Explanation of Significant Differences

AT&SF Albuquerque Superfund Site

Albuquerque, New Mexico

United States Environmental
Protection Agency
Region 6
Superfund Division

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Concurrence Page: AT&SF Albuquerque Superfund Site
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I. Introduction

Site Name:	AT&SF Albuquerque Superfund Site (NMD980622864)
Site Location:	Albuquerque, Bernalillo County, New Mexico
Lead Agency:	U. S. Environmental Protection Agency, Region 6 (EPA)
Support Agency:	New Mexico Environment Department (NMED)
Potentially Responsible Party:	BNSF Railway Company (BNSF)

This Explanation of Significant Differences (ESD) documents significant changes for the AT&SF Albuquerque Superfund Site (Site), located in Albuquerque, Bernalillo County, New Mexico. The ESD is published by the United States Environmental Protection Agency (EPA), pursuant to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. 300.435(C)(2)(i) and 300.825(a)(2), and Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA).

This document will become part of the Administrative Record [NCP 300.825(a)(2)], which is developed in accordance with Section 113 (k) of CERCLA, 42 U.S.C. § 9613 (k), and is available for review at the Albuquerque Public Library Main Downtown Branch, 501 Copper Avenue, NW, Albuquerque, NM, 87102; and the New Mexico Environment Department Harold Runnels Building, 1190 St. Francis Drive, Santa Fe, NM, 87505. The Director of the Superfund Division is delegated the authority to sign this ESD.

II. Statement of Purpose

This ESD explains differences in the implementation of the remedial action at the Site from the remedial action selected for the Site in the CERCLA Record of Decision (ROD) dated June 27, 2002. The remedial action is being implemented by the BNSF Railway Company (BNSF) in accordance with the Consent Decree entered on February 9, 2005, in the United States District Court for the District of New Mexico between the United States, the State of New Mexico (the State), and BNSF (Consent Decree).[1] This ESD documents significant changes to the ROD that (1) address the expanded areal extent of zinc-contaminated soil to be excavated, treated, and capped, by decreasing the required depth of excavation for the zinc-contaminated soil; (2) revise the performance criteria for the treated contaminated soil; and (3) remove phytoremediation as a soil remediation component. This ESD does not change or affect any component of the Site Ground Water Remedy as specified in the ROD.

[1] *United States of America, New Mexico Environment Department v. The Burlington Northern and Santa Fe Railway Company*, No. CIV-04-1102 RB/WDS, D.N.M. Superfund RDRA Consent Decree, entered on February 9, 2005.

III. Site History

The AT&SF Albuquerque Superfund Site (Site) is located at 3300 Second Street, SW, in the South Valley area of the City of Albuquerque, Bernalillo County, New Mexico (Figure 1). It is the location of the former The Atchison, Topeka and Santa Fe Railway Company (AT&SF) Tie Treating Plant (facility). The Site consists of approximately 42 acres of the almost 89-acre former facility that used creosote and other compounds in its wood preservation processes. The Site was listed on the EPA National Priorities List December 16, 1994 [59 Fed. Reg. 65212, 65221 (December 16, 1994)].

The facility operated as a wood pressure treatment plant from March 1908 to January 1972. The facility primarily used creosote and creosote petroleum mixtures for the manufacture of pressure treated wood products, including railroad cross ties, bridge ties, switch ties, bridge timbers, road crossing materials, bridge piling materials, lumber, stock pen posts and fence posts. From 1914 through 1926, some materials were treated with zinc chloride, followed by a creosote-petroleum mixture. Additionally, documents from the 1950s and early 1960s refer to experiments and small scale projects performed using solutions containing 2% to 10% pentachlorophenol (PCP). In 1972, the plant was totally dismantled, and the only physical feature remaining onsite was the wastewater reservoir/wastewater sump.

Previous activity

- In July and August of 1990, BNSF removed and disposed of approximately 8,250 tons of creosote-tainted debris in connection with a state enforcement action.
- Three areas were excavated from the tie storage area in 1996, and were backfilled with clean soil after confirmation testing.
- In April 1999, sludge and process residue from the wastewater reservoir was excavated from the Site in response to a Unilateral Administrative Order for a Removal Response Action issued by the EPA to BNSF. The removal action was completed on April 30, 1999, after a total of approximately 83 gondola cars (approximately 6,012 tons) were filled and transported by rail to Safety Kleen Inc.'s Lone Mountain (Resource Conservation and Recovery Act Subtitle C) Landfill in Waynoka, Oklahoma, for disposal.
- In 1999, three recovery trenches were installed in the wastewater reservoir to collect dense non-aqueous phase liquid through a gravity feed system.
- In 2000, five recovery pumps were installed in onsite wells to extract dense non-aqueous phase liquid from the Shallow and Intermediate Aquifers and continue to pump dense non-aqueous phase liquid from the aquifer.

Remedial Investigation and Feasibility Study

Ground Water Contamination

The CERCLA Remedial Investigation and Feasibility Study (RI/FS) for the Site was conducted under the auspices of an Administrative Order of Consent (AOC) entered between the EPA and

AT&SF (a/k/a BNSF) in 1994. The RI/FS was completed by TRC Environmental Corporation in 2001 for BNSF and was approved by the EPA. Among the findings of the RI/FS was the fact that most of the organic contamination found at the Site occurs as a dense non-aqueous phase liquid (DNAPL) with organic compounds that slowly dissolve into the ground water and preferentially adsorb to soil particles in the aquifer matrix. The RI report indicates that DNAPLs are present in the subsurface as either "free phase" or "residual phase". The free phase is that portion of the DNAPL that can continue to migrate and sink into the aquifer, whereas the residual phase is that portion of the DNAPL that is trapped in pore spaces by capillary forces and cannot generally migrate as a separate liquid. Both occurrences of the DNAPL act as continuing sources of contamination to ground water. It is estimated that there are between 59,300 and 70,000 gallons of DNAPL at the Site.

Soil Contamination

As expected, the nature of contamination across the Site is fairly typical of a wood treating operation. These contaminants consist of Polynuclear Aromatic Hydrocarbons (PAHs). In addition, zinc contamination of the soil was identified in the process area. The estimated volume of contaminated soil was 5,600 cubic yards (yd^3). Although the plant used pentachlorophenol in the 1960s, its use is not believed to be as significant as the use of other preservatives at the plant, as there have not been significant levels of associated 2,3,7,8-tetrachloro-dibenzo-para-dioxin (TCDD or dioxin) detected in wastes present at the Site. As such, dioxin is not considered a contaminant of concern (COC) at this Site.

A more complete description of the Site can be found in the July 2001 *Remedial Investigation for the Former Tie Treating Facility Final Report* by TRC Environmental Corporation.

IV. Selected Remedy

Record of Decision (June 27, 2002)

After review and response to comments, the CERCLA ROD was signed by the EPA Region 6 Superfund Division Director on June 27, 2002. For the convenience of the reader, the Remedial Action Objectives (RAOs), Ground Water Remediation Goals (GRGs), Soil Remediation Goals (SRGs), and major components of the selected remedial action as established in the ROD for the Site are discussed in Table 1, Table 2, and the following text below.

