RECORD OF DECISION

AT&SF Albuquerque Superfund Site
Albuquerque, New Mexico

CERCLIS # NMD980622864

June 2002

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
SUPERFUND DIVISION

PART 1

DECLARATION - AT&SF Albuquerque Superfund Site

DECLARATION
AT&SF ALBUQUERQUE SUPERFUND SITE
RECORD OF DECISION

SITE NAME AND LOCATION

AT&SF Albuquerque Superfund Site
Albuquerque, New Mexico
NMD980622864

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the AT&SF Albuquerque Superfund Site (hereinafter, the "Site"), in Albuquerque, New Mexico, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. § 9601 et seq., and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, as amended (NCP), 40 CFR Part 300 et. seq.. This decision is based on the Administrative Record for the Site.

The State of New Mexico supports this remedial action, and a letter of concurrence from the New Mexico Environment Department (NMED) can be found in Appendix B to this Record of Decision (ROD).

ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

DESCRIPTION OF THE REMEDY

Both soil and ground water contamination at the Site will be addressed through the remedial action selected in this ROD. This response action will treat both principal threat wastes and low-level threat wastes. The major components of the selected remedial action consist of:

Soil Remediation

The selected remedy with respect to soil contamination consists of a modified alternative consisting primarily of elements of proposed (preferred) soils alternative S-8, modified to require elements of proposed alternative S-6 for areas of the Site where dense non-aqueous phase liquid (DNAPL) contaminated soil is encountered. This modification is the result of new information received during the public comment period on the proposed plan as explained more fully in the ROD, Part 2, Decision Summary. This modified soils remedy adopts the approach utilized by EPA for dealing with DNAPL hot spots that is incorporated in the selected ground water remedy below.

- Alternative S-8, in-situ solidification/stabilization, capping, and run-off/run-on management is the selected remedy for contaminated soils above the remediation goals that do not contain DNAPL.

- Alternative S-6, off-site incineration is the selected remedy for those portions of the Site where DNAPL-contaminated soil is encountered during the excavation of soil. This will consist of the excavation of DNAPL-contaminated soils, transportation to an off-site hazardous waste incinerator facility in accordance with 40 CFR 300.440, and incineration of the DNAPL-contaminated soil at such facility.

Ground Water Remediation

The selected remedy for ground water consists of the preferred alternative that was described in the proposed remedial plan for the Site. In addition, based upon new information received during the public comment period, one new element involving ground water monitoring was added to the preferred alternative, as noted below. The ground water remedy is discussed and explained more fully in the ROD, Part 2, Decision Summary. Elements of the ground water remedy are summarized as follows.

- The EPA has selected the preferred alternative, an aggressive performance-based alternative for remediation of contaminated Site ground water. This performance-based approach consists of the following major components, and includes modifications described below:

    - Ground water restoration through pumping and treatment and re-injection alternatives GW-2, GW-3, or GW-4 will be accomplished through a performance based alternative. Depending upon the outcome of operational performance review and evaluation during the remedial design phase, any one of these alternatives or a combination thereof will actually be implemented during remedial construction. The performance criteria that will determine which of these alternatives will actually be implemented is their ability to meet ground water remediation goals for both the aquifer and the treated ground water. Implementation will continue during long term remedial action for up to ten years, followed by an operation and maintenance period that may last an estimated twenty (20) years or more.

    - DNAPL source removal and hot spot treatment will be accomplished through operational performance based evaluation and review of alternatives GW-5, GW-6, and GW-7 during remedial design, followed by implementation of one of these approaches or a combination thereof with conventional DNAPL recovery methods during remedial construction. The performance criteria that will determine which of these alternatives will actually be implemented is their ability to attain DNAPL mass reduction so that ground water remediation goals for the aquifer are met. Implementation will continue during long term remedial action for up to ten years.

- This alternative also includes quarterly ground water monitoring to assess the extent of any remaining contamination and risks to human health, a modification to the proposed preferred alternative.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy also satisfies the statutory preference for treatment which permanently reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants as a principal element of the remedy. Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is protective of human health and the environment as required by CERCLA Section 121, 42 U.S.C. § 9621.

ROD CERTIFICATION CHECKLIST

The following information is included in the Decision Summary, Part 2 of this ROD. Additional information can also be found in Decision Summary and in the Administrative Record file for the Site.

- Chemicals of concern (COCs) and their respective concentrations;
- Baseline risk represented by the COCs;
- Remediation goals, or cleanup levels, established for COCs and the basis for these goals;
- How source materials constituting principal threats are addressed;
- Current and reasonably-anticipated future land use assumptions, and current and potential future beneficial uses of ground water used in the Baseline Risk Assessment and ROD;
- Potential land and ground water use that will be available at the Site as a result of the selected remedy;
- Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected; and
- Key factors that led to selection of the remedy.

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6/27/02
Date

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PART 2

DECISION SUMMARY - AT&SF Albuquerque Superfund Site

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Selected Acronyms

AOC	Area of Contamination
ARAR	Applicable or Relevant and Appropriate Requirement
ASJCAC	Albuquerque San Jose Community Awareness Council
AT&SF	Atchison, Topeka and Santa Fe Railway Company
ATSDR	Agency For Toxic Substances And Disease Registry
BGS	Below Ground Surface
BNSF	The Burlington Northern and Santa Fe Railway Company
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Constituent of Concern
CTE	Central Tendency Exposure
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	U. S. Environmental Protection Agency
ERA	Ecological Risk Assessment
GAC	Granulated Activated Carbon
FS	Feasibility Study
HI	Hazard Index
HQ	Hazard Quotient
LNAPL	Light Non-Aqueous Phase Liquid
LOAEL	Lowest Observable Adverse Effect Level
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goals
mg/kg	Milligrams per Kilogram
MW	Monitoring Well
NCP	National Contingency Plan
ND	Not Detected
NMED	New Mexico Environment Department
NOAEL	No Observable Adverse Effect Level
NPL	National Priorities List
OSE	New Mexico Office of the State Engineer
O&M	Operation & Maintenance
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbons
PCE	Tetrachloroethene
PCP	Pentachlorophenol
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RG	Remediation Goal
RI	Remedial Investigation

RME	Reasonable Maximum Exposure
ROD	Record Of Decision
Site	AT&SF Albuquerque Superfund Site
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compound
TCDD	2,3,7,8-Tetrachlorodibenzo-p-Dioxin
TCE	Trichloroethene
TEQ	Toxicity Equivalence Factors
UST	Underground Storage Tank
UAO	Unilateral Administrative Order
UV	Ultra-Violet
VOC	Volatile Organic Compound
WWR	Waste Water Reservoir

1.0 Site Name, Location, and Brief Description

The Site is listed as the AT&SF Albuquerque Superfund Site in the U.S. Environmental Protection Agency (EPA) National Superfund Electronic Database Identification Number under the identification number of NMD980622864. The AT&SF Albuquerque Superfund Site (the Site or the facility) is located at 3300 Second Street, SW, in the South Valley area of the City of Albuquerque, Bernalillo County, New Mexico. It is the location of the former The Atchison, Topeka and Santa Fe Railway Company (AT&SF) Tie Treating Plant. The Site was listed on the EPA National Priorities List (NPL) on or about December 16, 1994.

The Burlington Northern and Santa Fe Railway Company (BNSF Railway), a successor railroad corporation to AT&SF and a wholly owned subsidiary of the Burlington Northern Santa Fe Corp. (BNSF), is the owner of the Site. BNSF 2002. Prior to the merger of AT&SF with and into the Burlington Northern Railroad Company (BNRR) to form the BNSF in 1996, the Site was owned by AT&SF. DPRA 1992. The topography of the Site and the surrounding area is generally flat and gently slopes down toward the Rio Grande. The Rio Grande, which is located approximately one mile west of the site, is the nearest surface water body. The Site consists of approximately 28 acres of the more than 85-acre former AT&SF Tie Treating Plant property (the plant property), which is an inactive wood treating facility that used creosote and other compounds in its wood preservation processes. Figure 1 shows the Site location. TRC 2001a. DPRA 1992.

The EPA is the lead agency for Site response activity under the Comprehensive Environmental Response, Compensation & Liability Act (CERCLA or Superfund), 42 U.S.C. §9601 *et seq.* The New Mexico Environment Department (NMED) is the support agency for CERCLA response action. The City of Albuquerque Environmental Health Department (AEHD) and Bernalillo County have also provided invaluable support on this Site.

2.0 Site History, Investigations, and Enforcement Activities

2.1 Site Operational History

The facility is a part of the plant property that was acquired by AT&SF in three parcels totaling more than 85 acres in 1907, and was constructed from 1907 to 1908. DPRA 1992. The facility operated as a wood pressure treatment plant from March 1908 to January 1972. The facility used primarily creosote and oil 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. In 1972, the plant was totally dismantled and the only physical feature remaining on-site is the wastewater reservoir/wastewater sump. Figure 2, as provided by the BNSF Railway contractor TRC Environmental Corp. (TRC), depicts the former layout of the plant. TRC 2001b. The reports of annual proceedings from the American Wood-Preserver's Association (AWPA) indicate that a number of AT&SF personnel involved in wood treatment were active in that trade organization over the years, starting almost from its inception early in the twentieth century. In fact, five AT&SF employees, including two individuals who had served as key personnel of the AT&SF Albuquerque plant, served as AWPA president and/or vice president between 1906 and 1965. AWPA 1972b.

The Site can be divided into five general areas of environmental impacts from the plant wood treating operations. These areas are set forth as follows.

Wood Treatment Area: This is the part of the Site where the pressure treatment processes employed by AT&SF to treat wood were applied. The facility utilized full cell processes for pressure treatment that included the Bethell and Burnettizing (zinc chloride), and Marine processes, as well as the empty cell Rueping process. TRC 2001. AWPA 1917. Plants such as this one involved the use of large pressure treatment cylinders called "retorts" utilizing steam and high pressure to inject creosote or other agents, such as zinc chloride, into wooden crossties, poles, posts, or the like. Goltra 1914. According to AWPA records, the two retorts that became operational at this plant in 1908 would have consisted of two riveted cylinders of approximately 6 feet in width and 132 feet in diameter, which were typical size retort units. AWPA 1914. Shipley 1929. Within two decades, some newer plants being constructed elsewhere utilized welded shell construction and were in many cases 8 feet in width. Shipley 1929. As late as 1964, according to Forest Service, U.S. Department of Agriculture (USDA) statistics as reproduced in AWPA proceedings, approximately 63% of all retorts in the nation were either 6 feet or 8 feet in diameter. Morriss 1965. The facility was reported to have added a third retort in 1953, according to AWPA records. AWPA 1954. Plant capacity was listed by AWPA as 1,025,000 standard 6" x 8" x 6' rail ties per year in 1914, which may have been expanded by the addition of the third retort in 1953. AWPA 1914.

The facility's only significant modernization involving change to processes occurred in 1953 or 1954 when a vapor drying system was installed. TRC 2001b. This may have reduced the quantity of plant creosote releases, but it is possible that this was only a feature of the additional retort installed that year, as the two 1908 retorts of the same size continued to operate. Further, this process modification occurred after the greatest period of United States' production of pressure treated rail ties, when national production was on a downward curve. This was probably due to the build-out of the American railroad system and the development of other competing modes of transportation, as well as the general success of wood preservation efforts like this one in extending the life of rail ties. In any event, according to USDA statistics as reported in the AWPA proceedings, national production of treated cross and switch ties (the principal product of the AT&SF plant) decreased from 150,104,330 cubic feet in 1945 to 52,702,688 cubic feet in 1963. Morriss 1965. As a result, any such modification would likely have been inconsequential when measured against cumulative historical environmental impacts of this facility. It is also clear that with the advent of modern environmental regulatory controls, such as pollutant effluent limitations in the 1970s, many facilities like this old plant were eventually closed. The dismantling of this plant was completed in early 1972.

The most common wood preservatives used in pressure treatment at this plant were creosote and creosote-petroleum mixtures. 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 in this area using solutions containing 2% to 10% pentachlorophenol (PCP). TRC 2001b. AWPA records document the usage of PCP at the facility in the 1960s as a wood treating preservative, but do not specify the scale or purpose of its usage. AWPA 1965. Borax/boric acid was also reportedly used at the plant as a flame retardant treatment. TRC 2001b.

Releases to the process area are evident where raw materials were unloaded from railcars and stored in above ground tanks. TRC 2001b. However, the most significant creosote or other preservative waste streams in a typical pressure treating plant like this one, would occur routinely with process condensate, vacuum water, and wash water from operation of the retorts. Best 1972. Thompson 1971. Halff 1959. Besides the general accumulation of process wastes from the operations of the retorts, the mechanisms for release may also have been from spillage and leakage at the point of transfer from the rail car to the sump or from leakage at the underground sump and pipes that transported the creosote from the unloading sump to the above ground tanks. TRC 2001b. Storm water run off from process areas and other contaminated areas, is also typically a significant source of pollution by creosote or other preservative wastes. Thompson 1971. The overall pattern of handling plant waste water at the Site with a settling pond, sumps, and ditches is fairly typical of older creosoting plants that were not constructed to treat the large volumes of creosote contaminated waste water they produced. Best 1972.

In addition to being a source of creosote contamination and its associated hazardous constituents, the treatment process area is also a potential source of zinc contamination. One of the structures noted on the plant blueprint was a Zinc Sump. Other than this, and the operation of the zinc chloride process at the plant, there is no known information on possible sources of zinc. A review of zinc contamination in the soil shows that most of the elevated soil concentrations occur in the treatment process area. Actual quantities of PCP production usage and waste products are unknown. TRC 2001b. Although the plant used PCP in the 1960s, it 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 (see section 5.3 below).

Drip Tracks: Tram tracks used for moving wood to and from the treatment cylinders are referred to as drip tracks. The standard operating practice in the wood treatment plant was to hold the treated lumber for a period of 24 hours on drip tracks in the vicinity of the retorts. Based upon this operating practice and a plant layout furnished by TRC, it is believed that the tram track areas, including those areas just outside the pressure treatment cylinders, were used as drip track areas. The drip tracks areas show impacts by both creosote and zinc. TRC 2001b.

Tie Storage Area: This area was where the treated ties were stored and allowed to dry. Releases to this area would be restricted largely to drippings from treated products. With the advent of vapor drying in 1953, the amount of drippings was reduced to some extent. Creosote drippings accumulate at locations where ties are repeatedly stacked, but the accumulations may tend to dry out between loads. TRC 2001b.

Wastewater Reservoir: Condensate water from the air compressor and retort process waste water from the oil/water separator tanks or sumps in the pressure treatment building were discharged to the wastewater reservoir. TRC 2001b. As noted above, this condensate water would have generally contained substantial quantities of creosote constituents. Also, sap water derived from wood before treating with creosote was discharged to this reservoir. A sump located in the northwestern corner of the reservoir, which is separated from the reservoir by an earthen berm, handled domestic sewage from on-site company housing. TRC 2001b.

Wastewater Discharge Ditch: Overflow from the wastewater reservoir was handled by the sump, which discharged to the Barillas Ditch bounding the west side of the property. The facility records show that plant wastewater was discharged in one of two fashions. Water that the plant considered to be clean (i.e., boiler blow-down, surplus vacuum pump water, and cooling jacket water) was discharged to the clear-water ditch bounding the south side of the property. TRC 2001b. However, according to analysis of typical creosoting facility waste streams, boiler blow down could contain soluble phosphates and other chemicals used as boiler compounds. Further, sealing water from "wet" vacuum pumps will likely contain light oils from the preservative used in the retorts. Best 1972. AWPA 1972a.

From 1972, when the plant was dismantled, to 1982, no activity reportedly took place at the plant. In 1982, portions of the property were leased to Bredero Price, Inc., which operated a pipe storage and coating facility for approximately one year. The pipe coating operation was of limited duration and none of the samples analyzed and reported suggest that the pipe coating operation had an impact on the Site. Bredero's storage needs prompted the consolidation of the plant's demolition debris. Much of the plant debris was pushed into the east end of the wastewater reservoir. Other debris, consisting largely of soil and uprooted trees, was bulldozed into a large pile at the southeast end of the plant. The debris in the wastewater reservoir was removed in 1990. TRC 2001b.

In 1987, an auto unloading facility was built north of the Site outside of the treatment area. Adjacent to the auto facility is an intermodal ramp used for unloading and loading containers and trailers on railcars. TRC 2001b.

2.3 Previous Response Actions

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. This debris was comprised of plant demolition wreckage that had been placed into the east end of the wastewater reservoir by Bredero Price, Inc. Due to contact with the creosote in the reservoir, much of the debris was tainted with creosote. Approximately 45,000 square feet of the wastewater reservoir were excavated to a depth of 2 to 5 feet.

Two areas with total SVOC concentrations above 41.1 mg/kg were excavated from the tie storage area in 1996. The excavated area was backfilled with clean soil and confirmation testing was performed to ensure that the contaminated soil had been excavated.

In April 1999, sludge and process residue from the wastewater reservoir (WWR) was excavated from the Site. This removal action was in response to a Unilateral Administrative Order (UAO) for a Removal Response Action issued by the EPA, which specifically called for BNSF to remove process residues located within the old wastewater reservoir. Approximately 1,100 cubic yards of process residues and highly contaminated soil were in the WWR. The UAO required the removal of process residues, plus a minimum of 6 inches of underlying soil. Because of the fluid nature of this material and a lack of a well-defined contact between process residues and soil, up to 2 feet of underlying soil was removed. At locations, upon instructions from EPA, excavations were as deep as 6 feet. The removal action was completed on April 30, 1999. A total of approximately 83 gondola cars (approximately 6,012 tons) were filled and transported by rail to Safety Kleen Inc.'s Lone Mountain (RCRA Subtitle C) Landfill in Waynoka, Oklahoma, for disposal. As a direct result of this removal action, the most highly contaminated soil and sludge has already been removed from the Site. As stated previously, there are still elevated concentrations of contamination in the soil at the Site, but at levels that are several orders of magnitude below the levels that were in the WWR prior to the removal.

In 1999, three recovery trenches were installed in the WWR to collect dense non-aqueous phase liquid (DNAPL) through a gravity feed system. In 2000, five recovery pumps were installed to extract DNAPL from the Shallow and Intermediate Aquifers. These pumps were installed in monitoring wells MW-2B, MW-18A, MW-19B, MW-22B and MW-23B, in connection with the Site Remedial Investigation and Feasibility Study (RI/FS). The recovery wells have been pumping DNAPL from the aquifer since 2000.

2.4 Potentially Responsible Parties

The EPA performed a potentially responsible party (PRP) search to determine the identities of the former owners and operators of the site. In 1907, AT&SF purchased the land comprising the plant property and the Site. The Site was used by the AT&SF to treat various wood products (railroad ties, bridge timbers, fence posts, etc.) with a solution of creosote and oil from 1908 to 1972. The Site includes much of the dismantled Tie Treatment Plant and any area where a hazardous substance has been deposited, stored, disposed of, or placed or otherwise come to be located through a release. The following statement is quoted from Form 10-K, filed by the Burlington Northern Santa Fe Corporation with the United States Securities and Exchange Commission for fiscal year ended December 31, 2001, at p.1. BNSF 2002.

