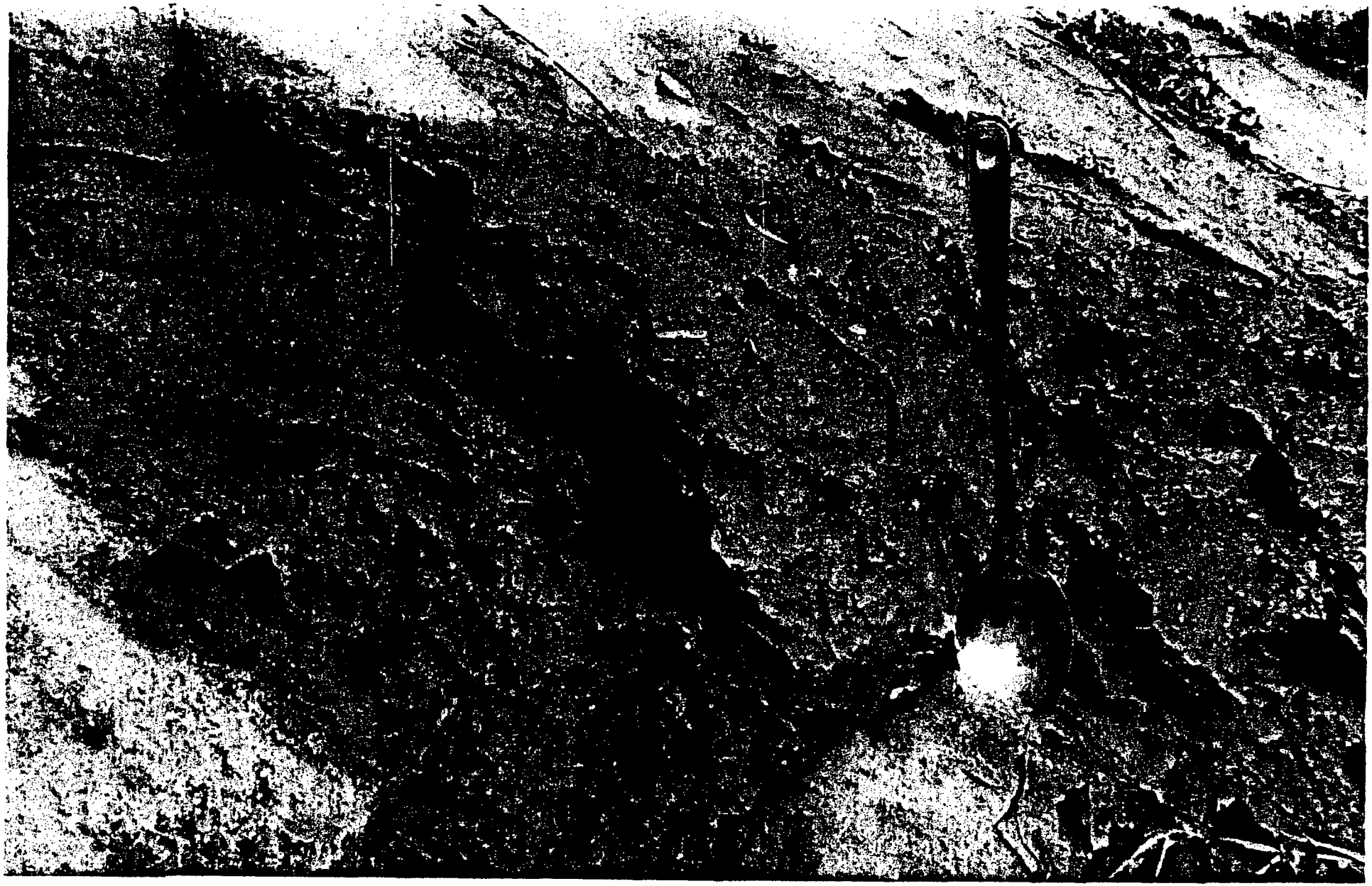


Photo 4: Bank along the north floodplain terrace, located just upstream of Woodside I Dam; stainless steel sampling-spoon is adjacent to fine grained sediment that was sampled for PCBs. Photo taken Feb. 19, 2011.