Table 1: Remedial Action Objectives (2002 ROD)	
Media: Ground Water	**Media: Soil**
Prevent human ingestion, inhalation, or dermal contact with ground water that contains Site related COCs at concentrations which exceed the corresponding Maximum Contaminant Level Goals established under the Safe Drinking Water Act (SDWA). This applies for COCs that have Maximum Contaminant Level Goals set above zero. Alternatively, prevent human ingestion or inhalation of ground water containing Safe Drinking Water Act Maximum Contaminant Levels of these COCs when the corresponding Maximum Contaminant Level Goals are zero. Restore the ground water at the Site such that it contains concentrations of the COCs less than the Maximum Contaminant Levels or non-zero Maximum Contaminant Level Goals, as applicable. Prevent the DNAPL, the principal threat waste at the Site, from causing concentrations of COCs in ground water to exceed the Maximum Contaminant Levels or Maximum Contaminant Level Goals. Remove the DNAPL, the principal threat waste at the Site, from the subsurface, to the extent practicable. Prevent the transport of COCs from ground water to surface water in concentrations that may result in exceedances of the Applicable or Relevant and Appropriate Requirements in the receiving surface water body.	Prevent the ground water from being impacted above Maximum Contaminant Levels through transport of COCs from the unsaturated zone. Prevent storm water runoff from areas that exceed any remediation goals. Prevent the inhalation, ingestion, and dermal contact of contaminated soils for future onsite commercial/industrial/utility workers exposed to the soil. Prevent contaminated soils from becoming airborne and leaving the Site as dust. Prevent ecological receptors from being adversely impacted by onsite contamination.

Table 2: Ground Water and Soil Remediation Goals		
Contaminant of Concern	**Ground Water (micrograms per liter) (µg/L)**	**Soil (milligrams per kilogram) (mg/kg)**
Zinc	-	200
Benzene	5.0	-
Benzo(a)anthracene	0.1	-
Benzo(a)pyrene	0.2	-
Benzo(b)fluoranthene	0.2	-
Benzo(k)fluoranthene	0.2	-
Bis(2-Ethylhexyl)phthalate	6.0	-
Carbazole	0.0031	-
Chrysene	0.2	-
Dibenz(a,h)anthracene	0.3	-
Dibenzofuran	15	-
Indeno(1,2,3-cd)pyrene	0.4	-
Total Naphthalenes(1)	30	-
Total Semi-Volatiles(2)	82.6	-
BAP Equivalent(3)	0.572	7.8

(1) - Sum of 2-methylnaphthalene and naphthalene.
(2) - Sum of all Semi-Volatile COCs
(3) - BAP Equivalent = 0.1BAA + BAP + 0.1BBF + 0.01BKF + 0.001C + DA + 0.01IP
Where:

BAA = Concentration of Benzo(a)anthracene
BAP = Concentration of Benzo(a)pyrene
BBF = Concentration of Benzo(b)fluoranthene
BKF = Concentration of Benzo(k)fluoranthene
C = Concentration of Chrysene
DA = Concentration of Dibenzo(a,h)anthracene
IP = Concentration of Indeno(1,2,3-cd)pyrene

Because there are no Federal or State cleanup standards for soil contamination, the EPA established the RAO soil remediation goals (SRGs) based on the baseline human health risk assessment and ecological risk assessment. The selected SRGs will reduce the excess risk associated with exposure to contaminated soil.

The RAOs will be achieved by:

- Treating soils that are above acceptable risk levels to prevent contact by receptors.
- Preventing further contamination of ground water by removing soil contaminant sources above acceptable levels and recovering DNAPL to the greatest extent possible.
- Monitoring the ground water to determine the effectiveness of the source removal.

Major components of the original remedy

Soil Remedy: In-situ solidification/stabilization and run-off/run-on management was selected for all contaminated soil excavated down to a maximum depth of three feet that does not contain DNAPL and is above the SRGs. Soil will be treated onsite, capped, and maintained. Offsite incineration and disposal was selected for Site soil containing DNAPL.

The soil remedy will meet the RAOs by addressing low-level threat wastes in the soil medium through in-situ solidification/stabilization treatment and run-off/run-on management and by addressing principal threat DNAPL-contaminated soil through incineration. The primary expected outcome of the soil remedy implementation is that the Site soil would no longer present an unacceptable risk of re-contaminating the ground water, and that the Site would continue to be suitable for industrial/commercial development.

Ground Water Remedy: An aggressive performance-based approach for remediation of the contaminated ground water will consist of ground water restoration through pump and treat and DNAPL source removal with hot spot treatment.

Ground water restoration through pump and treat will be accomplished with either GW-2 (UV-oxidation treatment, filtration, carbon adsorption and disposal of ground water), GW-3 [Biological treatment (fluidized GAC bed), clarification, filtration and disposal of ground water], GW-4 (Filtration, clay adsorption, carbon adsorption and disposal of ground water), or a combination thereof, may be utilized to treat the ground water, once it has been extracted from the subsurface. The GRGs must be met in both the aquifer, as well as in the treated ground water.

Dense non-aqueous phase liquid source removal and hot spot treatment will be accomplished with either GW-5 (Steam flushing), GW-6 (Co-solvent/alcohol flooding), GW-7 (In-situ Oxidation), or a combination thereof, in addition to conventional dense non-aqueous phase liquid removal methods, may be utilized for DNAPL removal and hot spot treatment. The performance criteria will be dense non-aqueous phase liquid mass reduction so that the GRGs will be met.

The ground water remedy will meet the RAOs by addressing the low level, but significant threat

waste at the Site identified as ground water contamination. The COCs will be removed from the subsurface with a pump and treat extraction and re-injection system for the shallow and intermediate portions of the aquifer. The primary expected outcome of implementation of the ground water portion of the Selected Remedy is that the threat to human health posed by contaminated ground water at the Site will be addressed through treatment of the ground water to acceptable concentrations, that the COCs in ground water will no longer act as a source of contamination of a drinking water resource, and that the Site will continue to be suitable for industrial/commercial development.

Institutional Controls: EPA and the New Mexico Environment Department will request that the New Mexico Office of the State Engineer issue an order to restrict use of the portion of the aquifer contaminated by the Site until remediation goals have been met. In addition to the Office of the State Engineer order, the EPA intends to require the Site property owner to develop and record restrictive covenants that are appropriate under New Mexico property law and that prevent the use of ground water on the Site for drinking, household, or other potable purposes, or any other purpose that would damage the Site remedy or endanger human health or the environment. These restrictive covenants should run with the land and apply to any subsequent owner(s) of the Site.

Monitoring: Ground water monitoring from Site-wide monitoring wells will be conducted quarterly to track the location of the plume, monitor the performance of the remediation system, and to ensure protection of human health. Ground water monitoring will include water level measurements and ground water sampling for contaminants of concern in order to observe the direction and rate of contaminant migration as well as document that containment is achieved.

Phytoremediation: The Site areas that are not in the proposed expansion track location, but that do contain low contaminant concentrations, will be phytoremediated. Plants proven to enhance degradation and removal of the contaminants will be placed in areas for residual management. These areas will be maintained as needed.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, five-year reviews will be required for this remedial action. In addition, operation and maintenance and institutional controls will be necessary.

