SUPERFUND PRELIMINARY SITE CLOSE OUT REPORT
BRODERICK WOOD PRODUCTS SUPERFUND SITE
Unincorporated Adams County, Colorado

I. INTRODUCTION

This Preliminary Close Out Report documents that the U.S. Environmental Protection Agency (EPA) has completed construction activities for all Operable Units at the Broderick Wood Products Superfund Site in accordance with **Procedures for Completion and Deletion of National Priorities List Sites and Update** (OSWER Directive 9320.2-09). EPA and the State of Colorado Department of Public Health and Environment (CDPHE) conducted a pre-final inspection on August 26, 1996, and determined that the Potentially Responsible Party (PRP), Broderick Investment Company, constructed the remedy in accordance with the Remedial Design (RD) plans and specifications. BIC has initiated activities necessary to achieve performance standards and site completion.

II. SUMMARY OF SITE CONDITIONS

Background

The Site is located at 58th Avenue and Galapago Street in unincorporated Adams County, Colorado approximately 1/2 mile west of the intersection of Interstate Highway 25 (I-25) and West 58th Avenue, immediately north of Denver. Land use in the area is primarily industrial. The Site is owned by a trust-operated partnership known as the Broderick Investment Company (BIC).

The Broderick Wood Products Company (BWP) operated a wood treating facility at this location from 1947 to 1982 on a 64-acre triangular piece of property. The Site consists of the BWP property plus an area immediately to the north contaminated by the plume from the BWP property. As part of the wood treatment process, creosote and pentachlorophenol (PCP) were used to treat power poles, fence posts, railroad ties and other wood products. Hazardous substances from the process were primarily disposed in two unlined impoundments in the northwestern corner of the Site.

The primary contaminants of concern at the Site are polynuclear aromatic hydrocarbons (PAHs), acid extractable compounds (principally PCP and other chlorinated phenolic compounds), dioxins and furans, volatile organic compounds (VOCs) (principally benzene, ethylbenzene, toluene and xylene), and some toxic metals (principally arsenic, cadmium, lead, zinc). Asbestos-containing building materials were present in some of the buildings.

The soils at the Site were found to be affected by wood treating chemicals (PCP, creosote), heavy metals (arsenic, lead, cadmium, zinc), and other wastes (fuel oil and grease). Ground water was found to have been contaminated with wood-treating chemicals (PCP, creosote, isopropyl ether) and volatile organic compounds (primarily fuel oil). Metals contamination was noted in the former railroad shop area. Some PCPs were identified along the eastern Site boundary near the adjacent wood-treating facility known as Koppers.

The Site posed potential threats to human health and the environment through dermal contact or ingestion of contaminated soil and groundwater, as well as inhalation of airborne contaminated-particulate matter.

EPA proposed the Site to the National Priorities List (NPL) on September 8, 1983 and added it to the final list on September 21, 1984.

Remedial Construction Activities

In June 1988, a Record of Decision (ROD) was issued to address interim source control measures for Operable Unit 1 (OU 1). OU1 was established to deal principally with the sludges in the two surface impoundments at the Site. In the ROD EPA chose wastewater treatment and incineration as the remedy for OU 1. Due to new information showing that the cost of the on-site incineration remedy would be in excess of $11 million, EPA amended the OU 1 ROD in September 1991 after a public comment period. The ROD Amendment chose off-site reclamation of the sludges as the remedy. The sludges were blended and processed on-site, and transported to Allied Signal's Fairfield, Alabama plant and reclaimed. Residues were incinerated and the ash disposed of in a permitted landfill. As a result of the OU 1 RA, a source of contamination was removed from the Site. The OU1 RA was completed in December 1993.

The Record of Decision for Operable Unit 2 (OU 2 ROD) was signed on March 24, 1992, and contained the following main components:

* Excavation and treatment (by ex-situ bioremediation) of organics-contaminated soils in a land treatment unit (LTU).
* Fixation of metals-contaminated soil.
* Excavation and treatment of Fisher Ditch sediments in the LTU.
* Demolition of buildings.

* Collection of contaminated groundwater and LNAPL from the surficial aquifer in a series of subsurface drain ditches located in the areas of highest groundwater contamination.

* Construction of a water treatment plant on the BWP Property to first remove LNAPL and DNAPL from collected groundwater in an oil/water separator and then treat the recovered groundwater in a two-stage, fixed-film bioreactor.

* Mixing the treated water with nutrients and oxygenating chemicals, and reinjecting it into the surficial aquifer to stimulate bacterial growth and to promote further breakdown of contamination within the shallow aquifer.

