EXPLANATION OF SIGNIFICANT DIFFERENCE
to the
Final Record of Decision
Koppers Co., Inc. (Charleston Plant) NPL Site
Charleston, South Carolina
August 2001

I. INTRODUCTION AND STATEMENT OF PURPOSE

This Explanation of Significant Differences (ESD) has been prepared to document a significant change to the Ashley River remedy component as described in the April 29, 1998 Final Record of Decision for the Koppers Co., Inc. (Charleston Plant) Site located in Charleston, South Carolina. As the lead regulatory agency for this National Priorities List (NPL) Site, the Region 4 Office of the United States Environmental Protection Agency (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 for this Site.

The Final Record of Decision (ROD) for the Site selected enhanced sedimentation to cover impacted Ashley River sediments with clean sediments, thereby mitigating potential risks posed to benthic macroinvertebrates and upper trophic level receptors. The conceptual approach to enhanced sedimentation envisioned in the ROD involved capping impacted river sediments by increasing and accelerating natural sedimentation processes. Enhanced sedimentation was to be achieved by decreasing water velocities in the area of interest, resulting in increased deposition of the river's suspended sediment load. The ROD required modeling studies be conducted to determine the engineering structures to be utilized to optimize sediment deposition and predict sediment deposition rates within the area of interest.

During the Remedial Design phase, numerical sediment transport modeling was conducted to support identification and evaluation of enhanced sedimentation alternatives. The results of this modeling effort indicated that the established Performance Standards for the Ashley River sediments could best be achieved by the installation of a sheet pile barrier wall system around the area slated for remediation. However, geotechnical analysis for the structural design of the sheet-pile wall determined that installation would be technically challenging and cost prohibitive due to the steep slopes of the Ashley River channel and depth of soft sediments. Moreover, concerns related to existing derelict dock structures and operational issues of property owners along the Ashley River necessitated a change in the selected remedy for Ashley River sediments. Instead of enhanced sedimentation, an engineered subaqueous cap with a minimum thickness of 12 inches will be placed over the defined Ashley River Area of Potential Ecological Concern (APEC) to achieve the Performance Standards specified in the 1998 ROD.

This ESD document 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 EPA Region 4 Records Center, Atlanta Federal Center, 61 Forsyth Street, SW, Atlanta, GA 30303; and at the Charleston County Main Library, 68 Calhoun Street, Charleston, SC, 29401.

II. SITE HISTORY AND THE SELECTED REMEDY

The Site is approximately 102 acres in size and is located in the neck area of northern Charleston, SC on the west side of the peninsula formed by the Ashley and Cooper Rivers. The Site contains various commercial operations and is surrounded on the north, south and east by a mixture of industrial, commercial and residential properties. The Site is generally bounded on the north by Milford Street, on the south by Braswell Street, on the east by the King Street Extension, and on the west by the Ashley River. From 1940 to 1978, the Koppers Company operated at wood-treatment facility at the Site which primarily consisted of treating raw lumber, utility poles and cross-ties with creosote. Pentachlorophenol (penta) and copper chromium arsenate (CCA) were also used as wood preservatives for short periods of time. The majority of wood-treating operations were conducted in the eastern portion of the Site, now identified as the Former Treatment Area. This area contained various above ground structures including preservative storage tanks, pressure treating vessels and wastewater recovery equipment. Surface water run-off from the Site was directed through a series of ditches to the Ashley River and adjacent tidal marshes. Beazer East, Inc. of Pittsburgh, PA is the successor in interest to environmental liabilities of the former Koppers Company.

The Site was proposed to the NPL in February 1992 and became Final on the NPL in December 1994. In January 1993, a Site-wide Remedial Investigation/Feasibility Study (RI/FS) was initiated by Beazer East under an Administrative Order on Consent (AOC) with EPA. An Interim Action ROD was issued by EPA on March 29, 1995. The Interim Action ROD was a source control effort that involved several components designed to eliminate off-site migration of non-aqueous phase liquid (NAPL) via surface water conveyances and shallow groundwater in close proximity to the Former Treatment Area. Physical reconstruction and rehabilitation of the Milford Street and Hagood Avenue drainage systems was completed in 1997. Six shallow NAPL extraction wells installed along Milford Street and two intermediate NAPL extraction wells installed near the former pressure vessels continue to operate to meet the objectives of the Interim Action ROD.