V. Basis for the Document

In accordance with the Consent Decree, the Potentially Responsible Party (PRP), BNSF, began remedial action in September 2008, and continues to perform remedial action construction activities under EPA and NMED oversight. Changes to the expected future reuse of the Site as well as consideration of Site data collected during the soil remediation activities provide the basis for the review of the soil remedy components and the significant changes. This ESD documents significant changes to the ROD that (1) address the expanded areal extent of zinc-contaminated soil to be excavated, treated, and capped, by decreasing the required depth of excavation for the zinc-contaminated soil; (2) revise the performance criteria for the treated

contaminated soil; and (3) remove phytoremediation as a soil remediation component. This ESD does not change or affect any component of the Site Ground Water Remedy as specified in the ROD.

VI. Description of Significant Differences

This review of Site circumstances significantly changes a component of the selected remedy; however, it does not fundamentally alter the overall cleanup approach. Table 3 lists only those components affected by these changes. All other components of the original selected remedy remain unchanged.

1. Zinc-contaminated Soil Volume and Excavation Depth

During implementation of the soil remedy, soil exceeding the ecological soil remediation goal (SRG) of 200 milligrams per kilogram (mg/kg) for zinc has been found on the Site in areas not previously identified during the Site remedial investigation (Figure 2). The increased areal extent of the zinc-contaminated soil has led to a greater than 50% increase in the volume of soil that requires excavation, treatment, and capping due to exceedances of the 200 mg/kg SRG for zinc. (The final volume will be documented in the remedial action report.) The ROD specifies that soil exceeding the SRG would be excavated down to a maximum depth of 3 feet (ft) in order to be protective. In order to keep excavated soil volumes at a manageable level for in-situ treatment and capping, the EPA has decided, at the recommendation of BNSF and with the concurrence of the NMED, to reduce the depth of excavation to a maximum of 2 ft for soil that only exceeds the SRG for zinc (Appendices A and B).

The SRG of 200 mg/kg for zinc was established based on an ecologic risk to ground feeding omnivorous birds. The SRG of 200 mg/kg is below the EPA Region 6 April 2009 soil screening level of 23,000 mg/kg and the New Mexico June 2006 human health soil screening level of 23,500 mg/kg. The 2001 ecological risk assessment concluded that zinc in soil at concentrations above 200 mg/kg could adversely affect the reproductive capability of ground feeding omnivorous birds due to high food intake rate relative to body weight. In this specific circumstance, excavation of the upper 2 ft of zinc-contaminated soil would eliminate the exposure pathway to omnivorous birds (e.g., American Robin), because the invertebrate earthworms on which these birds primarily feed, generally burrow and remain in the upper 2 ft of soil in this ecosystem.

Excavation and removal of the upper 2 ft of soil is generally accepted by EPA as an appropriate depth necessary to eliminate the exposure pathway in order to be protective of ecological receptors. Because zinc was not identified as a concern for human health or to ground water at these concentrations and under these conditions, and is listed as a COC in the ROD for ecological protectiveness, the excavation of zinc-impacted soil to a maximum depth of 2 ft will therefore be protective of both human health and the environment. The base of the excavated areas will be sampled to document remaining COC concentrations prior to being backfilled with clean soil. These backfilled areas will be managed to minimize erosion.

The second SRG established in the ROD is applicable to soil exceeding a concentration of 7.8 mg/kg Benzo(a)pyrene (BAP) equivalent. This SRG was established to protect human health. If the soil exceeds the BAP equivalent SRG, excavation to a maximum depth of 3 ft, as specified in the ROD, will be conducted in order to be protective of human health.

In summary, soil excavation to a maximum depth of 2 ft will be conducted in areas where the only SRG exceeded is zinc, while areas where the BAP equivalent SRG is exceeded, either solely or in addition to the zinc SRG, will be excavated to a maximum depth of 3 ft in order to be protective of human health.

Zinc measured in ground water samples collected from site monitoring wells has not exceeded the New Mexico Water Quality Control Commission (NMWQCC) ground water standard of 10 mg/l for zinc, and thus was not designated as a COC for ground water in the ROD. Additional soil and ground water data were collected in support of the revised maximum excavation depth for zinc-contaminated soil discussed in this ESD. Soil samples from 6 locations ranging in depths from 6 inches to 1.2 ft below ground surface with zinc concentrations ranging from 200 mg/kg to 36,000 mg/kg were analyzed using EPA method 1312 synthetic precipitation leaching procedure (SPLP; Appendix C). This procedure is used to evaluate the potential for zinc to leach from the soil and move into the ground water. Zinc leachate results ranged from 23.2 micrograms per liter (µg/L) to 3,800 µg/L, the latter being a result from the location with the highest zinc-soil concentration of 36,000 mg/kg. All of the zinc leachate concentrations are below the NMWQCC ground water quality zinc standard of 10 milligrams per liter (mg/L), or 10,000 µg/L.

In 2009, ground water samples were collected from 7 wells and analyzed for zinc (Appendix C). These monitoring wells are located in the southern half of the Site. Relative to the remaining areas of soil with zinc concentrations exceeding the zinc SRG, two wells are located upgradient, one well is located beneath, and 4 wells are located downgradient. The zinc-groundwater concentrations are all below the analytical method reporting limit of 0.2 mg/L, with three estimated values of 0.117 mg/L, 0.116 mg/L, and 0.109 mg/L reported. All of these results are below the NMWQCC ground water quality zinc standard of 10 mg/L (10,000 µg/L) and are consistent with ground water data collected during the remedial investigation which are also below the NMWQCC ground water quality zinc standard. As a conservative measure, the ground water monitoring program will be revised for Agency review and approval to include analysis and review of zinc concentrations, as well as the associated chloride ion, to evaluate continued protection of ground water quality into the future.

Based on the review of Site-specific circumstances and data, the potential that the zinc concentrations left in place, at a depth of 2 ft, would pose a threat to human receptors, ecological receptors, or ground water is low. The potential exposure pathway to ecological receptors is interrupted through the process of soil removal and backfill with clean fill meeting the SRG, and both soil SPLP and ground water monitoring data indicate that the NMWQCC ground water quality zinc standard is not likely to be exceeded. Therefore, excavation of zinc contaminated soil to a depth of 2 ft (3 ft when BAP equivalents exceeding 7.8 mg/kg are present) is protective of human health and the environment.

2. Performance Criteria for Treated Soil Capped Onsite

As described in the ROD (Section 12.2), BNSF had plans to expand existing rail tracks on the western portion of the Site. These formerly proposed expansion tracks would have been placed 300 ft inside of the western fence line of the Site over the existing wastewater reservoir where the in-situ solidified/stabilized soil would remain. Therefore, the ROD specified that the excavated soil would be in-situ solidified/stabilized to meet a permeability of 10^{-6} centimeters per second (cm/sec) and a compressive strength of 20 pounds per square inch (psi) in support of this expected future reuse. Since the signing of the ROD, BNSF has sold the main rail line located outside of the western fence line to the New Mexico Department of Transportation. In addition, BNSF track expansion plans have been redesigned so that construction within the Site boundary is no longer part of BNSF's future construction plan (Appendix D). Given this change in plans and the institutional controls affecting future Site development (including the provisions of the Consent Decree governing Site development), the existing permeability and compressive strength requirements for the in-situ solidified/stabilized soil are no longer necessary to support this future usage.