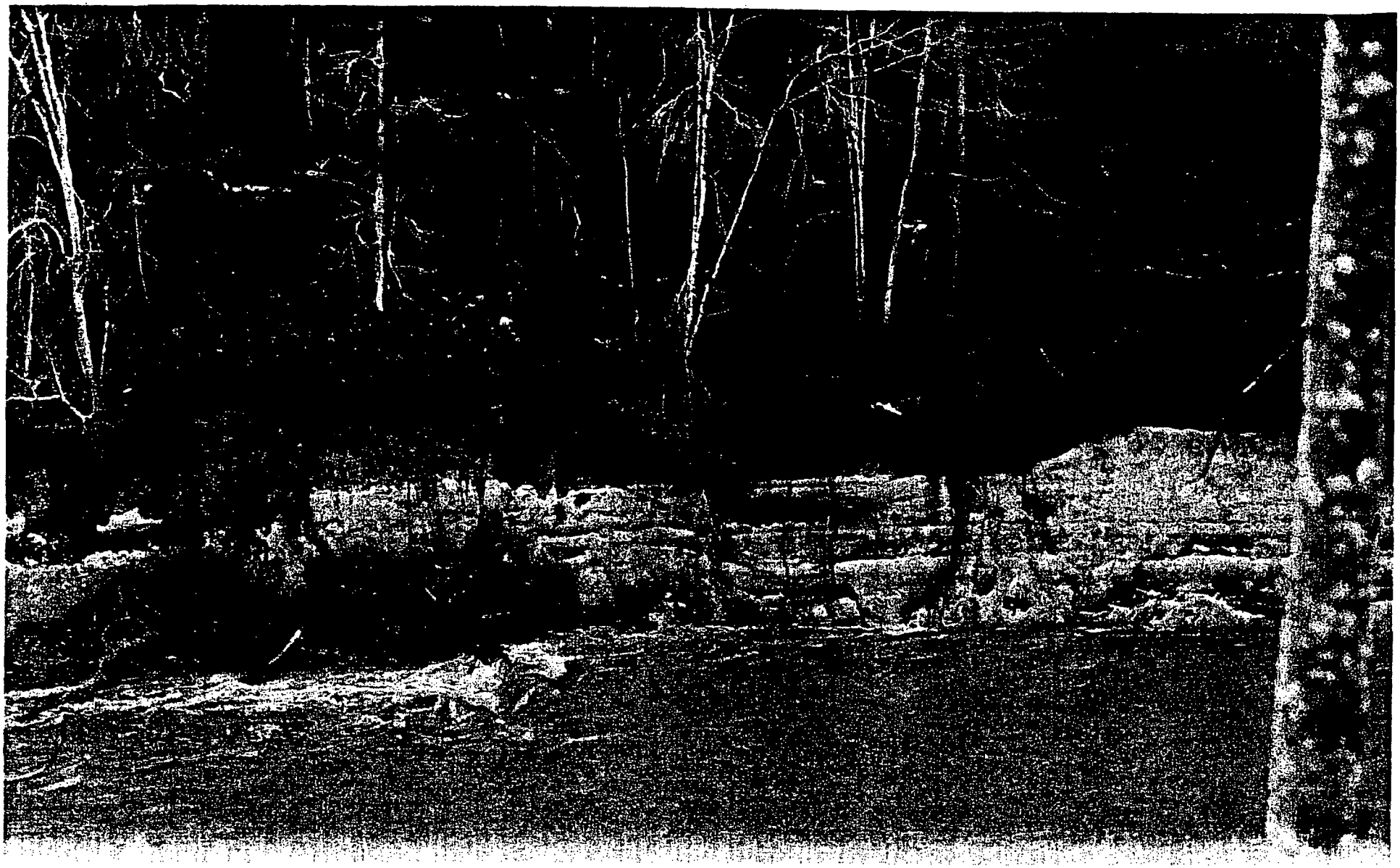


Photo 5: Bank of north floodplain terrace, located just upstream of Woodside I Dam. Force of the river following heavy rain has undercut the sandy bank causing the upland plateau to collapse into the river. Strata sampled on Feb. 19, 2011 have washed away. Photo taken on March 16, 2011.

