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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8, MONTANA OFFICE
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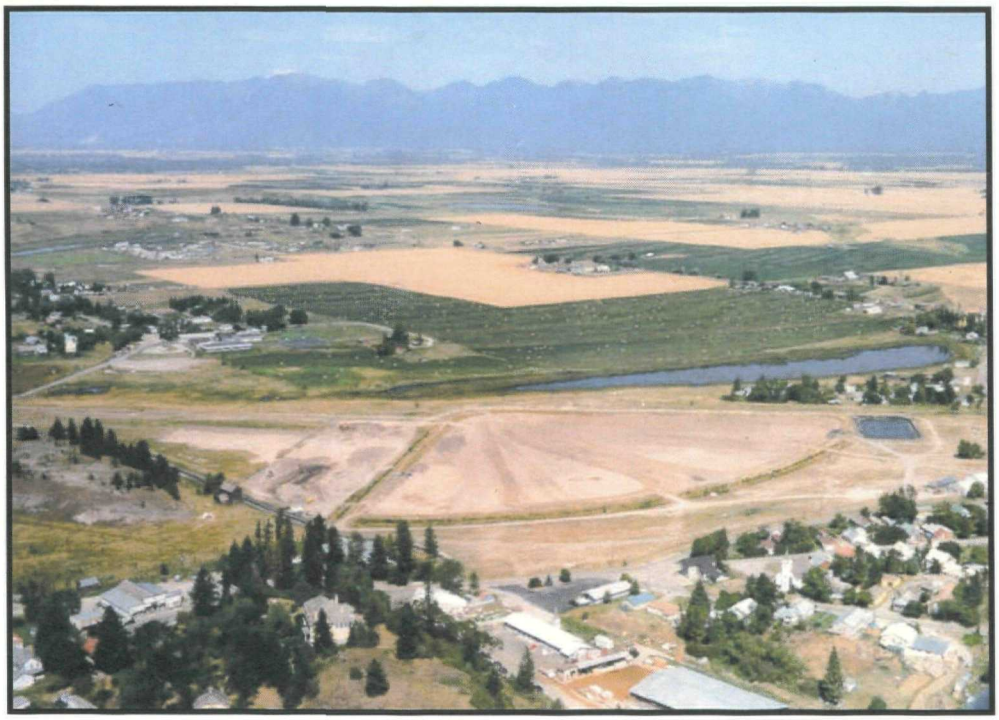
HELENA, MONTANA 59626

THIRD FIVE-YEAR REVIEW REPORT

Burlington Northern Somers Tie Treating Plant

Somers, Flathead County, Montana
September 2006



Approved by:

John F. Wardell
Director, Montana Office
US E.P.A. Region 8

Date: 9/29/2006

Five-Year Review Report
BN Somers Tie Treating Plant
Table of Contents

ATTACHMENTS:

1. Figures

2. Tables

3. Photographs

4. Site Inspection Form

ABBREVIATIONS AND ACRONYMS

AOC	Administrative Order of Consent
ARARs	applicable, relevant and appropriate requirements
B(a)P	benzo(a)pyrene
BN	Burlington Northern
BNSF	Burlington Northern Santa Fe
CERCLA	Comprehensive Environmental Restoration Compensation and Liability Act
CFR	Code of Federal Regulations
CPAH	carcinogenic polycyclic aromatic hydrocarbons
DNAPL	dense non-aqueous phase liquid
DNRC	Department Natural Resources and Conservation
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
FWS	U.S. Fish and Wildlife Service
GAC	granular activated carbon
gpm	gallons per minute
GWTS	groundwater treatment system
HDPE	high density polyethylene
LTD	land treatment demonstration
LTU	land treatment unit
MDEQ	Montana Department of Environmental Quality
mg/kg	milligram per kilogram
mg/kg-dy	milligram per kilogram per day
mg/L	milligram per liter
MCL	maximum contaminant level
NAPL	non-aqueous phase liquids
NCP	National Contingency Plan
NMD	no-migration demonstration
NPL	National Priorities List
O&M	operations and maintenance
OSWER	Office and Solid Waste and Emergency Response
PAH	polycyclic aromatic hydrocarbon compounds
RCRA	Resource Conservation and Recovery Act
RDI	Remedial Design Investigations
RD/RA	Remedial Design/Remedial Action
RfD	reference dose
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPF	relative potency factors
SDWA	Safe Drinking Water Act
SVOC	semi-volatile organic compounds
TDS	total dissolved solids
TSS	total suspended solids
TWA	time weighted average
µg/L	microgram per liter
UV	ultraviolet
WQB	Water Quality Bulletin

EXECUTIVE SUMMARY

The third five-year review of the BN (BNSF) Somers Former Tie Treating Plant, located in Somers, Flathead County, Montana, was completed in September 2006. The results of the five-year review indicate that the remedies for the soil and groundwater components remain protective of human health and the environment. The soil component of the remedy has achieved remediation levels specified in the 1989 Record of Decision (ROD) and later revised in the 1998 Explanation of Significant Differences (ESD) for three lifts of soil placed on the land treatment unit (LTU). The LTU was closed in 2002. The groundwater component continues to operate with operational modifications implemented as needed. A Technical Impracticability (TI) demonstration has been completed and approved by EPA and DEQ, however the TI waiver has not been promulgated awaiting review of a request by BNSF to decommission the ground water treatment system. A Controlled Groundwater Area was established at the site in 2003.

No deficiencies in the operation and maintenance of the remedy were noted during the third five-year review.

The protection of human health and the environment by each component of the remedial action at the BNSF Somers Former Tie Treating Plant site is discussed below:

Soil Component

The 14 acre lined LTU constructed in 1994 at the site has successfully treated three lifts of soil to treatment levels and was closed during the 2002 construction season. The LTU and retention pond have been regraded and revegetated. The soil component of the remedy at the BNSF Somers Former Tie Treating Plant has been certified by EPA as complete.

The wetlands compensation determination resulted in mitigation and construction of wetlands to replace those lost or damaged during implementation of the remedy. Wetland areas within and near the Swamp Pond exhibit healthy habitat and have been certified by the federal Fish and Wildlife Service (FWS). BNSF has completed a land exchange process for property located in the Flathead Valley and has been certified by the FWS and EPA as completing the required wetland mitigation.

Ground Water Component

The groundwater component of the remedy at the BNSF Somers Former Tie Treating Plant site consists of an extraction/injection system with carbon treatment and *in-situ* capability. The extraction well system and the treatment plant are operating as designed with minor modifications to address operational issues. The groundwater component of the remedy has demonstrated limited mass removal of contaminants through the groundwater treatment system (3 percent of total contaminant loading estimated to reside in the subsurface) and limited improvement of groundwater quality contamination in the

treatment zone. Operational changes have been required due to low extraction and injection rates (25 percent below design rate), as a function of subsurface conditions of low permeability. Operation of the system has resulted in the removal of free-phase NAPL from four out of nine treatment area wells. Dissolved-phase concentrations in the treatment area have not shown a significant change. The contaminant plume is hydraulically contained. A Controlled Ground Water area was established in 2003 under State authorities and BNSF has requested that the treatment system be decommissioned. The groundwater component of the remedy at the BNSF Somers Former Tie Treating Plant site is protective of human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name *(from WasteLAN)*: BNSF Somers Tie Treating Plant

EPA ID *(from WasteLAN)*: MTD053038386

Region: 8	**State:** MT	**City/County:** Somers/Flathead

SITE STATUS

NPL status: ☐ Final **X** Deleted ☐ Other (specify) **Non-NPL Site**

Remediation status (choose all that apply): ☐ Under Construction **X** Operating ☐ Complete

Multiple Ous?* ☐ YES **X** NO	**Construction completion date:** N/A

Has site been put into reuse? ☐ YES **X** NO

REVIEW STATUS

Reviewing agency: **X** EPA **X** State ☐ Tribe ☐ Other Federal Agency

Author name: Jim Harris, P.E.

Author title: RPM	**Author affiliation:** EPA Region 8

Review period: September 29, 2001 to September 29, 2006

Date(s) of site inspection: August 8, 2006

Type of review:***

X Statutory

☐ Policy (☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Regional Discretion)

☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead

Review number: ☐ 1 (first) ☐ 2 (second) **X** 3 (third) ☐ Other (specify)

Triggering action:****

X Actual RA Onsite Construction ☐ Actual RA Start at OU#____

☐ Construction Completion

☐ Other (specify)

Triggering action date *(from WasteLAN)*: September 27, 2001

Due date *(five years after triggering action date)*: September 27, 2006

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the five-year review in WasteLAN.]
*** [see page A-18 and Chapter 1 for further explanation.]
**** [see page A-19 and Chapter 1 for further explanation.]

Five-Year Review Summary Form, cont'd.

Issues:

With the closure of the LTU and the retention pond, operational changes were made in the treatment plant to manage filter press sludge, spent carbon, and management of treated water that previously was used to irrigate the LTU. None of these changes are viewed to impact the protectiveness of the groundwater component of the remedy.

Operation of the groundwater treatment system has demonstrated limited mass removal of contaminants and limited improvement of groundwater quality contamination in the treatment zone. A Technical Impracticability (TI) demonstration has been completed and approved and a Controlled Groundwater Area was established in 2003.

Recommendations and Follow-up Actions:

- Complete the evaluation of BNSF's request to modify operation of the groundwater treatment system

- Issue ESD to provide TI waiver and ruling on groundwater system operation

- The most recent Montana DEQ-7 Numeric Water Quality Standards should be evaluated for inclusion as site remediation levels.

Protectiveness Statement(s):

Soil Component:

The soil component of the remedy at the Somers Site is protective of human health and the environment. The LTU was closed in 2002 and the soil component of the remedy is complete.

Ground Water Component:

The ground water component of the remedy is functioning effectively and is therefore protective of human health and the environment. Current operation of the treatment system has hydraulically contained the groundwater plume. A TI evaluation has been completed and a Controlled Groundwater Area has been established.

I. INTRODUCTION

The U.S. Environmental Protection Agency (EPA) Region 8 has conducted a statutory five-year review of the remedial actions implemented at the Burlington Northern-Santa Fe (BNSF) Superfund Site located in Somers, Flathead County, Montana (BNSF Somers Site). This review was conducted August 2006 through September 2006, and is the third five-year review for this Site. The purpose of five-year reviews is to determine whether the remedy at the site is protective of human health and the environment, to identify any deficiencies found during the review, if any, and to identify recommendations to address them. The methods, findings and conclusions are documented in this five-year review report.

This statutory five-year review was conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) ("Superfund"), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121(c), as amended, states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This third five-year review was triggered by the completion of the second five-year review on September 27, 2001. This five-year review was performed in accordance with the Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03B-P entitled *Comprehensive Five-Year Review Guidance*, (EPA, 2001). Five-year reviews conducted for the Site in 1996, 2001 and 2006 were triggered by the initiation of remedial action by the responsible party (Burlington Northern) in 1990. Due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unrestricted use and unlimited exposure, this five-year review is required.

II. SITE CHRONOLOGY

The following table presents the relevant events and dates that have occurred during the investigation and remedial activities at the BNSF Somers site.