The Final Site-wide remedy was issued by EPA in the ROD dated April 29, 1998. The ROD specified a multi-media response action to address surface/subsurface soil, sediments of drainage ditches, groundwater and NAPL, surface water, contaminant transport pathways, and sediments of the Ashley River, Barge Canal, and North/South/Northwest Tidal Marshes. The major components of EPA's selected remedy for this Site include:

- Excavation of the most heavily impacted surface/subsurface soils and drainage ditch sediments with subsequent off-site transport and disposal in an approved hazardous waste landfill;

- Placement of a protective engineered soil cover over relatively less impacted surface soils;
- Permanent reconstruction of on-site surface water conveyances;
- Recovery of groundwater/NAPL at three source areas to remove/treat NAPL to the maximum extent practicable, contain non-restorable source areas, and contain/restore aqueous contaminant plumes;
- Enhanced sedimentation in the Ashley River;
- Placement of a protective cap over bottom sediments of the Barge Canal;
- Excavation of acutely toxic tidal marsh sediments in portions of the North and South Tidal Marshes followed by restoration/revegetation and off-site disposal in an approved hazardous waste landfill; and
- In-situ bioremediation for sediments in the Northwest Tidal Marsh and portions of the South Tidal Marsh which did not demonstrate significant acute toxicity.

III. BASIS FOR THE DOCUMENT

Pursuant to requirements of the Final ROD, a sedimentation modeling study of the Ashley River was conducted by the U.S. Army Corps of Engineers, Waterways Experiment Station, Engineering and Research Development Center located in Vicksburg, MS. The purpose of this modeling effort was to identify alternatives that could achieve the established objectives for the enhanced sedimentation remedy component. The modeling study focused on the Ashley River APEC which includes an approximate1,500 foot strip adjacent to the Site that stretches from sample point SD-70 on the north to sample point SD-64 on the south. The western edge of the enhanced sedimentation cell extends to the former Ashley River navigation channel, and the eastern edge is delineated by the marsh along the shore line. The hydrodynamics of this system were run using RMA2, a depth averaged two-dimensional finite element numerical model. Sedimentation rates within this system were predicted by SED-2D, the sediment transport companion for the RMA2 hydrodynamic model. The hydrodynamic model was calibrated by comparing tide level simulations to predicted tides at four National Ocean Service tide stations in the area. The sediment model was verified by using physical measurements of sediment depths obtained from bathymetric surveys conducted in 1995 and 1999.

Two alternatives for enhanced sedimentation were evaluated for sediment deposition characteristics within the Ashley River APEC using the calibrated models. The first alternative was a dike field which employed nine perpendicular groins consisting of steel sheet pile walls. The groins generally extended 100 to 200 feet out from the shore, and were spaced along the shore at 200 foot intervals. Perpendicular groins have been used by the Corps of Engineers as river training structures to force flow away from bank areas where erosion is a problem. The

groins induce large eddies that carry water and suspended sediment into the spaces between the groin, producing increased sedimentation within the area covered by the structures. The second alternative was a sedimentation cell consisting of a continuous steel sheet pile wall with weirs to allow influx of water and suspended sediment into the isolated cell during the tidal cycle.

