

**EXPLANATION OF SIGNIFICANT DIFFERENCE**  
**to the**  
**Final Record of Decision**  
**Sangamo Weston, Inc./Twelve Mile Creek/Lake Hartwell Superfund Site**  
**Operable Unit Two**  
**September 2009**

**I. INTRODUCTION AND STATEMENT OF PURPOSE**

This Explanation of Significant Differences (ESD) has been prepared to document a significant change to the June 1994 Final Record of Decision (ROD) for Operable Unit Two (OU2) of the Sangamo Weston, Inc./Twelve Mile Creek/Lake Hartwell PCB Contamination Superfund Site ("the Site") located in Pickens, Pickens County, South Carolina. Among other components, the OU2 ROD required regular flushing of sediments trapped behind three impoundments on Twelve Mile Creek (12MC) to facilitate burial of contaminated sediments further downstream while mitigating adverse impacts to Lake Hartwell water quality. In May 2006, State and Federal Natural Resource Trustees (NRTs) reached a natural resource damage settlement agreement with Schlumberger Technology Corporation (Schlumberger) via a Consent Decree (Natural Resource Damages Settlement CD) entered in Federal Court. The settlement requires restoration and compensation for alleged injuries to natural resources due to PCB exposure and for alleged lost recreational fishing use due to fish consumption advisories. Ecological restoration projects include removal of the lower two hydroelectric impoundments on 12MC known as Woodside 1 (WS1) and Woodside 2 (WS2) and stream corridor restoration.

The removal of the WS1 and WS2 dams and the associated stream restoration activities are expected to provide significant ecological benefits for the lower reach of 12MC. Moreover, removal of the two dams is expected to complement the Remedial Action for OU2 because removal of the dams will allow unimpeded flow of sediments from the Easley-Central water supply reservoir to the 12MC Arm of Lake Hartwell, thus facilitating the natural capping of contaminated sediments downstream. Pursuant to the Natural Resource Damage Settlement CD, engineering design reports have been submitted by Schlumberger to the NRTs for review and approval. These reports have also been submitted to the United States Environmental Protection Agency (EPA). Mobilization for the initial phase of WS1 and WS2 dam removal is anticipated by the 4<sup>th</sup> Quarter of 2009. This ESD is written to incorporate into the selected remedy all activities necessary to facilitate WS1/WS2 dam removal and regular flushing of sediments from the Easley-Central dam into the 12MC Arm of Lake Hartwell, thereby enhancing the performance of the remedy for Sangamo OU2.

As the lead regulatory agency of this Superfund Site, the Region 4 EPA is issuing this ESD pursuant to public participation requirements specified in Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Section 300.435(c)(2)(i) of the National Contingency Plan (NCP). The South Carolina Department of Health and Environmental Control (SCDHEC) is the support agency of this Site. This ESD will become part of the Administrative Record for the site pursuant to NCP Section 300.825(a)(2). The Administrative Record for this Site is available for public review at the



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locations listed below. Site information can also be found at [www.epa.gov/region4/waste/npl/nplsc/sangamsc](http://www.epa.gov/region4/waste/npl/nplsc/sangamsc)

- EPA Region 4 Records Center, Sam Nunn Atlanta Federal Center;
- Pickens County Library; Easley, South Carolina;
- Hart County Library; Hartwell, Georgia; and
- Clemson University R.M. Cooper Library; Clemson, South Carolina.

## II. SITE HISTORY AND THE SELECTED REMEDY

Sangamo Weston manufactured capacitors and other related electrical components from 1955 until 1987 when the business was sold. The plant used a variety of dielectric fluids in the manufacturing processes, including fluids that contained polychlorinated biphenyls (PCBs). Waste disposal practices included land burial of off-specification capacitors and wastewater treatment sludge on the 220 acre plant site and six satellite disposal areas. The satellite disposal areas are generally within a 3-mile radius of the plant site and are referred to as the Nix, Dodgens, Welborn, Cross Roads, John Trotter, and Breazeale sites. PCBs were discharged with effluent directly into Town Creek, a tributary of 12MC, which is in turn a major tributary of Lake Hartwell. Lake Hartwell was created between 1955 and 1963 when Hartwell Dam was constructed by the U.S. Army Corps of Engineers on the upper Savannah River. At the normal pool level of 660 feet MSL, Lake Hartwell is 56,000 acres in size with a shoreline of 962 miles.

Between 1955 and 1977, the average quantity of PCBs received and used at the plant ranged from 700,000 to 2,000,000 lbs/yr. An estimated 3% of the quantities received and used at the plant were discharged to Town Creek, resulting in an estimated cumulative discharge of over 400,000 lbs. of PCBs. An unspecified amount was buried at the six satellite disposal areas and the Plant site. PCB use was terminated at the plant in 1977, prior to an EPA ban of its use in January 1978. A fish consumption advisory for Lake Hartwell was first instituted in 1976. This advisory has been modified many times, and remains in effect.