Photo 6: View of the river behind the former Woodside I Dam, after the dam has been removed. South floodplain (on the right) is collapsing during flow that followed a heavy rain (note trees have fallen into the river as banks collapsed). Photo taken March 17, 2011

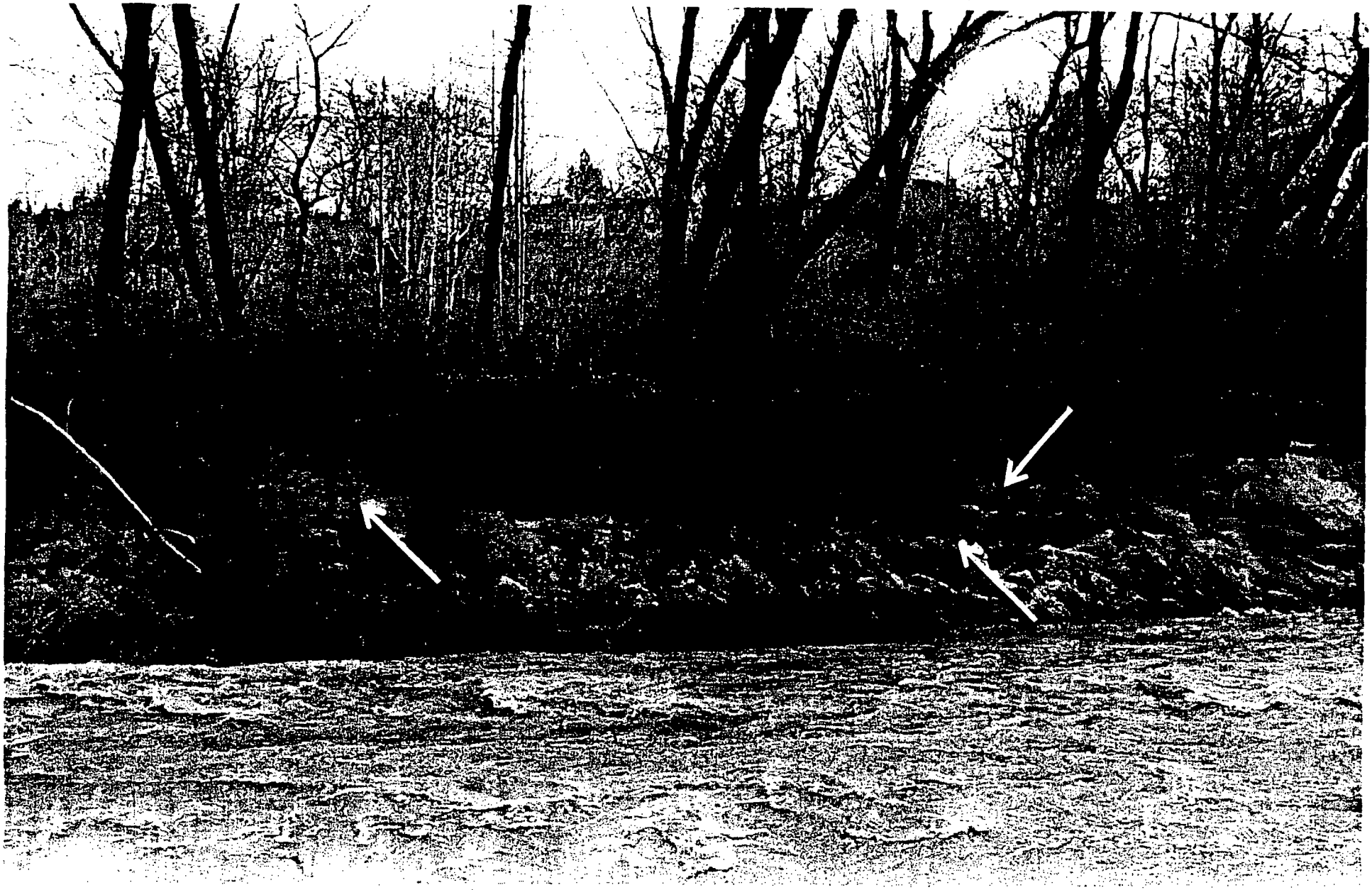


Photo 7: View of river behind Woodside I Dam, after the dam has been removed. The exposed bank from the large south floodplain reveals dark strata (arrows). Strata are similar in appearance to those sampled for PCBs. Photo taken March 17, 2011