Chronology of Events

Event	Date
Initial discovery of problem or contamination	February 1984
Pre-NPL responses, Phase I Investigation	March 1984
NPL listing (proposed)	October 1984
Administrative Order of Consent for Emergency Removal Action (Docket No. CERCLA VIII-85-02)	May 1985
Removal action, Swamp Pond area	June- August 1985
Administrative Order of Consent for Remedial investigation/Feasibility Study (Docket No. CERCLA- VIII-85-07)	October 1985
Phase II Investigation	1987
Phase III Investigation	1988
Removal of Beach Sediments	May 1988
Remedial Investigation/Feasibility Study complete	September 1988
RCRA Impoundment Closure	1988
ROD signature	September 1989
Demolition Work Plan	1991
Demolition former operations	1991-1992
Consent Decree for Remedial Design/Remedial Action (Civil Action No. CV-91-32-M-CCL)	December 1991
Remedial Design/Remedial Action	1991 - 1992
Land Treatment Demonstration	December 1991
No Migration Petition	June 1992
Remedial design start, soil component	June 1992
Remedial design start, groundwater component	June 1992
Explanation of Significant Differences	June 1992
Remedial design complete, soils component	September 1992
Remedial design complete, groundwater component	1993
Removal Action, excavation of soil	April 1993
Wetlands Compensation Determination	July 1993
Construction Land Treatment Unit	August 1993
Groundwater Remedy Start	May 1994
Soils remedy start, Land Treatment Unit operations	May 1994
Construction completion date, Groundwater Treatment System	April 1994
Initial Five-Year Review	September 1996
Explanation of Significant Differences	July 1998
Clean Closure of RCRA Surface Impoundment	September 1998
Land Treatment Unit Closure Work Plan	September 2001
Land Treatment Unit Closed	October 2002
Technical Impracticability Demonstration	February 2003
LTU Closure Certification	March 2003
Controlled Groundwater Designation	May 2003
Wetland Mitigation Release	November 2003
Request to Modify Groundwater Treatment System	September 2004
Natural Attenuation Demonstration	April 2006

III. BACKGROUND

Location

The Burlington Northern-Santa Fe Somers Former Tie Treating Plant (the BNSF Somers Site) is located in northwestern Montana in the unincorporated town of Somers, Flathead County. Somers has a population of approximately 500 people. The Site, which covers approximately 80 acres, is located immediately adjacent to Flathead Lake in parts of Sections 23, 24, 25 and 26, Township 27 North, Range 21 West (Figure 1) (EPA, 1989 and USGS, 1994). The historical plant area of the Site is bounded by residential areas to the west, east and south-southwest. The area to the south of the plant houses a barn and pasture area, through which a former discharge ditch flowed. The area to the north and northeast drops down a slope into a slough. The Swamp Pond area of the Site is bounded by Flathead Lake on the south and southeast, wetlands area to the east, and undeveloped land to the north and west. Site features are shown in Figure 2 (ThermoRetec, 2001c).

The Site is located partially in the floodplain of Flathead Lake. Flathead River enters Flathead Lake approximately five miles east of Somers. Portions of the Site along Flathead Lake and in a slough area adjacent to the Site are wetlands. Groundwater generally flows from the former plant toward the lake and slough. The Flathead Waterfowl Production Area occupies much of the north shore of Flathead Lake east of the site (USGS, 1994). Waterfowl also use the slough area adjacent to north and northeast of the tie plant as breeding grounds.

Land and Resource Use - Site

The Somers Tie Plant was operated by Burlington Northern (BN) Railroad between 1901 and 1986, and treated railroad ties and other miscellaneous lumber products to protect the materials from weathering and insects. Treatment was conducted in retorts and cylinders. Historical features of the plant include an office building, a retort building (which housed the wood treating equipment), a boiler house, three large insulated creosote product storage tanks, drip tracks, and miscellaneous support buildings. Three wastewater impoundments and one sanitary lagoon were located on the site. The historical features of the site are shown in Figure 3 (ThermoRetec, 2001g). All historical features of the Site were demolished in 1992.

The Somers Plant is currently a remedial action site with a groundwater treatment plant, extraction/injection well gallery, and support buildings.

Land and Resource Use - Area

The Somers community is located in the Flathead Valley surrounded by the Rocky Mountains of western Montana. Flathead Lake and Glacier National Park (located approximately 30 miles to the north) are important recreational areas. The Flathead Valley economy depends primarily on lumber, farming and tourism (EPA, 1989).

Flathead Lake, adjacent to the Site, covers an area of 300 square miles and is used for hydroelectric power generation at Kerr Dam in Polson, Montana. The lake is also used for recreational fishing and boating. A local beach area, which is part of the Site, was formerly used as a swimming beach, although it was closed to public access in 1985 by the property owners because of liability concerns. Most of the southern half of the lake area and shoreline is contained within the Flathead Indian reservation.

Flathead Lake use to serve as the source of the Somers municipal drinking water supply. The Somers Water District converted to a bedrock aquifer drinking water source in 1989. One bedrock well is located southwest of the Swamp Pond area of the Site, situated on top of the bedrock outcrop. The other well is located near the Somers Marina. A bedrock well at the local school located approximately ¼ mile north of the tie plant previously was the only well in Somers which was used as a source of drinking water. Six residences in Somers have private wells used for purposes other than drinking water. One of the six wells is completed in bedrock, the other five are completed in the shallow water table aquifer. None of these wells has thus far been shown to be affected by contamination from the Site.

History of Contamination

The Somers Tie Plant was operated by BN between 1901 and 1986. Treatment fluids used by BN included zinc chloride (used 1901 to 1943), chromated zinc chloride (used 1940 to 1943) and creosote/petroleum preservative mixtures (used 1927 to 1986) (ThermoRetec, 2001g). The treatment process generated wastewater primarily consisting of steam condensate containing zinc chloride or creosote. Floor and shop washing, drippage from treated ties pulled from the retort onto the drip track, and storage of treated ties on the property were other sources of process-generated wastewater. An average of 350 gallons of wastewater was discharged per day. Approximately 1,000 pounds of sludge from the retort was generated every 1.5 to 2 years. These activities impacted surface and subsurface soil and groundwater at concentrations that pose a threat to human health and the environment.

Prior to 1971, BN discharged wastewater into a lagoon located immediately south of the retort building (the "CERCLA Lagoon"). Overflow from this lagoon discharged through an open ditch into Flathead Lake, a distance of approximately 1,200 ft. Sometime prior to 1946, a pond formed in the swamp area (the "Swamp Pond") adjacent to Flathead Lake and waste material discharged though the

open ditch accumulated there. The Swamp Pond was determined to pose an imminent and substantial hazard to Flathead Lake because of the presence of heavy creosote contamination in water and soil located within 2-feet of the shoreline. Beach sediments contaminated by plant discharges were found to extend approximately 150 feet into Flathead Lake. In addition to the soil contamination, groundwater was contaminated with creosote in the vicinity of the CERCLA lagoon and the Swamp Pond area.

BN abandoned the lagoon and the ditch in 1971 when the company constructed two wastewater treatment impoundments ("RCRA impoundments"). In 1984, BN began operation of a recycling system and stopped all wastewater discharges. Subsequently the Resource Conservation and Recovery Act (RCRA) impoundments were closed in 1988 under the Montana Department of Environmental Quality (MDEQ) Hazardous Waste Permitting Program. Subsequent to the closure, a groundwater monitoring well located adjacent to the impoundment indicated that groundwater was contaminated.

In February 1984, the MDEQ sampled the soils at the BN Somers Plant. Based on the results of this investigation, the site was proposed for listing on the Superfund National Priorities List (NPL) in 49 FR 40320, October 15, 1984. The proposed listing cited potential negative effects on Flathead Lake, which at that time, was the Somers' water supply.

In May to June 1985, approximately 3,000 cubic yards of contaminated soil and 100,000 gallons of contaminated water were removed from the Swamp Pond as an emergency action under Administrative Order. BN removed contaminated soil and contaminated groundwater from the Swamp Pond and the drainage ditch. The soils were temporarily placed in the lined RCRA impoundments and eventually hauled to the BN RCRA-regulated facility in Paradise, Montana for treatment. The excavated areas were backfilled with clean soil and riprap was placed along the lakeshore. The Remedial Investigation/Feasibility Study (RI/FS) conducted from 1985 to 1988 identified the nature and extent of contamination at the Site. As a result, specific areas of contamination were identified as: the Swamp Pond, drainage ditch, CERCLA lagoon, and drip track area.

Contaminants of concern identified during the RI/FS include: (1) creosote consisting of polycyclic aromatic hydrocarbons (PAHs), tar acids (phenols, creosols), tar bases (pyridine) and nitrogen bearing heterocyclic bases; (2) zinc; and (3) other compounds consisting of benzene, phenolic compounds, and various heavy metals (arsenic, selenium, lead, chromium, copper, barium, beryllium, mercury, nickel and thallium).

In April 1988, a small area of creosote contamination was discovered on the surface of beach sediment on the north shore of Flathead Lake, adjacent to the Swamp Pond. This area of contamination extended 30 feet along the riprap wall and 20 feet onto the beach. In May 1988, the contaminated area was excavated resulting in removal of 40 cubic yards of contaminated sediment. The contaminated sediment was placed in the CERCLA lagoon. A test pit was installed on the inland side of the riprap

wall, resulting in the discovery of creosote-contaminated soil and a groundwater seep. Subsequently, high-density polyethylene (HDPE) liner was placed along the lakeside wall of the test pit to prevent further migration along the seep (RETEC, 1989).

Enforcement History

Based on the results of the February 1984 MDEQ investigation of soils, the BNSF Somers Site was proposed for inclusion on the National Priorities List (NPL) of Superfund Sites in 49 CFR 40320, October 15, 1984. The proposed listing cited potential negative effects on Flathead Lake and the water supply for the town of Somers, which drew water from the lake. The site was later removed from the proposed NPL due to joint RCRA/CERCLA authorities.

In May 1985, EPA, BN and Sliters (a corporation which owns a portion of the site) signed an Administrative Order on Consent (AOC) (Docket No. CERCLA-VIII-85-02) providing for an emergency removal action in the area of the Swamp Pond adjacent to Flathead Lake. The area was determined to pose an imminent and substantial hazard to Flathead Lake because of the presence of heavy creosote contamination in water and soil located within 2 feet of the shoreline.

In October 1985, the EPA, BN and Sliters signed a second AOC (Docket No. CERCLA-VIII-85-07) to conduct an RI/FS. The purpose of the RI/FS was to determine the nature and extent of contamination at the Site, to evaluate the impacts of contamination on public health and the environment, and to formulate alternatives for remedial action. The field work for the RI was performed from the fall of 1985 to fall 1988. A RI/FS Report (RETEC, 1989) was submitted to EPA in the spring of 1989.

The RCRA impoundments were closed in 1988 under the MDEQ Hazardous Waste Permitting Program. Subsequent to the closure, a groundwater monitoring well located adjacent to the impoundment indicated that groundwater was contaminated; therefore, groundwater corrective action was required.

After completion of the RI/FS, a Record of Decision (ROD) was signed on September 27, 1989 (EPA, 1989). The ROD selected a remedy and a contingency remedy for remediation of soil, groundwater and sediments, which were determined to pose a potential threat for human health and the environment. The selected remedy addressed the principal threats by removing the potential for direct contact with soils, by reducing the impact of the soils and sediments on groundwater and surface water, and by treating the groundwater. The contingency remedy was to be implemented if the selected remedy was not determined to be effective.