The Sangamo Site was proposed to the National Priorities List (NPL) in January 1987, and became Final on the NPL in February 1990. As a result of a merger with Sangamo Weston, the responsible party for the Sangamo Site became Schlumberger Industries, Inc. The Site was divided into two Operable Units (OUs). Operable Unit One (OU1) includes the land-based source areas which comprise the plant site and six satellite disposal areas. Schlumberger conducted the OU1 RI/FS pursuant to the terms of a June 1987 Administrative Order on Consent (AOC). The Record of Decision (ROD) for OU1 was issued by EPA in December 1990. Schlumberger performed the Remedial Design and Remedial Action at OU1 pursuant to the terms of an April 1992 Consent Decree with EPA. Remedial Action construction was completed at OU1 in August 1999. The OU1 remedy generally involved the following components:

- Excavation of PCB impacted soils and debris from the satellite dump sites and the Plant site to residential (1 to 10 mg/kg) and industrial (< 25 mg/kg) cleanup levels, respectively. All excavated material was stockpiled on the Plant site for treatment by low temperature thermal desorption.

Approximately 60,000 tons (e.g. 40,000 cubic yards) of PCB impacted material was treated via thermal desorption on the Plant property from December 1995 through May 1997. All soil was treated to meet the established Performance Standard of  $\leq 2$  mg/kg PCBs.

Installation of groundwater recovery and treatment systems at the Breazeale and Plant sites to address VOC and PCB contamination. The remediation system at the Breazeale site was started in June 1997. The remediation system at the Plant site was started in November 1998. Collectively, the two systems have recovered 325 million gallons of groundwater, and removed  $> 1500$  pounds of chlorinated solvents and  $\approx 17$  pounds of PCBs.

The first Five-Year Review for OU1 was completed in September 2005. As a result, several residual VOC/PCB source investigations and pilot scale treatability studies have been conducted at the Breazeale and Plant sites. A ROD Amendment for the Breazeale site is anticipated by September 2009. The ROD Amendment changes the Breazeale groundwater remedy from "pump-and-treat" to In-Situ Chemical Oxidation (ISCO) using potassium permanganate. The second Five-Year Review for OU1 is scheduled for completion by September 2009.

Operable Unit Two (OU2) includes the sediment, surface water, and biological migration pathways downstream from the land-based PCB source areas. EPA conducted the RI/FS for OU2 from 1990 – 1994. The ROD for OU2 was issued by EPA in June 1994. The OU2 remedy is Monitored Natural Recovery (MNR) of low-level, widespread PCB impacted surficial sediments in approximately 730 acres of the 12MC Arm of Lake Hartwell. The OU2 remedy was implemented by Schlumberger via a September 1998 Unilateral Administrative Order (UAO) with EPA. The major components of the OU2 remedy include:

- Continuation of the existing fish consumption advisory on Lake Hartwell;
- Implementation of a public education program to increase the awareness of the advisory and methods to prepare/cook fish to reduce the quantity of contaminants consumed;
- Continued monitoring of aquatic biota and sediment for trend analysis and to support the fish consumption advisory; and
- Regular flushing of sediments trapped behind the three impoundments on 12MC to facilitate burial of contaminated sediments further downstream while mitigating adverse impacts to Lake Hartwell water quality.

The fish consumption advisory on Lake Hartwell was recently revised by Georgia and South Carolina. In April 2009, approximately 80 new advisory signs were posted at public access areas in both states. The advisory states: 1) Do not eat any fish from the 12MC and Seneca River Arms of Lake Hartwell; 2) Do not eat any hybrid or striped bass from all of Lake Hartwell; 3) Do not eat more than one meal a month of largemouth bass or catfish from the remaining waters of Lake Hartwell; and 4) In the Tugaloo Arm of Georgia, unlimited consumption of black crappie is allowed. The public education program was conducted between 1998 and 2000 and consisted of brochure distribution and telephone surveys. Responses to the

program generally indicated a high level of awareness and understanding of the fish consumption advisories.