> Burlington Northern Santa Fe Corporation (BNSF) was incorporated in the State of Delaware on December 16, 1994. On September 22, 1995, the stockholders of Burlington Northern Inc. (BNI) and Santa Fe Pacific Corporation (SFP) became the stockholders of BNSF pursuant to a business combination of the two companies. To effect the combination, BNSF was formed to act as the parent holding company of BNI and SFP. BNI and SFP each owned a large, Class I railroad: Burlington Northern Railroad Company (BNRR) and the Atchison, Topeka and Santa Fe Railway Company (ATSF), respectively.
>
> On December 30, 1996, BNI merged with and into SFP. On December 31, 1996, ATSF merged with and into BNRR, and BNRR changed its name to The Burlington Northern and Santa Fe Railway Company (BNSF Railway). On January 2, 1998, SFP merged with and into BNSF Railway.

The BNSF Railway is a wholly owned subsidiary of BNSF, which has its principal executive offices at 2650 Lou Menck Drive, Second Floor, Fort Worth, Texas 76131-2830. As the sole owner and operator of this facility and the successor corporation to AT&SF, which held the same status, the BNSF Railway is the only PRP identified by the EPA for the Site. Based upon existing factual knowledge about the operations and history of this facility, no other parties fall within the elements of those persons who are potentially liable under section 107(a) of CERCLA, 42 U.S.C. §9607(a).

3.0 Community Participation

Throughout the investigative process, the EPA and NMED have held open houses and informal meetings with community leaders and area residents to seek public input and meet the public participation requirements in CERCLA during the remedy selection process.

A public information repository is located at the Albuquerque Public Library, Main Branch, located at 510 Copper Avenue NW in downtown Albuquerque. The repository contains copies of reports generated for the Site and the Administrative Record file.

The EPA has held open houses, and will continue to hold them in order to provide residents, civic leaders, public officials, environmental groups, news reporters, and others with current information about site activities and the Superfund program. Open houses may include a project update from the EPA and any other involved parties and a question and answer period. In addition to EPA sponsored open houses, the EPA has given numerous presentations at community meetings held by the Albuquerque San Jose Community Awareness

Council (ASJCAC).

The ASJCAC has received two Technical Assistance Grants in order to provide technical advice at the Site. This site also represents a significant partnership with not only the community, but also with the City of Albuquerque, Bernalillo County, the State of New Mexico, and elected officials.

An informal open house was held on November 20, 1993, at noon at the San Jose Parish Hall, located at 2401 Broadway SE, Albuquerque, New Mexico, to discuss the Superfund Program, and the AT&SF Site as a proposed NPL Site.

An informal open house was held on May 11, 1994, at 6:00 P.M. at the San Jose Community Awareness Council Office, located at 2401 Broadway SE, Albuquerque, New Mexico, to discuss the AT&SF Superfund Site remedial activities.

An informal open house was held on April 21, 1999, at 7:00 P.M. at the Jack Candelaria Community Center, located at 400 San Jose Street SE, Albuquerque, New Mexico, to discuss the removal activities for the sludge and contaminated soils in the old impoundment area.

An informal open house was held on November 4, 2001, in the evening at the San Jose Parish Hall, located at 2401 Broadway SE, Albuquerque, New Mexico, to discuss the remedial activities and the pending release of the Proposed Plan. n English-to-Spanish interpreter was at the open house to translate the presentation into Spanish.

An informal open house was held on December 18, 2001, at 7:00 P.M. at the Jack Candelaria Community Center, located at 400 San Jose Street SE, Albuquerque, New Mexico, to summarize the activities conducted as part of the RI/FS. The Proposed Plan was introduced at this meeting. An English-to-Spanish interpreter was at the open house to translate the presentation into Spanish. Representatives from the EPA, NMED, City of Albuquerque, and BNSF attended the open house to answer questions about the Site activities.

In addition, at least seven other open house meetings have been held in conjunction with the ASJCAC in 1995, 1997, 1998, 1999, 2000, and 2001. The community was updated on the on-going site characterization activities and future planned actions for the Site.

The EPA announced a 30-day public comment period on the Proposed Plan from February 7, 2002, to March 9, 2002, to enable citizens to review and comment on the Agency's recommended alternatives. The ASJCAC requested a 30-day extension to the public comment period. The extension was granted and the public comment period ended on April 8, 2002. A public notice containing a brief summary of the cleanup action, dates of the comment period, and instructions on how to submit comments was published in the *Albuquerque Journal* and the *Albuquerque Tribune* on February 7, 2002. In addition, a fact sheet was mailed to approximately 500 people who are on the Site mailing list. Additional copies of the fact sheet were also hand delivered to members of the community by the ASJCAC.

A public meeting gives community members an opportunity to give and receive feedback regarding site activities. A formal public meeting was held on February 27, 2002, at the South Broadway Cultural Center, 1025 Broadway, SE, Albuquerque, New Mexico. The public was invited to orally comment on the Proposed

Plan during the formal public meeting. A court reporter was at the meeting to create a transcript of the proceedings. An English-to-Spanish interpreter was also present at the formal public meeting to translate the presentation into Spanish, as needed. EPA's response to the comments received during the public comment period and the formal public meeting is included in the Responsiveness summary, which is part of this ROD.

4.0 Scope and Role of Response Action

The EPA expects that the Site contamination will be addressed as one unit through the remedy selected in this Record of Decision (ROD). That is, the response action, detailed in this ROD, will address both the principal threat wastes and the low-level threat wastes for all of the environmental media.

5.0 Site Characteristics

5.1 Physical Site Characteristics

The site and the surrounding area's topography is generally flat and gently slopes down toward the Rio Grande. The Rio Grande, located approximately one mile west of the site, is the nearest surface water body. The Barr Canal, which diverts water from the Rio Grande during irrigation season, is approximately one-quarter mile west of the site. The San Jose Drain, which is a storm water run-off control waterway, is approximately one-tenth of a mile east of the site.

The climate in the Site vicinity is semi-arid and characterized by sunny days and low humidity. The average annual total precipitation is between 8 and 9 inches with a potential evapo-transpiration rate computed to be greater than 60 inches. Most of the rainfall is from storms that occur from July to September. Temperatures vary from an average of 90 degrees Fahrenheit in the summer months, to an average of 49 degrees Fahrenheit in the winter months.

5.2 Site Hydrogeology

The site is located in the inner Rio Grande Valley, which is incised into the sedimentary basin fill of the Albuquerque basin. The sedimentary basin fill consists largely of the Santa Fe Formation with some overlying recent deposits represented by the Rio Grande Alluvium. The Santa Fe Formation has been divided into three parts (upper, middle and lower) that are inter-connected. The Santa Fe Formation is approximately 4,750 feet thick in the area. The upper Santa Fe Formation is estimated to be about 650 feet thick in the vicinity of the site and flows in a northerly direction. This is probably in response to ground water withdrawn from the San Jose Municipal Well Field located about 2 miles north of the site.

At the site, the Rio Grande Alluvium is about 53 to 82 feet thick and consists of two water-bearing zones: the Shallow Aquifer and the Intermediate Aquifer. A discontinuous silty clay layer separates these two aquifers. At the site, ground water flow is generally in the east-southeast direction.

For the purposes of the remedial design and delineating the vertical extent of contamination, ground water (aquifer) zones are based on depth below the ground surface (bgs). The designated aquifer zones are defined primarily by the depths of existing monitoring and water supply wells. These aquifer zones are:

Shallow (S) - The shallow Aquifer extends to an average depth of 20 feet below ground surface (bgs).
Intermediate (I) - The Intermediate Aquifer extends to an average depth of 60 feet bgs.
Santa Fe Formation (D) - The Santa Fe Formation Aquifer starts at approximately 60 feet bgs, and extends for several thousand feet below the Site.

An additional term in describing the contamination in the aquifer is a "**hot spot**." For the purposes of this Site, a hot spot is defined as an area having ground water contamination with relatively high concentrations (at least two orders of magnitude above maximum contaminant levels (MCLs)) observed consistently (during at least three sampling periods).

5.3 Nature and Extent of Contamination

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 followed by some preferential sorption 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.

The ground water contamination at this site has two different components: the aqueous contaminant plume and the DNAPL plume. The aqueous contaminant plume includes those portions of the site where only dissolved contaminants are present in ground water. The DNAPL zone includes those portions of the site where DNAPL is present in the subsurface, as either free phase or residual phase compounds.

Ground water contamination at the site was found to be in the two aquifers that comprise the Rio Grande Alluvium as well as the upper Santa Fe Formation. DNAPL has been found down to depths of 65 feet. The Shallow Aquifer extends to an average depth of 20 feet and has an average thickness of 4 feet. The Intermediate Aquifer extends to an average depth of around 60 feet and has an approximate thickness of 25 feet and is separated from the Shallow Aquifer by a silty clay layer about 13 feet thick. The Santa Fe Formation Aquifer starts at around 60 feet and extends for several thousand feet below the Site.

Soil Contamination

As expected, the nature of contamination across the site is fairly uniform. While the concentration of contaminants at different locations within the impacted area varies, the list of contaminants is fairly typical of a wood treating operation. These contaminants consist of Polynuclear Aromatic Hydrocarbons (PAHs).

Creosote constituent concentrations in unsaturated zone soils of the wastewater reservoir areas were as high as 13,250 mg/kg. However, the removal activities in 1999 removed this principal threat waste. In the treatment process area, concentrations are as high as 1,356 mg/kg and in the drip track area, concentrations are as high as 7,000 mg/kg. These maximum concentrations are typically near the points of release, e.g., the tank car unloading area, the above ground storage tanks and the weighing station for treated ties. These concentrations in the unsaturated soils may be indicators of the presence of DNAPL. More typically, the concentrations in these three areas are in the range of 100 to 1,000 mg/kg. At depth, the boundaries of impacted soil from these different source areas overlap and merge.

Based on the Human Health Risk Assessment, the EPA identified 8 mg/kg Benzo(a)pyrene (BAP) equivalents as a preliminary health based screening criteria for carcinogenic PAHs in soils. The 8 mg/kg BAP equivalents is based upon an industrial scenario through soil ingestion. Carcinogenic PAHs were found at concentrations above 8 mg/kg BAP equivalents in the unsaturated soils of the wastewater reservoir and the drip track area. In the wastewater reservoir, carcinogenic PAHs are as high as 92 mg/kg BAP equivalents, and in the drip track area, they are as high as 70 mg/kg and possibly 269 mg/kg BAP equivalents. PAHs concentrations are not above 8 mg/kg BAP in the treatment process area.

Soil samples with elevated concentrations of PAHs occur at discharge points in the clear-water ditch and in the Barelas Ditch. However, carcinogenic PAHs are negligible in ditch samples. Naphthalene and 2-methylnaphthalene occur in a number of samples, but at concentrations of 1 mg/kg or less.

Dioxin and furan concentrations from soil samples were evaluated as an equivalent 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (2,3,7,8-TCDD) concentration, which is the most toxic congener of dioxins and furans. Only one sample had a detectable presence of 2,3,7,8-TCDD, with a concentration of 1.005 ng/kg. All other samples had only the less toxic congeners detected in them. The TCDD-TEQ concentrations for soil samples ranged from 1.19 ng/kg to 94.1 ng/kg. The elevated TCDD-TEQ concentrations were located in the wastewater reservoir area and the treatment process/drip track area. The sample with 2,3,7,8-TCDD was located in the wastewater reservoir area that had the removal action in 1999. As such, dioxin is not considered a COC at this Site.

DNAPL Contamination

A significant thickness of DNAPL has been measured in the DNAPL recovery wells. The DNAPL thickness, as recorded in 2000, ranged from 1.0 to 8.8 feet. The occurrence of DNAPL in wells in both of the Rio Grande Alluvial aquifers indicates the clay layer is discontinuous between the Shallow and Intermediate Aquifers. Well MW-19B is located in an area where a gap in the clay layer occurs. This gap indicates a pathway from the original source downward through the Shallow Aquifer to the Intermediate Aquifer. In contrast, MW-18A is located in an area where the clay is intact. The clay layer is also near the weighing station for the treated ties, which was a significant source of DNAPL. While DNAPL has been measured in MW-18A in the Shallow Aquifer, it has not appeared in MW-18B in the Intermediate Aquifer; hence, for the treatment plant and drip track areas, the clay has been a somewhat effective barrier to the downward migration of DNAPL. DNAPL is also observed in the sand layer of the Intermediate Aquifer beneath the wastewater reservoir. Figures 3, 4, and 5 show the location of the DNAPL in the three aquifers.

Shallow Aquifer

The contaminated ground water plume in the Shallow Aquifer has a maximum width of approximately 1,500 feet in the east-west direction and a maximum length of approximately 1,800 feet in the northeast-southwest direction. The existence of two plume centers is attributed to two different sources within the AOC: the wastewater reservoir and the wood treatment facility. Figure 6 shows the dissolved-phase contamination in the Shallow Aquifer.

During the 2000 ground water monitoring performed at the site, benzene was the only volatile organic compound (VOC) that exceeded the federal maximum contaminant level (MCL) and the New Mexico Water Quality Control Commission (NMWQCC) regulations. Benzene was detected in MW-3A at a concentration of 70.9 µg/L. VOC concentrations in other shallow wells were either not detected, or were below federal and state limits.

For semi-volatile organic constituents (SVOCs), benzo(a)pyrene, naphthalene and 2-methylnapthalene exceeded federal or state standards during the 2000 ground water monitoring event. Benzo(a)pyrene exceeded the standard in MW-12A, and the sum of naphthalene and 2-methylnapthalene exceeded the standard in MW-3A and MW-8A. SVOC concentrations in other shallow wells were either not detected, or were below federal and state limits.

Intermediate Aquifer

The contaminated ground water plume in the Intermediate Aquifer is an irregular elliptical shape with a "finger" of low concentration SVOCs extending west of the fenced boundary. The dimension of the plume, with the exception of the finger, has a maximum width of 1,300 feet in the east-west direction and a maximum length of 1,100 feet in the north-south direction. The two focal points of the plume is attributed to two different sources: the wastewater reservoir and the wood treatment facility. Figure 7 shows the dissolved phase contamination in the Intermediate Aquifer.

During the 2000 ground water monitoring, VOCs were not detected in excess of the federal and state MCLs in the Intermediate Aquifer. For SVOCs, naphthalene and 2-methylnapthalene exceeded federal or state standards.

Santa Fe Formation Aquifer

The estimated horizontal extent of contamination occurs mainly beneath the wastewater reservoir and the wood treatment area. Only the top of the Santa Fe Formation Aquifer is impacted. Figure 8 shows the dissolved contamination in the Santa Fe Aquifer.

During the 2000 ground water monitoring, VOCs were not detected in excess of the federal and state MCLs in the Santa Fe Aquifer. For SVOCs, naphthalene and 2-methylnaphthalene exceeded federal or state standards. The sum of naphthalene and 2-methylnaphthalene exceeded the standard in MW-26C. No SVOCs were detected in the Santa Fe Aquifer wells that are screened deeper than 100 feet below the ground surface. Samples collected from the upper part of the Santa Fe Aquifer indicate evidence of dissolved DNAPL constituents. Wells MW-25C, MW-26-C, MW-27C, MW-28CU and MW-29CU showed total SVOC concentrations from 0.413 µg/L to 679.35 µg/L.

5.4 Conceptual Site Model

The EPA has developed a site conceptual Site model based on information obtained during previous investigations and during the Remedial Investigation. This conceptual Site model represents the migration routes of contaminants from the various historical Site operations as they have migrated through the vadose zone into the ground water. As a result of the Site operations, there is contamination above the remediation goals in both the soil and ground water. In addition, DNAPL is also present in both the vadose zone as well as in the aquifer.

The removal action in 1999 removed the most highly contaminated material in the shallow subsurface in the WWR. As a result, the remaining contaminated soils are not considered a principal threat waste, but they are a low-level threat waste.

Human receptors could be exposed in the future to the contaminated shallow, intermediate and deep zone ground water by the ingestion, inhalation, and dermal contact exposure route through City of Albuquerque or private wells completed in the impacted ground water plume. However, no human receptors are currently being exposed because the municipal wells and private water wells are not impacted and are not currently contaminated.

6.0 Current and Anticipated Future Land and Ground Water Use

Future land use in the vicinity of the Site is expected to be similar to current land use, which is chiefly industrial, agricultural, and residential. To the immediate south and east of the site are agricultural fields and to the west, north, and northeast are industrial complexes. The agricultural fields are zoned for industrial use. There are small residential areas scattered to the northwest, southwest and south. The closest residential area is about 0.5 miles to the southwest and a single residence (mobile home) is located about 600 feet west of the site. This area is currently zoned as industrial. Two major residential areas are located about 2 miles north and 1.5 miles south of the site. Major population centers are located either west of the Rio Grande, north of Woodward Drive or east of Interstate 25.

The future land use for the Site after the remedial action is completed is anticipated to be a railroad switching yard and possible expansion of the intermodal facility for the unloading of automobiles from railcars. The land will be used for industrial purposes.

Contaminated ground water at the Site is not currently used as a drinking water supply. However, the ground water in the Santa Fe Formation is presently the only source of drinking water for the City of Albuquerque. There are no municipal supply wells or private drinking water wells located within the current boundaries of the Site, but there are six municipal supply wells located within two miles of the Site. The closest private water well is located 400 feet west (up-gradient) of the Site.

Future use of the Site ground water may involve drinking water use to meet supply demand as the City of Albuquerque and the surrounding area continue to grow. In addition, because private and municipal supply wells are located directly down-gradient of the Site contamination, unaddressed migration of the ground water contaminant plume might impact drinking water wells in the future.

7.0 Principal and Low-Level Threat Wastes

The National Contingency Plan (NCP) (40 CFR Part 300) establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). The principal threat concept is applied to the characterization of source materials at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct exposure. Contaminated ground water is generally not considered to be a source material; however, DNAPLs in ground water are viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the remedy selection criteria. The EPA expects that treatment will be the preferred means to address the principal threats posed by a site, wherever practicable. Low-level threat wastes are those source materials that generally can be reliably contained and that contain contaminant concentrations not greatly above the acceptable levels. Examples of low-level threat wastes include non-mobile contaminated source material of low toxicity and low concentrations of low toxicity source material. Principal threat and low-level threat wastes associated with the Site are as follows:

Principal Threats:

DNAPL

The EPA considers the creosote DNAPL at the Site to be a principal threat waste because contaminant concentrations are substantially above concentration levels that pose an unacceptable risk to human health. In addition, the DNAPL will continue to be a source of ground water contamination unless it is removed or immobilized. The DNAPL creosote is in the soil and ground water at depths down to 65 feet. The DNAPL has just reached the very top of the Santa Fe Formation Aquifer. The Santa Fe Formation Aquifer is the only source of drinking water supply for the City of Albuquerque. It should be noted that the DNAPL contamination has not yet reached any of the municipal supply wells or private water wells. However, there is the possibility, that if unaddressed, contamination from the Site may reach municipal supply wells for the City of Albuquerque and private water wells.

Low-Level Threats:

Ground water

The EPA considers the VOCs and SVOCs (including benzene, benzo(a)pyrene, naphthalene and 2-methylnapthalene, and Benzo(a)pyrene) in ground water at the Site to be a low level, but significant threat waste because contaminant concentrations are above concentration levels that pose an unacceptable risk to human health, if humans were exposed to the ground water. The contamination is in an aquifer that is the only source of drinking water supply for the City of Albuquerque. It should be noted that the contamination has not yet reached any of the municipal supply wells or private water wells. However, there is the possibility, that if unaddressed, contamination from the Site may reach municipal supply wells for the City of Albuquerque and private water wells.