Photo 8: View of water leaving the project boundary, passing over the Woodside II Dam. Water contains an unusually heavy sediment load. Much of the sediment load is from upstream of Woodside I. It represents scour of residual sediment left in the river channel after dredging was terminated and erosion of the floodplain banks exposed after the dam was removed.
Photo taken March 17, 2011.

KESTREL HORIZONS
www.kestrelhorizons.com
GREENVILLE
84 Villa Rd, Suite 300
Greenville, SC 29615
Phone: (864) 288-6353
CHARLESTON
1876 Wallenburg Blvd
Charleston, SC 29407
Phone: (843) 769-4449

Date Created: 03/28/2011

Aerial Source: Bing Maps

Project #: XXXX-XXX.XX

Floodplain Sediment Sample Location and PCB Results Map (Feb. 19, 2011)

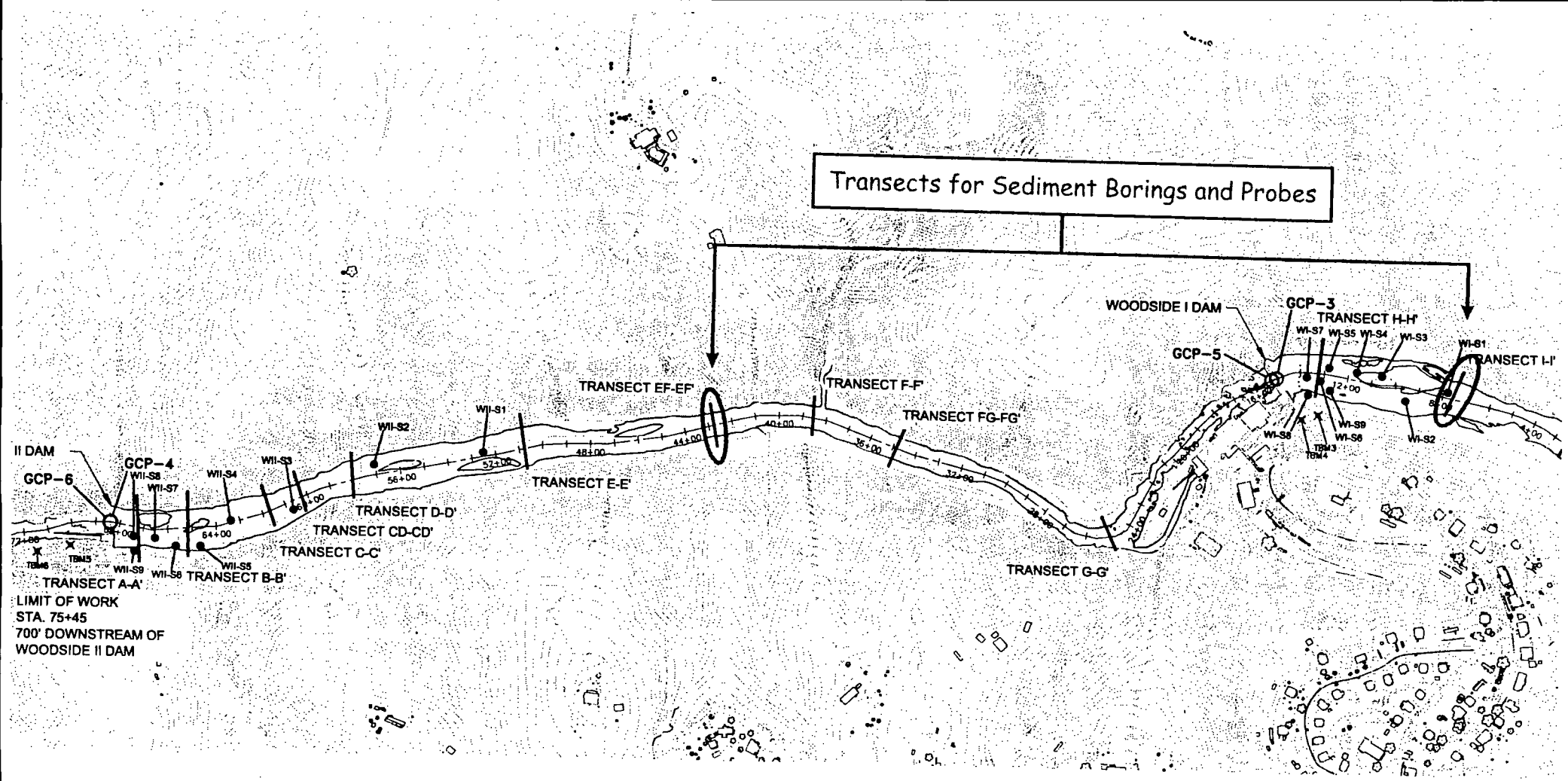
Twelve Mile River - Cateechee, South Carolina

