Superfund Program
Proposed Plan

Sangamo-Weston, Inc./Twelve Mile Creek/Lake Hartwell PCB Contamination

USEPA ID: SCD003354412 OU-01 Pickens, South Carolina
Operable Unit 1(OU-1) – Breazeale Site

Region 4

USEPA Announces Proposed Plan

This Proposed Plan identifies an amendment to the remedial alternative selected in the 1990 Record of Decision (ROD) for cleaning up contaminated groundwater in portions of Operable Unit 1 (OU-1) of the Sangamo Weston, Inc./Twelve Mile Creek/Lake Hartwell PCB Contamination Superfund Site. This Plan specifically addresses one of the satellite locations, Breazeale Site, which is part of OU-1 (Figure 1). In addition, this Plan summarizes alternatives that were evaluated as part of recommendations by United States Environmental Protection Agency (USEPA) in the first five year review for the site along with pilot studies conducted for portions of OU-1. This document is issued by the USEPA, the lead agency for site activities, and the South Carolina Department of Health and Environmental Control (SC DHEC), the support agency. USEPA, in consultation with SC DHEC, will review and consider all information submitted during the 30-day public comment period prior to finalizing the amendment to the 1990 ROD for OU-1. USEPA, in consultation with SC DHEC, may modify the recommended Alternative or select another response action based on new information or public comments. Therefore, the public is encouraged to review and comment on the alternative modifications presented in this Proposed Plan.

USEPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 300.43 (f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information that can be found in greater detail in the documents contained in the Administrative Record files for this site. USEPA and the State encourage the public to review these documents to gain a more comprehensive understanding of the site and Superfund activities that have been conducted at the site.

Dates to remember:

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:

The public comment period runs for 30 days, and will begin on July 6, 2009 and run through August 5, 2009.

USEPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING:

USEPA will hold a public meeting on Thursday, July 9, 2009 to explain the Proposed Plan for OU-1. Oral and written comments will also be accepted during this meeting. The meeting will be held from 7 to 8:30 PM at Pickens County Auditorium located at: Pickens County Administration Facility; 222 McDaniel Avenue; Pickens, SC 29671.

For more information, see the Administrative Record at the following locations.

- Pickens County Library, Easley, SC
- Hart County Library, Hartwell, GA
- R.M. Cooper Library, Clemson University, Clemson, SC
- USEPA Records Center, Region 4, Atlanta, GA

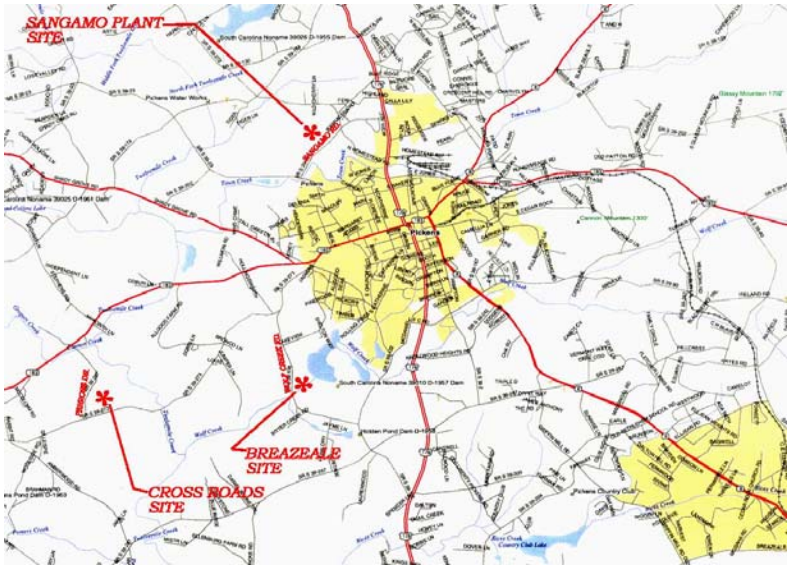
Additional site information can also be located at www.epa.gov/region4/waste/npl/nplsc/sangamsc.htm

Site History

Sangamo-Weston owned and operated a capacitor manufacturing plant near Pickens, South Carolina. The plant began operation in 1955 and manufactured capacitors and other related electrical components until the business was sold in 1987. Some of the capacitors used a dielectric fluid, which contained polychlorinated biphenyls (PCBs). The use of PCBs was discontinued at the plant in 1977.