* Placement of institutional controls, such as deed restrictions or restrictive covenants, on future uses of groundwater on the BWP Property by the current owner to control access to contaminated water in the surficial and Denver aquifers.

* Monitoring of groundwater in all three aquifers for a period of 30 years on a periodic basis with approximately 10 to 15 wells on and off the BWP Property.

* Construction of at least one recovery well to the north of the BWP Property to contain the dissolved plume off of the BWP Property.

As a result of new information, the February 1995, Explanation of Significant Differences to the OU 2 Record of Decision (OU2 ESD) listed the following significant modifications to the OU 2 ROD:

* Remediation levels in the groundwater would be attained at specified points of compliance (POC, i.e., appropriate locations for measurement of performance of the remedy) instead of throughout the plume.

* New remediation goals would be established for the contaminated groundwater within the POC.

* A soil/bentonite cut-off wall would be constructed north of the NBC system and south of Fisher Ditch at the north boundary of the BWP Property.

* The recovery well off the BWP Property would be eliminated.

In addition, the OU 2 ESD included the following non-significant changes to the ground-water remedy at the Site:

* The on-site water treatment plant that has been constructed as part of the OU 2-Stage 1 NBC system would also be used to treat water produced from the drain lines. The treated water would be discharged to the Adams County stormwater system. Instead of a two-stage fixed film bioreactor, the treatment plant would employ an activated clay and an activated carbon treatment process.

* The surficial aquifer would be dewatered and oxygen introduced into the dewatered aquifer solids, using the in-situ bioremediation process known as bio-venting instead of through reinjection of oxygenated water.

* The number of monitoring wells on and off the property would be increased.

The performance standards for the Site include the numeric criteria for treatment levels for soils and sediments, and treatment levels for groundwater (Tables 1-1 and 1-2). The OU 2 ESD determined that the treatment levels for groundwater are unattainable on the property, but continue to apply at and beyond the POCs designated near the BWP Property boundaries and at the top of the Arapahoe aquifer, as shown on Figure 1. The modified remediation goals for the contaminated groundwater within the POCs are as follows:

- Control access to contaminated groundwater within the POCs on the BWP Property to reduce or eliminate exposure;

- Reduce the mass of contamination (as determined by oxygen consumption) within the POCs to reduce migration of contaminated groundwater beyond the POCs; and

- Contain contaminated groundwater within the POCs.

The RA for OU 2 was divided into two stages, Stage 1 and Stage 2. OU 2 Stage 1 activities, conducted by EPA, included: design and construction of a Land Treatment Unit (LTU), North Boundary Cutoff (NBC)/Package Water Treatment System (PWTS), and a lined surge pond; excavation and stockpiling of organics-contaminated soils; metals-contaminated soil fixation; groundwater monitoring; disposal of 21,200 gallons of creosote and pentachlorophenol sludge; and abatement of asbestos-contaminated buildings and building demolition and disposal. Also, additional sampling of Fisher Ditch sediments showed remediation would not be necessary because contaminant levels were within acceptable risk ranges. Stage 1 was performed in

conformance with the design drawings and specifications, and was operational and functional April 27, 1994.

The OU 2 Stage 1 RA was operated by EPA until February 1995, when BIC took over operation of the Site via Unilateral Administrative Order. BIC has treated the first lift of organics-contaminated soils in the LTU and is currently working on the second one.

In a Consent Decree signed with EPA, BIC agreed to perform the remedial design/remedial action (RD/RA) for Stage 2 of OU 2. OU 2 Stage 2, identified as the Final Site Remedy, included the following components: installation of the north boundary soil-bentonite cutoff wall; construction of a non-aqueous phase liquid (NAPL) recovery and dewatering system; construction of an in-situ phased bioventing system; modification of the existing PWTS; installation and abandonment of specific monitoring wells; placing a one-foot soil cover throughout the BWP Property; and removal of a clay pipe.

EPA and the State of Colorado Department of Public Health and Environment (CDPHE) conducted a pre-final inspection on August 26, 1996 and developed a list of outstanding construction items:

- Clean bioventing wells and wellheads;
- Re-set bioventing well, piezometer and air monitoring wellhead housings that have shifted from their proper setting;
- Install concrete collars and label wellhead housings and manholes;
- Inspect, dewater and seal pump manholes;
- Install missing cleanout caps and housings; and
- Complete site grading around all wells, manholes and cleanouts to provide proper drainage and protect the installations.

Remaining activities to be completed by BIC include periodic adjustments and/or modifications to the constructed remedy to maintain remedy integrity and performance.