To date, excavated soil has been in-situ solidified/stabilized in 8-inch lifts across the bottom of the onsite repository using a mixture of Portland cement and bentonite in order to meet the permeability and compressive strength criteria specified in the ROD. Data results indicate that the compressive strength criterion has been met and that all but one permeability test meets the specified permeability criterion of 10^{-6} cm/sec. The one failed test, only slightly exceeded the permeability criterion with a permeability value of 1.6×10^{-6} cm/sec.

Because the proposed expansion of the rail tracks in the western area of the site is no longer being considered, the potential for leachate concentrations exceeding the ground water quality standard is low, the requirements for permeability and compressive strength for the underlying in-situ solidified/stabilized soil are met, and the permeability requirement for an overlying repository cap is met, the additional soil requiring excavation will not be treated to the permeability performance standard noted above. Nevertheless, the additional excavated soil will be treated through in-situ solidification/stabilization using Portland cement added at a rate of 5% by volume to further limit the leaching potential, and then will be compacted to meet a 10 psi compressive strength criterion to provide a stable base for the cap, limit subsidence, and minimize future maintenance activity. The compressive strength will be verified and documented in accordance the approved project Construction Quality Assurance Project Plan. As a final step, a cap meeting a permeability requirement of 1×10^{-7} cm/sec will be placed over the entire in-situ solidified/stabilized soil repository. The soil remedy will remain protective of human health and the environment, because the direct exposure pathway is eliminated by the cap meeting the permeability requirement specified in the ROD, and the potential leaching of contaminants is limited both by in-situ solidification/stabilization of the excavated soil with Portland cement and the presence of underlying in-situ solidified/stabilized soil meeting the lower permeability criterion specified in the ROD. These actions will be documented in an amendment to the remedial design which will include detailed plans to control Site run-on/run-off, to manage stormwater, and to enable long-term dust control.

In support of the remedial action described above and as a secondary level of protection for human health and the environment, an institutional control was put in place as a requirement of the Consent Decree and the ROD. This requirement reflected the fact that the remedial action would not result in the Site being available for unlimited use and unrestricted exposure because Site contaminants in the soil will only be addressed to levels protective of future industrial or commercial use. On February 27, 2008, an Environmental Protection Easement and Declaration of Restrictive Covenants was filed by BNSF, after approval by EPA and NMED, and recorded by the County Clerk of Bernalillo County, New Mexico. This institutional control runs with the land and restricts the use or development of the Site property and the use or development of ground water on or underlying the property. Specifically this institutional control prevents any use or development that would threaten or damage remedial components on the Site, which would include potential damage to the cap or underlying in-situ solidified/stabilized contaminated soil. Further, any development within the 27.28 acre southern part of the Site requires prior EPA review and written approval of development, along with certification that remediation goals have been met. At the conclusion of the remedial action construction, an Interim Remedial Action report will document actions taken at the site including maps showing the excavation areas, soil concentrations at the base and sides of excavation areas, quality control performance data, and as-built details of the soil repository.

In conjunction with the Environmental Protection Easement and Declaration of Restrictive Covenants, the New Mexico Office of the State Engineer instituted a temporary institutional control in the form of a moratorium on new permits for ground water wells within a 200-ft buffer zone of the currently identified ground water plume surface area while remedial action is being performed. This moratorium was filed on January 29, 2009, to protect human health and minimize interference with the ground water remediation activities until all ground water remediation goals have been met. The revised soil compressive strength and performance criteria, taken in conjunction with the existing Site institutional controls (including the Site development restrictions of the Consent Decree) will ensure that remedial protectiveness of human health and the environment is maintained at the Site. Five-year reviews will be conducted by the Agencies to evaluate the protectiveness of the remedial action, including the integrity of the soil repository and the fill in the excavated areas, review of ground water data (including zinc), and the overall operation of the ground water treatment system. In addition, annual operation and maintenance reviews will be conducted by BNSF.

3. Phytoremediation Removal

The ROD identifies the use of phytoremediation in areas of low-level contamination (Sections 7.0 and 10.1), which were not further defined. Pursuant to the ROD, contaminated soil exceeding the excess lifetime cancer risk range or the non-cancer hazard index for an industrial future use scenario and/or the ecological risk will be excavated, treated, and capped. The excavation areas will then be backfilled with clean soil meeting the Site-specific SRGs. No identified areas of soil exceeding the SRGs will be left in place. All identified areas will be excavated to either a maximum depth of 2 ft for zinc contaminated soil as specified in this ESD or to a maximum of 3 ft for BAP Equivalent contaminated soil as specified in the ROD. Since impacted soil in all identified areas exceeding the SRGs will be excavated, in-situ

solidified/stabilized, and capped, the use of phytoremediation as a remedial component is considered to be superfluous and not cost effective. Therefore, it is no longer deemed a part of the Site remedy by the EPA.

Table 3: Comparison of the Differences between the 2002 ROD and 2010 ESD

Component	2002 ROD	2010 ESD	Difference
Soil Volume	5,600 yd^3 (6,160 tons)	>50%	Soil volume increase of >50%
Soil Depth	3 ft maximum	2 ft maximum 3 ft maximum	Excavation to a maximum of 2 ft for zinc contaminated soil >SRG and to a maximum of 3ft for BAP equivalent contaminated soil >SRG
Treated Soil Performance Criteria[1,2]	1×10^{-6} cm/sec permeability[1] or less minimum 20 psi compressive strength[2]	No Criterion[1] Minimum 10 psi compressive strength[2]	The permeability criterion is no longer required.[1] Decrease in compressive strength requirement.[2]
Phytoremediation	Implemented in areas of low-level contamination	Removed as a component of the soil remedy	No phytoremediation component

1. The permeability criterion is applicable to the treatment of the remaining soil to be excavated. All soil treated prior to the ESD meets the ROD permeability requirement of 1×10^{-6} cm/sec. In addition, this does not apply to the cap, as the cap will meet the ROD permeability requirement of 1×10^{-7} cm/sec.
2. The compressive strength criterion is applicable to the treatment of the remaining soil to be excavated. All soil treated prior to the ESD meets the ROD compressive strength requirement of 20 psi.

VII. Support Agency Comments

The NMED has been consulted and provided the opportunity to comment on this ESD in accordance with the NCP 40 C.F.R. 300.435 (c)(2) and CERCLA § 121 (f), 42 U.S.C. § 9621(f). The NMED supports the changes in the selected remedy (Appendix B).

VIII. Statutory Determinations

These significant changes comply with the statutory requirements of Section 121 of CERCLA, 42 U.S.C. § 9621, are protective of human health and the environment, and comply with Federal and State requirements that are applicable or relevant and appropriate to the remedial action. The changes are cost-effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. This remedy satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

Specifically, contaminated soil will be excavated, in-situ solidified/stabilized, and capped onsite. As presented in the ROD, this action complies with RCRA removal and treatment requirements and land disposal restrictions because it is part of the Site area of contamination and is being treated and disposed in place. The remedial action provides for long-term effectiveness and permanence due to contamination removal, treatment, and onsite disposal; reduces contaminant mobility, through treatment and capping; and is cost effective. The completed remedial action will be easily implemented because it utilizes conventional equipment used and accepted in the construction industry. Implementation of these significant changes does not alter or affect the requirements of the Ground Water remedial action component as specified in the ROD, will meet the remedial action objectives, and adheres to the established restrictions outlined in the institutional controls.