On December 20, 1991, the EPA entered into a Consent Decree with Burlington Northern Railroad Company and Burlington Northern, Inc. for Remedial Design/Remedial Action (RD/RA) of the selected remedy at the Site. The Consent Decree required performance of a Pilot Study to demonstrate

the "practicability" of the innovative hot water flushing and *in-situ* bioremediation component of the selected groundwater remedy, in the low permeability hydrogeologic conditions at the Site. The Consent Decree required the Pilot Study to be conducted prior to any soil application on the LTU.

During the 1991 Remedial Design Investigations, a Land Treatment Demonstration (LTD) and a No Migration Demonstration (NMD) were conducted to satisfy RCRA and land disposal restriction requirements. The results demonstrated that the creosote contaminated soils are amenable to biological treatment and that no migration of hazardous constituents above health based criteria was expected. Based on the data, in 1991 the EPA granted a variance to land disposal restrictions for wastes to be treated in the LTU.

EPA issued an Explanation of Significant Differences (ESD) in June 1992 (EPA, 1992) that modified the elements of the selected groundwater remedy, based on the "practicability" determination required in the ROD. The results of the Pilot Study were presented in the *Remedial Design Investigation Report for the Former Somers Tie Plant* (RETEC 1991). The study was conducted to more accurately define and quantify the conditions under which the groundwater could be successfully remediated. The 1992 ESD eliminated the hot water flushing option due to the low permeability of the aquifer materials.

The U.S. Fish and Wildlife Service (FWS) delineated wetlands in the former Swamp Pond and the slough area in July 1983, to determine functional wetland values for wetlands compensation determination. As a result of the determination, BN reconstructed the Swamp Pond area, performs semi-annual water quality monitoring and assesses vegetation recovery. The determination identified the preference for no excavation to take place in the slough area if no ecological or human health impacts exist.

In April 1993, contaminated soils in the area of the former Swamp Pond and a portion of the drainage ditch were excavated and removed to the Land Treatment Unit (LTU). Approximately 1 acre was excavated to a depth of 12 feet, resulting in a volume of 19,303 cubic yards of contaminated soil. The CERCLA lagoon area exhibited contaminated groundwater consisting of dense nonaqueous phase liquids (DNAPL) within and adjacent to the CERCLA lagoon boundaries and dissolved components in the groundwater downgradient from the lagoon.

In 1998, EPA issued a second ESD (EPA, 1998) to modify the remediation requirements for site soils and groundwater, identified in the 1989 ROD. The modifications included: (1) revision to the soil remediation level for carcinogenic polycyclic aromatic hydrocarbons (CPAH) from 36 to 57 milligrams per kilogram (mg/kg) calculated as benzo(a)pyrene (B(a)P) equivalents using the revised cancer slope factor; (2) removal of limitations for pyrene, naphthalene and phenanthrene in soils, based on toxicological assessment and the no-migration demonstration; (3) revision of the soil remediation level for total non-carcinogenic PAH from 1,875 to 1,500 mg/kg based on revisions to the Reference Dose

(RfD) for naphthalene equivalents which was revised from 0.005 to 0.004 mg/kg-day; (4) revision of the groundwater remediation level for total non-carcinogenic PAH from 0.3 to 40 µg/L, based on the revision to the RfD for naphthalene; and (5) revision of the groundwater remediation level for total phenolics from 15,000 to 6,000 µg/L, based on revisions in the RfD for phenol and phenolic compounds.

Basis for Action

The following description is from the 1989 ROD (EPA, 1989) and the Phase II Groundwater Remedy Remedial Design report (RETEC, 1998c):

> Soils in the Somers area are identified as silty clay loams, consisting primarily of silts and fine sands. Most of the soils in the area were deposited by glacial or alluvial processes. Glacial soils are heterogeneous, commonly containing clayed and unsorted deposits. Regional soil thicknesses range from zero to over 500 feet. Subsurface conditions in the vicinity of the former tie plant vary with depth. The Somers tie plant property is covered with a veneer of 0.5 to 10 feet of man-made gravel fill. Underlying the fill are discontinuous layers of silty sand and sandy silt to depth of about 60 feet, underlain by a thick silt unit containing interbedded silty sands and clays.
>
> The Precambrian bedrock surface in the Somers area is very irregular. Bedrock outcrops are present to the west of the former RCRA impoundments and to the west of the discharge ditch and swamp areas. Away from the outcrop, depths to bedrock were identified at 105 to 110 feet below ground surface at the site. The depth to bedrock is less to the north and greater to the south. The bedrock dips to the east.
>
> Three groundwater aquifers have been identified at the Site. The uppermost unit is a surficial aquifer located in alluvium material (interbedded silt, clay and sand). This unit yields small volumes of water to domestic and stock wells. Well encrustation from iron bacteria, low yields, and marginal water quality have prevented significant use of this aquifer in the Somers area (Noble 1986). Five residences in Somers, upgradient from the tie plant, have water supply wells completed in this aquifer; none are used for drinking water. The water table aquifer discharges to Flathead Lake during periods of low lake level and is recharged by the lake during summer months when lake levels are high.
>
> Underlying the water table aquifer, and separated from it by low-permeability silty clay materials, is an artesian aquifer. The artesian aquifer was encountered in two wells at depths of 60 and 90 feet at the Site. This aquifer consists of a number of sand and gravel deposits separated by discontinuous beds of fine-grained material. No residential wells in Somers are completed in this unit.

Underlying the artesian aquifer is the bedrock aquifer. It is present within the secondary structural features such as joints and fractures. One residential well and the Somers School well are completed in bedrock. Two municipal bedrock wells for the municipal supply were installed in 1989.

The RI/FS identified contaminated soil beneath and adjacent to the CERCLA lagoon, along the drip track, along the drainage ditch and near the former Swamp Pond. The heaviest contamination observed in soil/oil mixture was in the upper few feet of the CERCLA lagoon and the surface of the drip track area. Other areas of contamination included: the slough where treated ties were stored and beach sediments below the high water line. The contamination in the beach area is believed to be either a remnant of discharges from the ditch or contaminated groundwater originating from the Swamp Pond area. The primary contaminants of concern in soils and sediments are PAH compounds and zinc in the area of the slough, due to potential impacts to aquatic life and waterfowl. Zinc is also a contaminant of concern for the drip track area.

The RI/FS identified groundwater contamination in the near surface water table aquifer downgradient of the CERCLA lagoon and in the Swamp Pond area. On closure of the RCRA impoundments, groundwater contamination was discovered in that area. The primary contaminants of concern in groundwater are PAH, phenols and zinc. Monitoring wells downgradient of the CERCLA lagoon exhibited visible evidence of oil contamination. The contaminant plume was discovered between 400 to 600 feet downgradient of the CERCLA lagoon.

The potential routes of migration from soil and sediment sources are primarily air and water. For groundwater the main potential route of exposure is discharge to surface water. The risk assessment determined that contaminated soils and groundwater pose the greatest risk to human health and the environment. The indicator compounds for the risk assessment included: PAH compounds, phenols and zinc. The risk assessment indicated that benzene in groundwater and the other inorganic metals do not pose a risk. The toxicity assessment identified the presence of carcinogenic and non-carcinogenic compounds, with the PAH - benzo(a)pyrene representing the most potent CPAH. Exposures routes identified in the risk assessment were based on a residential exposure scenario, due to the proximity of residential area and potential future use of the property. The exposure routes determined by the risk assessment include: direct contact/ingestion of surficial soil and inhalation of volatile compounds and fugitive dust. Potential exposure routes were identified for ingestion of groundwater from wells downgradient of the CERCLA lagoon, direct contact/ingestion of soil and sediment or water by wildlife, fish or other aquatic life and consumption of environmental contaminants via the food chain.

IV. REMEDIAL ACTIONS

SUMMARY OF THE 1989 RECORD OF DECISION

The contaminants of concern at the BNSF Somers Site are PAH compounds, phenols and zinc. The 1989 ROD established cleanup levels for those contaminants of concern at the Site. The objective of the remedy selected in the 1989 ROD is to reduce human exposure to both the soil and groundwater contaminants of concern. The major components of this remedy consisted of excavation and biological treatment of soils with an onsite land treatment unit (LTU) and *in situ* biological treatment of contaminated groundwater within the water table aquifer, supplemented by extraction and treatment of contaminated water through a mechanical and chemical treatment process. This process was intended to remove free product, metals and particulates, and dissolved organics through oil/water separation, equalization, oxidation, particulate settling and granulated activated carbon filter processes.

A complete list of the components of the original remedy selected for the site can be found on pages 40 through 46 of the 1989 ROD (EPA, 1989). The remedy was modified by the 1992 ESD, based on the Pilot Study for groundwater contaminants of concern. A brief summary of the original and modified remedy is excerpted below.

Soil Component

As stated in the ROD, the objective for soil remediation is to reduce exposure from direct contact to an acceptable level and to ensure that the migration of contaminants to groundwater is minimized. The 1989 ROD required the following:

- Excavation of 11,700 cubic yards of creosote and zinc contaminated soils in the CERCLA lagoon, drip track, drainage ditch, beneath the retort building and in the slough and beach areas. Some soil left below the water table in the CERCLA lagoon and swamp would be treated as part of the groundwater component of the remedy. The ROD included provision for RCRA groundwater monitoring and post-closure care for up to 30 years or deed restriction placed if hazardous constituents remain. A demonstration of no-migration of hazardous constituents was conducted to satisfy RCRA land disposal restriction requirements.

- The original alternative was modified to exclude the excavation of the beach sediments. The sediments were not excavated due to a determination that the ecological risks to Flathead Lake from beach excavation outweighed the benefits of removing the contaminated sediments.

- Excavated areas were backfilled with clean borrow soils and revegetated. The remedy also included replacement or restoration of wetlands lost during the remedial action.

The original remedial action goals for excavation of contaminated soil and cleanup of contaminated soil are presented in Table 1.

Groundwater Component

The ROD states that the objectives for the groundwater component are to reduce, by treatment, potential exposures from groundwater ingestion and to ensure contaminants in groundwater do not adversely affect the quality of Flathead Lake. The 1989 ROD requires the following:

- The initial groundwater remedy involved the evaluation of innovative technology consisting of either hot water flushing of contaminated groundwater, ozone/ultraviolet (UV) or peroxide/UV treatment at surface and *in situ* biological treatment of residual contamination. The remedy involved the installation of injection and recovery wells in the CERCLA Lagoon and the Swamp Pond area. Recovered groundwater would be treated in a chemical reactor.

Because aspects of the innovative bioremediation were unproven, the ROD included two contingency remedies for the groundwater component. The 1991 Consent Decree required Pilot Tests of the hot water flushing and *in situ* biological treatment innovative technologies to evaluate the "practicability" in the low permeability hydrogeologic conditions at the Site. Implementation of the soil remedy was restricted until after the Pilot Tests, as the contingency remedies involved modification to the soil remedy, based on results of the Pilot Test. The contingency remedies involved "deep" excavation and incineration of soils.

- Identify and implement institutional controls to restrict use of groundwater downgradient of the areas.