EPA and the CDPHE have approved the operations and maintenance (O&M) plan.

III. DEMONSTRATION OF QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) FROM CLEANUP ACTIVITIES

Activities at the Site were consistent with the RODs, OU 1 ROD Amendment, Explanation of Significant Differences to the OU 2 ROD and the RD/RA Statement of Work. The Quality Assurance Project Plan (QAPP) incorporated all EPA and CDPHE quality assurance and quality control (QA/QC) procedures and protocol. EPA analytical methods were used for all validation and monitoring samples during RA activities.

The QA/QC program utilized throughout the RA was rigorous in conformance with EPA and CDPHE standards; therefore, EPA and the CDPHE determined that all analytical results are accurate to the degree needed to assure satisfactory execution of the RA and are consistent with the RODs, OU 1 ROD Amendment, OU 2 ESD, RD plans and specifications and RD/RA Statement of Work (SOW).

IV. ACTIVITIES AND SCHEDULE FOR SITE COMPLETION

It is anticipated that institutional controls on future uses of groundwater on the property will be implemented by BIC by the end of December.

A phased approach during operations will be used to allow for flexibility in the actual operation of the bioventing system, to evaluate system performance and to effectively allocate resources over the extended bioventing period. The results of the initial phase of operations will be evaluated to optimize the configuration and operational parameters for subsequent phases. Equipment (i.e. bioventing well flow control manifolds and manifold housings) from the first phase will be used in subsequent phases. All necessary bioventing wells throughout the areas of concern have been installed.

The following activities will be completed according to the following schedule:

Task	Estimated Completion	Responsible Organization
Complete Punch List Items	10/21/96	BIC Contractor
Complete Final Inspection	10/31/96	EPA/CDPHE
Approve RA Report	11/29/96	EPA/CDPHE
Approve Final Close Out Report	11/7/96	EPA
Institutional Controls	12/31/96	BIC
Operation and Maintenance	ongoing	BIC Contractor

V. FIVE-YEAR REVIEW

EPA Region VIII conducted a Statutory Five-Year Review (Type Ia) pursuant to CERCLA § 121(c), NCP § 300.400(f) (4) (ii); OSWER Directive 9355.7-02, *Structure and Components of Five-Year Reviews*, May 23, 1991; and OSWER Directive 9355.7-02A, *Supplemental Five-Year Review Guidance*, July 26, 1994. The Five-Year Review was signed on March 24, 1995. This Type Ia review is applicable only to a site at which response is ongoing. The next required Five-Year Review will be a Statutory Type I Review due on or before March 24, 2000.

Max H. Dodson

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Ecosystems Protection and Remediation
Region VIII

9/30/96
Date

TABLE 1-1
TREATMENT LEVELS
FOR SOILS AND SEDIMENTS
BWP SITE

CHEMICAL	MEAN CONCENTRATION SURFACE/SUBSURFACE (mg/kg)	TREATMENT LEVEL (mg/kg)
ORGANICS:		
Total PAHs		
Benzo(a)pyrene	35.9/4.5	15.2
Dibenzo(a,h)anthracene	41.8/6.5	13.9
2,3,7,8-TCDD equivalent	NA	0.0006*
K001 Constituent**		
Naphthalene	367/142	95-99%
Pentachlorophenol	653/380	90-99%
Phenanthrene	556/75	95-99%
Pyrene	356/28	95-99%
Toluene	0.6/1.2	0.5-10
Xylene (Total)	2.7/7.5	0.5-10
Lead	NA	99-99.9%
METALS:		
Arsenic***	29.7/3.8	5.0
Cadmium***	24.7/0.2	1.0
Lead***	838.2/26.7	5.0

*Laboratory detection limits may not allow measurement to this level. In that case, the detection limit will be the treatment level. The currently recognized detection level of 1 μg/kg corresponds to a cancer risk level close to 10^{-3}.

**Remedy will comply with LDRs through a Treatability Variance. Treatment levels or percent reduction ranges that ex-situ biological treatment will attain are presented.

***Action levels are based on nonwastewater TCLP (mg/L).

NA - Not applicable.