IX. Public Participation

An open house was held on February 2, 2010, to discuss the ESD with the community. A fact sheet was also mailed to the community for those that could not participate in the meeting. This ESD will become part of the Administrative Record [NCP, 40 C.F.R. 300.825(a)(2)], which is developed in accordance with Section 113 (k) of CERCLA, 42 U.S.C. § 9613(k), and which is available for review at the Albuquerque Public Library Main Downtown Branch, 501 Copper Avenue, NW, Albuquerque, NM, 87102; and the New Mexico Environment Department Harold Runnels Building, 1190 St. Francis Drive, Santa Fe, NM, 87505. As required by the NCP, 40 C.F.R. 300.435(c)(2)(i)(B), a Notice of Availability and a brief description of the ESD will be published in the local paper.

X. Authorizing Signatures

This ESD documents the significant changes related to the remedy at the AT&SF Albuquerque Superfund Site. These changes were selected by EPA with the concurrence of the New Mexico Environment Department (Appendix B).

U.S. Environmental Protection Agency

By: _____ Date: 2/26/2010

Samuel Coleman, P.E.
Director
Superfund Division

Figure 1
Site Map

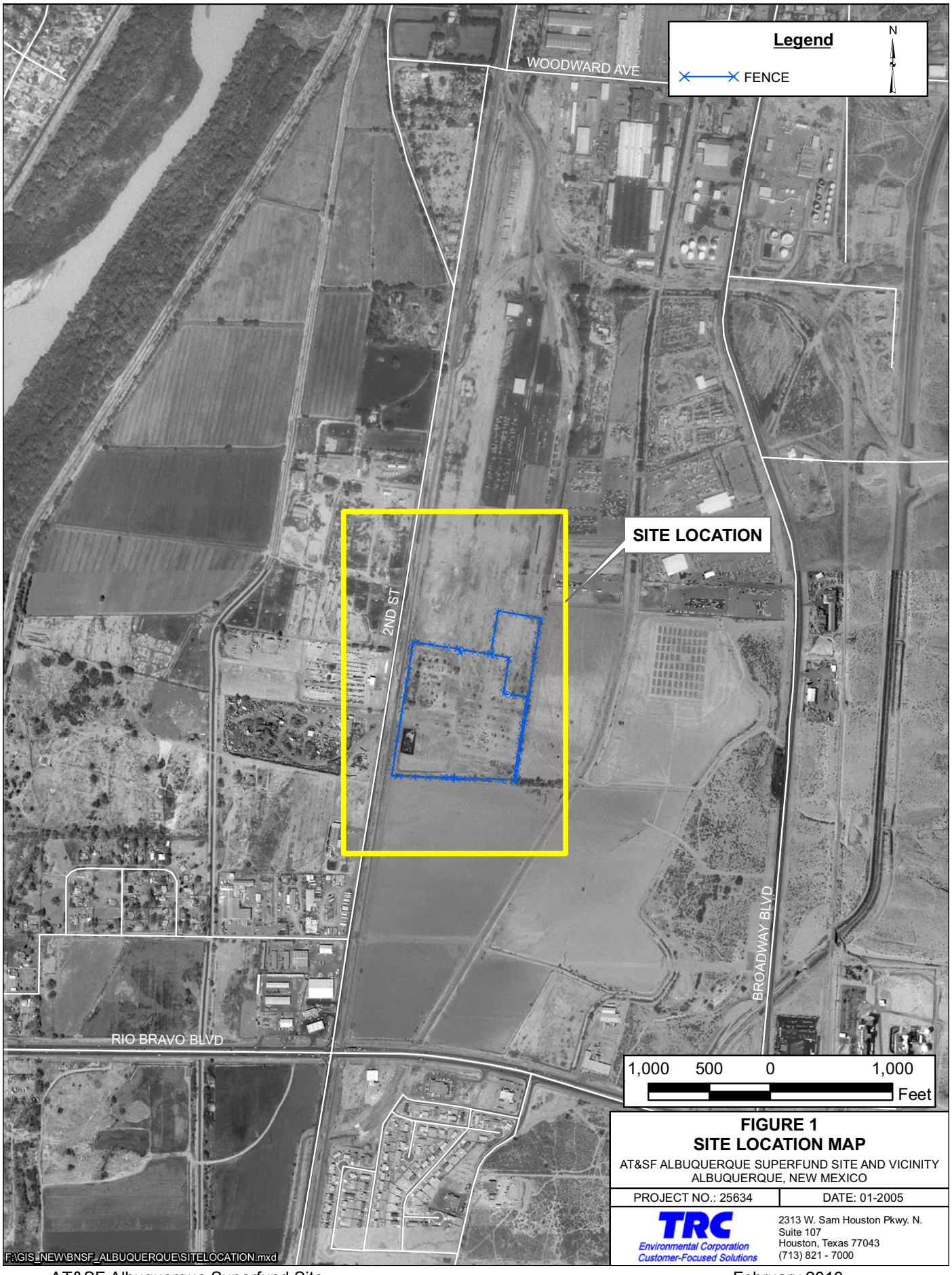


FIGURE 1
SITE LOCATION MAP

AT&SF ALBUQUERQUE SUPERFUND SITE AND VICINITY
ALBUQUERQUE, NEW MEXICO

PROJECT NO.: 25634	DATE: 01-2005

TRC
Environmental Corporation
Customer-Focused Solutions
2313 W. Sam Houston Pkwy. N.
Suite 107
Houston, Texas 77043
(713) 821 - 7000

Figure 2
Site Excavation Areas

LEGEND

- IMPACTED LOCATION (ZINC >200 mg/kg)
- UNIMPACTED LOCATION (ZINC <200 mg/kg)
- ORIGINAL EXTENT OF SOIL EXCAVATION AREA
- CURRENT EXTENT OF SOIL EXCAVATION AREA
- PROPOSED EXTENT OF SOIL EXCAVATION AREA
- PROPOSED RECOVERY SYSTEM PIPING
- EXCAVATION TO 1.00 FT. BGS
- EXCAVATION TO 2.00 FT. BGS
- EXCAVATION TO 3.00 FT. BGS
- PROPOSED EXTENSION OF SOIL REPOSITORY

VOLUME ESTIMATES	
ESTIMATED VOLUME (ROD)	5,600 YD^3
CURRENT STABILIZED VOLUME	8,150 YD^3
ADDITIONAL ESTIMATED VOLUME TO BE STABILIZED WITH ESD	18,551 YD^3

N

0 75 150 300

SCALE IN FEET
1" = 150'-0"

SHALLOW SOIL ZINC INVESTIGATION
FORMER PROCESS AREA

AT&SF ALBUQUERQUE SUPERFUND SITE
ALBUQUERQUE, NEW MEXICO

PROJECT NO.: 163995 | DATE: 01/08/2010 | BY: O.F.