- Monitoring activities required to assess the performance of the components of the remedy would be performed throughout the life of the remedial activities. Monitoring would involve groundwater monitoring wells and semi-annual monitoring of the Somers municipal supply well until cleanup levels are achieved.

- The Site conditions will be reviewed no less than each five years after initiation of the remedial action to ensure that the remedy protects human health and the environment.

The original remedial action goals for groundwater are presented in Table 1.

SUMMARY OF 1992 EXPLANATION OF SIGNIFICANT DIFFERENCES

In 1992, EPA modified the remedy selected for the site through an ESD (EPA, 1992). The ESD presented the "practicability" determination for the innovative bioremediation technology for the groundwater component. The significant differences between the remedy described in the 1989 ROD and the ESD are described below:

1. Excavate additional soils in the CERCLA Lagoon and the Swamp Pond Areas increasing the total of excavated materials from 11,700 cubic yards to 31,000 cubic yards.

2. Increase the size of the Land Treatment Facility from 10 acres to 14 acres to decrease the time to meet remedial objectives and cleanup goals.

3. Eliminate the hot water flushing option of the groundwater remedy due to the low permeability of the aquifer materials. Excavation of additional soil in the CERCLA Lagoon would remove more source material and aid the remediation process.

4. Change soil and groundwater cleanup times. Decrease the time to achieve soil remediation goals to four to six years rather than 10 years. Increase the estimate to achieve groundwater remediation goals from 10 to 15 years to 50 years.

Only those changes described in paragraphs 1, 2, 3, and 4 above were made to the selected remedy as described in the ROD. All other requirements and planned remedial actions contained in the 1989 ROD remained unaltered by the ESD.

SUMMARY OF 1998 EXPLANATION OF SIGNIFICANT DIFFERENCES

As the result of the first five-year review, EPA modified the remedy selected for the site through an ESD issued in 1998 (EPA, 1998). The ESD modified remediation criteria established in the ROD and the 1992 ESD. The modification of remediation levels was based on revisions in slope factors and establishment of new reference dose for non-carcinogenic PAH compounds. The significant differences between the remedy described in the 1989 ROD and the 1998 ESD are described below:

Soil Component

- Revision of soil remediation level for CPAH from 36 to 57 mg/kg calculated as B(a)P equivalents using the revised B(a)P cancer slope factor.

- Elimination of limitations for pyrene, naphthalene and phenanthrene in soils. This was based on toxicological assessment, field data and no-migration demonstration.

- Revision of the soil remediation level for total non-carcinogenic PAH from 1,875 mg/kg to 1,500 mg/kg based on revisions to the RfD for naphthalene equivalents which has been revised from 0.005 to 0.004 mg/L.

Groundwater Component

- Revision of the groundwater remediation level for total non-carcinogenic PAH from 0.3 µg/L to 40 µg/L based on the current procedure of not considering co-carcinogenicity and the change to the RfD equivalent to naphthalene.

- Revision of the groundwater remediation level for total phenolics from 15,000 µg/L to 6,000 µg/L, based on revisions in the RfD's for phenol and phenolic compounds.

Table 1 presents a summary of these modified risk-based remediation levels for excavation of soil, cleanup of soil and cleanup of groundwater. Only the initial treatment levels were changed by this 1998 ESD. The ROD requirements for additional treatment of soils, after attaining the new initial treatment levels remained unchanged, with regard to net reduction of 20 percent for TPAH compounds.

REMEDIAL OBJECTIVES

The objective of the response actions implemented at the Site is to alleviate the primary threats to human health and the environment posed by contaminant sources and contaminant migration. Specifically, the response action objectives are to minimize, eliminate and prevent current or future exposure of humans and other receptors to contaminated soils and groundwater.

Soil Remediation

The response objective for soil was the elimination of risk to human health through direct contact, and the risk to the environment through migration to groundwater and surface water. Remediation of site contaminated soils (within the site and adjacent to Flathead Lake) would be accomplished through contaminant source removal by excavation of contaminated soil, and subsequent remedial treatment. Contaminant source removal provides protection of human health and the environment by minimizing contaminant migration to groundwater and preventing adverse impacts to surface water.

Related to the soil component is the determination of wetlands compensation for loss of damage of wetlands in the area of the slough and the Swamp Pond, as a result of remedy implementation.

Groundwater Remediation

The response objective for groundwater contamination is to reduce, by treatment, potential exposures from groundwater ingestion and to ensure contaminants in groundwater do no adversely affect the quality of Flathead Lake. To accomplish this objective, cleanup of contaminated groundwater would be achieved through *in situ* biotreatment and treatment of extracted groundwater and leachate water from the LTU. The mechanical and chemical treatment process was intended to remove free product, metals, and particulates, and dissolved organics though oil/water separation, equalization, oxidation, particulate settling, and granulated activated carbon filtration. These processes and their respective status towards achieving the remedial goals are further described in this section and Section VI.

The Phase I groundwater remedy was implemented to capture and treat contaminants located in the area of the CERCLA lagoon and the area downgradient where residual contaminants are present. The intent of the Phase I remedy is to hydraulically contain the PAH contaminated groundwater within the CERCLA lagoon boundary and to obtain field scale data on the effectiveness of using bioremediation to remediate groundwater at the site.

REMEDY IMPLEMENTATION

The components of the remedy selected for the BNSF Somers site have been summarized above. BNSF has designed constructed and commenced operations of the soil and groundwater portions of the remedy. In 1991 to 1992, the former tie plant was demolished as a pre-cursor to implementation of the remedy. Remedial Design Investigations (RDI) were conducted in 1990 and 1991, with construction completion in 1993 for the LTU and 1994 for the groundwater treatment system. The *Remedial Design Investigation Report for the Former Somers Tie Plant* (RETEC 1991), was submitted to EPA in 1991. A summary of the status of the activities for each remedial component is presented below.

Soil Component

The soil remedy identified in the 1989 ROD and modified in the 1992 ESD was implemented between 1991 and 1994, following the *Remedial Design Investigation Report* (RETEC, 1991) and the *Somers Soil Remedy Volume 3: Operations and Monitoring* (RETEC, 1992). During the 1991 Remedial Design Investigation, a Land Treatment Demonstration and No Migration Demonstration were conducted to satisfy RCRA and land disposal restriction requirements. EPA granted a variance to land disposal restrictions in late 1991. The no-migration petition was submitted as an appendix to the *Remedial Design Report* (RETEC, 1991). EPA approved the no-migration petition with the issuance of the 1992 ESD in June 1992.

Excavation of soil from the retort building, drip track, CERCLA lagoon, drainage ditch and the Swamp Pond area was conducted at various times from 1991 to 1993 (Figure 4). Soil was managed in the RCRA impoundments until the completion of the LTU in 1994. Soil excavation activities are presented in the *Construction Completion Report for Land Treatment Facility Construction and Contaminated Soil Excavation - Somers, Montana (RETEC, 1993a).*

Construction of the LTU commenced in September 1992 and was completed in August 1993. Soil placed on the LTU was managed by tilling, irrigation and nutrient addition and was closed in 2002.

In August 1995, ThermoRetec presented to EPA a Workplan for the application of the second lift of soil to the LTU. This plan was approved by EPA and the second lift was completed in October 1995. BN submitted the *Land Treatment Unit Reapplication Workplan* (RETEC, 1998e) to EPA in April 1998. The final lift of soil was completed in August 1998 in conjunction with the closure of the RCRA surface impoundment. The RCRA surface impoundment was closed based on the Work plan provided to MDEQ June 1997. The *Construction Completion Report for Closure of the RCRA Surface Impoundment (ThermoRetec, 1999e)* was completed in July 1999.

In July 1998 EPA issued the second ESD, modifying the remediation requirements based on changes in slope factors and reference doses.

Wetlands Mitigation

The wetlands at the former Swamp Pond and the slough area of the Site were delineated by the FWS in July 1993 to determine wetland functional values described in a Wetlands Compensation Determination. The Determination indicated preference that no excavation takes place in the slough area if no ecological or human health impacts exist. In April 1994, BN reconstructed areas of the Swamp Pond where excavation activity had damaged wetlands. This activity was conducted in accordance with a 1994 plan developed by FWS as partial mitigation of past wetlands damage. BNSF purchased land in the Flathead Valley and gave the land to the Natural Resource Conservation Service (NRCS) in 2004 to meet FWS requirements.

Flathead Lake Sediments

Contaminated beach sediments remain covered by several feet of sand which is only exposed when lake levels are low in the winter months, when use of the beach is limited. Due to the coverage of the sediments and continued sedimentation in the area, EPA determined that leaving the sediments in place would cause lesser impacts to human health and the environment, than would removal. The clean sand provides a barrier for direct contact with impacts sediments and disturbance of the sediments be

removal could impact water quality. Leaving the sediments in place below the continued sedimentation remains protective of human health and the environment.

Groundwater Component

The groundwater component of the remedy identified in the 1989 ROD consists of *in situ* biological treatment of contaminated groundwater within the water table aquifer, supplemented by extraction and treatment by mechanical and chemical processes. A 1991 Consent Decree, required that a pilot test of the hot water flushing and *in situ* biological treatment technologies be conducted to evaluate their "practicability" in the low permeability conditions. Subsequently, the 1992 ESD modified the groundwater remedy through elimination of the hot water flushing option due to low permeability. The contingency modification was excavation of additional soil in the CERCLA lagoon to remove more source material.

In December 1993, EPA granted conditional approval of the *Final Design Report for Phase I of the Groundwater Remedial Action at the Burlington Northern Tie Treating Plant, Somers, Montana* (RETEC, 1993b). EPA approval is conditional upon submittal of additional detail on the design basis for Phase II of the remedy. A March 1994 addenda to the design report identified that if Phase I data indicate that it is not technically feasible to achieve the ROD cleanup levels within 50 years, then several options would be considered. One such option could be modification of project goals in terms of cleanup levels and restoration time frame, while remaining protective of human health and the environment.

The remedy was implemented to capture and treat contaminants in two areas: the CERCLA lagoon and the downgradient area where residual contaminants remain below the maximum depth and breadth of the excavated areas. The intent of the groundwater remedy was to hydraulically contain the PAH contaminated groundwater within the CERCLA lagoon boundary, treat groundwater, and to obtain field scale effectiveness of the *in-situ* bioremediation technology. The construction of the well system was completed in 1993. The construction of the groundwater treatment system (GWTS) plant started in 1993 and was completed in April 1994. The *Final Construction Completion Report for Phase I of the Groundwater Remedial Action, Burlington Northern Tie Treating Plant, Somers, Montana, "As-Built Construction Document"* (RETEC, 1994) describes the design and construction of the system. The *Operations and Maintenance Manual* (RETEC, 1996a) details the operations and maintenance of the groundwater treatment system. The GWTS began treating groundwater in a limited capacity in April 1994, with routine operations established in January 1995.

A site-wide groundwater monitoring program was implemented in 1993. The program incorporates semi-annual and as needed sampling and analysis of groundwater collected from the on-site monitoring well network. Figure 5 shows the sitewide well locations in association with site feature (RETEC, 1998c). Figure 9 contains results of water quality samples from various groups of wells, for TPAH, zinc and total suspended solid (TSS) constituents. In general water quality has been below water

quality standards with the exception of zinc and PAH compounds in specific wells close to the treatment area. Additional information is presented in Section VI. Figure 8 contains a summary of historical zinc results.