Created By: AMF, WAS

Prepared By: AMF, WAS

Checked By: WAS, HHM

FIGURE 1



eview
uction

LEGEND:

GCP-1 ○ GRADE CONTROL POINT AS SPECIFIED IN THE CONSENT DECREE (SEE TABLE 3, DRAWING G-101)

EXISTING GRADE CONTOUR

PROPERTY LINE

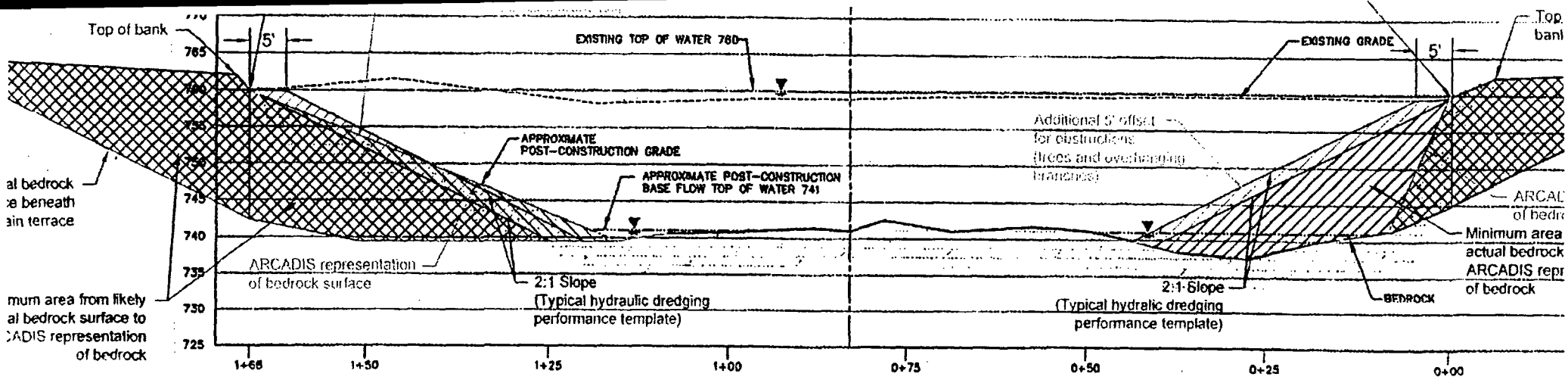
2007 KESTREL TRANSECT LOCATION

● WII-S1 2005 KESTREL BORING

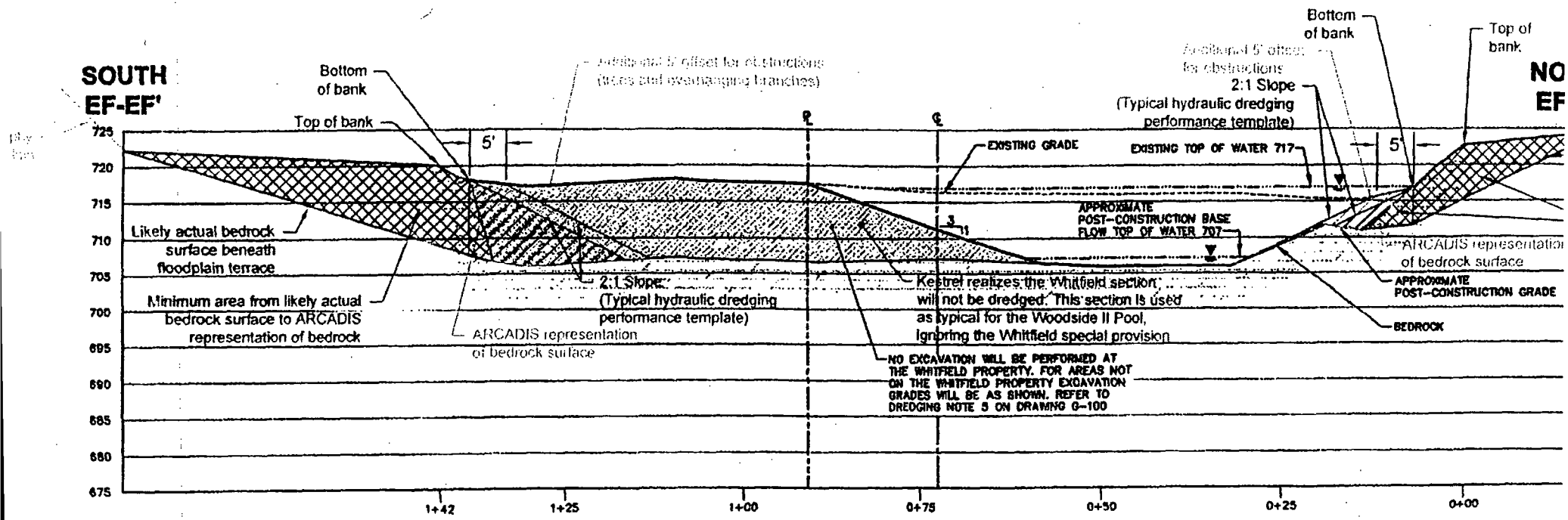
✕ TBM1 TEMPORARY BENCHMARK

SION

Selec



Section I