As part of the manufacturing process, all capacitors were inspected and tested. The capacitors that failed to meet quality control criteria were discarded along with other process and non-process solid wastes. These solid wastes

Figure 1 Site Location



were disposed of in several locations on the plant property and at six sites remotely located off the plant property. The Breazeale site was one of the six remote sites.

The Breazeale Site is approximately seven acres in size and is located approximately one mile south-southwest of Pickens, South Carolina, on Wolf Creek School Road. Wolf Creek borders the site to the south. The south and southwest portion of the site are located within the floodplain of Wolf Creek.

The site was proposed for inclusion on the National Priorities List (NPL) in January 1987 and was finalized on the NPL in February 1990. As a result of a merger with Sangamo-Weston, Schlumberger Technology Corporation (Schlumberger) became the responsible party for the site. On June 18, 1987, Sangamo-Weston (Schlumberger) and USEPA Region 4, signed an Administrative Order on Consent (AOC) that specified actions to assess the nature and extent of waste constituents in soils and groundwater at the Plant Site and the six remote sites resulting from the waste disposal activity. Schlumberger conducted the RI/FS from 1987 to 1988. USEPA issued a Record of Decision (ROD) in December 1990.

Specifically for Breazeale Site, the ROD specified remediation of soils by means of thermal desorption to remove PCBs. Soil remediation was completed at the Breazeale site in 1994. A groundwater recovery and treatment system was installed at the Breazeale Site to address volatile organic compounds (VOCs) in the groundwater underlying this parcel. The groundwater remediation systems at the Breazeale Site started up in June 1997. The first five year Review Report for the Sangamo OU-1 site was finalized in September 2005. USEPA along with Schlumberger worked to implement the recommendations from these remedy effectiveness evaluations. Specifically, residual VOC source investigations were conducted at the Breazeale Site to identify contaminant mass that may be contributing to the need for the long term pump-and-treat strategy.

Pilot testing of two *in situ* oxidation technologies, ozone sparging and potassium permanganate injections, were conducted in 2007. The ozone sparging pilot produced reductions in VOC concentrations in only three of the ten monitoring points. Results from this effort indicate potassium permanganate was more effective at reducing VOCs below clean-up goals.

Evaluation of the potassium permanganate pilot proved that this technology was persistent and continued reduction of VOCs were observed over one year following completion of the injections. The radius of influence of the permanganate injection(s) appeared to be approximately 30 feet for one year following the injections. Overall comparisons of both technologies indicated that permanganate injection would be the more effective of the two *in situ* oxidation technologies piloted to accomplish reduction of the VOCs

Scope and Role of the Action

This action for OU-1 serves as an amendment to the 1990 Remedial Action Objectives (RAOs). The RAOs for OU-1 are to prevent current and future exposure to contaminated media by treatment of contaminated groundwater. Through the use of treatment technologies, this response will accelerate reduction of toxicity, mobility and volume of those source materials at the site.

Summary of Site Risks

A baseline risk assessment was conducted as part of the RI/FS to evaluate the current and potential future effects of contaminants on human health and the environment. The primary media of concern is groundwater. Although drinking water wells are not currently within or nearby the site, the potential for future consumption of groundwater was considered in the ROD. Groundwater has been compared to appropriate health-based standards since remediation begin in 1994.

Groundwater concentrations of Tetrachloroethene (PCE) range from non detect to 0.74 ppm. Concentrations of Trichloroethene (TCE) range from non detect to 1.7 ppm. These VOCs are evaluated by comparing to the groundwater concentrations to current drinking water standards or maximum contaminant levels (MCLs). The MCL for both TCE and PCE is 0.005 ppm.

Summary of Remedial Alternatives

Approximately 24,000 cubic yards of capacitor debris and impacted soil were removed from the Breazeale Site in the early 1990s. Impacted soil was relocated and treated on the Sangamo Plant Site property by means of Thermal desorption. Capacitor debris was disposed of at a hazardous waste landfill in Emelle, Alabama

Since 1997, a groundwater recovery and treatment system has been in operation at the Breazeale Site as a permitted facility (National Pollutant Discharge Elimination System [NPDES] Permit No. SC0047198). System startup began June 30, 1997.

The groundwater remediation system at the Breazeale Site consists of nine groundwater recovery wells divided into two well fields.