A grid was established within the study area, and the models were run to replicate the 1999 bathymetry based on the 1995 bathymetry information. A single 4-day tidal event was modeled and the results were extrapolated for the 4-year period to allow a comparison of the two enhanced sedimentation alternatives. Model runs for both enhanced sedimentation alternatives indicated that adequate deposition rates could be induced within the isolated APEC. The perpendicular groin alternative was predicted to deposit 14 to 24 inches of sediment throughout the APEC over the four year period. In comparison, the sheet pile weir alternative was predicted to deposit 12 inches of sediment within the APEC over the four year period. The perpendicular groin alternative produced a more uniform deposition profile, whereas the sheet pile weir alternative produced a more rapid build up of sediment on the outside wall of the APEC. The modeling effort concluded that enhanced sedimentation concepts could achieve the established Performance Standards, and that predicted sedimentation rates for the perpendicular groin alternative and sheet pile weir alternative were essentially equivalent. Therefore, Final Remedial Design concepts for the Ashley River remedy component were based upon constructability and cost-effectiveness criteria, rather than sedimentation rates.

During the constructability and cost analysis phase of the Remedial Design effort, the following areas of concern were identified with regard to successful implementation of the enhanced sedimentation remedy:

- Property Owner Operational Issues: Parker Marine is a marine construction firm that is located approximately in the middle of the 1,500 foot reach of the Ashley River APEC. Maintaining access to the Parker Marine dock facility and providing adequate maneuvering room for barges and tugs is important for continued operations.

- Existing Conditions of Structures: Existing structures within the Ashley River APEC potentially affected by enhanced sedimentation include the former Braswell pier and railroad trestle, the Parker Marine pier, and the former Dent pier. Fire damage and aging of the Braswell pier and railroad trestle have resulted in significant structural damage that represents a physical safety hazard. The former Dent pier is also severely damaged, and both of these structures must be removed from the remediation area before the enhanced sedimentation remedy can be implemented.

- Ashley River Geotechnical Data: A geotechnical field program was conducted to evaluate subsurface conditions throughout the remediation area. The geotechnical evaluation of enhanced sedimentation considered lateral pressure from 2 feet of sediments deposited over time and the effect of hydrodynamic wave loads. Based on the load considerations and subsurface conditions, sheet piles driven to induce sediment deposition would need to

be installed to a constant depth of -47 feet. Due to navigational concerns in this area, the perimeter height of the sheet piles was established at +7 feet. In light of these depths, slope stability and sheet pile structural integrity near the western edge of the APEC, near the former navigation channel was identified as a major uncertainty.

The enhanced sedimentation remedy envisioned in the ROD did not fully account for or evaluate the constructability concerns and associated increases in remedy costs described above. The original ROD cost estimate for enhanced sedimentation was $541,000, which did not include demolition of damaged dock structures. The more detailed evaluation conducted in the Remedial Design estimated the remedy cost of enhanced sedimentation at $3.8 Million. Based on the detailed evaluation conducted during the Remedial Design phase, it was determined that implementation of the enhanced sedimentation remedy in the Ashley River APEC posed significant limitations. The reader is referred to the following documents that are located in the Administrative Record for specifics related to the numerical sediment deposition modeling and Remedial Design efforts:

- Ashley River Sedimentation Study; Department of the Army, Engineer Research and Development Center, Corps of Engineers, Waterways Experiment Station (August 30, 2000).

- Ashley River Remediation 100 Percent Design Submittal; URS Corporation on behalf of Beazer East, Inc. (March 14, 2001).

IV. DESCRIPTION OF SIGNIFICANT DIFFERENCE

The Feasibility Study and Final ROD did identify and evaluate subaqueous capping as a potential remedy to address Ashley River sediments within the APEC. Due to the restraints posed by property owner concerns, existing dock structures, and geotechnical conditions on the ultimate success of the enhanced sedimentation remedy, the Ashley River Remediation 100 Percent Design Submittal (URS, March 14, 2001) delineates the specifications for an engineered, subaqueous cap for Ashley River sediments. SCDHEC issued approval of this document on March 19, 2001. EPA issued approval of this document on March 27, 2001. The Performance Standards and the defined area of remediation within the Ashley River (i.e. the APEC) remain unchanged by this ESD. The Performance Standards for the Ashley River remedy component established in the ROD include:

- Ensure short-term protection to surrounding environment during construction and installation activities;

- Provide sufficient cover to mitigate exposure to benthic organisms and subsequent adverse impacts to the food chain; and

- Ensure long-term effectiveness and permanence by mitigating erosional effects.