In May 1998, BN prepared a *Phase II Remedial Design, Somers, Montana* document (RETEC, 1998c) to present a summary of site characteristics and report on progress regarding implementation of the groundwater remedy. The document presented information from Phase I operations indicating that due to characteristics of site geology, hydrogeology and contaminant characteristics, it is not technically feasible to achieve the ROD clean up levels.

In July 1998, EPA issued an Explanation of Significant Differences (EPA, 1998) that partially modified the groundwater remediation levels based on changes in slope factors and reference dose, as previously discussed.

In December 1999, BN prepared a *Draft Technical Impracticability Evaluation for Groundwater Restoration, Former Somers Tie Treating Plant, Somers, Montana* (ThermoRetec, 1999g). This document was subsequently revised in 2000 and in 2001 (ThermoRetec, 2001g). The draft TI Evaluation reviews alternatives for the groundwater remedy due to the challenges the subsurface conditions and contaminant types pose to achieving the ROD designated cleanup levels.

The TI Evaluation was determined to be complete by EPA and MDEQ in 2003. A Controlled Ground Water Area was also established in 2003 that prohibits drilling new ground water wells within the site properties. A request to modify operation of the ground water treatment system has been submitted by BNSF. The TI waiver has not been granted by formal action awaiting a decision by EPA and MDEQ on the request to modify plant operations.

Operations and associated monitoring for the groundwater remedy have been reported in quarterly progress reports and annual reports since 1995.

SYSTEM OPERATIONS/O&M

Soil Component

O&M Requirements

The LTU was constructed with a very low-density polyethylene liner overlain by a sand layer with a low profile drainage network embedded in sand. The drainage network discharged to a sump on the south side of the LTU. Drainage water collected in the sump was periodically pumped to an adjoining retention pond or the groundwater treatment system. Application and treatment of the first 17,000 cubic

yards was conducted in May 1994 with treatment until September 1995, when treatment goals met the cleanup criteria for naphthalene and less than 20 percent net reduction. The second application consisted of 14,500 cubic yards placed on the LTU in October 1995. Treatment of the second lift lasted until November 1997, when the B(a)P equivalent concentrations was less than the revised soil treatment goal and the net reduction in TPAH from October 1996 to November 1997 was less than 20 percent. The final application was in August 1998 and consisted of 9,367 cubic yards from the stock pile and 5,055 cubic yards of RCRA impoundment soil. The total of 14,422 cubic yards of soil formed a 10-inch lift. Treatment was continued until 2000 when the B(a)P equivalent and the less than 20 percent reduction was attained. The LTU was closured in 2002, after approval of the *Land Treatment Unit Closure Work Plan, BNSF Former Tie Treating Plant, Somers, Montana*, dated August 14, 2001 (ThermoRetec, 2001f).

Operations and maintenance (O&M) activities associated with the LTU included tilling (cultivation), spray irrigation, application of nutrients, inspections, and management of stormwater and subsurface drainage water management. Tilling was performed weekly, as conditions permitted. Irrigation with a center pivot system was conducted as soil moisture readings indicated the need for additional moisture. Application of nutrients was conducted when microbial activity was evaluated as low. Inspections were conducted monthly as part of site-wide maintenance. Stormwater management generally occurred at the end of the winter months, prior to start-up of LTU operations (typically May). Subsurface drainage management occurred as needed. Both stormwater and subsurface drainage water were placed in the retention pond or pumped to the treatment plant.

Monitoring requirements included air monitoring for airborne particulates and naphthalene during tilling operations, soil sampling for toxicity semi-volatile organic compounds (SVOC) and nutrient concentrations, groundwater quality monitoring (SVOC, zinc and TSS), and leachate sampling (SVOC and zinc). Soil sampling was conducted a minimum of twice per year.

System Operations/Activities to Date

The LTU was placed into operation in 1994, and consisted of a 14.1-acre lined impoundment which includes 1.7-acre soil storage area and 12.7-acre treatment area. The system was designed to promote the degradation of PAH contaminated soil using naturally-occurring micro-organisms. The LTU had an irrigation system, leak detection and leachate collection system and was supported by a retention pond to assist with management of accumulated water. A total of 69,700 cubic yards of contaminated soil was excavated from the site for treatment in the LTU.

Remediation levels in soils placed on the LTU were achieved in 2001 and a closure plan was developed for the LTU and approved by EPA and DEQ in 2002 (*Land Treatment Closure and Post Closure Work Plan*, RETEC May 2002). Closure activities were completed by November 14, 2002.

Operation Problems

Since operations began on the LTU few operation problems occurred. The largest challenge was managing accumulated water following heavy snow fall years. This situation was addressed by use of the treatment plant when volumes exceeded the capacity of the retention pond. To assist with managing the water a stand pipe connecting the subsurface drainage system to the sump was added to the southern end of the LTU in October 1996.

Estimated Costs

The estimate of annual O&M costs from the ROD was $121,000 per year. However, this estimate does not take into consideration the additional volume of soil as a result of the contingency remedy for the groundwater component, and the larger configuration of the LTU. Actual annual operational costs for the soil component of the remedy averaged from $50,000 to $60,000 per year during the period from 1996 to 2000, with the total O&M costs being approximately $300,000 for the period. Revised cost estimates have not been made due to the closure of the LTU.

Groundwater Component – O&M Requirements

The system includes two separate arrays of injection and extraction (recovery) wells, to provide containment of a significant portion of the dissolved phase contaminant plume. The northern array is situated within the former CERCLA lagoon consisting of five extraction wells surrounded by ten injection wells. The southern array is located to the south of the lagoon and consists of one extraction well and four injection wells (Figure 11).

The treatment plant includes primary treatment to remove oil and creosote, solids and iron, followed by secondary treatment to remove dissolved organic contaminants. The oil and creosote is removed in an oil/water separator system with oil skimmed from the top and creosote drawn from the bottom, for off-site recycling. Dissolved iron is removed using potassium permanganate to oxidize the iron and form iron hydroxide floc. Filtrate is recycled back to the treatment system and the filter press sludge is transferred to the LTU for treatment. The removal of dissolved organic contaminants is achieved through granulated activated carbon (GAC) units. Treated groundwater is either reinjected into the wells or an infiltration gallery, or used as irrigation water for the LTU. The treatment goal for the final effluent is PAH < 1 µg/L prior to reinjection or reuse of water. Water reinjected through the injection wells may be enriched with dissolved oxygen, nitrogen and phosphorous nutrients to promote *in-situ* biodegradation (RETEC, 1996a).

Well field monitoring includes documentation of extraction and injection rates and collection of quarterly groundwater elevation data in the well network. Groundwater quality monitoring is conducted through a series of wells on a semi-annual basis, to evaluate water quality conditions within the contaminant plume emanating from the CERCLA lagoon, water quality in the area of the former Swamp Pond, and down gradient of the treatment area. Figure 5 shows the locations of wells in the monitoring network. Wells at the Site are designated for specific purposes and include: CERCLA wells, LTU wells, RCRA wells, treatment area wells, voluntary wells, and town wells.

System Operations/Activities to Date

The groundwater system has been in operation since May 1994. Routine operations did not begin until January 1995 due to technical difficulties experienced during start up. Table 2 summarizes treatment plant monitoring requirements. In general treatment plant monitoring is performed in accordance with the O&M requirements. Some data that are field analyzed are not provided in annual reports, but field data is maintained to assist with plant operations e.g., temperature, pH, flow rate, dissolved oxygen. Water quality samples for nutrients are only collected if water is enriched with oxygen and nutrients prior to reinjection, which is only conducted as needed. In general groundwater quality monitoring is conducted in accordance with the O&M manual and remedy requirements.

Potentiometric surface maps were generated on a quarterly basis from September 2001 to March 2006. In general, the potentiometric surface indicates an area of draw down associated with operation of the extraction well system, otherwise the general flow direction is east-northeast and east-southeast in various parts of the site. The area of drawdown covers approximately 2.5-acres since startup of the well field operations in 1994, and represents the zone of contaminant plume containment.

Prior to initiation of system operations, non-aqueous phase liquids (NAPL) were present in all six extraction wells and three of the injection wells (IW-6, IW-7 and IW-8). After five years of operation NAPL is present in five of the extraction wells, but is no longer present in EW-6, IW-6, W-7 and IW-8. Figure 8 shows the changes in NAPL occurrence over time in the extraction and injection well system. The following table provides a synopsis of dissolved TPAH concentrations in two treatment area wells, showing little progress has been achieved in the reduction of dissolved contaminants since startup of the system and treatment of over 8 million gallons of water. Generally, groundwater quality in wells outside of the treatment area remains unchanged.

Dissolved TPAH concentrations
Treatment Area Wells

Date	MW-93-2S	MW-93-2D
April 2001	2.91 mg/L	0.503 mg/L
March 2006	0.708 mg/L	0.0858 mg/L

Estimations of mass of contaminants removed provide a measure of progress towards aquifer restoration. These estimations are based on volume of extracted groundwater treated and the quality of influent and effluent at the plant. The following table summarizes the mass contaminant removed by year since the start of operations.

Contaminant Mass Removed During Carbon Filtration

Year	**Volume of Treated Water (gallons)**	**Mass of Contaminant Removed (pounds)**		
		Naphthalene	**Total PAH**	**Total SVOC**
1995	769,096	51	59	257
2000	1,173,807	267	257	412

Year	Volume of Treated Water (gallons)	Mass of Contaminant Removed (pounds)		
		Naphthalene	Total PAH	Total SVOC
2005	950,839	45	76	130
Total (thru 3/27/06)	17,833,174	1,754	2,895	3,657

Over the 11-year period that the Phase I system has been operational, approximately 3,657 pounds of semi-volatile organic compounds has been recovered representing three percent of the total mass estimated to reside in the subsurface.

The quality of water processed through the treatment system has not changed appreciably over time as shown in Table 12.

Operation Problems

The Phase I RDI indicated that pumping rates of 0.5 to 2.0 gallons per minute (gpm) per extraction well and 0.45 to 1.8 gpm per injection well were feasible. Actual operations indicate the total combined pumping rate for the six extraction wells is 2.0 gpm and that injection rate is 0.1 gpm, which are lower than expected. These lower than expected extraction and injection rates are a factor of natural subsurface conditions.

Only 9 of the 12 injection wells are in use due to the presence of DNAPL in wells IW-6, IW-7, and IW-8. To date the volume of water that can be reinjected into the subsurface represents only 10 percent of the total volume extracted.

The treatment plant operates in batch mode rather than the designed continuous mode to ensure low extraction rates.

Estimated Costs

The estimate of annual O&M costs from the ROD was $540,000 per year. However, this estimate does not take into consideration the elimination of hot water flushing and other modifications to the extraction and treatment system. Actual annual operational costs for the ground water component of the remedy have varied from $100,000 to over $150,000 per year with the total for the period from 2001 to 2006 being approximately $750,000.

V. PROGRESS SINCE THE LAST REVIEW

Summary of Recommendations and Status

There were five recommendations from the second five-year review:

- The Montana *WQB-7 Numeric Water Quality Standards* should be evaluated for inclusion as site remediation levels. A protectiveness evaluation of the current risk-based groundwater remediation criteria will be initiated.
  The evaluation was completed; however, no additions or changes have been made.