Well field 2 consists of four recovery wells (EW-201 through EW-204) and is located in the area with the highest constituent concentrations found during the RI. Well Field 1 consists of five recovery wells (EW-101 through EW-105) and is located south of the downgradient end of the plume adjacent to Wolf Creek.

The remediation system was started on June 30, 1997 and as of February 28, 2009 has extracted 116,298,500 gallons of groundwater. Approximately 84 pounds of chlorinated solvents have been removed since system startup.

For implementation of the new alternative, approximately 54,000 gallons of permanganate solution would be injected at the site. Potassium permanganate injections would target areas of the plume with concentrations of PCE and TCE exceeding 0.04 mg/L and 0.15 mg/L, respectively. Groundwater modeling efforts have demonstrated that by focusing the injections in the portion of the plume exceeding these concentrations, surface water quality criteria for PCE and TCE in Wolf Creek (0.00069 mg/L and 0.0025 mg/L, respectively) will not be exceeded. Injection of potassium permanganate will take place at 30 injection points (Figure 2).

Groundwater will be monitored at the site on a regular basis to assess plume response to the injection activities. Groundwater extraction and treatment at the Breazeale Site will be suspended upon implementation of this alternative.

Evaluation of Alternatives

Nine criteria were used to evaluate the new proposed remedial alternative and the original alternative individually and against each other for selection of a remedy. The section of the Proposed Plan profiles the relative performance of the preferred remedy against the nine criteria. The purpose of this analysis is to identify relative advantages and disadvantages of the new alternative. Table 1 identifies the proposed remedial action for the Breazeale Site and the original remedy from the 1990 ROD and serves as a basis for comparison to the NCP criteria. A brief description of the NCP evaluation criteria is presented below.

NCP EVALUATION CRITERIA

Threshold Criteria

- Overall Protection of Human Health and Environment – Assessment of the degree to which the cleanup alternative eliminates, reduces, or controls threats to public health and the environment.
- Compliance with ARARs – An evaluation of whether or not the alternative complies with all other state and federal regulations – environmental or otherwise.

Primary Balancing Criteria

- Long-term Effectiveness and Permanence – The cleanup alternative is evaluated in terms of its ability to maintain reliable protection of human health and the environment over time once the cleanup goals have been met.
- Reduction of Toxicity, Mobility, or Volume – An evaluation of how well a cleanup alternative reduces the harmful nature of the chemicals; the ability of the chemicals to move from the site into the surrounding area; and the amount of contaminated material.
- Short-term Effectiveness – The length of time needed to implement a cleanup alternative is considered. This criteria also assesses the risks that carrying out the cleanup alternative may pose to workers and nearby residents.
- Implementability – An assessment of how difficult the cleanup alternative will be to construct and operate, and whether the technology is readily available.
- Cost – A comparison of the costs of each alternative. Includes capital, operations, and maintenance costs.

Modifying Criteria

- State Acceptance – USEPA takes into account whether or not the state agrees with the recommended alternative and considers comments from the state on the RI/FS Reports and Proposed Plan.
- Community Acceptance– USEPA considers the comments of local residents on the recommended alternative presented in the Proposed Plan and RI/FS Reports.

TABLE 1
BREAZEALE SITE NCP COMPARISON SUMMARY

DESCRIPTION	SELECTED REMEDIAL ALTERNATIVE IN 1990 ROD	RECOMMENDED ALTERNATIVE NO. 1
	GROUNDWATER – EXTRACTION AND TREATMENT BY AIR STRIPPING AND/OR CARBON ADSORPTION OF CONTAMINATED GROUNDWATER	**DIRECT-PUSH INJECTIONS OF POTASSIUM PERMANGANATE**
1. Overall Protection of Human Health and Environment	**Groundwater** – reduces mass and volume of impacted groundwater - may not meet clean-up goals in short time frame	▪ Returns aquifer to intended use as drinking water aquifer in relatively short time frame (approximately 7-10 years) ▪ Reduces mass and volume of impacted groundwater which will prevent exposure beyond property boundary of site. ▪ Spill of permanganate is not anticipated or likely.
2. Compliance with ARARs	**Groundwater** – Extraction and treatment alternative complies with ARARs – may not meet clean-up goals in short time frame	▪ Direct push injections of potassium permanganate should reduce VOC concentrations in groundwater within 2 years following the completion of injections. This reduction will provide short and long term improvement in water quality. ▪ This alternative complies with ARARs