Soil

Based on the information that the EPA has, VOCs and SVOCs in soils at the Site are not a principal threat because concentrations of these COCs in the soil are not high (several orders of magnitude above levels that allow for unrestricted soil use and unlimited exposure) and because the toxicity is low. However, this material is a low-level threat, because the concentrations in the soil are high enough to potentially contaminate ground water through leaching. This could lead to ground water contamination that exceeds MCLs.

8.0 Summary of Site Risks

8.1 Contaminants of Concern

The following constituents are considered to be COCs at the Site:

Constituent	Ground Water COC	Soil COC
Zinc		✓
Benzene	✓	
Benz(a)anthracene	✓	✓
Benz(a)pyrene	✓	✓
Benzo(b)fluoranthene	✓	✓
Benzo(k)fluoranthene	✓	✓
Bis(2-ethylhexyl) phthalate	✓	
Carbazole	✓	
Chrysene	✓	
Dibenz(a,h)anthracene	✓	✓
Dibenzofuran	✓	✓
Indeno(1,2,3-c,d)pyrene	✓	✓
2-Methylnaphthalene	✓	✓
Naphthalene	✓	✓
BAP Equivalent	✓	✓

These COCs are chemicals that pose a carcinogenic risk to human health greater than 1 in 1,000,000 ($1x10^{-6}$), have a noncarcinogenic hazard index (HI) greater than (>)1, or are found in Site ground water at concentrations that exceed MCLs. These COCs have been encountered at the Site in elevated concentrations. Specific constituent concentrations for each COC is provided in the RI Report.

8.2 Potentially Exposed Populations

The Baseline Risk Assessment identified primary contaminant sources, contaminant release mechanisms, exposure pathways, and receptors for the COCs. The potentially exposed individuals evaluated were based on current and potential future land use and most probable current and future activities at the site. During the risk assessment process, it was determined that an industrial on-site exposure scenario would be utilized, and a residential off-site exposure scenario would be used.

Potentially exposed individuals and their associated **soil** exposure pathways include:

- Current off-site resident adult and child exposed to soil via inhalation, dermal contact and ingestion;
- Future off-site resident adult and child exposed to soil via inhalation, dermal contact, and ingestion;
- Current on-site workers exposed to the soil via inhalation, ingestion, and dermal contact;
- Future on-site workers exposed to the soil via inhalation, ingestion, and dermal contact; and
- Future on-site excavation/utility workers exposed to the soil via inhalation and dermal contact.

Potentially exposed individuals and their associated **ground water** exposure pathways include:

- Future off-site resident adult and child exposed to ground water via inhalation, ingestion and dermal contact; and
- Future on-site workers exposed to the ground water via inhalation, ingestion and dermal contact.

8.3 Toxicity Assessment

Site contaminants were assessed for carcinogenicity and for non-carcinogenic systemic toxicity. Table 2 summarizes the Site cancer toxicity data. Non-cancer toxicity data for the Site COCs is presented in Table 3.

Site contaminants were assessed for carcinogenicity and for non-carcinogenic systemic toxicity. For carcinogens, risks are expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

Risk = CDI x SF

where:
risk = a unitless probability (e.g., 2×10^{-5}) of an individual's developing cancer
CDI = Chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor (cancer potency factor), expressed as $(\text{mg/kg-day})^{-1}$.

These risks are probabilities that usually are expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer of 1×10^{-6} indicates that an individual has a 1 in a 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual's developing cancer from all other causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site-related exposures is 10^{-4} to 10^{-6}.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ less than 1 indicates that an individual's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect that same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI less than 1 indicates that, based on the sum of all HQ's from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. An HI greater than 1 indicates that site-related exposures may present a risk to human health.

he HQ is calculated as follows:

$$\text{Non-cancer HQ} = \text{CDI}/\text{RfD}$$

where:

CDI = Chronic daily intake
RfD = Reference dose.

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

8.4 Human Health Risk Characterization

Risk estimates were calculated for future land use scenarios for hypothetical human receptors at the Site. Cancer risks were estimated as the probability of an individual developing cancer over a lifetime as a result of exposure to the Site's carcinogenic contaminants. Toxicity risk estimates for noncarcinogenic toxic chemicals are presented for COCs. The potential for noncarcinogenic hazards due to potential exposures to chemicals was evaluated by calculating an HI for the COCs at the Site. The Baseline Risk Assessment shows the detailed calculation of risk.

The Baseline Risk Assessment organized the types of risk at the Site according to various exposure scenarios. Each exposure scenario specifies the type of human receptor (e.g., child resident, adult industrial worker), the exposure pathway (e.g., inhalation, ingestion) and the COC. If a contaminant or exposure scenario is found to produce a risk which will require a remedial action (based on either the carcinogenic risk or the HI) that contaminant or exposure scenario is said to "drive the risk" or "drive" the need for action. A remediation goal is set for site-related contaminants that drive risk. The following exposure scenarios are driving the need for action at the Site (all risks are based on Reasonable Maximum Exposure or RME).

Current Off-Site Resident (Adult and Child)

Soil

- **Cancer Risk:** The estimated overall cancer risk exceeded the target of $1x10^{-6}$. The risk for the child was the highest for the current resident scenario, with a total risk of $3x10^{-6}$.

- **Non-Cancer Risk:** The estimated overall non-cancer HI exceeded the target of 1. The adult scenario had the highest HI of 7. The individual pathway with the highest risk was inhalation of volatiles, and the constituent driving the risk was naphthalene.

Future Off-Site Resident (Adult and Child)

Soil

- **Cancer Risk:** The estimated overall cancer risk exceeded the target of $1x10^{-6}$. The risk for the child was the highest for the future resident scenario, with a total risk of $4.3x10^{-5}$. The pathways exceeding the target risk were ingestion ($1.2x10^{-5}$) and dermal contact ($1.7x10^{-5}$) with soils and inhalation of volatiles ($3x10^{-6}$). The constituents driving the ingestion pathway risk were benz(a)anthracene, and benzo(b)fluoranthene. The constituents driving the dermal contact pathway were benz(a)anthracene, benzo(b)fluoranthene, and dibenz(a,h)anthracene.

- **Non-Cancer Risk:** The estimated overall non-cancer HI exceeded the target of 1. The adult scenario had the highest HI of 7. The individual pathway with the highest risk was the inhalation of volatiles and the constituent driving the risk was naphthalene.

Shallow Aquifer

- **Cancer Risk:** The estimated overall cancer risk exceeded the cancer target of $1x10^{-6}$. The risk for the adult was the highest for the future resident scenario, with a total risk of $2x10^{-4}$ The pathways exceeding the target cancer risk were ingestion ($1.8x10^{-4}$) and dermal ($1.1x10^{-5}$). The constituents driving the ingestion pathway were benzo(a)anthracene, benzo(a)pyrene and benzo(b)fluoranthene. The constituent driving the dermal pathway was benzo(a)anthracene.

- **Non-Cancer Risk:** The estimated overall non-cancer HI exceeded the target of 1. The risk for the child was the highest for the future resident scenario, with a HI of 4. The pathways exceeding the target HI were ingestion (2.7) and inhalation (2). The constituent driving the inhalation HI was dibenzofuran.

Intermediate Aquifer

- **Cancer Risk:** The estimated overall cancer risk exceeded the cancer target of $1x10^{-6}$ The risk for the adult was the highest for the future resident scenario, with a total risk of $6x10^{-6}$. The pathway exceeding the target cancer risk was ingestion with a risk of $5x10^{-6}$. The constituents driving the risk in the ingestion pathway were benzo(b)fluoranthene and carbazole.

- **Non-Cancer Risk:** The estimated overall non-cancer HI exceeded the target of 1. The risk for the child was the highest for the future resident scenario, with a HI of 17. The pathways exceeding the target HI were ingestion (3.5) and inhalation (13). The constituent driving the inhalation HI were dibenzofuran and napthalene.

Santa Fe Formation Aquifer

- **Cancer Risk:** The estimated overall cancer risk did not exceed the cancer target of $1x10^{-6}$. Additionally, the individual pathways of ingestion, inhalation, and dermal contact did not exceed the target risk.

- **Non-Cancer Risk:** The estimated overall non-cancer HI exceeded the target of 1. The risk for the child was the highest for the future resident scenario, with a HI of 2. The pathway exceeding the target HI was inhalation (2). The constituent driving the inhalation HI was napthalene.

Future On-Site Commercial/Industrial Worker

Soil

- **Cancer Risk:** The estimated cancer risk exceeded the target of $1x10^{-6}$ with a total risk of $5x10^{-3}$. The pathways exceeding the target risk were ingestion ($1.29x10^{-3}$) and dermal contact ($4.8x10^{-3}$) with soils. The constituents driving both the ingestion and dermal contact pathway risks were benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

- **Non-Cancer Risk:** The overall non-cancer risk exceeded the target HI of 1 with a total risk of 4. While none of the individual pathways exceeded the target risk, the ingestion and dermal contact with soil pathways and the inhalation pathway contributed most to the overall risk. For both ingestion and dermal contact, the constituents that drive the HI were dibenzofuran, 2-methylnaphthalene, naphthalene, and phenanthrene. For inhalation of volatiles, the constituents that drive the HI were dibenzofuran, 2-methylnaphthalene, and naphthalene.

Shallow Aquifer

- **Cancer Risk:** The estimated overall cancer risk exceeded the cancer target of $1x10^{-6}$ with a total risk of $2x10^{-4}$. The pathways exceeding the target cancer risk was ingestion ($1.22x10^{-4}$), inhalation ($5x10^{-5}$) and dermal ($1.5x10^{-5}$). The constituents driving the ingestion risk were benzene, bis(2-ethylhexyl)phthalate and carbazole. The constituent driving the inhalation risk was benzene. The constituents driving the dermal risk were benzene, bis(2-ethylhexyl)phthalate and carbazole.

- **Non-Cancer Risk:** The estimated overall non-cancer HI exceeded the target of 1 with a total HI of 372. The pathways exceeding the target HI were ingestion (6.9), inhalation (363) and dermal (2.6). The constituent driving the ingestion HI was naphthalene. The constituents driving the inhalation HI were dibenzofuran, 2-methyl naphthalene and naphthalene. The constituent driving the dermal HI was naphthalene.

Intermediate Aquifer

- **Cancer Risk:** The estimated overall cancer risk exceeded the cancer target of 1×10^{-6} with a total risk of 1.2×10^{-3}. The pathways exceeding the target cancer risk was ingestion (9.76×10^{-3}), inhalation (3×10^{-5}) and dermal (1.6×10^{-3}). The constituents driving the ingestion risk were benzo(a)anthracene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene and benzo(b)fluoranthene. The constituent driving the inhalation risk was benzene. The constituents driving the dermal risk were benzo(a)anthracene, benzo(a)pyrene, dibenz(a,h)anthracene and benzo(b)fluoranthene.

- **Non-Cancer Risk:** The estimated overall non-cancer HI exceeded the target of 1 with a total HI of 423. The pathways exceeding the target HI were ingestion (9), inhalation (410) and dermal (9). The constituents driving the ingestion, inhalation, and dermal HIs were dibenzofuran, 2-methylnaphthalene and naphthalene.

Santa Fe Aquifer

- **Cancer Risk:** The estimated overall cancer risk exceeded the cancer target of 1×10^{-6} with a total risk of 2×10^{-6}. The pathway exceeding the target cancer risk was ingestion (2×10^{-6}). The constituent driving the ingestion risk was carbazole.

- **Non-Cancer Risk:** The estimated overall non-cancer HI exceeded the target of 1 with a total HI of 24. The pathway exceeding the target HI was inhalation (6). The constituents driving the inhalation HI were 2-methylnaphthalene and naphthalene.

Future On-Site Utility/Construction Worker

Soil

- **Cancer Risk:** The estimated cancer risk exceeded the target of 1×10^{-6} with a total risk of 4×10^{-4} The pathways exceeding the target risk were ingestion (2×10^{-4}) and dermal contact (2×10^{-4}) with soils. The constituents driving both the ingestion and dermal contact pathway risks were benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

- **Non-Cancer Risk:** The overall non-cancer risk exceeded the target HI of 1 with a total risk of 4. While none of the individual pathways exceeded the target risk, the ingestion and dermal contact with soil pathways and the inhalation pathway contributed most to the overall risk. For both ingestion and dermal contact, the constituents that drive the HI were dibenzofuran, 2-methylnaphthalene,

naphthalene, and phenanthrene. For inhalation of volatiles, the constituents that drive the HI were dibenzofuran, 2-methylnaphthalene, and naphthalene.

8.5 Ecological Risk Characterization

An ecological risk assessment (ERA) was conducted based on the results of a screening ERA and surface soil and biota tissue sampling results collected from the site. Important ecological receptors at the site included soil vertebrates, avian and mammalian herbivores, insectivores/omnivores, and carnivores. To support the ERA, a defined surface soil sampling program was conducted to secure the required data. Pathways for the receptors are ingestion of contaminants detected in surface soils and ingestion of vegetation, invertebrates, and small mammals that are in contact with the surface soils at the site.

Key outputs of the risk characterization step are contaminant concentrations in each environmental medium that bound the threshold for estimated adverse ecological effects given the uncertainty inherent in the data and models used. The lower bound of the threshold would be based on consistent conservative assumptions and No Observed Adverse Effect Level (NOAEL) toxicity values. The upper bound would be based on observed impacts or predictions that ecological impacts could occur. This upper bound would be developed using consistent assumptions, site-specific data, Low Observed Adverse Effect Level (LOAEL) toxicity values, or an impact evaluation.

Mean and maximum exposure doses to soil invertebrates and six indicator species were estimated based on models previously developed in the screening ecological risk assessment and surface soil sampling data. The selected indicator species include: (1) prairie vole (mammalian herbivore); (2) Canada goose (avian herbivore); (3) short-tailed shrew (mammalian insectivore/omnivore); (4) American robin (avian omnivore); (5) red fox (mammalian carnivore); and (6) red-tailed hawk (avian carnivore). NOAEL and LOAEL chronic toxicity reference values for avian and mammalian receptors were derived from the literature and compared with the mean and maximum estimated exposure doses received by the selected indicator species.

The maximum estimated exposure dose received by the prairie vole, Canada goose, red fox and red-tailed hawk are less than their respective chronic NOAEL toxicity values. It is unlikely that these indicator species are at risk from detected concentrations of contaminants at the site.

The estimated maximum polycyclic aromatic hydrocarbons (PAH) exposure doses (both low and high molecular weight PAHs) received by the short-tailed shrew exceed chronic NOAEL benchmarks, but are less than the chronic LOAEL benchmarks. PAH exposure to the shrew is primarily from the ingestion of contaminated surface soils. Because the estimated PAH exposure doses exceed the chronic NOAEL toxicity value, the shrew is potentially at risk from the detected concentrations of PAHs in the surface soils of the site. However, there is considerable uncertainty in this potential risk as the chronic NOAEL was derived by reducing the LOAEL by an order of magnitude.

Estimated mean and maximum exposure doses of zinc received by the American robin exceed chronic NOAEL and LOAEL toxicity values. The mean exposure dose of the robin is approximately two times greater than its LOAEL toxicity value that is associated with a reduction in egg hatchability. Therefore, there is a potential for detected zinc concentrations within site invertebrates and vegetation to result in adverse effects to avian insectivores/omnivores.

8.6 Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA, as amended by 42 U.S.C § 9621(d) requires, at the completion of the remedial action, a level or standard of control for a pollutant that at least attains the applicable or relevant and appropriate standard, requirement, or limitation. ARARs are derived from both federal and state environmental laws and may include regulations, standards, criteria, or limitations promulgated under federal or state laws. RCRA, the Clean Water Act, the Safe Drinking Water Act, the Clean Air Act, and their associated regulations are examples of federal laws from which ARARs may be derived. State standards that may constitute ARARs are those laws that are promulgated, substantive in nature, more stringent than federal requirements, consistently applied, and identified by the state in a timely manner. Table 6 summarizes the ARARs for this Site.

ARARs may be "applicable" or "relevant and appropriate" but not both. The NCP defines "applicable" and "relevant and appropriate" as follows:

- Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.

- Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, addresses the problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than the federal requirements may be relevant and applicable.

In addition to the legally binding requirements established as ARARs, many federal and state programs have developed criteria, advisories, guidelines, or proposed "to be considered" (TBC) standards. TBC material may provide useful information or recommend procedures if no ARAR addresses a particular situation. In such situations, TBC criteria or guidelines should be used to set remedial action levels. TBC criteria are not legally binding and do not have the status of ARARs.

Preliminary identification of ARARs involves considering site-specific factors such as potential remedial actions, compounds at the site, physical characteristics of the site, and the site location. A requirement is applicable if it specifically addresses or regulates the hazardous substance, pollutant, contaminant, action being taken, or other circumstances at the site.

Determining whether the requirements of an environmental statue constitute ARARs involves a two-step process. First, the applicability of a given requirement must be determined. If the requirement is not applicable, then the relevancy and appropriateness of the requirement must be determined. To determine the relevancy and appropriateness of a requirement, one evaluates the requirement's (1) capacity to regulate or address problems sufficiently similar to those encountered at the CERCLA site and (2) appropriateness to the circumstances of the release (well suited to the particular site). Determination of a requirement's relevancy and appropriateness is site-specific and must be based on best professional judgment. A requirement may be relevant but not appropriate for the specific site. Compliance is necessary only with those requirements that are determined to be both relevant and appropriate. Portions of a requirement may be relevant and appropriate, even if a requirement in its entirety is not.

Under certain circumstances, an ARAR may be waived, provided that human health and the environment are protected. However, these waivers apply only to meeting ARARs with respect to remedial actions on-site. Other promulgated requirements, for example, the NCP requirement that remedies be protective of human health and the environment, cannot be waived. CERCLA Section 121 permits a remedial action that does not attain a level of control at least equivalent to an ARAR to be selected if the following apply:

- The remedial action selected is only part of a total remedial action that will attain such level or standard of control when completed.
- Compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options.
- Compliance with such requirements is technically impracticable from an engineering perspective.
- The remedial action selected will attain a standard of permanence that is equivalent to that required under the otherwise applicable standard, requirement, or limitation through the use of another method or approach.
- With respect to a State standard, requirement, criteria, or limitation, the State has not consistently applied (or demonstrated its intention to consistently apply) the standard, requirement, criteria, or limitation in similar circumstances at other remedial actions within the State.

The determination of ARARs and TBC criteria for the Site was made in accordance with CERCLA Section 121(d), the NCP, and EPA's two-part CERCLA Compliance with Other Laws document during the FS. The determination of ARARs and TBC criteria also involved a comprehensive review of federal, state, and local statutes, regulations, and guidance documents to identify cleanup standards, location restrictions, and remedial-action-related requirements that could be applicable or relevant and appropriate to on- or off-site response actions.

ARARs identified for remedial actions are based on anticipated chemicals present, site location, and possible remedial actions for the site. The following sections present the action-specific, location-specific, and chemical-specific federal and state ARARs that may be applicable to the Site.

8.6.1 Action-Specific ARARs

Action-specific ARARs are typically technology- or activity-based requirements applicable to actions involving special categories of wastes. Action-specific requirements are usually triggered by certain remedial activities that may be a component of the overall remediation strategy. Action-specific requirements do not in themselves determine the site-specific remedial actions; rather, they indicate the way in which a selected alternative must be achieved.