- Continue to develop future land use scenarios to support deed restriction language being developed in conjunction with plans for closure of the LTU and the retention pond.
  This activity is ongoing.

- Complete the controlled ground water use area petition process with the Department of Natural Resources and Conservation (DNRC) to designate a limited groundwater use area as an institutional control measure for protection of human health and the environment and complete an Institutional Controls Plan.
  Controlled Ground Water Area has been established and the IC plan is currently being refined.

- Complete technical impracticability evaluation of the groundwater remedy.
  TI Demonstration completed and approved.

- Modify groundwater system operations as necessary to address the management of spent carbon, filter press sludge and filters, and treated water upon closure of the LTU and the retention pond.
  This activity is ongoing and will continue as long as the groundwater treatment system continues to operate.

VI. FIVE-YEAR REVIEW PROCESS

Administrative Components

The Somers site five-year review was compiled by EPA Region 8 with assistance from the Montana Department of Environmental Quality. The following team members participated in the review:

Jim Harris, P.E., EPA Remedial Project Manager
Lisa DeWitt, Montana DEQ, Project Officer
Kevin Kirley, DEQ Federal Superfund Program Manager
John Wardell, EPA Montana Office Director
Kathy Chiotti, EPA Montana Office
Jim Stearns, EPA Attorney
Dave Smith, BNSF
Nancy Gilliland, RETEC
Ann Colpitts, RETEC

This five-year review consisted of the following activities: a review of relevant documents submitted between 2001 and 2006 and a site inspection in August 2006. The completed report is available in the information repository. Notice of its completion will be placed in the local newspaper and local contacts will be notified by letter. A brief summary of this report will be distributed to community members.

Community Notification and Involvement

The EPA Region 8 Montana Office published a notice in *The Daily Interlake* in October 2006, indicating that the five-year review is in progress and that information would be public when completed.

Document Review

Documents reviewed for site operational information and data included land treatment unit annual operations reports, groundwater treatment system annual operations reports, quarterly progress reports, LTU closure completion plan and technical evaluations of the groundwater remedy. Historical information for O&M was obtained from construction completion reports, design documents, and annual operations reports. Section XII contains a listing of documents reviewed for this five year review.

The 1989 ROD, 1996 Five Year Review, 1998 ESD and 2001 Five Year review contain discussions regarding the remedy and criteria for implementation of the remedy as well as the

identification of ARARs and risk-based standards identified as remedial cleanup goals for the Somers site.

Data Review

Data reviewed for this five year review consists of the following:

- LTU soil chemistry and nutrient analysis
- LTU groundwater quality
- LTU leachate
- Groundwater Treatment Plant influent/effluent water quality
- Site-wide water quality data from monitoring wells

LTU Closure Completion

During the 2000 LTU operations, soil samples were collected in May, July and October. The B(a)P equivalent concentrations exhibited a degradation from 10.1 mg/kg to 6.32 mg/kg during the 2000 treatment season, which are below the treatment goals. Evaluation of TPAH concentrations from July 1999 to July 2000, indicate an 11 percent reduction in TPAH. Thus the treatment goal of 57 mg/kg B(a)P and less than 20 percent net reduction has been met. The CPAH concentrations reached the residential soil treatment level of 5.7 mg/kg, and the final lift could be used for final cap material.

EPA approved the Land Treatment Unit Closure and Post-Closure Work Plan (Work Plan) on May 17, 2002. The Invitation to Bid on Closure Activities package was sent to contractors on May 23, 2002. Envirocon Incorporated (Envirocon) of Missoula, Montana was selected as the contractor on June 28, 2002 for construction to begin on September 26, 2002. Based on the Envirocon bid, the LTU closure activities were estimated to take approximately 4 weeks to complete from mobilization to demobilization, weather permitting.

Written notification was provided to EPA on September 13, 2002 that the closure date had been postponed due to contractor delays at a nearby site. Envirocon started mobilizing equipment to the site on October 14, 2002. LTU closure was complete with seeding conducted on November 14, 2002 and a final survey on November 15, 2002.

The LTU was closed in accordance with the approved Work Plan. Closure activities began with removing the top lift of soil treated to residential levels, removing the irrigation line and puncturing the LTU and retention pond liners. The LTU surface was then graded to meet a 0.5% slope across the surface using surrounding berm soil and stockpiled soil. The final 18-inch soil cap was constructed in two 9-inch lifts consisting of the top lift of soil, berm soil and borrow material. The final soil cap was graded and

seeded to complete LTU closure activities. In addition to capping the LTU and retention pond, the pump and associated piping system were sealed in place.

The EPA, the Montana Department of Environmental Quality (MDEQ) and EPA consultants visited the site periodically throughout closure activities and provided consultation and oversight. Photographs are included in the Appendices.

Top Lift of Soil Removal

One of the first tasks was to remove the top 10-inch lift that met the residential soil treatment goal. The entire surface was staked in a 100-foot grid and was surveyed with a laser level to determine accurate removal of the top lift. Two bulldozers worked in coordination with the surveyor on the ground to ensure removal of only the top 10-inches of soil across the LTU surface. The bulldozers scraped the soil into piles, which were then placed in dump trucks with a loader. The removed soil was hauled off the treated surface and placed in one of two stockpile areas either in the former stockpile area or just outside the LTU near the center pivot.

The LTU surface was then graded to meet a 0.5% slope across the surface using surrounding berm soil and some stockpiled soil. The LTU surface was contoured using the 100-foot staked grid and a surveyor on the ground continually checked grades with a total survey station.

LTU Liner

The sub-grade of the LTU was lined with 40-mils VLDPE and a 6-ounce polyethylene non-woven filter. The liner was located beneath 30 inches of treated soil and 12 inches of sand and was keyed (anchored) into the berms to keep the liner in place during LTU operations. During closure activities, the liner was cut at the top and bottom of the berm and folded back into the LTU footprint and was covered with the final 18-inch soil cap.

The liner in the LTU sub-floor was punctured in a 50-foot grid to allow adequate drainage. The excavator bucket was used to first push the soil aside and expose the liner, then rip approximately 20-inch holes in the liner and fabric. When the operator visually confirmed that the liner and fabric was ripped, the soil was pushed back in place.

Leachate Collection System and Sump

The subsurface leachate collection system (LCS) was composed of 8-inch perforated high-density polyethylene (HDPE) header pipe with a lateral branch network of 1½-inch by 12-inch perforated HDPE pipe connected every 50 feet to the header pipe. The lateral branches of the LCS were left in place below the treated soil and 12 inches of sand. The header pipe of the LCS joined the vertical concrete sump at

the south end of the LTU, outside the LTU area footprint. The sump was connected to the retention pond and the groundwater treatment system by a 4-inch poly pipe.

The sump pump was removed and placed on site with other miscellaneous scrap metal. The top rings of the concrete sump were crushed and placed inside the sump area. The sump was filled with concrete to above the discharge line to the retention pond and the LCS header pipe from the LTU. The remaining sump area was then backfilled with clean fill to existing grade.

A hole was excavated at the retention pond to locate the 4-inch steel discharge pipe from the pond. The pipe was cut below grade and concrete was poured into the hole to seal the 4-inch discharge pipe. The water return pipe from the retention pond was exposed where it enters the GWTS, cut and backfilled with concrete to seal the pipe. The 4-inch steel pipe from the retention pond to the center pivot irrigation system was exposed, cut and backfilled with concrete. The holes were backfilled with native soil to existing ground surface.

Retention Pond

Standing water was pumped off the retention pond and applied to the LTU as irrigation prior to closure activities in October 2002. The retention pond had a VLDPE liner that was keyed into the retention pond berms to keep the liner in place during operations. The liner in the berm was cut at the bottom and top of where it was keyed into the berm and was then folded back into the retention pond footprint.

The excavator bucket was used to expose the liner and rip approximately 20-inch by 20-inch holes in the fabric and liner to allow adequate drainage. The liner was punctured (ripped) in a 30-foot grid pattern on the retention pond sub-floor. The excavator operator visually confirmed the liner was punctured.

After the liner was punctured, the rock and concrete debris stockpiled inside the LTU, from previous soil application activities, were placed as a fill layer at the bottom of the retention pond. The perimeter berms around the retention pond were pushed in to cover the liner and debris to bring the final surface elevation level with the final LTU grade and the existing ground surface.

Irrigation System

The center pivot irrigation system was used on the LTU to control moisture and to prevent wind erosion. The irrigation line was rinsed in place with approximately 8,000 gallons of clean municipal water and was moved off the northeast side of the LTU on October 14, 2002. The rinse water was sprayed directly onto the LTU. On October 25, 2002, EPA issued a letter indicating the irrigation system had been cleaned in accordance with the approved Work Plan and may be re-used for any purpose. The

irrigation system and piping was sold to Orvis Irrigation of Kalispell, Montana, who dismantled the system for re-use off-site on October 24, 2002.

Decontamination Area

Equipment was decontaminated on the LTU ramp by brushing off soils. The decon pad and the haul route from the LTU to the clean stockpile area was used exclusively by the heavy equipment and was scraped and placed back on the LTU at the conclusion of grading the LTU surface prior to capping.

Final Cover/Cap

The final cap consists of 18-inches of clean soil placed over the first and second lifts, which were treated to the industrial soil cleanup goal. The final soil cap was constructed from the 10-inch lift of soil treated to residential levels, available berm soil and clean borrow material. The final cover/cap has been designed to allow a variety of future uses of the surface of the LTU area.

After the top lift of soil was removed, the surface of the LTU area was graded. A surveyor with a total survey station used a 100-foot staked grid system to ensure the final surface grade and final cap thickness. The treated soil was brought back onto the LTU with dump trucks as dozers spread the material. The surveyor on the ground checked each staked grid section. After stockpiles A and B were used, the berm materials and borrow material were used for completion of the final cap.

The final cap over the LTU and retention pond was compacted to prevent soil subsidence using heavy equipment and water trucks. The final cap surface was completed and contoured with a grader. A survey of the final cap surface was conducted on November 15, 2002 by Thomas, Dean and Hoskins (TD&H), of Kalispell, Montana.

The final cap was seeded using a drill with double disc openers, depth barrels, seed metering device, seed box agitator, and packer wheels. Fertilizer was added with the seeds over the entire planting surface. The seeding rate was approximately 30 pounds per acre (lb/acre) using the following seed mix:

• Hard Fescue	50%	15 lb/acre
• Cover Sheep Fescue	20 %	6 lb/acre
• Western Wheat Grass	20%	6 lb/acre
• Blue Bunch Grass	10%	3 lb/acre

A second seeding was performed in the fall of 2003 due to poor germination of the initial seeding.

Influent/Effluent Water Quality

Influent water is analyzed to characterize and quantify influent conditions from the treatment area. Samples are collected at the influent port from the extraction wells. Influent water quality is assessed on the first batch of water per month for SVOC, iron, manganese, and TSS. Subsequent, batches are only assessed for iron, manganese, and TSS, in support of treatment plant operations. Sample results are reported in the quarterly progress reports on a monthly basis. The quality of water processed through the treatment system has not changed appreciably over. Greater variability in semi-volatile concentrations is observed compared to TPAH or naphthalene.