TABLE 1-2
TREATMENT LEVELS
FOR GROUNDWATER
BWP SITE

CHEMICAL	MEAN CONCENTRATION (μg/L)	TREATMENT LEVEL (μg/L)
CARCINOGENIC CHEMICALS:		
2,3,7,8-TCDD equivalent	NA	5×10^{-5}
Trichloroethylene	6.6	5.0
Tetrachloroethylene	1.8	1.6
Carbozole	92.0	4.1
NON-CARCINOGENIC CHEMICALS:		
Naphthalene	1653.7	41.6
Acenaphthene	372.7	623.0
Fluorene	544.7	416.0
Anthracene	248.9	3120.0
Fluoranthene	460.5	416.0
Pyrene	643.7	312.0
Phenol	219.0	623.0
2-methylphenol	307.0	520.0
4-methylphenol	286.7	520.0
2,4-dichlorophenol	162.9	31.2
2,4,5-trichlorophenol	171.2	1040.0
Pentachlorophenol	7862.0	1.0

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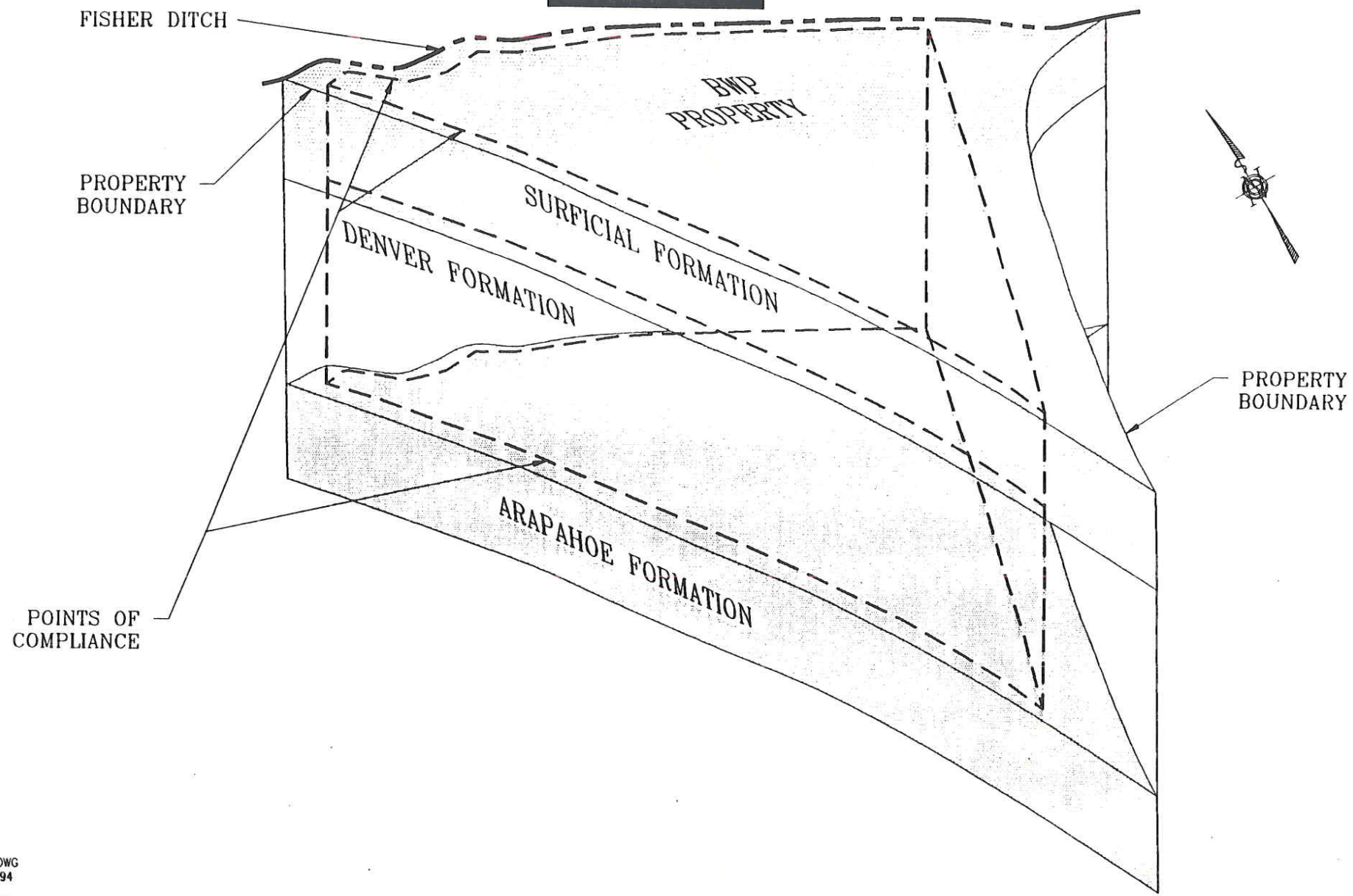

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GROUNDWATER POINTS OF COMPLIANCE
BRODERICK WOOD PRODUCTS

FIGURE 1