Solid Waste Requirements

Pursuant to section 4001 and 4003 of RCRA, as amended, 42 U.S.C. §§6941, 6943, and 40 CFR Part 239, the State of New Mexico operates an approved solid waste management plan under the New Mexico Solid Waste Act, N.M. Stat. Ann. §74-9-1, *et seq.* This plan regulates materials, such as nonhazardous contaminated waste soil and debris, generated at the site through industrial activities. The regulations under the plan are set forth in the New Mexico Administrative Code (NMAC), at 20 NMAC 9.1, pursuant to applicable requirements of RCRA Subtitles D and C. These regulations require that persons generating, collecting, transporting, storing, processing, and disposing of solid waste comply with the notification and permitting requirements for facilities and landfills under 20 NMAC 4.1 (See also "Hazardous Waste Requirements" below). This rule specifies the reporting, notification, waste testing, waste code assignment, waste accumulation, and transporter requirements with which all generators of industrial solid waste must comply.

Hazardous Waste Requirements

Subtitle C of RCRA, 42 U.S.C. §6901, *et seq.*, allows any state to administer and enforce a hazardous waste program, if that plan has been authorized by the EPA Administrator. New Mexico operates an EPA authorized RCRA hazardous waste program under the New Mexico Hazardous Waste Act, N.M. Stat. Ann. §74-4-1, *et seq.* Under 20 NMAC 4.1, state rules and regulations for a hazardous waste management system were established by the NMED in order to implement the RCRA program. Generators of hazardous waste in New Mexico must comply with the rules set forth in 20 NMAC 4.1.200 and 20 NMAC 4.1.300, which adopt by reference parallel provisions of RCRA at 40 CFR 261, 262, and 263. These regulations establish the requirements for hazardous waste determination, generator identification, waste manifests and shipments, transport activities, and generator housekeeping and reporting activities, among other things. In addition, New Mexico implements hazardous waste regulations dealing with treatment, storage, and disposal of hazardous waste, as well as permitting and permit program approval, found at 40 CFR 264, 265, 266, 267, 268, 270, and 272. The Hazardous and Solid Waste Amendments of 1984 (HSWA), P.L. 98-616 (1984), expanded the scope of RCRA by adding new corrective action requirements and technical requirements. The HSWA also included regulatory restrictions on the land disposal (LDR) of certain listed hazardous wastes after certain specified dates. These potentially include contaminated soil and debris that has been disposed at the Site and identified as a principal threat waste and constituent compounds under the selected remedial action in this ROD. The LDRs are found in 40 CFR Part 268 and the Appendices thereto. Although the Part 265 requirements would appear to be inapplicable to the Site, the remainder of these provisions must be considered as potential ARARs. See Table 6 for further information.

Air Quality Requirements

Under the provisions of the federal Clean Air Act (CAA), 42 U.S.C. §7401 et seq., and the New Mexico Air Qaulity Control Act (NMAQCA), N.M. Stat. Ann. §74-2-1, Bernalillo County, New Mexico has promulgated and the EPA has approved a State Implementation Plan (SIP) effective for the County, pursuant to section 110 of the Clean Air Act, 42 U.S.C. §7410. That SIP is published by the State of New Mexico as 20 NMAC Ch. 11, and it regulates air emissions for stationary and mobile sources in Bernalillo County. In addition, the County has delegated authority from EPA to enforce Clean Air Act New Source Performance Standards (NSPS) at 42 U.S.C. §7411 and 40 CFR Part 60, and CAA regulatory requirements over stationary sources emitting hazardous air pollutants at 42 U.S.C. §7412 and 40 CFR Parts 61 and 63.

Among other things, remedial actions resulting in the generation of airborne particulate matter from the excavation of contaminated soil, earth moving, and regarding must be evaluated by the SIP requirements at 20 NMED 11.20. These regulations call for the control of fugitive emissions by taking measures to prevent particulate matter and suspended particulate matter from becoming airborne. In addition, activities conducted may be required to meet the requirements of the SIP provisions at 20 NMAC 11.65, and of the NSPS, Subpart Kb, at 40 CFR 60.110b, which provide for controls related to emissions of volatile organic compounds (VOCs), during contaminated soil and groundwater treatment. Potential ARARs will be further evaluated during the Site remedial design phase. See Table 6 of this ROD for further information on Site ARARs.

Water Quality Requirements

Under the federal Clean Water Act (CWA), as amended, 33 U.S.C. § 1251, *et seq.*, and the New Mexico Water Quality Act (NMWQA), N.M. Stat. Ann. §74-6-1, *et seq.*, the State of New Mexico has adopted water quality standards designed to protect beneficial uses of each water body and to designate uses for each water body. For remedial actions at the Site involving the construction and excavation of contaminated soil and treatment of contaminated groundwater, engineering controls designed to prevent discharges that may affect the water quality of nearby surface waters must be implemented. Under the NMWQA, New Mexico has established at 20 NMAC 6.2 , requirements and procedures for permitting, enforcement, monitoring and surveillance, and spill control activities, in accordance with the New Mexico Ground and Surface Water Protection regulations.

An EPA issued CWA National Pollutant Discharge Elimination System (NPDES) permit is required for any activity that results in the discharge of any pollutant into the waters of New Mexico that is within the scope of coverage of the NPDES permit program, in accordance 40 CFR Parts 122-125, and 20 NMAC 6.2.2000. Any Site construction activity, including grading, clearing, excavation, or other earth moving process may require an NPDES storm water permit for construction under the NPDES Storm Water Program. Any construction activity that disturbs an area greater than 5 acres must comply with the NPDES Storm Water Discharge Regulations (40 CFR 122.26, July 1, 1998), and Region 6 Storm Water Construction Permit (63 Fed. Reg. 36490, July 6, 1998). Surface water discharges will comply with the NPDES Storm Water Discharge Regulations and NMED surface water quality regulations as designated in 20 NMAC 6.4.

Worker Safety Requirements

Employers are required to comply with all applicable occupational safety and health standards promulgated under Section 5 of the Occupational Safety and Health Act. The requirements include the Occupational Safety and Health Administration (OSHA) standards under 29 CFR 1910.120 that were developed to maintain the health and safety of employees involved in hazardous waste operations or hazardous waste operations and emergency response. These standards are applicable to employees engaged in cleanup activities at designated CERCLA sites regulated under 40 CFR 264, Subpart G. Because remediation activities at the site (excavation and construction) may involve the potential for workers to be exposed to hazardous working conditions that may include toxic and hazardous substances and hazardous wastes, any on-site remedial actions must be performed in accordance with applicable OSHA standards.

8.6.2 Location Specific ARARs

The Endangered Species Act, the National Historic Preservation Act, and the Archaeological and Historic Preservation Act are also potential ARARs at the site. Based on the available information, the Site is not located in an area affected by these acts.

8.6.3 Chemical Specific ARARs

Chemical specific ARARs are usually health or risk-based numerical values or methodologies, that, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to the environment. Potential exposure pathways for contamination include air, soil, and groundwater.

The following chemical specific ARARs have been identified:

- EPA Region 6's *Human Health Medium-Specific Screening Levels* (EPA, 2000). Risk-based screening levels provided in this document are based on default exposure parameters for residential and industrial scenarios. Screening levels are based on a cancer risk of 1E-6 and a non-cancer hazard quotient of 1. These values are potential criteria for guiding remediation at the site.

- NMED Hazardous Waste Bureau and Ground Water Quality Bureau's Voluntary Remediation Program's *Technical Background Document for Development of Soil Screening Levels*. The soil screening levels (SSLs) provided in this document are based on default exposure parameters for residential, industrial, and construction worker scenarios. All SSLs are based on a carcinogenic risk of 1E-05 and a non-carcinogenic hazard quotient of 1. These values are potential criteria for guiding remediation at the site.

- OSHA Permissible Exposure Limits (PELs). These values are potential ARARs for evaluating occupational exposure to airborne contaminants in the work place. They are typically expressed as time-weighted average (TWA) concentrations that must not be exceeded during any 8-hour shift of a 40-hour work week. PELs would be applicable to site workers during implementation of potential response actions.

- National Institute for Occupational Safety and Health recommended exposure levels (REL) and short-term exposure limits (STEL). These values are similar to OSHA PELs in that they provide guidance in worker exposure to airborne contaminants; however, unlike PELs, they are not legally enforceable. They are criteria for air emissions. RELs are expressed as TWA concentrations for up to a 10-hour work day during a 40-hour work week. A STEL is a 15-minute TWA exposure that should not be exceeded at any time during a work day.

8.7 Basis for Action

The Selected Remedy identified in this Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

9.0 Remedial Action Objectives and Goals

9.1 Remedial Action Objectives

Under the provisions of the National Contingency Plan (NCP) (40 CFR Part 300), the lead agency involved in a Remedial Action (in this case, the lead agency is the EPA) is required to establish remedial action objectives (RAOs) for protecting human health and the environment. The RAOs specify the contaminants and media of concern, potential exposure pathways, and preliminary remediation goals (NCP, 1990). Remediation goals are concentrations of contaminants for each exposure route that are protective of human health and the environment.

RAOs provide a general description of what the cleanup will accomplish. These goals typically serve as the design basis for many of the remedial alternatives that are presented in the next section. RAOs provide a basis for evaluating the cleanup options for the site and understanding how the risks identified in the previous section will be addressed by the response action.

RAOs are "medium-specific (for example, ground water or soil) or operable unit specific goals for protecting human health and the environment." Typically, for wood treater sites, RAOs should be developed that will minimize the further release of contaminants from the soil, limit further spreading of subsurface DNAPL to off-site media, and reduce the quantity of source material present in the DNAPL zone. To accomplish these objectives, EPA recommends the use of treatment technologies to control principal threats and containment technologies to control low-level threats.

The RAOs for **ground water** are:

- Prevent human ingestion, inhalation, or dermal contact with ground water that contain Site related COCs at concentrations which exceed the corresponding Maximum Contaminant Level Goals (MCLGs) established under the Safe Drinking Water Act (SDWA). This applies for COCs that have MCLGs 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 (ARARs) in the receiving surface water body.

The RAOs for **soil** are:

- Prevent the ground water from being impacted above MCLs 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 on-site 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 on-site contamination.

9.2 Basis for Selection of Remediation Goals

A Remediation Goal is the allowable concentration of a contaminant which may remain in a specific medium (such as soil or ground water) at a site after implementation of the ROD through the Remedial Action. For the Site ground water COCs, the remediation goal is set at the ARARs, which are the MCLGs and MCLs as per Section 300.400(g)(2) of 40 CFR. Therefore the remediation goals for the Site COCs in ground water are:

Constituent of Concern	Ground Water Remediation Goal
Benzene	5.0 µg/l (MCL)
Benz(a)anthracene	0.1 µg/l
Benz(a)pyrene	0.2 µg/l (MCL)
Benzo(b)fluoranthene	0.2 µg/l
Benzo(k)fluoranthene	0.2 µg/l
Bis(2-ethylhexyl) phthalate	6.0 µg/l (MCL)
Carbazole	0.0031 µg/l

Constituent of Concern	Ground Water Remediation Goal
Chrysene	0.2 µg/l
Dibenz(a,h)anthracene	0.3 µg/l
Dibenzofuran	15 µg/l
Indeno(1,2,3-c,d)pyrene	0.4 µg/l
Total Naphthalene	30 µg/l
Total Semi-Volatiles	82.6 µg/l
BAP Equivalent	0.572 µg/l

Where no ARARs exist or where ARARs may not be sufficiently protective, the NCP prescribes methods for selection of remediation goals. Since there are no chemical-specific ARARs for Site soils, remediation goals for soil were selected based on guidance documents outlining scientific methods to determine protective goals. The remediation goals for soil are set at a level such that, if remediation goals are met, ground water cannot become impacted above the MCLs for these compounds through contaminant migration from soils. The remediation goals for the soil will reduce potential human health risk levels from soil exposure at the Site. These soil remediation goals are protective of both human health and the environment In addition, if the remediation goals are met, ecological receptors will not be adversely impacted by on-site contamination. The remediation goals for the Site COCs in soil are:

Constituent of Concern	Soil Remediation Goal
Zinc	200 mg/kg
BAP Equivalent	7.8 mg/kg

9.3 How the RAOs Address Risk

RAOs will address risks 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.

10.0 Description of Remedial Alternatives

This section summarizes the most comprehensive remedial alternatives for both the soil and the ground water developed during the Feasibility Study, plus the no-action alternative for each medium. These alternatives, along with other alternatives that are deemed less comprehensive, are analyzed in more detail in the Feasibility Study, which is part of the Administrative Record file.

Soil Remedies:

- **Alternative S-1** - *No Further Action Alternative*
- **Alternative S-2** - *Excavation and on-site disposal*
- **Alternative S-3** - *Excavation, solidification/stabilization, on-site disposal, and capping*
- **Alternative S-4** - *Excavation, soil washing, and on-site disposal*
- **Alternative S-5** - *Excavation and bioremediation*
- **Alternative S-6** - *Excavation and off-site incineration*
- **Alternative S-7** - *In-situ solidification/stabilization*
- **Alternative S-8** - *In-situ solidification/stabilization and run-off/run-on management*

Ground Water Remedies:

- **Alternative GW-1** - *No Action*
- **Alternative GW-2** - *UV-oxidation treatment, filtration, carbon adsorption and disposal of ground water*
- **Alternative GW-3** - *Biological treatment (fluidized GAC bed), clarification, filtration and disposal of ground water*
- **Alternative GW-4** - *Filtration, clay adsorption, carbon adsorption and disposal of ground water*
- **Alternative GW-5** - *Steam flushing*
- **Alternative GW-6** - *Co-solvent/alcohol flooding*
- **Alternative GW-7** - *In-situ Oxidation*

The FS describes a total of nine ground water alternatives and nine soil alternatives. The Proposed Plan and this ROD details the seven most comprehensive soil alternatives, and six most comprehensive ground water alternatives, plus the no-action alternative for each medium. The alternatives that were carried through to the proposed plan were deemed to be the best candidates for remediating the Site. In addition, the presumptive remedy approach was incorporated into the overall RI/FS process.

EPA began developing the concept of presumptive remedies in 1990 as a method for accelerating the remedial process at certain types of waste sites, including wood treaters. The presumptive remedy approach limits the number of candidate technologies for the remediation of soils, sediments, and sludges, thereby expediting the FS process.

In addition to the evaluation of wood treater presumptive remedies, presumptive response strategy and treatment technologies established for contaminated ground water at CERCLA sites for DNAPL and affected ground water have also been evaluated in accordance with EPA guidance. The presumptive responses strategy for sites containing DNAPL considers containment, source control, and reduction to the extent practicable. The presumptive ground water remedies must also restore ground water to its beneficial use wherever practicable.

10.1 Common Elements of Remedial Alternatives

Each of the remedial alternatives (other than Alternatives S-1 and GW-1; No Action) evaluated as part of the detailed analysis have certain assumptions and aspects in common. These are called the common elements. The common elements used in the FS are as follows:

- All costs were based on completion of the remedial action, or a maximum 30-year project lifetime.
- All costs have a degree of accuracy of +50% to -30% pursuant to the "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA - Interim Final" OSWER Directive 9355.3-01 (October 1988) insofar as it is consistent with the NCP.
- All costs and implementation times are estimates which should be used as a basis for a comparative analysis of the alternatives only, and not as a determination of absolute costs which will be expended during the project. These costs will be refined in the Remedial Design Work Plan.
- Tables 4 and 5 show detailed cost estimate summaries for the selected soil and ground water remedies. The cost summary is based on the construction and annual O&M activities anticipated to implement the major components of the Selected Remedy. A 7% discount factor was used to derive these tables. The information in these cost estimate summary tables is based on the best available information regarding the anticipated scope of the project.
- Net present value (also called present worth) costs are presented in this ROD so that the remedial action alternatives which may have costs incurred in different time periods can be compared on the basis of a single cost figure for each alternative. Also, although some alternatives may take over 30 years to achieve clean-up, a maximum cost period of 30 years is used for comparison purposes. Net present value cost, or present worth, is the amount of money that would have to be set aside at the inception of the response action in order to assure that funds will be available in the future to complete a given response action, assuming certain economic factors such as an interest rate and an inflation rate. The capital costs for the project are the costs necessary to design and build the remedial action. Capital costs do not include annual O&M costs.
- Under the NCP, if a Remedial Action is selected that results in hazardous substances, pollutants, or contaminants remaining at the Site at concentrations that are above concentrations that allow for unlimited use and unrestricted exposure, the EPA must review the Remedial Action every five years. The five-year reviews are necessary at the Site because each remedial alternative evaluated allows hazardous substances to remain on-site in concentrations that restrict use. The EPA must conduct the reviews no less often than every five years after initiation of the Remedial Action in order to ensure that human health and the environment are being protected (See 42 U.S.C. Section 9621(c)). The EPA will conduct the statutory five-year reviews until ground water is restored to the MCLs.
- All ground water remediation alternatives (GW-series alternatives) shall meet ground water ARARs which are non-zero MCLGs, or MCLs where MCLGs are set at zero (see Sections 5.1 and 5.2). There are no chemical-specific ARARs for soils.

- All soil remediation (S-series) alternatives will address the estimated volume of contaminated soil (5,600 cubic yards).

- All ground water remediation (GW-series) alternatives will address the estimated volume of contaminated ground water (76,000,000 gallons).

- Institutional controls will be implemented during the response action to protect human health in the interim before the remedies have met the remediation goals. As part of the institutional controls for ground water, EPA and NMED will request that New Mexico Office of the State Engineer (OSE) 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 OSE 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. This goal should be accomplished through the pursuit of a civil judicial enforcement action under CERCLA that will require their implementation. EPA intends to implement institutional controls to the extent necessary to minimize risk to human health and the environment during implementation of the remedy.

- All alternatives include an operations and maintenance (O&M) component that involves annual ground water monitoring to assess the extent of contamination and the risks to human health.

- All selected ground water pump and treat alternatives are preceded by the following pretreatment steps:

  Oil/free product removal: In the first step of oil and DNAPL capture, a coalescing oil/water separator, an inclined plate separator or a gross knock-out/skimming tank will be used for free phase capture. The second step would be physical treatment to lower emulsified oils and product. Off-gases would be vented through either vapor phase carbon or a scrubbing system for volatile organic and odor capture. Separated DNAPL will be transferred to a heater tank to aid in further handling or treatment. The DNAPL separated in primary treatment steps and in the float would be handled by additional decanting, volume reduction (if technically and economically feasible), and offsite disposal or batch destruction by cavitation with treated water being added back into the main process flow for final polishing. Captured oil and DNAPL product will be sent offsite for disposal.

  - **Equalization:** An equalization tank providing 1.5 to 2 hours of flow equalization would be used with air mixing to promote metals oxidation and suspended solids suspension. As all volatile compounds will have been removed in the first step, the equalization tank would be open top unless nuisance odors are anticipated. In this case, off-gas air would be captured and sent to the carbon adsorber or scrubber system used for the flotation unit.

  - **Neutralization/metals precipitation:** Metals will be precipitated by pH adjustment and oxidation. The use of metal coagulants to form sweep flocs may be considered to enhance minor heavy metal constituents. The pH adjustment toward neutrality can be done with $CO_{2(g)}$ (re-carbonation) or by sulfuric acid addition. Solids from the clarification step will be de-watered for landfill disposal.

- Disposal of the treated ground water from a pump and treat alternative may be accomplished in two ways: on-site injection or off-site discharge to the Rio Grande River Basin. A combination of disposal alternatives may be required in order to allow the flexibility necessary for continuous treatment. Treated ground water will meet all ARARs prior to disposal.
- All alternatives will support the current and future anticipated land and ground water use at the Site.
- All of the soil alternatives have a phytoremediation component. 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.