(Upper pool typical cross-section)



Section EF
(Lower pool typical cross-section)

or obstructions with Calculation)
:1 slope from irface
edment area from

ESTIMATED VOLUME CALCULATIONS FOR FLOODPLAIN SEDIMENTS

UPPER POOL - SECTION I

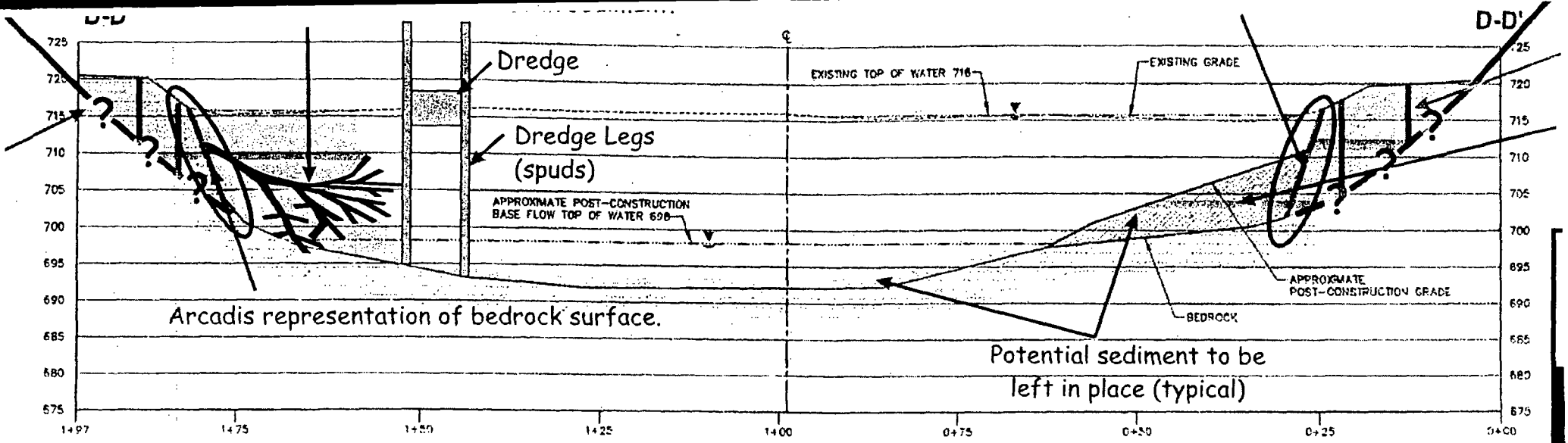
BANK	MIN. CROSS-SECTIONAL AREA (SF)	MAX. CROSS-SECTIONAL AREA (SF)	LENGTH OF POOL	MINIMUM VOLUME (CY)	MAXIMUM VOLUME (CY)
SOUTH	927	976	2345	80512	84767
NORTH	393	793	2345	34133	68874