TABLE 1
BREAZEALE SITE NCP COMPARISON SUMMARY

DESCRIPTION	SELECTED REMEDIAL ALTERNATIVE IN 1990 ROD GROUNDWATER – EXTRACTION AND TREATMENT BY AIR STRIPPING AND/OR CARBON ADSORPTION OF CONTAMINATED GROUNDWATER	RECOMMENDED ALTERNATIVE NO. 1 DIRECT-PUSH INJECTIONS OF POTASSIUM PERMANGANATE
3. Long-term Effectiveness and Permanence	**Groundwater** – Extraction and treatment – effective once clean-up goals are met. Time frame to clean-up goals anticipated to be longer than other alternative	▪ Potassium Permanganate is a relatively strong oxidant. VOC concentrations will be reduced to levels protective of surface water standards. ▪ The remedy is flexible as additional injection points can be added as aquifer response is assessed. ▪ Potassium permanganate is an indiscriminant oxidant that oxidizes any organic source. Permanganate would be dosed at rates lower than the natural oxidant demand of the aquifer. Therefore, injecting permanganate into the impacted aquifer is not anticipated to have a negative effect on aquifer recovery. The aquifer is expected to return to its designated use as a drinking water aquifer.
4. Reduce Toxicity, Mobility, or Volume Through Treatment	**Groundwater** – Extraction and treatment – provides a reduction of volume, may not be as effective in preventing mobility.	▪ Direct push of potassium permanganate will reduce the concentration and volume of impacted groundwater. ▪ Permanganate injections will return aquifer to designated use as a drinking water aquifer in a relatively short period of time (7-10 years). This time period for remediation is less than the time period required for the plume to migrate off the site. ▪ The mass of potassium permanganate injected into the aquifer is less than the oxidant demand of the plume minimizing the risk of permanganate migrating off the site or to a surface water.
5. Short-term Effectiveness	**Groundwater** – Extraction and treatment – no short-term risks to workers and residents, alternative not successful in meeting clean-up criteria in the short term	▪ Reduces concentrations of VOCs and volume of impacted groundwater in relatively short time period (~2 years). Returns aquifer to designated use in approximately 7-10 years. ▪ Exposure of workers to impacted groundwater during injection activities. ▪ Risks of using potassium permanganate (strong oxidant). ▪ A spill of permanganate is not anticipated or likely; however, it could reach surface water and adversely effect the aquatic environment.
6. Implementability	**Groundwater** – Extraction and treatment – implementable	▪ A pilot test using permanganate was conducted in 2007, which proved the oxidants effectiveness at reducing VOC concentrations in groundwater. ▪ Proven technology that has been implemented at numerous sites with VOC contaminated groundwater successfully. ▪ Full-scale injections would be completed in 2009
7. Cost	**Groundwater** – Extraction and treatment – costs were presented in the original ROD for the entire OU-1 site	▪ $1.1 MM to $1.5 MM

TABLE 1
BREAZEALE SITE NCP COMPARISON SUMMARY

DESCRIPTION	SELECTED REMEDIAL ALTERNATIVE IN 1990 ROD	RECOMMENDED ALTERNATIVE NO. 1
	GROUNDWATER – EXTRACTION AND TREATMENT BY AIR STRIPPING AND/OR CARBON ADSORPTION OF CONTAMINATED GROUNDWATER	DIRECT-PUSH INJECTIONS OF POTASSIUM PERMANGANATE
8. State Agency Acceptance	**Groundwater** – Extraction and treatment by air stripping and/or carbon adsorption of contaminated groundwater was accepted by State agencies	▪ State agencies accepted the pilot studies and are in concurrence with the full-scale implementation
9. Community Acceptance	**Groundwater** – Extraction and treatment by air stripping and/or carbon adsorption of contaminated groundwater - accepted by community	▪ It is anticipated to be accepted by the community

Figure 2 Breazeale Site

Injection Site Locations

SUMMARY OF THE PREFERRED ALTERNATIVE

The Preferred Alternative for the Breazeale Site is *in situ* chemical oxidation with potassium permanganate. The groundwater alternative was selected over the original alternative identified in the 1990 ROD because it is expected to achieve substantial risk reduction through treatment of contaminants in the groundwater and prevent future exposure to groundwater within a reasonable time frame and less cost than the original remedial alternative. In addition, the remedy will be protective of surface water.