TRC
10011 MEADOWGLEN LANE
SUITE 100
HOUSTON, TEXAS 77042
713-244-1000

FIGURE 2

HOU M:\ACAD-TRC\DRAFTING\AT&SF Albuquerque Superfund Site\ Fig 1 - AT&SF Albuquerque Superfund Site - Shallow Zinc Inv in Frmr Proc Area.dwg 01/26/10

Appendix A

Letter from TRC Environmental on behalf of BNSF dated December 3, 2009

Response to Request for Review of Explanation of Significant Differences

10011 Meadowglen Lane
Suite 100
Houston, Texas 77042

713.244.1000 PHONE
713.244.1099 FAX

www.TRCsolutions.com

December 3, 2009

NMED
Mr. David Mayerson
1190 S Saint Francis Dr. Ste. N231 **Sent Via E-mail**
Santa Fe, New Mexico 87505

Subject: Response to Request for Review of Explanation of Significant Difference (ESD) for the AT & SF Superfund Site, Albuquerque, NM

Dear Mr. Mayerson;

TRC has reviewed the letters from the City of Albuquerque, Bernalillo County and the Albuquerque Bernalillo County Water Utility Authority in reference to the subject matter. TRC and BNSF share their focus and attention on the protection of groundwater as the critical goal for the site. By way of this letter, we hopefully address all of their comments and questions. However, before we respond to these, we believe it will be extremely helpful for all of us to review the relevant and pertinent elements of the operational history of the site and key elements of the site investigation and remedial activites at the site.

Site Operation History, Site Investigation and Remedial Activity Review:

As noted before, this is not an exhaustive review; only those elements pertinent to the current issues associated with the ESD are described here-in.

The AT&SF Railway Company, predecessor to the BNSF Railway Company, operated a wood treatment plant at this site from 1907 to 1972. The plant was dismantled in 1972. Creosote was the primary chemical used to treat the wood products, although from 1914 to 1926, zinc chloride was also occasionally used as a wood treating chemical. As BNSF voluntarily started

investigating this site, the initial effort primarily focused on defining the impact of industrial activity on the site groundwater. Of 40+ wells that were sampled during the Remedial Investigation (RI), less than half showed the presence of zinc. Zinc concentration in the wells ranged from 0.005 to 0.029 mg/l. In comparison, the State of New Mexico's drinking water standard for zinc is 10 mg/l and the NMED tap water screening level is 11 mg/l.

Numerous soil samples were also analyzed for zinc during the RI. Samples were collected from the surface to depths of over 350 feet. At the time of the completion of RI, the maximum observed concentration of zinc in soil was 3,950 mg/kg. As comparison, the NMED Soil Screening Level for an Industrial/Occupational area is 100,000 mg/kg. The corresponding standard for a Residential area is 23,500 mg/kg. The maximum observed site soil concentrations are well below both the industrial and residential soil screening levels.

BNSF also investigated the potential for site contaminants in soil, including zinc, to impact the underlying groundwater. The Synthetic Precipitation Leaching Procedure (SPLP) test is the standard protocol used by agencies including the USEPA to quantify this potential. Seven soil samples were tested using the SPLP test. The most impacted soil sample from the wastewater reservoir (with a zinc concentration of 9,980 mg/kg) produced a leachate with a zinc concentration of 0.23 mg/l, a number well below the drinking water standard of 10 mg/l.

The above mentioned analyses led BNSF to conclude that:

- zinc is detected in groundwater on an infrequent basis and at very low concentrations, almost two orders of magnitude lower than the drinking water standards;
- zinc in site soils is one to two orders of magnitude lower than industrial soil screening levels used by the State of New Mexico, and
- the potential for zinc in site soils to leach and impact groundwater is non-consequential; the leachate concentration is two orders of magnitude lower than the drinking water standard.

In summary, zinc in both soil and groundwater was not a concern. Zinc was also not identified as a constituent of concern in the human health risk assessments.

The ecological risk assessment for this site, however, concluded that zinc in soil at concentrations above 200 mg/kg could adversely affect the reproductive capacity of ground feeding omnivorous birds (high food intake rate relative to body weight). For purposes of conducting the risk assessment, this species of birds was represented by the American Robin. And, the primary causative agent for this impact was ingestion of soil invertebrates. Thus zinc over 200 mg/kg became a soil remediation goal (SRG).

TRC/BNSF's expectation was that removal/excavation of creosote impacted soils (soil exceeding the SRG for benzo(a)pyrene equivalency (B(a)P)) would also result in the removal/excavation of soils exceeding the zinc SRG. Unfortunately, this assumption was incorrect. To date, TRC/BNSF have identified a previously unidentified area encompassing some 4+ acres that have soils exceeding the zinc SRG. This area is mostly down-slope of the process area. The EPA/NMED's selected remedy for soil was to excavate to a maximum depth of three feet for all soils that exceed the SRGs for B(a)P and zinc. Based on the borings completed through the completion of the Remedial Investigation, TRC had estimated excavation of approximately 6,000 cubic yards of soil. We have, to date, excavated 11,500 cubic yards of soil, and, if we excavate all of the impacted soils to a maximum depth of 3 feet (as per the agreed upon remedy), we will excavate an additional 22,000 cubic yards of soil.

Since, zinc came into play strictly due to ecological concerns (ground feeding birds eating soil invertebrates), the excavation of this soil can logically be limited to the depth that corresponds to this activity. Note that during the ecological risk assessment the depth was assumed to be six inches. Furthermore, only one surface soil sample collected during the ecological risk assessment showed the presence of soil invertebrates. Hence, TRC/BNSF approached EPA for an ESD requesting a reduction in the maximum depth of excavation from three feet to two feet for soils that were impacted with zinc only. From the perspective of the conservation of resources, the additional one foot of excavation will not add any value to the environmental protection or enhancement of the site and, hence, is considered a wasteful use of resource.

Answers to Agencies Comments:

The following paragraphs address the various agencies comments and questions.

1. During remedial investigation, TRC has completed nearly 175 soil borings. Soil samples from several of these borings were analyzed for zinc. Generally, the first soil sample was collected at a depth of 3 feet or greater. Zinc concentrations in the soil samples indicate that zinc concentrations decrease very quickly with depth to background levels of 50mg/kg. For the ecological risk assessment, thirteen surface soil samples were analyzed for zinc. These soil samples were taken from the top six inches of soil. During the remedy implementation, TRC has collected over 500 soil samples within the first three feet and had them analyzed for zinc. In summary, we have a defined lateral and vertical profile of zinc for the site soils.

2. Design documents prepared and finalized in 2006 delineated seven areas to be excavated, the location of the groundwater treatment plant and pipe routes collecting groundwater

impacted by organic constituents, as well as free phase organic liquids. For the purpose of creating a good foundation, the soils underneath the proposed groundwater treatment plant were excavated to a depth of five feet.

On December 11, TRC will present to the agencies a map that shows the areas that were originally planned for excavation and the new proposed area for excavation based on zinc concentrations in soil that exceed the SRG.

3. Excavation volumes are given below:
    - Estimated volume of soil to be excavated in ROD = 5,600 cubic yards
    - Current excavated volume = 11,500 cubic yards
    - Estimated volume of soil to be excavated under the ESD = 26,000 cubic yards
    - Estimated volume of soil to be excavated if the ESD is not granted = 33,500 cubic yards

4. As designed, all of the soil was to be placed in a soil repository. The soil repository was located within the footprint of the old wastewater reservoir. The designed volume of the repository was 15,000 cubic yards. TRC has determined that the additional soil can be accommodated in the repository by expanding its foot print 30 feet to the south, 30 feet to the west, 30 feet to the north and by adding three feet to the height. Please note that the additional three feet of height on the cap will still place the crown of the cap below the height of the rail line to the west and therefore below the sightline of adjacent properties.