10.2 Alternatives S-1 and G-1 - *No Further Action*

Alternatives S-1 and GW-1 are the baseline conditions against which other soil and ground water remedial alternatives are compared, as required by the NCP. Alternatives S-1 and GW-1 would provide no further remedial action at the Site. Alternatives S-1 and GW-1 would not address the human health risks identified in Section 4 of this document and, therefore, they do not protect human health. Alternatives S-1 and GW-1 do not reduce contaminant toxicity, mobility, or volume and they are not effective or permanent remedies. Because these no action alternatives leave hazardous substances on the Site, CERCLA requires the EPA to conduct a review of the Remedial Action every five years in order to assess risks to human health and the environment. Costs for conducting the five-year reviews are shown for Alternatives S-1 and GW-1. Alternatives S-1 and GW-1 are mentioned throughout the evaluation process for the purposes of comparison.

- Capital cost: $0
- Annual operation and maintenance (O&M): $100,000
- Net Present Value: $1,860,000
- Implementation time: N/A

10.3 Soil Alternatives

10.3.1 Alternative S-2 - *Excavation and on-site disposal*

Alternative S-2 includes the excavation of all soil above the RGs in the AOC. The excavated soils will be placed in an on-site landfill. The soil will not be treated prior to deposition in the landfill. This alternative involves (1) excavating contaminated soils, (2) constructing a containment system consisting of a liner and a cap, (3) implementing institutional controls and (4) implementing dust suppression and erosion controls. All soils exceeding the RGs will be placed in the landfill. The proposed landfill location is the wastewater reservoir. This alternative provides complete containment and immobilization of the waste material.

Prior to implementation of the excavation and capping activities, the following site preparation tasks will be performed:

- The monitoring wells in the excavation and cap area will be plugged and properly abandoned;

- The DNAPL recovery trenches in the WWR will be plugged and properly abandoned;
- The south and east portions of the site will be cleared and grubbed; and
- Run-off/run-on controls will be installed.

After the completion of the site preparation activities, the contaminated soil will be excavated and stockpiled. A composite liner system consisting of a 60-mil high-density polyethylene (HDPE) liner, and a protective/drainage layer will be constructed in the wastewater reservoir area. Additionally, a leachate collection system will also be installed with the liner system for the management of leachate in the lined area. The excavated soil will be placed in the lined area and a composite cover system will be constructed over the contaminated soil. The composite cover will consist of a 2-foot thick clay to clayey soil layer with a maximum hydraulic conductivity of 1 x 10^{-7} cm/s and a 6-inch thick topsoil layer. Erosion control measures will be utilized to ensure adequate drainage and minimize erosion across the site. All excavated areas will be backfilled with clean fill. The clay and topsoil materials will be transported to the site from an off-site source.

- Capital cost: $2,230,000
  Annual operation and maintenance (O&M): $2,900
  Present worth: $2,740,000
  Implementation time: 1 year

10.3.2 Alternative S-3 - *Excavation, solidification/stabilization, on-site disposal, and capping*

Alternative S-3 includes the excavation of soils above the RGs in the AOC and treating them in a pug mil to reduce the mobility of the COCs. This alternative involves (1) the excavation of contaminated soils, (2) solidification/stabilization of the excavated soils, (3) consolidation of the treated soil in the WWR area, (4) construction of a cap over the treated soils and (5) implementation of institutional controls.

Prior to implementation, the site preparation activities described in Section 10.3.1 will be performed. After completion of the site preparation activities, the contaminated soils will be excavated for treatment. The excavated areas will be backfilled with clean fill material.

Contaminated soils will be excavated and moved to an on-site treatment facility. Solidification/stabilization will be implemented by mixing contaminated soils with pozzolanic materials, such as fly ash, cement kiln dust or concrete to physically immobilize the contaminants in the soil. The specific reagent will be determined during treatability studies. After treatment, the solidified soil will be placed in the WWR for containment with a clay cap. The cap will consist of a 2-foot thick clay to clayey soil layer with a maximum hydraulic conductivity of 1 x 10^{-7} cm/s and a 6-inch thick topsoil layer. Erosion control measures will be utilized to ensure adequate drainage and minimize erosion across the site. All excavated areas will be backfilled with clean fill. The clay and topsoil materials will be transported to the site from an off-site source.

- Capital cost: $3,120,000
  Annual operation and maintenance (O&M): $2,700
  Present worth: $3,450,000
  Implementation time: 1 year

10.3.3 Alternative S-4 - *Excavation, soil washing, and on-site disposal*

Alternative S-4 includes the excavation of all soils above the RGs in the AOC to prevent further mobility of the contaminants. Alternative S-4 involves (1) excavation of contaminated soils, (2) treatment via soil washing, (3) consolidation of treated soil in excavated areas, (4) consolidation of contaminated fines in the WWR, (5) construction of a cap to cover the contaminated fines and (6) implementation of institutional controls.

Prior to implementation, the site preparation activities described in Section 10.3.1 will be performed. After completion of the site preparation activities, the contaminated soils will be excavated for treatment. The excavated areas will be reconstructed with clean fill material and the treated coarse fraction of soil.

The excavated soil will be transported to an on-site soil washing facility, which consists of the following processes: (1) screening the soil for rocks and other debris, (2) washing the screened soil with high-pressure water and detergent, which separates the fine soil particles from the gravel and sand particles and (3) dewatering the fine soil particles. The coarse soil fraction will be spread into previously excavated areas and phytoremediated for residual low toxicity management.

The fine soil fraction will be disposed of in an on-site landfill located in the wastewater reservoir. The landfill liner and cover construction is the same as described in Alternative S-2. Erosion control measures will be utilized to ensure adequate drainage and minimize erosion across the site. All excavated areas will be backfilled with clean fill and the clay and topsoil materials will be transported to the site from an off-site source.

- Capital cost: $4,750,000
  Annual operation and maintenance (O&M): $2,600
  Present worth: $5,270,000
  Implementation time: 1 year

10.3.4 Alternative S-5 - *Excavation and bioremediation*

Alternative S-5 includes the excavation of all soils above the RGs in the AOC and transporting them to on-site bioremediation repositories, otherwise known as landfarms. Alternative S-5 involves the (1) excavation of contaminated soils, (2) construction of bioremediation cells, (3) consolidation of treated soil in the bioremediation cells, (4) aeration, nutrient and water addition to promote biological degradation, (5) consolidation of treated soil in previously excavated areas and the WWR and (6) implementation of institutional controls.

Prior to implementation, the site preparation activities described in Section 10.3.1 will be performed. After completion of the site preparation activities, the contaminated soils will be excavated for treatment. The excavated areas will be reconstructed with clean fill material and the bioremediated soil.

The soil will be segregated by COC: the soils containing elevated levels of metals will be placed in one treatment unit, the soils containing elevated levels of organics will be placed in another treatment unit. The treatment site will be leveled prior to consolidation of the soil. Each treatment unit will be lined with 40-mil PVC and surrounded by up to a 3-foot tall earthen berm. Additionally, the liner will be covered with 12 inches of sand to prevent the aerating plow from damaging the PVC liner. A French drain, consisting of slotted PVC pipe and gravel, will be installed along the inner perimeter of the berm. The berm materials are constructed from clean soils on the site. Contaminated soil will be placed an average of 6 to 18 inches deep over the sand base. Nutrients will be added when the soil is placed in each treatment unit, either in solid form or as liquids combined with water. After all adjustments have been made to the soil, the treatment unit is covered with reinforced plastic to keep rainwater from saturating the soil or creating runoff-containing hazardous products. The cover also helps to maintain soil moisture and temperature. Occasionally, the soil will be aerated and additional nutrients will be added. Once the soil has been remediated below the RGs, the soil will be removed from the treatment unit and spread out in the WWR area and in previously excavated areas.

- Capital cost: $2,850,000
  Annual operation and maintenance (O&M): $2,900
  Present worth: $3,030,000
  Implementation time: 1 year

10.3.5 Alternative S-6 - *Excavation and off-site incineration*

Alternative S-6 includes the excavation of soil and/or DNAPL above the RGs and transporting them to an off-site incinerator for disposal. This proposal involves the (1) excavation of contaminated soils, (2) transportation to a hazardous waste incinerator, (3) incineration of the contaminated soil, (4) consolidation of clean fill in the excavated areas, and aeration and (5) implementation of institutional controls.

Prior to implementation, the site preparation activities described in Section 10.3.1 will be performed. After completion of the site preparation activities, the contaminated soils will be excavated for treatment. The excavated areas will be reconstructed with clean fill material.

Contaminated soil will be excavated and loaded into containers for transportation to an incinerator. Each container will be lined with plastic, loaded with contaminated soil and covered with a tarp. The vehicle will be decontaminated, placarded, and manifested before it leaves the site. The incineration facility must be permitted to receive this type of waste, and must be in compliance with all federal, state, and local standards.

- Capital cost: $8,110,000
  Annual operation and maintenance (O&M): $2,500
  Present worth: $8,640,000
  Implementation time: 1 year

10.3.6 Alternative S-7 - *In-situ solidification/stabilization*

Alternative S-7 includes in-situ remedial treatment and closure of soils above the RGs in the AOC that are above RGs by utilizing solidification/stabilization processes. Alternative S-7 involves the (1) the excavation of contaminated soils, (2) consolidation of excavated soil in the WWR for treatment, (3) in-situ solidification/stabilization of the excavated soils and (4) implementation of institutional controls.

Prior to implementation, the site preparation activities described in Section 10.3.1 will be performed. After completion of the site preparation activities, the contaminated soils will be excavated for treatment. The excavated areas will be backfilled with clean fill material.

The wastewater treatment reservoir is the selected in-situ treatment area because the excavation to 5 feet bgs provides adequate volume for in-situ solidification/stabilization activities and will avoid additional excavation. Soils above the RGs from other areas of the site will be excavated and hauled to the wastewater reservoir area for remedial treatment. Macro-encapsulation will be implemented by mixing contaminated soils with pozzolanic materials, such as fly ash, cement kiln dust, or concrete. The specific reagent will be determined during treatability studies in the remedial design. Once all of the contaminated soil is placed in the treatment area, the soil will be stabilized in place. Reagent materials are mechanically mixed into the soil with augers. As the augers move down into the contaminated soil, the stabilizing agent is added as the augers mix the soil. Once the augers reach the lowest extent of contamination, they are removed and the soil is mixed a second time. After mixing of the soil and reagent is accomplished, the soil is left to cure. The stabilized material will have a compressive strength of at least 20 psi and a permeability of 1×10^{-6} cm/sec. All excavated areas will be backfilled with clean fill and institutional controls will be implemented.

- Capital cost: $1,760,000
  Annual operation and maintenance (O&M): $2,700
  Present worth: $1,900,000
  Implementation time: 1 year

10.3.7 Alternative S-8 - *In-situ solidification/stabilization and run-on/run-off management*

Alternative S-8 includes in-situ remedial treatment and closure of soils above the RGs in the AOC that are above RGs by utilizing solidification/stabilization processes and covering the treated material with a 6-inch clay cap a HDPE liner, 6-inch soil cap which is topped with 12-inches of crushed rock for erosion and infiltration control. Alternative S-8 involves the (1) the excavation of contaminated soils, (2) consolidation of excavated soil in the WWR for treatment, (3) in-situ solidification/stabilization of the excavated soils, (4) placement of 6-inch clay cap, HDPE liner, 6" soil cap, and 12-inch erosion control cover over treated material and (5) implementation of institutional controls.

Prior to implementation, the site preparation activities described in Section 10.3.1 will be performed. After completion of the site preparation activities, the contaminated soils will be excavated for treatment. The excavated areas will be backfilled with clean fill material.

The wastewater treatment reservoir is the selected in-situ treatment area because the excavation to 5 feet bgs provides adequate volume for in-situ solidification/stabilization activities and will avoid additional excavation costs. Soils above RGs from other areas of the site will be excavated and hauled to the wastewater reservoir area for remedial treatment. Macro-encapsulation will be implemented by mixing contaminated soils with pozzolanic materials, such as fly ash, cement kiln dust, or concrete. The specific reagent will be determined during treatability studies. Once all of the contaminated soil is placed in the treatment area, the soil will be stabilized in place. Reagent materials are mechanically mixed into the soil with augers. As the augers moved down into the contaminated soil, the stabilizing agent is added as the augers mix the soil. Once the augers reach the lowest extent of contamination, they are removed and the soil is mixed a second time. After mixing of the soil and reagent is accomplished, the soil is left to cure. The stabilized material will have a compressive strength of at least 20 psi and a permeability of 1 x 10^{-6} cm/sec. A 6"clay cap with a maximum hydraulic conductivity of 1 x 10^{-7} cm/s will be placed over the stabilized soils. A HDPE liner will be placed over this first 6" clay cap to ensure that surface water infiltration does not occur. A 6-inch soil cap will be placed over the HDPE liner and graded to a 2% slope to serve as an added barrier to infiltration. A 12-inch layer of crushed rock will be placed over the clay to serve as erosion control. All excavated areas will be backfilled with clean fill and institutional controls will be implemented.

- Capital cost: $1,800,000
  Annual operation and maintenance (O&M): $2,700
  Present worth: $1,950,000
  Implementation time: 1 year

10.4 Ground Water Alternatives

10.4.1 Alternative GW-2 - *UV-oxidation treatment, filtration, carbon adsorption and disposal of ground water*

Alternative GW-2 is a "pump and treat" ground water remedy where contaminated ground water is pumped out of the ground through extraction wells and brought to the surface where it is treated. Ground water would be pumped out of the shallow and intermediate aquifers through a series of extraction wells. This extracted water would flow through to an above-ground treatment plant located within the Site boundaries.

This alternative includes the ex-situ remedial treatment and disposal of ground water that is above the RGs by utilizing ultra-violet (UV) oxidation treatment technology. Alternative GW-2 involves the (1) pumping of the contaminated ground water, (2) pretreatment as described in Section 10.1, (3) treatment by UV-oxidation, (4) filtration of precipitated solids, (5) treatment by granulated activated carbon and (6) disposal of treated water.

Prior to implementation, the pretreatment activities described in Section 10.1 will be performed. After completion of the site preparation activities, the contaminated ground water will be pumped for treatment.

Organics in the ground water will be oxidized through high intensity UV light combined with chemical oxidant addition (peroxide). The combination of UV light and peroxide addition greatly increases the oxidation rate, therefore reducing treatment time. Additionally, catalysts, which are photo-reactive and non-toxic, may be added to significantly enhance a systems' performance. The specific combination of additives and catalysts will be determined in a treatability study.

After the UV-oxidation step, flow will be filtered to remove any oxidized precipitated solids. The final step consists of a granular activated carbon (GAC) polishing step to remove any recalcitrant organics.

- Capital cost: $10,280,000
  Annual operation and maintenance (O&M): $1,710,000
  Present worth: $33,880,000
  Implementation time: 2 years

10.4.2 Alternative GW-3 - *Biological treatment, clarification, filtration and disposal of ground water*

Alternative GW-3 is a "pump and treat" ground water remedy where contaminated ground water is pumped out of the ground through extraction wells and brought to the surface where it is treated. Ground water would be pumped out of the shallow and intermediate aquifers through a series of extraction wells. This extracted water would flow through to an above-ground treatment plant located within the Site boundaries.

This alternative includes the ex-situ remedial treatment and disposal of ground water that is above the RGs by degrading organic constituents in a fixed film bioreactor. Alternative GW-3 involves the (1) pumping of the contaminated ground water, (2) pretreatment as described in Section 10.1, (3) biological treatment in a fixed film bioreactor, (4) filtration of precipitated solids, (5) treatment by granulated activated carbon and (6) disposal of treated water.

Prior to implementation, the pretreatment activities described in Section 10.1 will be performed. After completion of the site preparation activities, the contaminated ground water will be pumped for treatment.

Ex-situ biological treatment of the ground water will be conducted in bioreactors that will be open top units. In attached growth reactors, biomass is attached to a solid substrate, such as sand, rubber, plastic, activated carbon or resin, and forms a thick film. Contaminated water is passed through a bioreactor that houses the media and the biomass, which biodegrades the organic constituents in the water.

The primary factors influencing bioreactor design are the microbial organic utilization rates and the peak organic mass loading rate (i.e., flow rate times organic concentration). Treatability tests are necessary to determine these and other design parameters. Under most circumstances, bioreactors require a significant startup time to acclimate the microorganisms to the specific contaminants being treated before the bioreactor will operate at optimal degradation rates.

After the passing through the fixed film bioreactor, ground water will be filtered to remove any oxidized precipitated solids. The final step before disposal consists of a granular activated carbon polishing step to remove any recalcitrant organics.

- Capital cost: $13,500,000
  Annual operation and maintenance (O&M): $1,150,000
  Present worth: $31,390,000
  Implementation time: 2 years

10.4.3 Alternative GW-4 - *Filtration, clay adsorption, carbon adsorption and disposal of ground water*

Alternative GW-4 is a "pump and treat" ground water remedy where contaminated ground water is pumped out of the ground through extraction wells and brought to the surface where it is treated. Ground water would be pumped out of the shallow and intermediate aquifers through a series of extraction wells. This extracted water would flow through to an above-ground treatment plant located within the Site boundaries.

Alternative GW-4 includes the ex-situ remedial treatment and disposal of ground water that is above the RGs by utilizing removing the organic constituents in the ground water by clay adsorption. This alternative involves the (1) pumping of the contaminated ground water, (2) pretreatment as described in Section 10.1,

(3) filtration of precipitated solids, (4) adsorption of organics onto clay, (5) treatment by granulated activated carbon, (5) disposal of organics adsorbed onto the clay media and (6) disposal of the treated ground water.

Prior to implementation, the pretreatment activities described in Section 10.1 will be performed. After completion of the site preparation activities, the contaminated ground water will be pumped for treatment.

The ground water will be pretreated and then treated in a clay adsorption unit first, then followed by a granulated activated carbon (GAC) unit. By treating the organics in the ground water with clay prior to GAC, the life of the GAC will be extended. However, depending upon the clay adsorption capacity and contaminant breakthrough profile, the GAC adsorbers may be loaded at a faster rate than with the other alternatives. The clay adsorbers' ability to meet effluent requirements and applicable or relevant and appropriate treatment criteria while still providing an economical solution must be verified by treatability studies. The clay material will consist of a bentonite based sorbent, composed of 30% organically modified clay and 70% anthracite. The clays are manufactured to remove long chain and high molecular weight hydrocarbons, chlorinated hydrocarbons and some heavy metals. Additionally, the clay platelets, modified with a quaternary amine, have the ability to remove emulsified oil onto the clay surface. The clay can achieve oil absorption of up to 60% of its weight before exhaustion. Disposal of the clay as a hazardous waste will be accomplished by an off-site landfill or thermal destruction service.

After the passing through the GAC column, the ground water will be disposed of as previously mentioned in Section 10.1.

- Capital cost: $10,130,000
  Annual operation and maintenance (O&M): $2,080,000
  Present worth: $38,200,000
  Implementation time: 2 years

10.4.4 Alternative GW-5 - *Steam Flushing*

This alternative is an enhanced extraction technique that injects steam into the subsurface to mobilize and/or vaporize DNAPL and its dissolved constituents. Ground water will be pumped after steam injection and treated with selected technologies from Alternatives GW-2 through GW-4.

This technology has been demonstrated to accelerate average DNAPL removal rates at a creosote contaminated utility pole yard in Visalia, CA. However, even with this technology, aqueous phase organics are still above site remediation standards as set forth in the site's ROD. Pump and treat operations would continue at this site after steam injection cessation to maintain hydraulic and contaminant containment as natural attenuation processes (including biological degradation) are monitored.