SOUTH CAROLINA
KESTREL HORIZONS, LLC

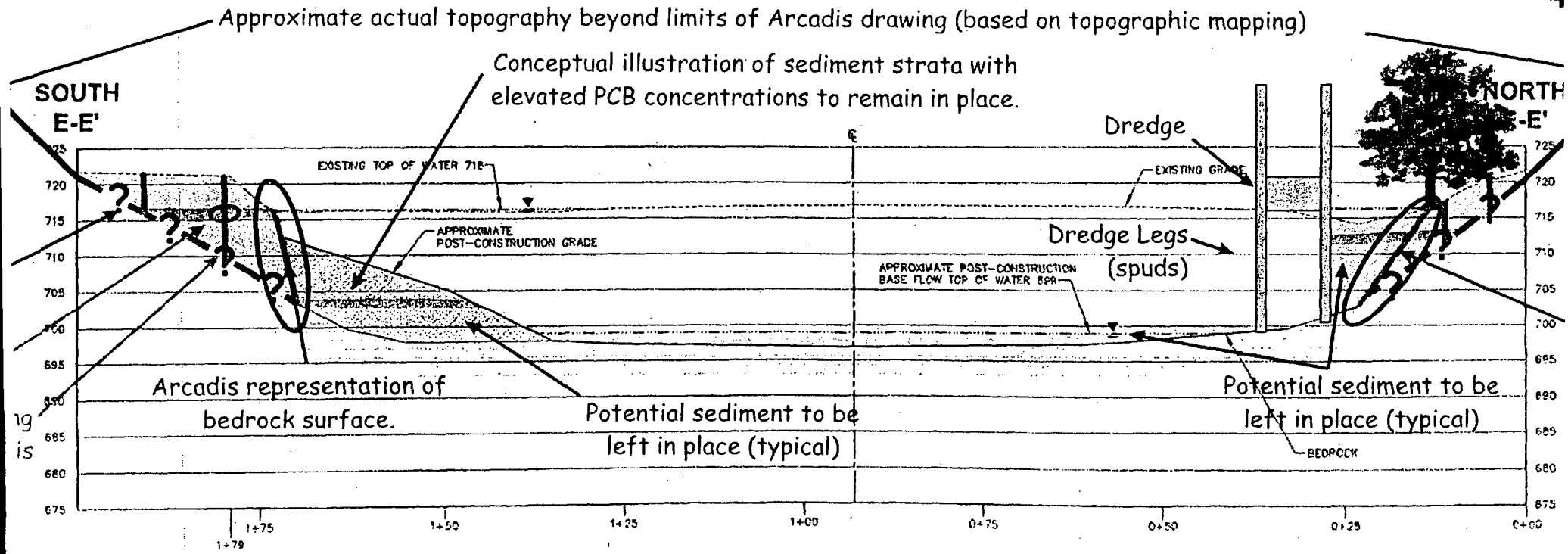
SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
NO. 17697

NOTES:

1. Approximate actual topography beyond lin mapping.
2. Cross-sections taken from review drawing: CREEK/LAKE HARTWELL PCB CONTAM RESTORATION - FINAL DESIGN REPOR



SECTION D-D' STA 58+02



SECTION E-E' STA 50+77