Objectives of treatment are to achieve final effluent PAH concentration of < 1 µg/L prior to reinjection or reuse of water, and to remove iron and solids to reduce the potential for clogging injection wells. Effluent samples are collected at the beginning of the month following both the lead and the lag GAC units. Subsequent batches in the month are only sampled following the lead GAC unit. Effluent water quality is assessed for SVOC, iron, manganese, and TSS. Additionally, TSS is collected for TSS after the lag GAC for each batch processed.

Approximately 17.8 million gallons of water have been processed through the treatment plant between July 96 and March 2006. To date, the Phase I treatment system has achieved the target effluent concentrations for all batches processed, with one exception. Batch 243 in June 1999 exhibited an effluent concentration of 1.7 µg/L naphthalene. Subsequently, both carbon units were backwashed extensively and effluent concentrations were less than 1 µµg/L in proceeding batches (ThermoRetec, 2001d).

Site-Wide Water Quality

The ROD requires that groundwater beneath and surrounding the Somers Site be monitored routinely to evaluate the performance of the remedy and establish compliance with the ROD cleanup standards. The following table summarizes the Somers site-wide groundwater monitoring program sampling schedule and analytical parameters. Wells at the Somers Site are grouped into various categories to meet the multiple objectives for the Somers Site.

Site-Wide Groundwater Monitoring Program

	SVOC 8270	PAH 8310	PAH GC/MS	TSS 160.2	ZINC 289.1
SEMI-ANNUAL					
CERCLA	X			X	X
Voluntary Wells	X			X	X
Treatment Area	X			X	
RCRA	X	X		X	X
LTU	X			X	X
Municipal Wells			X	X	X
QUARTERLY					
Treatment Area	X			X	
Voluntary Wells	X			X	X

CERCLA Wells - S-3/3R, S-4, S-84-10, S-85-7, S-85-8A, S-85-8B, S-91-1, S-91-3, S-91-4, SP-10, Swamp Pond (surface water). Site-wide wells to measure water quality associated with implementation of the soil and groundwater remedies.

Voluntary Wells - S-6, S-91-2 (Sept 2000), S-84-16, S-85-5A, S-85-5B, S-85-6A, S-85-6B, S-88-1, S-88-2, S-88-3. Various wells assessed to provide additional information for specific areas of the site.

Treatment Area - S-93-2S, S-93-2D. Provides basis for evaluation of effectiveness of the groundwater remedy.
RCRA Wells - S-3/3R, S-4, S-84-11, S-85-3, S-95-1. Required under the RCRA program to monitor compliance for the RCRA impoundments.

LTU wells - S-5R, S-6, S-85-5A, S-93-7. Monitor compliance for the LTU.
Municipal Wells - TW-1, TW-2. Evaluated to determine level of protection to human consumption and use.

CERCLA Wells

The CERCLA wells are spread site-wide for purposes of monitoring effectiveness of the remedy in achieving cleanup objectives and to evaluate compliance with cleanup objectives. CERCLA wells are sampled semi-annually and analyzed for SVOC, zinc, and TSS. Table 7 summarizes groundwater quality data collected for the CERCLA wells between April 1996 and March 2006.

Zinc concentrations in the CERCLA wells ranged from <0.004 to 51.5 mg/L between April 1996 and March 2006.

Voluntary Wells

Voluntary wells are sampled for purposes of monitoring effectiveness of the remedy in achieving cleanup objectives and evaluating compliance with cleanup objectives. Voluntary wells are segregated into three groups based on proximity to site features including: treatment area (S-88-1, S-88-2, S-88-3), downgradient of the treatment area (S-84-15, S-91-2, S-84-16, S-85-6A, S-85-6B and S-6), and downgradient of RCRA impoundment/LTU (S-85-5A and S-85-5B). Voluntary wells in the treatment area have been sampled on a semi-annual and quarterly basis since September 1997, and on a quarterly basis for the two downgradient areas since October 1998. Samples were collected and analyzed for SVOC including PAH and phenols, zinc and TSS.

Treatment Area Wells

Treatment area wells S-93-2S and S-93-2D are sampled for purposes of monitoring effectiveness of the remedy in achieving cleanup objectives and to evaluate compliance with cleanup objectives. These treatment area wells are located within the zone of influence for the Phase I treatment system. Treatment area wells have been sampled on a quarterly basis since September 1997. Samples were collected and analyzed for SVOC including PAH and phenols, zinc and TSS. Tables 7, 8, 9, 10 and Figure 9 summarize groundwater quality data collected for the treatment area wells between September 1997 and May 2006.

Well S-93-2S has exhibited TPAH concentrations exceeding the 40 µg/L target cleanup level in 45 of the 47 sample events. CPAH concentrations exceeding the 0.047 µg/L target cleanup level have been detected in 2 of 44 sample events. Phenol concentrations have not exceeded the 6,000 µg/L target cleanup level.

Well S-93-2D has exhibited TPAH concentrations exceeding the 40 µg/L target cleanup level in 24of the 44 sample events. CPAH concentrations exceeding the 0.047 µg/L target cleanup level have been detected in only 4 of 44 sample events. Phenol concentrations have exceeded the 6,000 µg/L target cleanup level only once.

Both S-93-2S and S-93-2D experience similar patterns of increases and decreases between sample events, but these are not attributable to seasonal variations (ThermoRetec, 2001g). In general there is limited evidence that groundwater quality has improved in the treatment area since 1995.

RCRA Wells

The RCRA wells, located up and down gradient of the RCRA impoundment area, are sampled to monitor the effectiveness of the remedy in achieving cleanup objectives and to evaluate compliance with cleanup objectives. RCRA wells have been sampled on a semi-annual basis since September 1995

Municipal Wells

The town well (TW-1) is located to the west-southwest of the Somers Site. The town well has been sampled on a semi-annual basis since March 1993 and analyzed for PAH, zinc and TSS. Table 13 summarizes water quality data for the municipal well (TW-1).

The PAH constituent naphthalene was detected in sample events from March 1994 to April 1996 at concentrations ranging from 0.012 µg/L to 0.027 µg/L. These do not exceed the WQB-7 numeric standard of 28 µg/L.

Zinc has been detected at concentrations ranging from 0.0303 mg/L to 0.614 mg/L, well below the 5 mg/L drinking water standard and the DEQ-7 numeric standard of 2.1 mg/L.

Site Inspection

An inspection of the Somers site was performed on August 8, 2006 by representatives of BNSF, DEQ, RETEC and EPA. During the Site inspection, areas visited included the former LTU and retention pond, extraction and injection system well field, Swamp Pond and beach area, and the groundwater treatment plant. A summary of the inspection findings is presented in Attachment 4.

Weekly treatment system operations batch reports are utilized to document O&M activities performed at the treatment plant. Field data records are utilized to document inspections of site operations (LTU, extraction/injection system, site conditions), as well as activity associated with any sample events. Copies of these documents are maintained on site and originals are sent to the RETEC Billings Montana office.

Site access is controlled by a perimeter fence with a locking gate that encloses the former LTU/retention pond, extraction/injection well gallery and treatment plant operations. The water treatment plant is located inside of a metal building that is locked when the operator is not present on-site. No damage to the fences or the water treatment plant building was noted during the inspection. The treatment plant operator is on-site each weekday.

The extraction/injection well galleries were observed in good operating condition. All six extraction wells are on-line and no problems were reported with pump or pipe transfer lines to the treatment plant. Of the 14 injection wells, all were operating with the exception of IW-6 and IW-7, which continue to be off-line due to the historical presence of residual PAH contamination. These injection wells remain off-line, with occasional pumping to remove any product for on-site treatment.

Interviews

Interviews conducted for this five-year review were limited to operational items and site management items with the operator. EPA has not received any complaints about Site activities from local residents or agencies in the past 5 years. The results of interviews are contained in the site inspection checklist.

VII. ASSESSMENT

Question A: Is the remedy functioning as intended by the decision documents?

- ***Remedial Action Performance:*** The soil component of the remedy has been successfully completed.

  The groundwater component of the remedy has demonstrated limited mass removal of contaminants through the groundwater treatment system (3 percent of total contaminant loading estimated to reside in the subsurface) and limited improvement of groundwater quality contamination in the treatment zone. Operational changes have been required due to low extraction and injection rates (25 percent below design rate), as a function of subsurface conditions of low permeability. Only about 9 percent of the water treated on-site is reinjected in the well field. Operation of the Phase I system has resulted in the removal of free-phase NAPL from four out of nine treatment area wells. When the system operates the contaminant plume is hydraulically contained as seen in the potentiometric surface map in Figure 6.

  The wetlands compensation determination resulted in mitigation and construction of wetlands to replace those lost or damaged during implementation of the remedy. Wetland areas within and near the Swamp Pond exhibit healthy habitat. BNSF has completing a land purchase for property located in the Flathead Valley to address the wetland compensation activity in cooperation with the FWS.

***System Operations/O&M*:** System operations procedures are consistent with site requirements. No specific deficiencies were identified that are not related to a function of the subsurface conditions impacting full efficiency of groundwater treatment plant operations.

***Cost of System Operations/O&M*:** System operational costs have been within an acceptable range.

***Opportunities for Optimization*:** All of the contaminated soil excavated from the site has been treated to the prescribed cleanup levels and the LTU was closed in 2002. The site is available for use.

***Early Indicators of Potential Issues*:** The treatment plant operator noted that equipment wear and tear, as a result of the age of the operations, may require attention.

***Implementation of Institutional Controls and Other Measures*:** Perimeter fencing with secured gates, and posted warning signs on the perimeter fence and the treatment plant are effective measures to controlling direct contact risks. Potential future institutional controls may consist of deed restriction for a minimum area including the LTU and retention pond areas. Additionally, a Controlled Groundwater Use Area was established in 2003.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

***Changes in Standard and TBCs*:** The State of Montana has promulgated health-based standards (DEQ-7 standards) for PAH constituents in groundwater. The DEQ-7 standards will be compared to the current risk-based PAH remediation levels for groundwater to determine if the WQB-7 standards should replace the current risk-based parameters and remediation levels. The risk-based PAH levels and the DEQ-7 standards are not directly comparable and a determination relating to the protectiveness of the current remediation level versus the DEQ-7 standard will be difficult. If the DEQ-7 standards are determined to be more protective, the groundwater parameters and remediation levels will be revised. As stated in 40 CFR Section 300.430(f)(1)(ii)(1), any Federal or State requirements that are promulgated or modified after the ROD has been signed must be attained (or waived) if those requirements are determined to be Applicable or Relevant and Appropriate Regulations (ARARs) for the site, and are necessary to ensure that the remedy is protective of human health and the environment. The following text summarizes the findings for potential new or modified ARARs for the BNSF Somers site.

***Changes in Exposure Pathways*:** No changes in site conditions that affect exposure pathways were identified as part of this five-year review. Future land use scenarios are being developed and could include public use as open space, residential use or industrial use. The health-based and risk-based standards used to establish target cleanup levels considered these scenarios. There are no new contaminants or contaminant sources identified at this site.

***Changes in Toxicity and Other Contaminant Characteristics*:** Toxicity and other factors for contaminants of concern have not changed.

***Changes in Risk Assessment Methods*:** Risk assessment methodologies since the time of the 1995 protectiveness evaluation have not changed.