DNAPLs such as creosote have the ability to form pools, even above relatively weak capillary barriers such as medium and fine sand. Therefore, the threat of vertical pool mobilization from the Intermediate Aquifer to the Deep Aquifer is real if steam flushing changes the viscosity, and downward mobilization occurs and the extraction techniques are insufficient to capture all of the DNAPL.

The conceptual arrangement considered for the site would be multiple steam injection wells, located in the Intermediate and Santa Fe Aquifers, arranged in a circle around areas that are suspected as concentrated contaminant source areas. Contaminant recovery would be through central extraction wells. Alternatively, to lower capital expense and to match the hydraulic treatment capability of the 300 gpm above ground treatment system, smaller cells may be treated, slowly working across the site, with injection and extraction wells arranged in an alternating pattern or in-line arrangement to prevent inappropriate contaminant migration. This technology may be utilized as a field scale study across part of the Site.

- Capital cost: $27,080,000
  Annual operation and maintenance (O&M): $2,480,000
  Present worth: $61,030,000 with a 10 year project span
  Implementation time: 2 years

10.4.5 Alternative GW-6 - *Co-Solvent/Alcohol Flushing*

There is limited information on full-scale applications of co-solvent/alcohol flooding projects at creosote sites. Therefore, a small-scale field trial would be performed before full-scale implementation. An initial conceptual design of how co-solvent flushing might be implemented at the site was used to determine this technology's cost. A fundamental assumption of the ability to cycle alcohols and water flushes through the aquifer pore volumes in a reasonable period of time was assumed. Most creosote-based target demonstration treatment systems used surfactants, alkaline salts, and polymers rather than purely alcohol-based systems. A surfactant/co-solvent system could include low surfactant concentration systems, high surfactant concentration systems, surfactant/alcohol systems, high alcohol concentration systems, low alcohol concentration systems and alkaline-surfactant-polymer combination systems.

DNAPLs such as creosote have the ability to form pools, even above relatively weak capillary barriers such as medium and fine sand. Therefore, the threat of vertical pool mobilization from the Intermediate Aquifer to the Deep Aquifer is real if co-solvent flooding lowers the interfacial tension, and downward mobilization occurs and the extraction techniques are insufficient to capture all of the DNAPL.

Delivery/recovery wells will be placed after analytical modeling of fluid flow patterns. The chemical delivery needs and time frame for floods will be based on the duration to flush a reasonable number of pore volumes. A phased modular approach is assumed. Linear sets of delivery and recovery wells across the contaminated zone will be used. This approach minimizes the delivery systems, pumps, piping and aboveground treatment systems by addressing a fraction of the target areas at any given time. Equipment requirements will be minimized by reusing the same equipment in each grid or module. The benefit of this approach is that smaller area floods may be more easily extracted and controlled to prevent vertical migration of DNAPLs that are mobilized through density or solubility changes.

The proposed system will concentrate primarily on alcohol flood technologies to avoid surfactant emulsion and foaming problems in aboveground treatment trains and to potentially allow reuse of the solvent. If an alcohol/surfactant combination is eventually selected, the induced gas flotation step to remove free product and oils will be reviewed for operational foaming problems and the need to selected another separation device.

- Capital cost: $21,560,000
  Annual operation and maintenance (O&M): $4,200,000
  Present worth: $62,720,000

Implementation time: 2 years

10.4.6 Alternative GW-7 - *In-Situ Oxidation*

In-situ chemical oxidation is based on the delivery of chemical oxidants to contaminated media in order to destroy the contaminants by converting them to simple compounds commonly found in nature. The oxidants applied in this process are typically hydrogen peroxide (H_2O_2), potassium permanganate ($KMnO_4$), ozone, and to a lesser extent, dissolved oxygen (DO). The most common field applications have been based on Fenton's Reagent where hydrogen peroxide is applied with an iron catalyst creating a hydroxyl free radical. This hydroxyl free radical is capable of oxidizing complex organic compounds. Residual hydrogen peroxide decomposes into water and oxygen in the subsurface and any remaining iron precipitates out. This process has been applied in waste treatment fields and ground water and soil remediation.

The volume and chemical composition of individual treatments are based on the contaminant levels and volume, subsurface characteristics and pre-application laboratory test results. The methods for delivery of the chemical may vary. The oxidant can be injected through a well or injector head directly into the subsurface, mixed with a catalyst and injected or combined with extracted water from the site and then injected and recirculated. In the case of hydrogen peroxide, stabilizers may be needed because of the compound's reactivity.

The following are potential concerns when using in-situ chemical oxidants:

- Constituents in the injected fluid exceed a primary or secondary drinking water standard;
- Formation of toxic intermediate products;
- Unknown toxicity of a constituent of the oxidant/catalyst;
- Adequate delivery of the chemical oxidants to the contaminated area;
- Formation/mobilization of colloids due to breakdown of natural organic material or other reduced constituents; and
- Migration of contaminants away from the plume or source area.

Due to health, safety and economic issues, the oxidants that were considered for use at the Former Tie Treating Facility were hydrogen peroxide, potassium permanganate and ozone.

- Capital cost: $12,630,000
  Annual operation and maintenance (O&M): $1,320,000
  Present worth: $32,140,000
  Implementation time: 2 years

Alternative Cost Estimate Table				
Alternative Title	**Proposed Plan Number**	**Capital Cost**	**Annual O&M Cost**	**Net Present Value**
Soil - No Action	S-1	$0	$0	$100,000
Excavation and on-site disposal with liner and cap	S-2	$2,230,000	$2,900	$2,740,000
Excavation, solidification/stabilization, on-site disposal, and capping	S-3	$3,120,000	$2,700	$3,450,000
Excavation, soil washing, and on-site disposal with liner and cap	S-4	$4,750,000	$2,600	$5,270,000
Excavation and bioremediation	S-5	$2,850,000	$2,900	$3,030,000
Excavation and off-site incineration	S-6	$8,110,000	$2,500	$8,640,000
In-situ solidification/stabilization	S-7	$1,760,000	$2,700	$1,900,000
In-situ solidification/stabilization and run-off/run-on management	S-8	$1,800,000	$2,700	$1,950,000
Ground water - No Action	GW-1	$0	$100,000	$1,860,000
UV-oxidation treatment, filtration, carbon adsorption and disposal of ground water	GW-2	$10,280,000	$1,710,000	$33,880,000
Biological treatment (fluidized GAC bed), clarification, filtration and disposal of ground water	GW-3	$13,500,000	$1,150,000	$31,380,000
Filtration, clay adsorption, carbon adsorption and disposal of ground water	GW-4	$10,130,000	$2,080,000	$38,200,000
Steam Flushing	GW-5	$27,080,000	$2,480,000	$61,030,000
Co-Solvent/Alcohol Flushing	GW-6	$21,560,000	$4,200,000	$62,720,000
In-Situ Oxidation	GW-7	$12,630,000	$1,320,000	$32,140,000

11.0 Comparative Analysis of Alternatives

The EPA uses nine NCP criteria to evaluate remedial alternatives for the cleanup of a release. These nine criteria are categorized into three groups: threshold, balancing, and modifying. The threshold criteria must be met in order for an alternative to be eligible for selection. The threshold criteria are overall protection of human health and the environment, and compliance with ARARs. The balancing criteria are used to weigh major tradeoffs among alternatives. The five balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; short-term effectiveness; implementability; and cost. The modifying criteria are state acceptance and community acceptance. The following briefly describes the evaluation criteria:

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other promulgated requirements that pertain to the site, or whether a waiver is justified.
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.
Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

The comparative analysis describes the strengths and weaknesses of the alternatives relative to one another with respect to each NCP criterion. The alternative(s) that performs the best overall in that category is discussed first, with the other alternatives discussed in order according to their relative success at satisfying the NCP criterion.

The alternatives intended to address the unsaturated zone soil (S-series) and ground water (G-series) were kept separate throughout the Feasibility Study evaluation, and that approach is continued in this section of the ROD.

11.1 Comparative Analysis of Soil Alternatives

Alternative S-1, No Action, does not actively address the contaminated soil. Alternatives S-2 through S-6 utilize excavation and either on-site disposal, solidification/stabilization, capping, soil washing, bioremediation or off-site incineration. Alternatives S-7 and S-8 utilize in-situ solidification/stabilization and capping or run-on/run-off management.

11.1.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment is based on a combination of criteria, compliance with ARARs, short-term effectiveness, long-term effectiveness, and reduction in toxicity, mobility, and volume. The Site Risk Assessments concluded that the contaminated soils currently pose a risk to human health and the environment. In addition, the concentration of contaminants in the soil could continue to contaminate the ground water above the MCLs. All the soil alternatives, with the exception of S-1, are equally protective of human health and the environment as far as direct exposure to soil is concerned; however, soil contamination poses a threat to humans in that it could impact ground water which is subsequently used by humans.

Alternative S-1 is not protective of either human health or the environment.

11.1.2 Compliance with Applicable or Relevant and Appropriate Requirements

A detailed discussion of ARARs is provided in the Feasibility Study Report and is referenced in the following discussion. Where no ARARs exist or where ARARs may not be sufficiently protective, the NCP prescribes methods for selection of remediation goals. Since there are no chemical-specific ARARs for soils, remediation goals for the Site soil were selected based on guidance documents outlining scientific methods to determine protective goals. The remediation goals for the Site soils are set at a level such that, if the remediation goals are met, ground water will not become impacted above the MCLs for these compounds through contaminant migration from soils. In addition, if the remediation goals are met, ecological receptors will not be adversely impacted by on-site contamination.

One potential issue of concern for the soil remediation is the RCRA Land Disposal Restrictions (LDRs). However, since the contaminated soils will be consolidated and treated within the Site AOC, LDRs will not be invoked. This is consistent with the NCP. See NCP Preamble, 55 Federal Register 8758 - 8760, March 8, 1990.

Because there are no chemical-specific ARARs for soil, and because all the soil alternatives would meet location-specific and action-specific ARARs, all of the soil alternatives, with the exception of S-1, would comply with ARARs.

Alternative S-6 will comply with site-specific ARARs. The incineration process will be performed by a facility that is in compliance with all federal and state ARARs concerning hazardous waste treatment facilities and air emissions. Additionally, all excavation activities will comply with local, state and federal air quality requirements.

Alternative S-8 will comply with site-specific ARARs. The solidification/stabilization process will be designed and operated to comply with all federal and state ARARs concerning hazardous waste treatment facilities and air emissions. It will also comply with RCRA removal and treatment requirements and land disposal restrictions. This alternative will not trigger the land ban on creosote-contaminated soil because it is part of the Site AOC and is being treated and disposed of in place. The disposal cell construction and management will be conducted in compliance with all federal and state ARARs concerning storm water discharge. Additionally, all construction activities will comply with local, state and federal air quality regulations.

Alternative S-7 will comply with site-specific ARARs. The solidification/stabilization process will be designed and operated to comply with all federal and state ARARs concerning hazardous waste treatment facilities and air emissions. It will also comply with RCRA removal and treatment requirements and land disposal restrictions. This alternative will not trigger the land disposal restrictions on creosote contaminated soil because it is part of the Site AOC and is being treated and disposed of in-place. Additionally, all construction activities will comply with local, state and federal air quality requirements.

Alternative S-4 will comply with site-specific ARARs. The soil washing process will be designed and operated to comply with all federal and state ARARs concerning hazardous waste treatment facilities and air emissions. It will also comply with RCRA removal and treatment requirements and land disposal restrictions. Additionally, all construction activities will comply with all local, state and federal air quality requirements.

Alternative S-3 will comply with site-specific ARARs. The solidification/stabilization process will be designed and operated to comply with all federal and state ARARs concerning hazardous waste treatment facilities and air emissions. It will also comply with RCRA removal and treatment requirements and land disposal restrictions. This alternative will not trigger the land disposal restrictions on creosote-contaminated soil because it is part of the Site AOC and is being disposed of in-place. Additionally, construction activities will comply with local, state and federal air quality requirements.

Alternative S-2 will comply with site-specific ARARs. The landfill will be designed, constructed, and managed to comply with all federal and state ARARs concerning RCRA Subtitle C hazardous waste landfills. The landfill construction and management will be conducted in compliance with all federal and state ARARs concerning storm water discharge. This alternative will not trigger the land disposal restrictions on creosote contaminated soil because it is part of the Site Area of Concern (AOC) and is being disposed of in-place. Additionally, construction activities will comply with local, state and federal air quality requirements.

Alternative S-5 will comply with site-specific ARARs. The bioremediation process will be designed and operated to comply with all federal and state ARARs concerning hazardous waste treatment facilities and air emissions. Additionally, all construction activities will comply with local, state and federal air quality requirements.

Alternative S-1 will not comply with site-specific ARARs.

11.1.3 Long-term Effectiveness and Permanence

Alternative S-6 would have the highest long term effectiveness and permanence. This alternative affords long-term protection of potential receptors by destroying the contaminants in the soil through incineration. The contaminants will be volatilized or destroyed in a hazardous waste incinerator. The excavated areas on-site will be backfilled with clean fill material.

Alternative S-8 has high long term effectiveness and permanence. If properly implemented, in-situ treatment by solidification/stabilization will effectively immobilize soil contaminants. The stabilized soils will be treated in-situ in the WWR and then capped in place using clay, an HDPE liner, soil, and crushed rock. The layer of crushed rock will function as a barrier between the stabilized soils and nearby residents and site workers. The crushed rock also serves to prevent storm water runoff from the site and to minimize the transport of contaminants by surface water run-off, infiltration or airborne dust. The crushed rock final cover will minimize potential disturbance of the cap. Ground water infiltration into the treated and stabilized soils will be prevented by the HDPE liner.

Alternative S-3 has high long term effectiveness and permanence if properly implemented. The ex-situ treatment by solidification/stabilization will effectively immobilize soil contaminants. The stabilized soils will be placed in the WWR and capped in place. The cap will function as a barrier between the stabilized soils and nearby residents and site workers. The cap also serves to prevent storm water runoff from the site and to minimize the transport of contaminants by surface water run-off, infiltration or airborne dust. Maintenance of the cap will be required.

Alternative S-5 affords long-term protection of potential receptors by removing the contaminants from the soil through bioremediation. If properly implemented, treatment by bioremediation will degrade the contaminants in the soil and reduce the toxicity of the COCs. However, the bioremediation process would take a significant amount of time for the COCs to be degraded.

Alternative S-2 and S-4 have high long term effectiveness and permanence. The liner and cap will function as a barrier between the contaminated soils and nearby residents and site workers. The landfill also minimizes the transport of contaminants by surface-water runoff or infiltration. Furthermore, the source materials will be contained and therefore, further contamination of the ground water will be prevented. Maintenance of the cap will be required.

Alternative S-7 has long term effectiveness and permanence. If properly implemented, in-situ treatment by solidification/stabilization will effectively immobilize soil contaminants. The stabilized soils will be treated in-situ in the WWR. The excavated areas on-site will be backfilled with clean fill material. There is the potential for surface water to infiltrate the stabilized and treated soils since there is not a cap over the treated material.

Alternative S-1 does not provide any long-term effectiveness and permanence.

11.1.4 Reduction of Toxicity, Mobility, and Volume through Treatment

Alternative S-6 completely reduces the mobility of the contaminants in the soil in all of the excavated soils. Incineration also reduces the volume and the toxicity via the combustion process. Incineration volatilizes or destroys the constituents, which reduces the toxicity and also reduces the soil to ash, which reduces the volume of the waste.

Alternative S-8 will significantly reduce the mobility of the contaminants by chemically binding and encapsulating them with the solidification/stabilization process. The clay cap serves as an infiltration barrier that will prevent leaching of contaminants to the ground water. The crushed rock layer also enhances the mobility reduction of this alternative. This treatment process, however, does not reduce the volume or the toxicity of the contaminants. Implementation of this remedy may increase the volume of contaminated soil by 10 to 30% through the solidification/stabilization process.

Alternative S-7 will significantly reduce the mobility of the contaminants by chemically binding and encapsulating them with the solidification/stabilization process. This treatment process, however, does not reduce the volume or the toxicity of the contaminants. Implementation of this remedy may increase the volume of contaminated soil by 10 to 30% through the solidification/stabilization process.

Alternative S-3 will significantly reduce the mobility of the contaminants by chemically binding and encapsulating them with the solidification/stabilization process. Capping also enhances the mobility reduction of this alternative. This treatment process, however, does not reduce the volume or the toxicity of the contaminants. Implementation of this remedy may increase the volume of contaminated soil by 10 to 30% through the solidification/stabilization process.

Alternative S-4 reduces the toxicity or the mobility of the contaminants in the soil reducing the volume of the contaminated soil via soil washing. Capping reduces the mobility of the contaminants in the soil. By combining soil washing and capping treatment technologies, this alternative provides reduction of mobility and volume of the contaminants in the soil.

Alternative S-5 does not reduce the mobility or the volume of contaminants except to the extent that more mobile compounds are effectively biodegraded. Bioremediation does reduce the toxicity of the contaminants in the soil by degrading organic compounds into water and carbon dioxide.

Alternative S-2 does not prescribe any treatment of the contaminated soils at the site; therefore, the toxicity and volume of contaminated soils will not be reduced. The mobility of the contaminants will be reduced by the prevention of contaminated surface water run-off and prevention of contaminated airborne dust. The liner and cap will prevent leaching of any contaminants to the ground water.

Alternative S-1 does not include treatment so contaminated soil would have no reduction of toxicity, mobility, or volume.

11.1.5 Short-term Effectiveness

A comparison of the alternatives with respect to the short-term effectiveness shows that all alternatives, with the exception of S-1, can be made to be protective of the community and workers.

Excavation, solidification/stabilization, disposal, and cap construction are full-scale technologies that will address site contaminants in a relatively short period of time. During remedial activities, short-term risks will be posed to site workers involved in handling and processing the contaminated soil. Risks may include dermal contact and inhalation. Nearby residents may also be at risk due to inhalation of fugitive emissions. Appropriate measures such as use of personal protective equipment will be used to protect workers. Fence line monitoring will guide implementation of monitoring to control fugitive emissions to eliminate risk to residents. There is the potential for short term risks from increased truck traffic and potentially rail traffic if DNAPL soils are sent off-site in Alternative S-6.

11.1.6 Implementability

All of the alternatives are implementable with regard to technical feasibility, administrative feasibility, and availability of resources.

Alternative S-6 is a full-scale technology which as been successfully used at other Superfund Sites for disposing of contaminated soil. Implementation of this alternative is relatively easy, as it requires relatively simple and earthmoving techniques and an existing permitted hazardous waste incinerator. Implementation time is also relatively short. Excavation of the contaminated soil will require engineering measures to control air emissions, fugitive dust, runoff, erosion and sedimentation.

Alternative S-7 and S-8 are full-scale technologies which have been successfully used at other Superfund sites in treating similar contaminants in soil. Before conducting the remedial action, a treatability study will need to be performed to evaluate the relative effectiveness of in-situ solidification/stabilization technology for the site constituents. Implementation of this alternative is relatively straight forward, as it requires a relatively simple treatment process and simple construction and earthmoving techniques. Operation of the solidification/stabilization process equipment will require engineering measures to control air emissions, fugitive dust, runoff, erosion and sedimentation. The infrastructure and vendors necessary to implement these alternatives are available.