Annual monitoring of aquatic biota (forage fish, *corbicula*, game fish) and sediments has been conducted in the Spring of each year since the 1994 ROD. EPA's Office of Research and Development (ORD) conducted three phases of investigation from 2001 to 2003 to gain a better understanding of natural mechanisms that contribute to the recovery of PCB contaminated sediments. These investigations developed and evaluated physical, chemical and biological tools and approaches for measuring the short and long term performance of MNR remedies. PCB surficial sediment concentrations have decreased steadily due to physical processes such as burial, mixing/dispersion and dechlorination. In 2008, PCB concentrations in surficial sediments of the 12MC Arm of Lake Hartwell were below or near the 1 mg/kg cleanup level. PCB fish tissue concentrations for largemouth bass, channel catfish, and hybrid bass have not responded measurably to the reductions in sediment concentrations. However, PCB concentrations in fresh water clams (e.g. *corbicula*) in 12MC have declined by more than an order of magnitude, from 10.1 mg/kg in 1995 to 0.25 mg/kg in 2009.

The dam farthest upstream, which is owned by the Easley-Central Water District and used for raw water storage, is equipped with high flow sluice gates that are used periodically and effectively to flush sediment through the dam to downstream areas. Historically, sediment was flushed from the sluice gates of WS1 and WS2 when sediment accumulations began to interfere with hydropower generation. Sediment flushing events during low flow periods in 1984 and 1993 were documented to have adverse impacts on water quality, stream habitat and in some instances resulted in fish kills. In lieu of sediment sluicing, EPA has evaluated and implemented many sediment management alternatives for the WS1 and WS2 impoundments over the years. In response to the 1993 sluicing event, automated trash rack rakes were installed in front of the intake structures to slurry accumulated sediment through the turbine and pen stock. By September 1997, this option was no longer feasible due to abrasion and damage to the turbine shaft and bearings.

In March 1998, Schlumberger completed an analysis of feasible sediment management alternatives that included: 1) Installation of high flow sluice gates on the back side of WS1/WS2; 2) Purchase and removal of the WS1/WS2 facilities by Schlumberger; and 3) Hydraulic dredging of accumulated sediment over the WS1/WS2 dams. In October 1998, dredging was first initiated at the WS1 and WS2 impoundments via a Nationwide Permit No. 38 from the U.S. Army Corps of Engineers. A portable cutterhead dredge, suction pump, and flexible 8-inch discharge line was used to pass material from the respective head pools to the downstream tail race. The general objective of hydraulic dredging as a sediment management plan was to maintain a 15-20 foot depth in front of the intake structures by periodically removing 5,000 to 10,000 cubic yards of sediment per event. Hydraulic dredging was conducted again in July 1999, January 2001 and February 2002. Periodic hydraulic dredging at WS1/WS2 eventually ceased due to concerns from local residents and the NRTs regarding localized sediment accumulations near Lay Bridge (e.g. downstream of WS2) and associated impacts to benthic communities and aquatic plants. Hydropower generation ceased at WS1 in July 2003, and at WS2 in September 2003, due to excessive sediment accumulation in the head pools.

In September 2004, the first Five-Year Review for OU2 was completed. As part of this process, EPA proposed to retrofit the back side of WS1/WS2 with high flow sluice gates (e.g. Option 1 from March 1998 evaluation above) to facilitate transport downstream at an estimated capital cost of approximately \$300,000 per dam. Due to ongoing Natural Resource Damage Assessment (NRDA) discussions with Schlumberger, the NRTs asked EPA to postpone capital improvement projects to WS1/WS2. The September 2004 Five Year Review for OU2 stated, *"EPA fully supports the dam removal concepts envisioned in the NRDA settlement as it represents the most permanent solution to ensuring natural sediment transport to the 12MC Arm of Lake Hartwell. EPA continues to monitor the progress of the NRDA settlement, and if an agreement is reached, EPA plans to issue an ESD to the ROD that would allow dam removal and stream corridor restoration to move forward. If removal of WS1 and WS2 is not included in the NRDA settlement for whatever reason(s), EPA will direct Schlumberger to install high flow sluice gates."* Schlumberger subsequently completed the Natural Resource Damages Settlement and acquired the WS1/WS2 facilities for purposes of removal pursuant to that Settlement.

### III. BASIS FOR THE DOCUMENT

EPA is issuing this ESD under CERCLA to incorporate into the selected remedy the activities necessary to facilitate WS1/WS2 dam removal and subsequent stream restoration, all of which will facilitate the long-term movement of clean sediment into the 12MC Arm of Lake Hartwell, and thereby enhance the Superfund remedy for Sangamo OU2. EPA will continue to support the WS1/WS2 dam removal and associated 12MC stream corridor restoration project as warranted. EPA will also continue to work with the Easley Central Water District to develop and implement a set of best management practices to ensure that sediment passage at the Easley Central dam meets the objectives of the Sangamo OU2 remedy.

### IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

Engineering design reports required by the Natural Resource Damage Settlement CD have been submitted by Schlumberger to the NRTs for review and comment. All engineering plans and reports will also be submitted to EPA for review. As stated in the Natural Resource Damage Settlement CD, the overall design goals for the WS1/WS2 dam removal project are:

- Dredge and remove sediment behind the WS1 and WS2 dams;
- Properly dispose of sediment generated during dredging operations;
- Remove WS1 and WS2 dams and use natural channel design to re-establish the free-flowing channel through the dam removal section;
- Re-establish aquatic habitat of a free-flowing stream (including re-exposure of coarse substrates);

- Provide for bank stabilization and tributary stability where landowner access has been granted;
- Provide for enhanced fish passage;
- Re-establish native vegetation where appropriate; and
- Improve recreational opportunities.

Pursuant to the schedule established at the July 7, 2009 status hearing regarding the implementation of the Natural Resource Damage Settlement CD, Schlumberger submitted its Revised Preliminary Design Report (Arcadis, 2009) to the Federal District Court, receivers appointed by the Federal District Court, and the NRTs on July 31, 2009. The Final Design Report (FDR) is to be submitted by August 31, 2009.

The on-site response activities of the modified remedy will include the following steps. Construction will be performed by removing, dewatering, and disposing of sediment from both impoundments, followed by removal of the WS1 and WS2 dams. The overall sequence is summarized below and is based on the restoration goals and objectives, as well as the available pre-design investigations:

- Prepare site and construct/open an upland Sediment Management Unit (SMU) proximate to the site;
- Remove sediment upstream of WS1 and WS2 to facilitate dam removal and transport sediment to SMU;
- Remove WS1 and WS2 dams;
- Allow a natural stream to establish itself within former impoundments, and grade, protect or remove sediment as needed to establish stable banks; and
- Complete restoration activities and close SMU.

Sediment will be hydraulically dredged from the WS1 and WS2 impoundments and pumped to a dewatering area at the SMU. Mechanical dredging may also be used if necessary in certain areas and to remove debris. Final disposal of the dredged sediments will be at the SMU and will be consistent with all applicable or relevant and appropriate requirements (ARARs) of State and Federal laws. Further details, including construction drawings for the dredging, dewatering and disposal in the SMU and for the dam removal and stream restoration activities will be provided in the FDR.

The modified remedy promotes the continued natural burial of contaminated sediment as provided in the ROD by allowing the unimpeded flow of sediments from the Easley-Central water supply reservoir and areas below the Easley-Central dam to the 12MC Arm of Lake Hartwell. In addition, the modified remedy will continue to mitigate adverse impacts to 12MC

and Lake Hartwell water quality, as discussed in the ROD. At the same time, the modified remedy will reduce the administrative burden on EPA of regulating three impoundments to achieve the controlled release of captured sediments. Given the large quantity of sediment to be removed from behind WS1 and WS2 dams and the low levels of PCBs potentially present in such sediments, placement of the sediment in an upland SMU proximate to the Site consistent with ARARs is protective of human health and the environment and cost-effective. The contemplated dredging, dam removal, and sediment management methods all use readily available technologies and are implementable. As indicated by the NRTs, removal of the dams and stabilization/restoration of the stream corridor are expected to provide significant ecological benefits for the lower reach of 12MC.

#### V. SUPPORT AGENCY COMMENTS

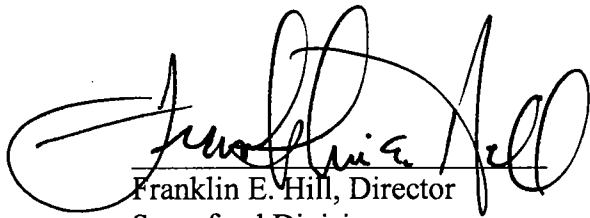
SCDHEC has reviewed this ESD and documentation which provides the rationale and justification for removal of the WS1 and WS2 hydroelectric impoundments on 12MC. As the support agency for this Site and as a State NRT, SCDHEC concurs with the issuance of this ESD.

#### VI. STATUTORY DETERMINATIONS

Pursuant to the requirements of CERCLA Section 121, the modified remedy for Sangamo OU2 is protective of human health and the environment, complies with applicable or relevant and appropriate requirements, is cost-effective and utilizes permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable, as discussed in the ROD.

#### VII. PUBLIC PARTICIPATION COMPLIANCE

Pursuant to the public participation requirements set forth in NCP Section 300.435(c)(2)(i), this ESD and other supporting documentation will be placed in the Administrative Record locations referred to in Section I above for public review. A notice will be published in a local newspaper of general circulation to summarize the ESD and reasons supporting the modified remedy.

  
Franklin E. Hill, Director  
Superfund Division  
US EPA Region 4

9/03/09  
Date