Enhanced sedimentation and subaqueous capping both strive to achieve the established Performance Standards by the placement of a clean layer of sediment over impacted bottom sediments of the Ashley River. The significant differences in the two approaches are represented by the methodology in which a clean cap of material is placed over the sediments within the defined Ashley River APEC and the time required to achieve cleanup objectives. Enhanced sedimentation relied on increasing and accelerating natural depositional rates, while subaqueous capping relies on physical placement of an engineered sand cover. Enhanced sedimentation would achieve the cleanup objectives gradually, over a period of years. Subaqueous capping is more aggressive and will achieve the cleanup objectives rapidly, over a period of months. Both approaches require engineering controls during construction to minimize potential short-term impacts, and long-term monitoring to ensure effectiveness and permanence.

Pursuant to the Final Ashley River Remediation Design Report, the principal work items involved with subaqueous capping include:

- Demolition of the Braswell Railroad Trestle, Braswell Pier, and Dent Pier: This activity involves removal of derelict timber piles and concrete dock slabs to allow placement of the subaqueous cap;

- Placement of Subaqueous Cap with Minimum Thickness of 12 Inches: In general, two types of cap designs will be utilized. On the northern and southern ends of the APEC, a 12 oz. non-woven geotextile base will be overlain by a minimum 12 inch sand cap of specified gradation. In the central portion of the APEC, near the Parker Marine operational area, a cement-stabilized cap will be placed by incorporating a minimum of 15% (by dry weight) Portland Cement into the upper 12 inches of bottom sediments.

- Long Term Monitoring: Potential erosion and settlement of the subaqueous cap will be monitored by thickness monitors spaced 50 feet on center in a grid pattern. Survey coordinates for the top of each settlement monitor (x, y, z) and distances from the top of the cap to the top of the monitor will be recorded and monitored to ensure long term protectiveness. A separate subaqueous cap monitoring plan will be submitted to specify the scope and frequency of the long term monitoring program.

Remedial Action construction to implement subaqueous capping in the Ashley River APEC is expected to begin in August 2001. Cost estimates for conducting this work are still under refinement pending resolution of issues associated with demolition activities. However, the present worth of the Ashley River subaqueous capping remedy is expected to be approximately $3 Million.

V. SUPPORT AGENCY COMMENTS

SCDHEC has reviewed this ESD and the supporting documentation, and concurs with EPA's modified remedy for the Ashley River sediments. The SCDHEC concurrence letter is

attached to this document for reference. EPA also received written comments on the March 1997 Proposed Plan from the Natural Resource Trustees (NRTs), as represented on this project by the U.S. Fish and Wildlife Service, the South Carolina Department of Natural Resources and the National Oceanic Atmospheric Administration. In these written comments, the NRTs favored subaqueous capping of Ashley River sediments over enhanced sedimentation. The reasons stated for support of capping over enhanced sedimentation included: 1) enhanced sedimentation is an unproven technology for isolating impacted sediments; 2) contaminants may be released to the Ashley River during installation of piles which are necessary to implement enhanced sedimentation; and 3) enhanced sedimentation would result in continued exposure to ecological receptors prior to adequate sediment deposition. Based on these comments, EPA does not expect the NRTs to oppose subaqueous capping of Ashley River sediments.

VI. STATUTORY DETERMINATIONS

Pursuant to the requirements of CERCLA Section 121, the modified remedy for Ashley River sediments is adequately 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. Subaqueous capping of impacted Ashley River sediments is not considered actual treatment, therefore the Ashley River remedy does not satisfy the preference for treatment as a principal element. However, subaqueous capping does reduce the toxicity and mobility of impacted sediments within the defined APEC.

VII. PUBLIC PARTICIPATION COMPLIANCE

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. Therefore, the public participation requirements set forth in NCP Section 300.435(c)(2)(i) have been met.

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U.S. EPA - Region 4

Date