5. Off-site disposal option is not favored for two reasons. First, BNSF believes it can provide better custodial care of the impacted material by managing it on-site. Second, transporting such large quantities of material creates a nuisance for the neighborhood.

6. TRC has installed forty-three wells to extract impacted groundwater and free-phase liquids. This water will be treated at the groundwater treatment plant which is expected to be completed by March 2010. However, we cannot initiate the construction of piping and ancillary conveyance facilities, as the pipes transverse areas subject to excavation due to the exceedance of the zinc SRG. We must excavate all areas and bring the area to final grade before constructing the conveyance facilities.

7. The objective for phytoremediation was to promote natural degradation of residual organics, which may be left at the site. However, it is no longer relevant. Under the ESD, all of the site would have either a minimum of 2 feet of clean fill or would be

covered by the liner as per the design of the soil repository. There will be no residual organics left to be remediated.

We hope the above addresses all comments and questions. We look forwards to meeting the board on December 11, 2009, at which time we will be glad to answer any other questions. In the interim, I can be reached at 713-244-1013 for any immediate questions or concerns.

Sincerely,

Riaz Ahmed, P.E.
Project Manager

Appendix B
Letter from NMED

NEW MEXICO
ENVIRONMENT DEPARTMENT

Office of the Secretary

BILL RICHARDSON
Governor

Harold Runnels Building
1190 Saint Francis Drive (87505)
P.O. Box 5469, Santa Fe, NM 87502
Phone: (505) 827-2855 Fax: (505) 827-2836
www.nmenv.state.nm.us

RON CURRY
Secretary

JON GOLDSTEIN
Deputy Secretary

February 24, 2010

Mr. Samuel J. Coleman, P.E.
Director
Superfund Division
U.S. Environmental Protection Agency Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

RE: Concurrence with the Explanation of Significant Differences for the AT&SF Albuquerque Superfund Site, Albuquerque (Bernalillo County), New Mexico; CERCLIS # NMD980622864

Dear Mr. Coleman:

The New Mexico Environment Department ("NMED") has reviewed the U.S. Environmental Protection Agency's ("EPA's") proposed Explanation of Significant Differences ("ESD"), dated February 11, 2010, to the Record of Decision ("ROD") for the AT&SF Albuquerque Superfund Site, and supports the changes to the Site Remedial Action detailed in that document. The components of this ESD with which NMED concurs include:

1. reduction in the depth of the maximum excavation required to address soil contaminated only with zinc concentrations in excess of the respective Site Soil Remediation Goal ("SRG"), from three feet to two feet;
2. the following changes in the performance criteria for the compacted mixture of 5% Portland cement by volume and the excavated zinc-contaminated soil:
    a. elimination of permeability criterion specified in the ROD, and
    b. reduction in the compressive strength criterion from 20 pounds per square inch ("psi") as specified in the ROD to 10 psi;
3. removal of phytoremediation as a component of Site Remedial Action.

NMED agrees that the reduction in maximum depth of excavation for zinc-contaminated soils will be protective of the ecological risk identified. NMED understands that the EPA will require the addition of zinc and chloride analyses to the ongoing ground water monitoring program to ensure that any potential unforeseen impacts to ground water from these changes to the Remedial

Action under this ESD will be detected and addressed in a timely manner. Furthermore, NMED understands that EPA also will require the Responsible Party to submit, for agency review and approval, revised design documentation for the Site soil repository that will detail elements for long-term management and control of storm water run-on/run-off and dust. NMED agrees that these measures, taken in concert with the existing Environmental Protection Easement and Declaration of Restrictive Covenants on the Site, will ensure that protectiveness of human health and the environment is maintained at the Site.

NMED also acknowledges that the deletion of phytoremediation from the Remedial Action specified in the Site ROD, which was to be applicable to areas of low-level soil contamination, is justified due to the excavation of soils in which contaminant concentrations exceed SRGs.

The elements of the Remedial Action not addressed in the ESD will continue to be implemented as specified in the ROD. That is, soil contaminated with benzo(a)pyrene (BAP) equivalents shall be excavated to a maximum depth of three (3) feet and will be treated onsite, capped and maintained. Soil containing dense non-aqueous phase liquids (DNAPL) will be transported offsite for incineration and disposal. Ground water remediation will include removal of DNAPL and subsequent treatment of persistent "hot-spots," as well as remediation of dissolved-phase contamination with pump-and-treat technology. These actions as well as those proposed in the ESD will ensure long-term protection of human health and the environment from contamination associated with the Site.

NMED looks forward to continued cooperation with EPA on ongoing Site remedial activities. Please contact me at (505) 827-2855 or David L. Mayerson of my staff at (505) 476-3777 if you should have any questions.

Sincerely,

Ron Curry
Secretary, New Mexico Environment Department

Copies: Dana Bahar, NMED Superfund Oversight Section, Program Manager
Katrina Higgins-Coltrain, EPA Remedial Project Manager
David L. Mayerson, NMED Superfund Oversight Section Project Manager
Buddy Parr, EPA Team Leader

ATSF/ABQ 2010 correspondence file
NMED/GWQB/SOS Read File

RC/dlm

Appendix C

Email Communication from TRC Environmental on behalf of BNSF dated December 29, 2009

Results from Ground Water and Soil Synthetic Precipitation Leaching Procedure Analyses

BNSF-ATTP; SPLP and groundwater results for zinc

Thomas, Charles \(Houston,TX-US\) to: Katrina Coltrain 12/29/2009 03:11 PM

Cc: Dana.Bahar, David.Mayerson, "Ahmed, Riaz \(Houston,TX-US\)", "Werner, Robert E"

Katrina,

In his absence, Riaz has asked me to pass along the recent SPLP results from the Albuquerque Superfund Site.

Earlier this month, we identified six soil samples that were under the custody of Pace Analytical Services that would provide a broad spectrum of zinc concentrations from the site-specific SRG (200 mg/kg) up to the highest reported concentration at the Site (36,000 mg/kg). These six samples were analyzed by EPA Method 1312 Synthetic Precipitation Leaching Procedure to evaluate the potential for zinc to leach into groundwater. The following table presents the original total zinc concentration obtained by EPA Method 6010 and the SPLP results obtained by EPA Method 1312, along with the depth of each sample.

TRC Sample ID	Depth (ft bgs)	Total Zinc (mg/kg)	Zinc SPLP (ug/L)
PA-1.2-0028	1.0 – 1.2	200	23.2
PA-1.2-0007	1.0 – 1.2	913	114
PA-0.5-0037	0.0 – 0.5	1,670	172
PA-1.2-0001	1.0 – 1.2	3,810	269
PA-0.5-0030	0.0 – 0.5	10,300	286
PA-1.2-0030	1.0 – 1.2	36,000	3,800

As illustrated, without any attenuation caused by depth or geology, the highest concentration of zinc identified at the Site (36,000 mg/kg) does not leach to the point of impacting groundwater above the NMED-adopted National Secondary Drinking Water criteria of 5 mg/L (5,000 ug/L).