Expected Progress Towards Meeting RAOs: The LTU has attained RAOs and was closed in 2002. The RAOs for the groundwater component are difficult given the subsurface conditions, tight silt/clay formation with low permeability. Eleven years of Phase I system operations has not conclusively improved groundwater quality or achieved mass contaminant removal. A TI Evaluation has been completed and has been determined to be complete.

Management of Remedy By-Products: Modifications have been made to address management of filters, filter press sludge, spent carbon, and excessive volumes of treated water.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has been identified that would call into question the protectiveness of the remedy. There have been no natural disasters that have occurred that could impact the remedy.

VIII. ISSUES

A request to modify operation of the groundwater treatment system has been submitted to EPA and MDEQ by BNSF. The request is currently being evaluated by the agencies.

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

There are three recommendations from this five-year review:

1. Complete evaluation of BNSF request to modify operation of the groundwater treatment system,
2. Issue ESD to provide TI waiver and ruling on groundwater system operation,

3. The most recent Montana DEQ-7 Numeric Water Quality Standards should be evaluated for inclusion as site remediation levels.

X. PROTECTIVENESS STATEMENTS

The protection of human health and the environment by the Remedial Actions for soil and groundwater are discussed below. The Remedial Action for the soil component of the remedy is complete and the groundwater component of the remedy is functioning effectively as anticipated; therefore, the remedy for the site is expected to be protective of human health and the environment.

Soil Component

The soil component of the remedy at the Somers Site has been certified complete.

Ground Water Component

The ground water component of the remedy is functioning effectively and is therefore protective of human health and the environment. Current operation of the Phase I system has hydraulically contained the groundwater plume. The municipal water supply system continues to provide potable water to the Somers residents. There are no residential wells in the area of contaminated groundwater being used for drinking water.

XI. NEXT REVIEW

This is a site that requires ongoing five-year reviews. The next review will be conducted within five years of the completion of this five-year review report. The completion date is the date of the signature shown on the cover attached to the front of this report.

XII. LIST OF DOCUMENTS REVIEWED

EPA, September 1989. *Record of Decision, Burlington Northern (Somers Plant) Superfund Site, Flathead County, Montana.*

EPA, 1992. *Explanation of Significant Differences, Burlington Northern (Somers Plant) Superfund Site, Flathead County, Montana.*

EPA, September 1996 and September 2001. *Five Year Review, Burlington Northern Superfund Site, Somers, Flathead County, Montana.*

EPA, July 1998. *Explanation of Significant Differences, Burlington Northern (Somers Plant) Site, Somers, Flathead County, Montana.*

EPA, June 2001. *Comprehensive Five-Year Review Guidance. OSWER No. 9355.7-03B-P.*

EPA, October 5, 2005, Letter to BNSF Attorney Trueblood from EPA Attorney Stearns Concurring with USFWS Determination that Wetlands Restoration Actions are Complete.

Montana Department of Environmental Quality, November 1998. *Circular WQB-7, Montana Numeric Water Quality Standards.*

Montana Department of Environmental Quality, February 2006. *Circular DEQ-7, Montana Numeric Water Quality Standards.*

RETEC, 1989. *Remedial Investigation and Feasibility Study. BN-Somers Superfund Site. Volumes II & III. Exposure and Endangerment Assessment and Feasibility Study.*

RETEC, 1991. *Remedial Design Investigation Report for the Former Somers Tie Plant.*

RETEC 1992. *Somers Soil Remedy Volume 3: Operations and Monitoring.*

RETEC, November 1993a. *Construction Completion Report for Land Treatment Facility Construction and Contaminated Soil Excavation, Somers Montana.*

RETEC, 1993b. *Final Design Report for Phase I of the Groundwater Remedial Action at the Burlington Northern Tie Treating Plant, Somers, Montana*

RETEC, 1994. *Final Construction Completion Report for Phase I Groundwater Remedial Action, Burlington Northern Tie Treating Plant, Somers, Montana, "As-Built Construction Document".*

RETEC, June 1996a. *Burlington Northern Tie Treating Plant, Somers, Montana, Operation and Maintenance Manual.*

RETEC, March, June, September and December 2002. *BNSF-Somers Quarterly Progress Reports for 2002.*

RETEC, March, June, September and December 2003. *BNSF-Somers Quarterly Progress Reports for 2003.*

RETEC, March, June, September and December 2004. *BNSF-Somers Quarterly Progress Reports for 2004.*

RETEC, March, June, September and December 2005. *BNSF-Somers Quarterly Progress Reports for 2005.*

RETEC, March, June and September 2005. *BNSF-Somers Quarterly Progress Reports for 2006.*

RETEC, 2003. *Technical Impracticability Evaluation for Groundwater Restoration, Former Somers Tie Treating Plant,* February 13, 2003.

RETEC, 2004. *Request to Modify Groundwater Treatment System, Former Somers Tie Treating Plant,* September 1, 2004.

RETEC, 2002, 2003, 2004 and 2005. *Phase I Groundwater Remedy. Annual CERCLA Report.*

RETEC, April 2006. *Evaluation of Natural Attenuation and Biodegradation Assimilative Capacity for the Somers Former Tie-Treating Plant.*

Roy F. Weston, Inc. 1995a. *Five-Year Review Site Visit Report. BN Somers Tie Plant. Somers, Montana.* Prepared for the U.S. Environmental Protection Agency, Region VIII, Montana Operations.

Roy F. Weston, Inc. 1995b. *Five-Year Review, Protectiveness Evaluation. BN Somers Tie Plant, Somers Montana.* Prepared for the U.S. Environmental Protection Agency, Region VIII, Montana Operations.

Roy F. Weston, Inc., May 1997 *Review Comments/Compliance Evaluation for Fourth Quarter 1996, BNSF Somers Operations, Somers Tie Plant, Somers, Montana.*

Roy F. Weston, Inc., January 1998 *Review Comments/Compliance Evaluation for Fourth Quarter 1997, BNSF Somers Operations, Somers Tie Plant, Somers, Montana.*

Roy F. Weston, Inc., January 1999 *Review Comments/Compliance Evaluation for Fourth Quarter 1998, BNSF Somers Operations, Somers Tie Plant, Somers, Montana.*

Roy F. Weston, Inc., January, 2000a. *Review Comments/Compliance Evaluation for Fourth Quarter 1999, BNSF Somers Operations, Somers Tie Plant, Somers, Montana.*

Roy F. Weston, Inc., December 2000b. *Review Comments/Compliance Evaluation for Fourth Quarter 2000, BNSF Somers Operations, Somers Tie Plant, Somers, Montana.*

Roy F. Weston, Inc., July 2001a. *Review Comments/Compliance Evaluation for Second Quarter 2001, BNSF Somers Operations, Somers Tie Plant, Somers, Montana.*

Roy F. Weston, Inc., September 2001b. *Review Comments/Compliance Evaluation for Third Quarter 2001, BNSF Somers Operations, Somers Tie Plant, Somers, Montana.*

Roy F. Weston, Inc., January 2002a. *Review Comments/Compliance Evaluation for Fourth Quarter 2001, BNSF Somers Operations, Somers Tie Plant, Somers, Montana.*

Roy F. Weston, Inc., March 2002b. *Review Comments/Compliance Evaluation for First Quarter 2002, BNSF Somers Operations, Somers Tie Plant, Somers, Montana.*

Roy F. Weston, Inc., October 2002c. *Review Comments/Compliance Evaluation for Second and Third Quarter 2002, BNSF Somers Operations, Somers Tie Plant, Somers, Montana.*

ThermoRetec, December 1998. *BNSF-Somers Progress Report for September, October and November, 1998 (EPA ID No. MTD053038386).*

ThermoRetec, January 1999a. *BNSF Somers Land Treatment Unit, 1998 Operations Report.*

ThermoRetec, March 1999b. *BNSF-Somers Progress Report for December 1998, January and February 1999.*

ThermoRetec, June 1999c. *Phase I Groundwater Remedy Annual CERCLA Report, Somers, Montana.*

ThermoRetec, June, 1999d. *BNSF-Somers Progress Report March, April and May 1999.*

ThermoRetec, July 1999e. *Construction Completion Report for Closure of RCRA Surface Impoundment.*

ThermoRetec, September 1999f. *BNSF-Somers Progress Report for June, July and August 1999 (EPA ID No. MTD053038386).*

ThermoRetec, December 1999g. *Draft Technical Impracticability Evaluation for Groundwater Restoration, Former Somers Tie Treating Plant, Somers, Montana.*

ThermoRetec, December 1999h. *BNSF-Somers Progress Report for September, October and November 1999.*

ThermoRetec, January 2000a. *BNSF Somers Land Treatment Unit, 1999 Operations Report.*

ThermoRetec, March 2000b. *BNSF-Somers Progress Report for December 1999, January and February 2000 (EPA ID No. MTD053038386).*

ThermoRetec, May 2000c. *Phase I Groundwater Remedy Annual CERCLA Report, Somers, Montana, Volume I.*

ThermoRetec, June, 2000d. *BNSF-Somers Progress Report March, April and May 2000 (EPA ID No. MTD053038386).*

ThermoRetec, September 2000e. *BNSF-Somers Progress Report for June, July and August 2000 (EPA ID No. MTD053038386).*

ThermoRetec, December 2000f. *BNSF-Somers Progress Report for September, October and November, 2000 (EPA ID No. MTD053038386).*

ThermoRetec, January 2001a. *BNSF Somers Land Treatment Unit, 2000 Operations Report.*

ThermoRetec, March 2001b. *BNSF-Somers Progress Report for December 2000, January and February 20001 (EPA ID No. MTD053038386).*

ThermoRetec, May 14, 2001c. *Draft Attachment 1: Explanation of Petition for Controlled Groundwater Use Area.*

ThermoRetec, June 2001d. *Phase I Groundwater Remedy Annual CERCLA Report, Somers, Montana.*

ThermoRetec, June, 2001e. *BNSF-Somers Progress Report March, April and May 2001 (EPA ID No. MTD053038386).*

ThermoRetec, September, 2001f. *BNSF-Somers Progress Report June, July and August 2001 (EPA ID No. MTD053038386).*

ThermoRetec, August 2001f. *Land Treatment Unit Closure Work Plan, BNSF Former Tie Treating Plant, Somers, Montana.*

ThermoRetec, August 2001g. *Technical Impracticability Evaluation for Groundwater Restoration, Former Somers Tie Treating Plant, Somers, Montana.*

ThermoRetec, September 2001h. *BNSF-Somers Progress Report for June, July and August 2001 (EPA ID No. MTD053038386).*

USGS, 1994. *Somers Quadrangle, Montana-Flathead County, 7.5-minute series (topographic).*

APPENDIX 1. Figures

APPENDIX 2. Tables

APPENDIX 3. Photographs

5/15/2007

NOTICE

This item(s) is not suitable for microfilming, but is available for review at the Environmental Protection Agency, Region VIII Superfund Records Center, Helena, Montana

TITLE: "THIRD **FIVE** YEAR REVIEW REPORT BURLINGTON NORTHERN SOMERS, TIE TREATING PLANT SOMERS, FLATHEAD COUNTY, MONTANA"(SIGNED; ATTACHED GENERAL COMMENTS AND CD ROM)

DATE: SEP.29, 2006

ITEM DESCRIPTION: CD ROM, SEP. 2006

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