Alternative S-3 is a full-scale technology which has been successfully used at other Superfund sites in treating similar contaminants in soil. Before conducting the remedial action, a treatability study will need to be performed to evaluate the effectiveness of ex-situ solidification/stabilization technology for the site constituents. Implementation of this alternative is relatively straightforward. It requires a relatively simple treatment process and simple construction and earthmoving techniques. Operation of the solidification/stabilization process equipment will require engineering measures to control air emissions, fugitive dust, runoff, erosion and sedimentation. The infrastructure and vendors necessary to implement this alternative are available.

Alternative S-2 is a full-scale technology which has been successfully used at other Superfund sites. Vendors offering construction equipment and materials in the vicinity of the site are available. Local infrastructure will be able to support the use of this technology. This treatment process will require engineering measures to control air emissions, fugitive dust, runoff, erosion and sedimentation. Standard procedures can monitor the effectiveness of this technology. Authorizations to implement this technology include standard regulatory compliance requirements. The infrastructure and vendors necessary to implement this alternative are available.

Alternative S-5 is a full-scale technology which as been successfully used at other Superfund sites in treating similar contaminants in soil. Before conducting the remedial action, a treatability study will need to be performed to evaluate the required the nutrient load, the aeration rate and the degradation rate of the microbes. Implementation of this alternative is relatively easy, as it requires a relatively simple treatment process and simple construction and earthmoving techniques. The treatment time for this technology however is lengthy. The bioremediation cells will require engineering measures to control air emissions, fugitive dust, runoff, erosion and sedimentation. The infrastructure and vendors necessary to implement this alternative are available.

Alternative S-4 is a full-scale technology which as been successfully used at other Superfund sites in treating similar contaminants in soil. Before conducting the remedial action, a treatability study will need to be performed to evaluate the combination of detergents and surfactants used to remove contaminants and fine soil particles from the contaminated soils. Implementation of this alternative is relatively easy, as it requires a relatively simple treatment process and simple construction and earthmoving techniques. Operation of the soil washing process equipment will require engineering measures to control air emissions, fugitive dust, runoff, erosion and sedimentation. The infrastructure and vendors necessary to implement this alternative are available.

11.1.7 Cost

Alternative	Capital Cost	Annual O&M Costs	Net Present Value
S-1	$0	$0	$100,000
S-2	$2,230,000	$2,900	$2,740,000
S-3	$3,120,000	$2,700	$3,450,000
S-4	$4,750,000	$2,600	$5,270,000
S-5	$2,850,000	$2,900	$3,030,000
S-6	$8,110,000	$2,500	$8,640,000
S-7	$1,760,000	$2,700	$1,900,000
S-8	$1,710,000	$2,700	$1,950,000

11.1.8 State Acceptance

The EPA and the NMED have worked together in the investigation of the Site and in developing this ROD. The NMED supports the selected remedy of solidification and stabilization for those soils not contaminated with DNAPL. The NMED advocates that EPA require DNAPL contaminated soils to be physically removed from the site and transported to an off-site incinerator for treatment. NMED requests that EPA require the use of an appropriate, scientific and objective method for segregating DNAPL impacted soils from those soils not containing DNAPL. Also, should DNAPL materials be encountered during the excavation, that excavation will continue to as great a depth as practicable, in order to remove a possible source of ground water contamination.

The NMED has documented its support for issuance of the Proposed Plan and the ROD outlining the Selected Remedy in a letter to the EPA dated May 30, 2002.

11.1.9 Community Acceptance

The City of Albuquerque stated that the preferred alternative, if properly implemented, would be adequately protective of human health, ground water, surface water, and ecological receptors. Nevertheless, the City of Albuquerque was most supportive of the excavation and off-site incineration alternative, which EPA has incorporated into the preferred remedy for DNAPL-contaminated soils. The ASJCAC and some local area residents opposed the preferred alternative, preferring further study, evaluation, and expansion of alternatives. However, the ASJCAC also commented that all of the technically accessible DNAPL-impacted soil be excavated and incinerated off-site, which EPA has partially incorporated into the preferred remedy, as noted above. Community views and comments on the proposed alternative from the Proposed Plan for soils were evaluated after the public comment period and are described in the responsiveness summary.

11.2 Comparative Analysis of Ground Water Alternatives

Alternative GW-1, No Action, does not actively address the contaminated ground water. Alternatives GW-2, GW-3, and GW-4 utilize ground water pump and treat technology. Alternative GW-5 utilizes thermal treatment via steam flushing. Alternative GW-6 utilizes co-solvent/alcohol flushing. Alternative GW-7 utilizes in-situ Oxidation to treat the ground water.

11.2.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment is based on a combination of criteria, compliance with ARARs, short-term effectiveness, long-term effectiveness, and reduction in toxicity, mobility, and volume. The Site Risk Assessments concluded that the contaminated ground water currently poses a risk to human health. All of the ground water alternatives, with the exception of GW-1, are protective of human health and the environment.

Since Alternative GW-1 is not protective of human health or the environment, it is not eligible for selection under the NCP (see 40 CFR §300.430(f)(1)(i)(A)).

11.2.2 Compliance with Applicable or Relevant and Appropriate Requirements

All GW-series alternatives except Alternative GW-1 would comply with chemical-specific ARARs because ground water would be treated until it is below the MCLs or the MCLGs. Alternative GW-1 will not meet chemical-specific ARARs because no remedial actions are conducted at the Site under this alternative.

For each of the Alternatives, an ARAR waiver over portions of the site where non-recoverable DNAPLs are present **might** be necessary. Treatment residual solids may require compliance with RCRA or hazardous materials transportation regulations for off-site disposal.

11.2.3 Long-term Effectiveness and Permanence

Alternative GW-1 would not be effective in the long-term because remediation goals would not be met and residual risk would remain for an indefinite period of time.

All of the alternatives that involve treatment provide the same high degree of long-term effectiveness in that only acceptable residual risk will remain once the remediation goals have been met, so no additional engineering or administrative controls will be necessary. However, because the complete removal of DNAPLs from the subsurface is often not practicable, long term monitoring will be required to verify hydraulic control and treatment system efficiency such that migration of contaminants does not occur.

11.2.4 Reduction of Toxicity, Mobility, and Volume through Treatment

All ground water treatment alternatives, except for Alternative GW-1, use treatment to reduce toxicity, mobility, and volume of contaminants. Some treatment residuals (precipitated sludges, biosolids and spent clay or GAC) are inherent in each process. Any ex-situ treatment (Alternatives GW-2, GW-3, and GW-4), or enhanced extraction process (Alternatives GW-5, GW-6, and GW-7) must combine with aggressive pumping to achieve reduction in mobility, toxicity and volume of contaminants in the ground water. There is the potential in Alternatives GW-5, GW-6, and GW-7, that the DNAPL contamination might migrate deeper into the Santa Fe Aquifer if an adequate capture system is not in place. Alternative GW-7 (in-situ oxidation) poses a risk of mobilizing some metals from the aquifer matrix.

11.2.5 Short-term Effectiveness

Alternatives GW-2 through GW-7 also have risks in the short term. Pumping, treating, and disposing of contaminated ground water may adversely expose workers during handling and processing activities. Workers could also be exposed to fugitive emissions from the process equipment. However, air monitoring and the use of PPE will be implemented as necessary to reduce health risks. Exposure risks to nearby residents should be controllable and therefore minimized. Traffic associated with the remedial activities could increase wear of local roads and increase the potential for accidents. This latter risk is somewhat reduced because transport activities will require safety-trained individuals.

Alternative GW-1 may be implemented immediately; the remaining alternatives will require some laboratory and/or field treatability pilot testing to verify performance assumptions. Alternatives GW-2 through GW-4 should be designed so that they can be implemented over a 2-year time span from remedy selection through design, construction and commissioning and startup activities.

Alternatives GW-5, GW-6, and GW-7 are based on the premise of either mobilizing contaminants for extraction or in-situ destruction. As a result, short term increases in concentrations of mobilized contaminants or reaction by-products will be evident. Extraction, surface treatment, and re-injection of ground water will allow plume reduction, eventually leading to aquifer restoration.

In order to ensure the short term effectiveness of the remedial action, institutional controls for ground water will be implemented to restrict use of the portion of the aquifer that is contaminated by the Site until remediation goals have been met. Despite any limitations associated with institutional controls, they will be implemented to the greatest extent possible to help minimize risk to human health and the environment during the implementation of the remedy.

Alternative GW-1 is not effective in the short term because this alternative represents a no-treatment scenario and the contamination would remain above remediation goals indefinitely.

11.2.6 Implementability

Ground water "pump and treat" is well proven and capable of containing the contaminant plume. The treatment alternatives should be readily available and are generally proven. However, treatability studies will be required for Alternatives GW-2 through GW-7 to refine applicable design criteria and verify performance on the potentially variable site-specific water quality matrix of contaminants and water characteristics.

The use of a fluidized bed reactor (FBR) with carbon media (Alternative GW-4) could allow a phased approach in terms of equipment addition, if required. Polishing-step GAC adsorbers are assumed unnecessary to reach remedial goals for semi-volatile compounds and are not anticipated in the selected remedy. This treated water will be re-injected at the edge of the plume to create a mounding effect. This mounding effect will hinder further migration of existing contamination. Depending upon the FBR treatability study results, the need and cost for carbon adsorption or oxidant (hydrogen peroxide) addition will be evaluated. These minor adjustments could include one or more of the following:

- Adjusting the rate of extraction from some or all wells.
- Discontinuing pumping at individual wells where cleanup levels have been attained.
- Pulsed pumping of some or all extraction wells to eliminate flow stagnation areas, allow time for sorbed contaminants to partition into ground water, or otherwise facilitate recovery of contaminants from the aquifer.
- Installing additional ground water extraction wells to facilitate or accelerate cleanup of the contaminant plume.
- Treating "hot spots" by in-situ oxidation.

It might be possible to allow natural attenuation to be implemented after the several years of pump and treat activities. A trend of declining contaminant levels confirmed over several successive rounds of sampling in the first several years would indicate that source control measures combined with remedial pumping and ex-situ treatment have been effective. Modeling could then be used to determine if natural attenuation will achieve remediation objectives in a reasonable time frame. Institutional controls would be implemented to prevent the use of the contaminated water until cleanup levels have been attained. The institutional control would consist of an ordinance prohibiting the drilling of wells within the vicinity of the site and previous off-site plume locations.

11.2.7 Cost

Alternative	Capital Cost	Annual O&M Costs	Net Present Value
GW-1	$0	$0	$186,000
GW-2	$10,280,000	$1,710,000	$33,880,000
GW-3	$13,500,000	$1,150,000	$31,380,000
GW-4	$10,130,000	$2,080,000	$38,200,000
GW-5	$27,080,000	$2,480,000	$61,030,000
GW-6	$21,560,000	$4,200,000	$62,720,000
GW-7	$12,630,000	$1,320,000	$32,140,000

11.2.8 State Acceptance

The EPA and the NMED have worked together in the investigation of the Site and in developing this ROD. The State has expressed its support for the selected remedy. The State does not believe Alternative GW-1, No Action, provides adequate protection of human health and the environment.

The NMED has documented its support for issuance of the Proposed Plan and the ROD outlining the Selected Remedy in a letter to the EPA dated May 30, 2002.

11.2.9 Community Acceptance

The City of Albuquerque has worked very closely with EPA and NMED during the investigation of the Site and in developing this ROD. The City of Albuquerque has expressed its support for the performance based approach for ground water restoration. The City does not believe that Alternative G-1 (No Action) is protective of human health and the environment, and it supports the preferred ground water remedial alternative as detailed in the Proposed Plan and the ROD. The City's comments are contained in a letter dated April 9, 2002, which is attached to this ROD in Appendix B. The ASJCAC generally opposes the EPA preferred ground water remedy, believing it to be vague and not protective of human health and the environment. The ASJCAC recommends further investigation and evaluation of ground water remedial alternatives. Community views and comments on the preferred alternative from the Proposed Plan for ground water were evaluated after the public comment period and are described in the responsiveness summary.

12.0 The Selected Remedy

12.1 Summary of the Rationale for the Selected Remedy

Selected Soil Remedy

After careful review of all of the comments received during the public comment period, the EPA has decided to select a dual approach for soil remediation. The EPA has selected a combination of S-8, in-situ solidification/stabilization and run-off/run-on management and Alternative S-6, off-site incineration of DNAPL contaminated soil as the best approach to remediate this Site.

Alternative S-8, in-situ solidification/stabilization and run-off/run-on management is the selected for **all** contaminated soils above the remediation goals that do not contain DNAPL down to a maximum depth of three feet because it provides the best balance of tradeoffs among the other alternatives with respect to the nine criteria evaluated, and because it will achieve substantial risk reduction by treating the entire volume of the source soil materials constituting a low-level threat at the Site. Alternative S-8 has a high level of protection of human health and the environment, because of its permanence, because of its attainment of ARARs, and because of its high level of overall reductions in the mobility of contaminants through treatment, compared to its relatively low cost. The cost for this component of the selected remedy is approximately $1,950,000.

Alternative S-6, off-site incineration is selected for those portions of the Site where **DNAPL-contaminated soil** is encountered during the excavation of soil. This remedial action will consist of the excavation and segregation of DNAPL-contaminated soils, transportation to a hazardous waste incinerator, and incineration of the DNAPL-contaminated soil. This alternative will remove the threat of the shallow DNAPL-contaminated soil, a principal threat waste. It will achieve substantial risk reduction by treating the DNAPL-contaminated soil material via off-site incineration. Alternative S-6 has a high level of protection of human health and the environment, because of its permanence, because of its attainment of ARARs, and because of its high level of overall reductions in the mobility toxicity, and volume of DNAPL contaminants through treatment, i.e., destruction, albeit at a relatively high cost compared to the other alternatives. The cost for this component of the selected remedy is approximately $917,000. This modification to the proposed plan also addresses concerns raised by NMED and the City of Albuquerque, and to some extent, the ASJCAC.

Selected Ground Water Remedy

The EPA has selected an aggressive performance-based approach for remediation of the contaminated Site ground water. This performance-based approach consists of the following components:

- Ground water restoration through pump and treat; and
- DNAPL source removal and hot spot treatment;

Alternatives 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), and GW-4 (Filtration, clay adsorption, carbon adsorption and disposal of ground water) are long term ground water pump and treat remedies that will be effective in remediating contaminated ground water to the levels that are presented in this ROD. Each of these three alternatives provides a good balance of tradeoffs with respect to the nine criteria evaluated. These three alternatives offers a high degree of protection of human health and the environment mainly because they reduce the mass and volume of contaminants through treatment in the Shallow and Intermediate aquifer zones, and ground water restoration will occur. Each of these alternatives is implementable. As a result, the EPA has decided to select a performance-based approach as its selected alternative for ground water restoration at the Site. 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), or 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 ground water remediation goals **must** be met in both the aquifer, as well as in the treated ground water. The actual cost for the selected ground water remedy will depend upon the specific method utilized. Specific cost information is provided in Tables 5 and 5a and Section 11.2.7 of this ROD.

In order to meet the remediation goals for ground water, DNAPL source removal and hot spot treatment are necessary. Alternatives GW-5 (Steam flushing), GW-6 (Co-solvent/alcohol flooding), and GW-7 (In-situ Oxidation) are technologies that are effective in removing DNAPL and treating hot spot areas. Each of these three alternatives provides a balance of tradeoffs with respect to the nine criteria evaluated in this Section. These three alternatives provide varying degrees of protection of human health and the environment mainly because of their potential to mobilize the DNAPL contamination and cause it to migrate deeper into the Santa Fe Formation aquifer if an adequate capture system is not in place. However, these three alternatives are capable of removing large quantities of DNAPL. As such, the EPA has selected a performance-based approach for DNAPL removal and hot spot treatment at the Site. Either GW-5 (Steam flushing), GW-6 (Co-solvent/alcohol flooding), or GW-7 (In-situ Oxidation), or a combination thereof, in addition to conventional DNAPL removal methods, may be utilized for DNAPL removal and hot spot treatment. The performance criteria will be DNAPL mass reduction so that the ground water remediation goals will be met. It is estimated that there are 59,300 to 75,000 gallons of DNAPL in the subsurface. The actual cost for the selected DNAPL remedy will depend upon the specific method utilized. Specific cost information is provided in Tables 5 and 5a and Section 11.2.7 of this ROD.

12.2 Description of the Selected Remedy

The Site contamination will be addressed as one unit through the remedy selected in this ROD. This response action will address the principal threat wastes and the low-level threat wastes in all environmental media.

Soil Remedy

The preferred soil remedy proposes in-situ remedial treatment and closure of soils that are above RGs by utilizing solidification/stabilization processes and covering the treated material with crushed rock for erosion and infiltration control and **off-site incineration** for those portions of the Site where **DNAPL-contaminated soil** is encountered during the excavation of soil. This involves the (1) the excavation of contaminated soils, (2) placement of excavated soil in the WWR for treatment, (3) in-situ solidification/stabilization of the excavated soils, (4) placement of 6-inch clay cap, HDPE liner, 6" soil cap, and 12-inch erosion control cover over treated material and (5) implementation of institutional controls. After issuance of the ROD, treatability studies and a detailed remedial design will be performed prior to any full-scale remedial construction activities at the site.

BNSF currently has plans to move their downtown facility to the Site. The proposed facility would expand the existing track on the western portion of the site: expansion tracks and relocated team tracks would be placed 300 feet inside the western fence line, over the existing wastewater reservoir. The selected location of the in-situ stabilization would be the western portion of the wastewater reservoir, which would have the expansion tracks placed over them. The remaining area of the wastewater reservoir would be filled with clean fill material to ground level. This track construction would not disturb the stabilized soil and would leave the rest of the site open for other improvements.

Prior to implementation of the remedy, the following site preparation activities will be performed:

- Monitoring wells affected by remedial activities will be plugged, abandoned, and replaced as needed;
- Appropriate areas will be cleared and grubbed;
- Runoff controls will be constructed for areas impacted by excavation and hauling activities;
- A perimeter security fence will be erected; and
- On-site and fence line air monitoring will be performed as appropriate.

After completion of the site preparation activities, the contaminated soils will be excavated for treatment. The excavated areas will be reconstructed with clean fill material.

All DNAPL-contaminated soils will be segregated during the contaminated soil excavation process. All of this DNAPL-contaminated soil will be transported to a permitted incineration facility. The additional cost of the incineration is estimated to be approximately $917,000 and is highly dependent upon the amount of DNAPL-contaminated soil that is encountered during the excavation process. In addition, the DNAPL-contaminated soil will be excavated down to as deep as practicable.

The western portion of the wastewater reservoir is the selected in-situ treatment area because the 1999 sludge excavation to 5 feet bgs provides adequate volume for in-situ solidification/ stabilization activities and will avoid additional excavation. High-risk soils from other areas of the site will be excavated and hauled to the wastewater reservoir area for remedial treatment. Macroencapsulation will be implemented by mixing contaminated soils with pozzolanic materials, such as fly ash, cement kiln dust, or concrete. The specific reagent will be determined during treatability studies. Once all of the contaminated soil is placed in the treatment area, the soil will be stabilized in place. Reagent materials are mechanically mixed into the soil with augers. As the augers moved down into the contaminated soil, the stabilizing agent is added as the augers mix the soil. Once the augers reach the lowest extent of contamination, they are removed and the soil is mixed a second time. After mixing of the soil and reagent is accomplished, the soil is left to cure. The stabilized material will have a compressive strength of at least 20 psi and a permeability of 1×10^{-6} cm/sec. A 6"clay cap with a maximum hydraulic conductivity of 1×10^{-7} cm/s will be placed over the stabilized soils. A HDPE liner will be placed over this first 6" clay cap to ensure that surface water infiltration does not occur. A 6-inch soil cap will be placed over the HDPE liner and graded to a 2% slope to serve as an added barrier to infiltration. A 12-inch layer of crushed rock will be placed over the clay to serve as erosion control. All excavated areas will be backfilled with clean fill and institutional controls will be implemented.