Injections of potassium permanganate at the Breazeale Site would reduce concentrations of TCE and PCE in a relatively short period of time when compared with continued groundwater extraction and treatment. This alternative would be protective of human health as it will return to aquifer to its designated use as a drinking water source in a relatively short period of time. The Groundwater MCL for PCE and TCE is 0.005 ppm. This alternative is also protective of surface water quality as it would not result in an exceedance of the surface water criteria for PCE (0.00069 mg/L) or for TCE (0.0025 mg/L).

Based on the information available at this time, USEPA and the State of South Carolina believe the Preferred Alternative would be protective of human health and the environment, would comply with ARARs, would be cost effective and would utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

COMMUNITY PARTICIPATION

USEPA and SC DHEC provide information regarding the cleanup of the Sangamo-Weston Superfund Site to the public through public meetings, the Administrative Record File for the site and announcements published in the Pickens County Sentinel and Greenville News Newspapers. Additional site information is available on the web at www.epa.gov/region4/waste/npl/nplsc/sangamsc.htm. USEPA and the State encourage the public to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted as the site. The dates for the public comment period, the date, location and time of the public meeting, and the locations of the administrative record files are provided on the front page of this Proposed Plan.

For further information on the Sangamo-Weston Site, please contact:

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GLOSSARY OF TERMS

Specialized terms used in this Proposed Plan are defined below:

Administrative order on consent (AOC) – an agreement between EPA and the PRP on response action terms and conditions..

Applicable or relevant and appropriate requirements (ARARs) – the Federal and State environmental laws that a selected remedy will meet. These requirements may vary among sites and alternatives.

Consent Decree – a legal document, approved by a judge, that formalizes an agreement between USEPA and one or more potentially responsible parties (PRPs) outlining the terms by which the response action will take place. A Consent decree is subject to a public comment prior to its approval by a judge, and is enforceable as a final judgment by a court.

Contaminant Plume – a column of contamination with measurable horizontal and vertical dimensions that is suspended in and moves with groundwater.

Groundwater – underground water that fills pores in soils or openings in rocks to the point of saturation. Groundwater is often used a source of drinking water via municipal or domestic wells.

National priorities list (NPL) – a list of the Nation's most contaminated sites requiring cleanup under the terms of CERCLA.

Polychlorinated biphenyls (PCBs) – are a class of organic compounds with 1 to 10 chlorine atoms attached to biphenyl, which is a molecule composed of two benzene rings. PCB's were widely used for many applications, especially as dielectric fluids in transformers and capacitors and coolants. Due to PCB's toxicity and classification as persistent organic pollutants, PCB production was banned by the United States Congress in 1976.

Tetrachloroethene (PCE) – PCE detected in groundwater at concentrations ranging from non detect to 0.74 ppm is a halogenated organic compound historically used for dry-cleaning fabrics and metal degreasing operations.

Potassium Permanganate – an inorganic chemical $KMnO_4$,, a water soluble salt consisting of equal mole amounts of potassium (K^+) and permanganate (MnO_4) ions. This salt is a strong oxidizing agent which attacks contaminants of concern in the groundwater. Potassium permanganate is a strong oxidant that does not generate toxic byproducts.

Record of Decision (ROD) – a part of the general remediation process for clean up of CERCLA sites. The ROD documents the specific clean up approach to be used and other details of the clean up process.

Safe Drinking Water Act Maximum Contaminant Level (SDWA MCL) – the maximum permissible level of a contaminant in water that is delivered to any user of a public water system.

Trichloroethene (TCE) – TCE detected in groundwater at concentrations ranging from non detect to 1.7 ppm is a halogenated organic compound historically used as a solvent and degreaser in many industries.

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for the Sangamo-Weston Site is important to USEPA. Comments provided by the public are valuable in helping USEPA select a final clean-up remedy for the site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by August 5, 2009. If you have any questions about the comment period, please contact Linda Starks at 404.562.8487 or through USEPA's toll-free number at 1.800.424.9346. Those with electronic communication capabilities may submit their comments to USEPA via Internet at the following email address: starks.linda@epa.gov.

Name: _____

Address: _____

City: _____

State: _____ **Zip:** _____

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