With regard to depth and geology, historical results indicate that zinc concentrations in soil fall below 100 mg/kg within the first five feet of the subsurface. Further, with the exception of an erosional channel crossing the site in the south central corner, a clay layer, averaging thirteen feet in thickness, exists across the entire site providing further protection of the groundwater in the Intermediate Aquifer. The Santa Fe Aquifer exists below the Intermediate Aquifer at a depth of approximately 60 to 70 feet below ground surface.

At the suggestion of the various agencies, several groundwater samples were collected and analyzed for zinc during the recent quarterly monitoring event. The results are as follows.

Monitoring Well	Groundwater Bearing Unit	Zinc Concentration (ug/L)	
		Result	RL
MW-8A(R)	Shallow Aquifer	ND	(20.0)
MW-12A	Shallow Aquifer	11.7 J	(20.0)
MW-6B	Intermediate Aquifer	11.6 J	(20.0)
MW-8B	Intermediate Aquifer	ND	(20.0)
MW-12B	Intermediate Aquifer	ND	(20.0)
MW-16B	Intermediate Aquifer	10.9 J	(20.0)
MW-28CL	Deep Aquifer (Santa Fe Aquifer)	ND	(20.0)

It should be noted that each of these monitoring wells are located in the southern half of the Site and that the majority of the wells (with the exception of MW-12A and MW-12B) are located in the southeastern quadrant beneath the elevated zinc concentrations in the surface soils. Monitoring wells MW-8A(R), MW-8B, MW-16B, and MW-28CL are located on the down-gradient edge of the zinc-impacted area.

Please feel free to contact either Riaz (after January 4th) or me with any further questions.

Charles D. Thomas

Senior Project Manager

TRC Environmental

10011 Meadowglen Ln, Suite 100

Houston, Texas77042

713.244.1057 office

713.244.1099 fax

713.249.8564 mobile

cthomas@trcsolutions.com

Appendix D

Letter from BNSF dated November 16, 2009
Track Expansion Plans

Robert (Rob) E. Werner, P.E.
Manager Environmental Remediation

BNSF Railway Company
4200 Deen Road
Fort Worth, TX 76106

Phone: (817) 740- 7341
Fax: (817) 740-7386
Email: Robert.Werner@BNSF.com

November 16, 2009

Ms. Katrina Higgins-Coltrain
US Environmental Protection Agency
Remediation Project Manager
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202

Subject: Track Expansion Plans
AT&SF Superfund Site
Albuquerque, NM

Dear Ms. Higgins-Coltrain

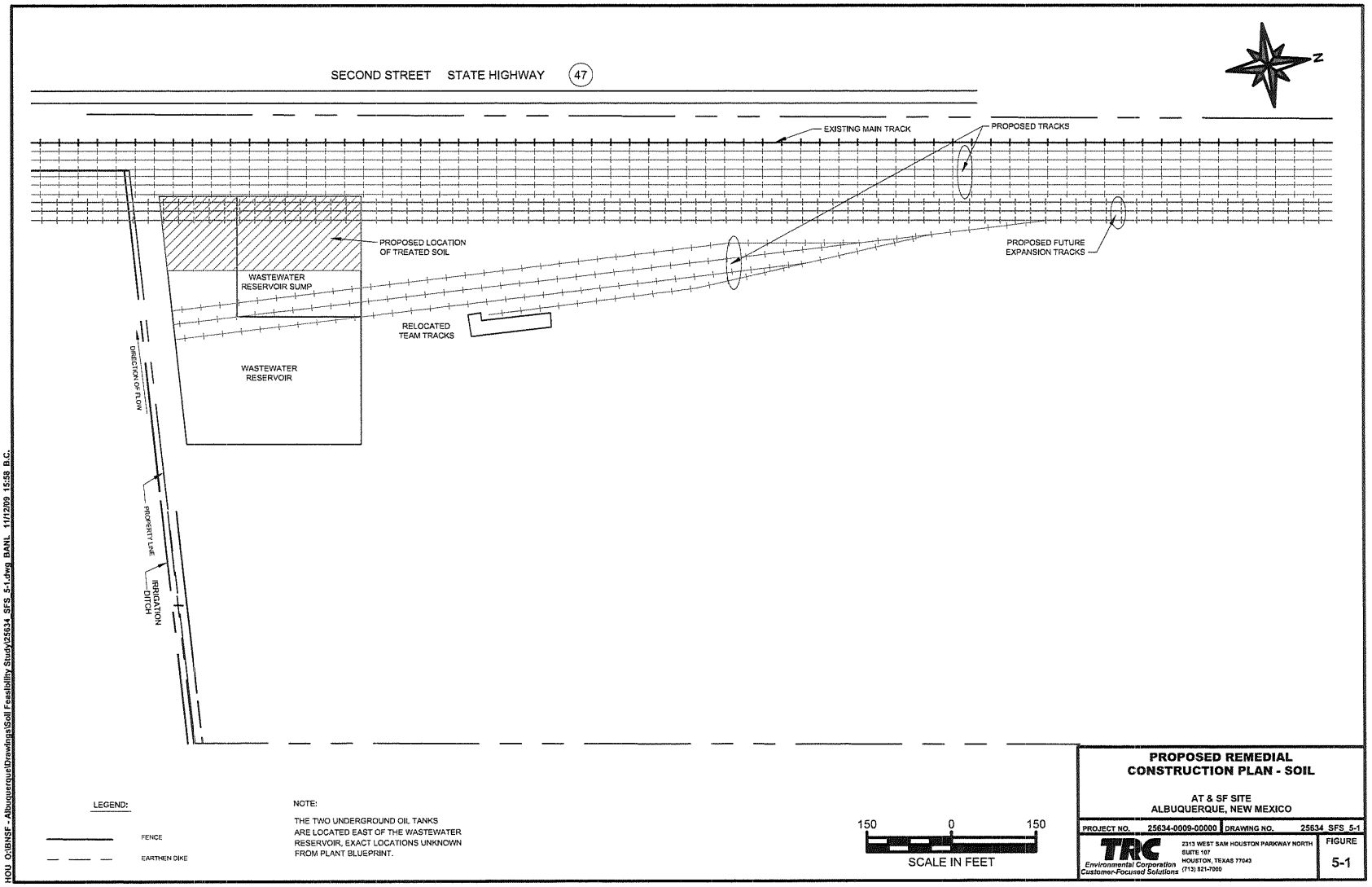
As shown on the attached figure 5-1, at the time when the Feasibility Study (FS) was being completed for the subject site, BNSF had plans for track expansion, which encroached on the soil repository. However since then BNSF has sold the mainline track in the area to New Mexico Department of Transportation (NMDOT) for their commuter line. As a result BNSF no longer plans to implement this track expansion project at the subject site.

Should you have any questions, please contact me at 817 740-7341 or Riaz Ahmed at 214 244-1013.

Sincerely,

Robert E. Werner, P.E.
Manager Environmental Remediation

cc: David Mayerson – NMED
Riaz Ahmed - TRC



O:\BNSF - AlbuquerqueDrawings\Soil Feasibility Study\25634_SFS_5-1.dwg BANL 11/12/2009 15:58 B.C. HOU