The remaining area of the wastewater reservoir will be backfilled in with clean fill up to the ground surface and graded at a slope of 2%. A 12-inch layer of crushed rock will be placed over the treated soil and also graded to a slope of 2% to serve as erosion control. After the stabilized soil has cured and the erosion control layer has been placed over the treated soil, expansion tracks will be placed over the stabilized area; this track construction will not disturb the treated soil.

Additionally, areas of low concentrations will be phytoremediated. This will provide management of residual concentrations in the soil. All excavated areas will be backfilled with clean fill and institutional controls will be implemented.

Groundwater Remedy

The EPA has selected an aggressive performance-based approach for remediation of the contaminated Site ground water. This selected remedy is a is a "pump and treat" ground water remedy where contaminated ground water is pumped out of the ground through extraction wells and brought to the surface where it is treated. Ground water would be pumped out of the shallow and intermediate aquifers through a series of extraction wells. This extracted water would flow through to an above-ground treatment plant located within the Site boundaries. Either Alternative GW-2, GW-3, or GW-3 may be utilized for the ground water remedial action. It is anticipated that a 350 gpm system will be utilized to remediate the dissolved ground water plume.

Prior to implementation, the pretreatment activities described in Section 10.1 will be performed. After completion of the site preparation activities, the contaminated ground water will be pumped for treatment.

Alternative GW-2 involves the (1) pumping of the contaminated ground water, (2) pretreatment as described in Section 10.1, (3) treatment by UV-oxidation, (4) filtration of precipitated solids, (5) treatment by granulated activated carbon and (6) disposal of treated water.

Organics in the ground water will be oxidized through high intensity UV light combined with chemical oxidant addition (peroxide). The combination of UV light and peroxide addition greatly increases the oxidation rate, therefore reducing treatment time. Additionally, catalysts, which are photo-reactive and non-toxic, may be added to significantly enhance a systems' performance. The specific combination of additives and catalysts will be determined in a treatability study.

After the UV-oxidation step, flow will be filtered to remove any oxidized precipitated solids. The final step consists of a granular activated carbon (GAC) polishing step to remove any recalcitrant organics.

Alternative GW-3 involves the (1) pumping of the contaminated ground water, (2) pretreatment as described in Section 10.1, (3) biological treatment in a fixed film bioreactor, (4) filtration of precipitated solids, (5) treatment by granulated activated carbon and (6) disposal of treated water.

Ex-situ biological treatment of the ground water will be conducted in bioreactors that will be open top units. In attached growth reactors, biomass is attached to a solid substrate, such as sand, rubber, plastic, activated carbon or resin, and forms a thick film. Contaminated water is passed through a bioreactor that houses the media and the biomass, which biodegrades the organic constituents in the water.

The primary factors influencing bioreactor design are the microbial organic utilization rates and the peak organic mass loading rate (i.e., flow rate times organic concentration). Treatability tests are necessary to determine these and other design parameters. Under most circumstances, bioreactors require a significant startup time to acclimate the microorganisms to the specific contaminants being treated before the bioreactor will operate at optimal degradation rates.

After the passing through the fixed film bioreactor, ground water will be filtered to remove any oxidized precipitated solids. The final step before disposal consists of a granular activated carbon polishing step to remove any recalcitrant organics.

Alternative GW-4 includes the ex-situ remedial treatment and disposal of ground water that is above the RGs by removing the organic constituents in the ground water by clay adsorption and consists of the (1) pumping of the contaminated ground water, (2) pretreatment as described in Section 10.1, (3) filtration of precipitated solids, (4) adsorption of organics onto clay, (5) treatment by granulated activated carbon, (5) disposal of organics adsorbed onto the clay media and (6) disposal of the treated ground water.

The ground water will be pretreated and then treated in a clay adsorption unit first, then followed by a granulated activated carbon (GAC) unit. By treating the organics in the ground water with clay prior to GAC, the life of the GAC will be extended. However, depending upon the clay adsorption capacity and contaminant breakthrough profile, the GAC adsorbers may be loaded at a faster rate than with the other alternatives. The clay adsorbers' ability to meet effluent requirements and applicable or relevant and appropriate treatment criteria while still providing an economical solution must be verified by treatability studies. The clay material will consist of a bentonite based sorbent, composed of 30% organically modified clay and 70% anthracite. The clays are manufactured to remove long chain and high molecular weight hydrocarbons, chlorinated hydrocarbons and some heavy metals. Additionally, the clay platelets, modified with a quaternary amine, have the ability to remove emulsified oil onto the clay surface. The clay can achieve oil absorption of up to 60% of its weight before exhaustion. Disposal of the clay as a hazardous waste will be accomplished by an off-site landfill or thermal destruction service depending on characterization and wastes analysis.

The DNAPL source removal and hot spot treatment is necessary to achieve the remedial goals. Alternatives GW-5, GW-6, and GW-7 are technologies that are effective in removing DNAPL and treating hot spot areas. The EPA has selected a performance-based approach for DNAPL removal and hot spot treatment at the Site. Either GW-5, GW-6, or GW-7, or a combination thereof, in addition to conventional DNAPL removal methods, may be utilized for DNAPL removal and hot spot treatment. The performance criteria will be DNAPL mass reduction so that the ground water remediation goals will be met. It is estimated that there are 59,300 to 75,000 gallons of DNAPL are in the subsurface. Each of these alternatives provides a balance of tradeoffs with respect to the nine criteria evaluated in this Section.

Institutional Controls

Institutional controls will be implemented during the response action to protect human health in the interim before the remedies have met the remediation goals. As part of the institutional controls for ground water, EPA and NMED will request that New Mexico Office of the State Engineer (OSE) 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 OSE 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. This goal should be accomplished through the pursuit of a civil judicial enforcement action under CERCLA that will require their implementation. EPA intends to implement institutional controls to the extent necessary to minimize risk to human health and the environment during implementation of the remedy.

Quarterly Ground Water 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 COCs in order to observe the direction and rate of contaminant migration. An estimated 40 wells could be necessary to adequately characterize and monitor the ground water contamination. As additional information is collected during the remedial action, the ground water monitoring program may be modified in both frequency of sampling and number of sampling points.

12.3 Summary of the Estimated Remedy Costs

Tables 4 and 5 show detailed cost estimate summaries for the selected soil and ground water remedies. The cost summary is based on the construction and annual O&M activities anticipated to implement the major components of the Selected Remedy. A 7% discount factor was used to derive these tables. The information in these cost estimate summary tables is based on the best available information regarding the anticipated scope of the Selected Remedy. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Changes in cost for the Selected Remedy will be documented in the form of a memorandum in the Site file, an Explanation of Significant Differences (ESD), or a ROD amendment depending upon NCP requirements for the change in question. The cost estimate in this ROD is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

12.4 Expected Outcomes of the Selected Remedy

The Selected Remedy meets the remedial action objectives in all of the affected media:

> ***Soil***: The Selected Remedy will address low-level threat wastes in the soil medium through the treatment of the soil via Alternative S-8, in-situ solidification/stabilization and run-off/run-on management.
>
> The primary expected outcome of implementation of the soil portion of the Selected Remedy is that the Site soils will no longer present an unacceptable risk of re-contaminating the ground water, and that the Site will continue to be suitable for residential and commercial development.
>
> ***DNAPL-contaminated Soil***: The Selected Remedy will address a principal threat waste at the Site, shallow DNAPL-contaminated soil, through removal of the DNAPL from the subsurface and treatment via Alternative S-6, incineration.
>
> The primary expected outcome of implementation of this Selected Remedy is that the shallow DNAPL-contaminated soil will no longer act as a source of contamination to surrounding soils or to the aquifer, and that the Site will continue to be suitable for residential and commercial development.
>
> ***Ground Water***: The Selected Remedy will address the low level, but significant threat waste at the Site, ground water contamination, through removal of the COCs from the subsurface with a pump and treat extraction and re-injection system for the shallow and intermediate portions of the aquifer. The Selected Remedy requires periodic environmental monitoring of the ground water to ensure that contamination is not migrating to non-contaminated areas, and it requires ground water use restrictions to protect human health until remediation goals are met. Under the EPA's Selected Remedy, the expected outcome 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.
>
> The primary expected outcome of implementation of the ground water portion of the Selected Remedy is 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 residential and commercial development.
>
> ***DNAPL***: The Selected Remedy will address the principal threat waste at the Site, DNAPL contamination, through removal of the DNAPL from the subsurface. The Selected Remedy requires periodic environmental monitoring of the ground water to ensure that the DNAPL is not migrating to non-contaminated areas, and it requires ground water use restrictions to protect human health until remediation goals are met. Under the EPA's Selected Remedy, the expected outcome is that the threat to human health posed by DNAPL at the Site will be addressed through removal.

The primary expected outcome of implementation of the DNAPL portion of the Selected Remedy is that the DNAPL will no longer act as a source of contamination of a drinking water resource, and that the Site will continue to be suitable for residential and commercial development.

The remediation goals and performance standards for the Selected Remedy, and the justification for their selection, are included in the Remedial Action Objectives and Goals section of this ROD.

13.0 Statutory Determinations

The Selected Remedy for the Site is consistent with CERCLA and, to the extent practicable, the NCP. The Selected Remedy is protective of human health and the environment, will comply with ARARs, and is cost effective. In addition, the Selected Remedy utilizes permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable, and satisfies the statutory preference for treatment that permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element.

13.1 Protection of Human Health and the Environment

The Selected Remedy will protect human health and the environment by eliminating, reducing or controlling exposures to human and environmental receptors. The Selected Remedy will reduce potential human health risk levels from exposure to Site ground water such that they do not exceed the EPA's acceptable risk range of 10^{-4} to 10^{-6} for carcinogenic risk for the ground water. It will also reduce the non-carcinogenic hazards to below a level of concern (*i.e.*, to a level at which the HI will not exceed 1). The selected remedy will reduce potential human health risk levels to protective ARARs levels (*i.e.*, the remedy will comply with ARARs). Implementation of the Selected Remedy will not pose any unacceptable short-term risks or cause any cross-media impacts.

13.2 Compliance with ARARs

The Selected Remedy for ground water -- treating the hot spot area with either enhanced bioremediation or chemical oxidation, and pumping and treating the ground water by air stripping and carbon adsorption, complies with all ARARs. The ARARs are presented below and discussed in more detail in the Feasibility Study.

Chemical, Location, and Action-Specific ARARs include the following:

- Resource Conservation and Recovery Act (RCRA) Regulations (40 CFR Parts 260 - 268)
- Safe Drinking Water Act MCLGs and MCLs (40 CFR Part 141), which specify acceptable concentration levels in ground water that serves as a potential drinking water supply;
- Clean Water Act (CWA) Regulations (40 CFR Part 403);
- Clean Air Act requirements for emissions from air stripping units.

Table 6 summarizes ARARs. Some of these ARARs might not be required depending on the final Remedial Design determinations for the Selected Remedy.

13.3 Cost-Effectiveness

The Selected Remedy is cost effective because the remedy's costs are proportional to its overall effectiveness (see 40 CFR § 300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., that are protective of human health and the environment and comply with ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria -- long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The overall effectiveness of each alternative then was compared to the alternative's costs to determine cost effectiveness. The relationship of the overall effectiveness of the Selected Remedy was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent. The selected remedy provides the same level of protection as the more costly alternatives. The addition of the incineration component of the DNAPL-contaminated soils will add an estimated $917,000 to the cost of the remedy. Table 4a contains the specific cost information for the incineration component.

13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. The Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, considering State and community acceptance, while also considering the statutory preference for treatment as a principal element and the bias against off-site treatment and disposal.

The Selected Remedy utilizes treatment to address the principal threat waste at the Site, the DNAPL and COCs in soil and ground water. The EPA expects that treatment of the COCs in ground water will restore the aquifer to a useable condition.

The shallow DNAPL-contaminated soils Selected Remedy utilizes treatment by off-site incineration to address the principal threat waste of DNAPL. The EPA expects the treatment of the shallow DNAPL-contaminated soils will protect ground water from being re-contaminated.

The low level threats at the Site posed by soil contaminated with COCs will be treated, stabilized, and capped. The EPA expects the treatment of the COCs in soil will meet the remedial action objective for the soil, and protect ground water from being re-contaminated by the soil.

13.5 Preference for Treatment as a Principal Element

This remedy also 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).

13.6 Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years of initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

Potential Innovative Technologies

The EPA is committed to reviewing the potential use of innovative technologies at this Site to achieve the remedial goals in a timely manner. However, because of the unique geological characteristics, i.e., several thousand vertical feet of sands and gravel, the inherent nature of the DNAPL to sink (until an aquitard is encountered, or the DNAPL mass becomes residual in the aquifer matrix and can no longer migrate downward via gravity) and the fact that the Site is located over the only drinking water aquifer for the Albuquerque region, the potential risks may outweigh the potential benefits of the available innovative technologies that were reviewed. As new technologies are developed, or as existing innovative technologies are refined, these alternatives will be reviewed to determine if they can successfully remediate the DNAPL creosote in the future.

At a minimum, innovative technologies will be reviewed during each five-year review for their applicability to this Site.

14.0 Documentation of Significant Changes

To fulfill CERCLA §117(b) and NCP §§300.430(f)(5)(iii)(B) and 300.430(f)(3)(ii)(A), the ROD must document and discuss the reasons for any significant changes made to the selected remedy. The Proposed Plan for the Site was released for public comment on February 7, 2002. It identified Alternative S-8, in-situ solidification/stabilization and run-off/run-on management as the Preferred Alternative for soil remediation. Alternative S-6, off-site incineration, was also considered in the Proposed Plan. During the public comment period, new information indicated that DNAPL-contaminated soils might be encountered during the implementation of the selected Remedy S-8. Therefore, EPA and NMED decided to select Alternative S-6 for those portions of the Site where **DNAPL-contaminated soil** is encountered during the excavation of soil while implementing Remedy S-8. This will consist of the excavation and segregation of DNAPL-contaminated soils, down to the maximum practicable depth, transportation to an off-site hazardous waste incinerator facility in accordance with 40 CFR 300.440, and incineration of the DNAPL-contaminated soil at such facility. By adding this component, the EPA has addressed the concern of shallow DNAPL-contaminated soil acting as a principal threat waste.

The Proposed Plan identified a performance based ground water remediation approach consisting of using either Alternative 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, or GW-4, filtration, clay adsorption, carbon adsorption and disposal of ground water as the Preferred Alternatives for soil and ground water remediation. In addition, using either Alternatives GW-5, Steam Flushing, GW-6, Co-Solvent/Alcohol Flushing, or GW-7, In-Situ Oxidation, or a combination thereof, for DNAPL removal. In order to ensure the effectiveness of the ground water remediation system, the EPA and NMED have added a quarterly ground water monitoring component to assess the extent of any remaining contamination and potential risks to human health. The quarterly ground water monitoring program was not specifically discussed in the proposed plan, but it is inherent in any ground water remediation system and supported by the Administrative Record.

The EPA reviewed all written and verbal comments submitted during the public comment period and determined that no unanticipated significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

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FIGURES

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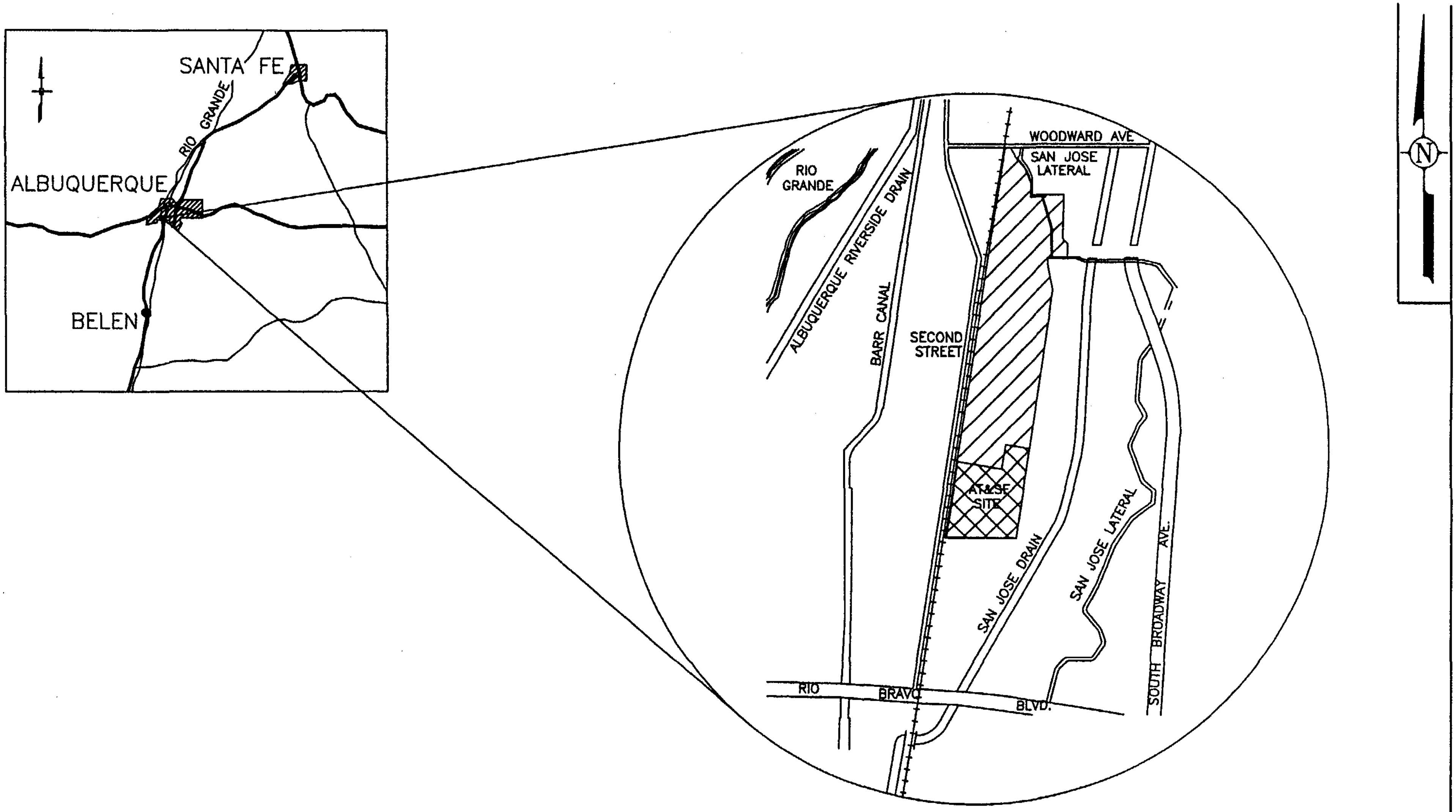


NOT TO SCALE

LEGEND:

▨ EXTENT OF FORMER TIE TREATING PLANT AND RAIL YARD

▩ AREA OF FORMER TIE TREATING PLANT

SITE LOCATION MAP

AT & SF SITE
ALBUQUERQUE, NEW MEXICO

TRC

FIGURE 1-1

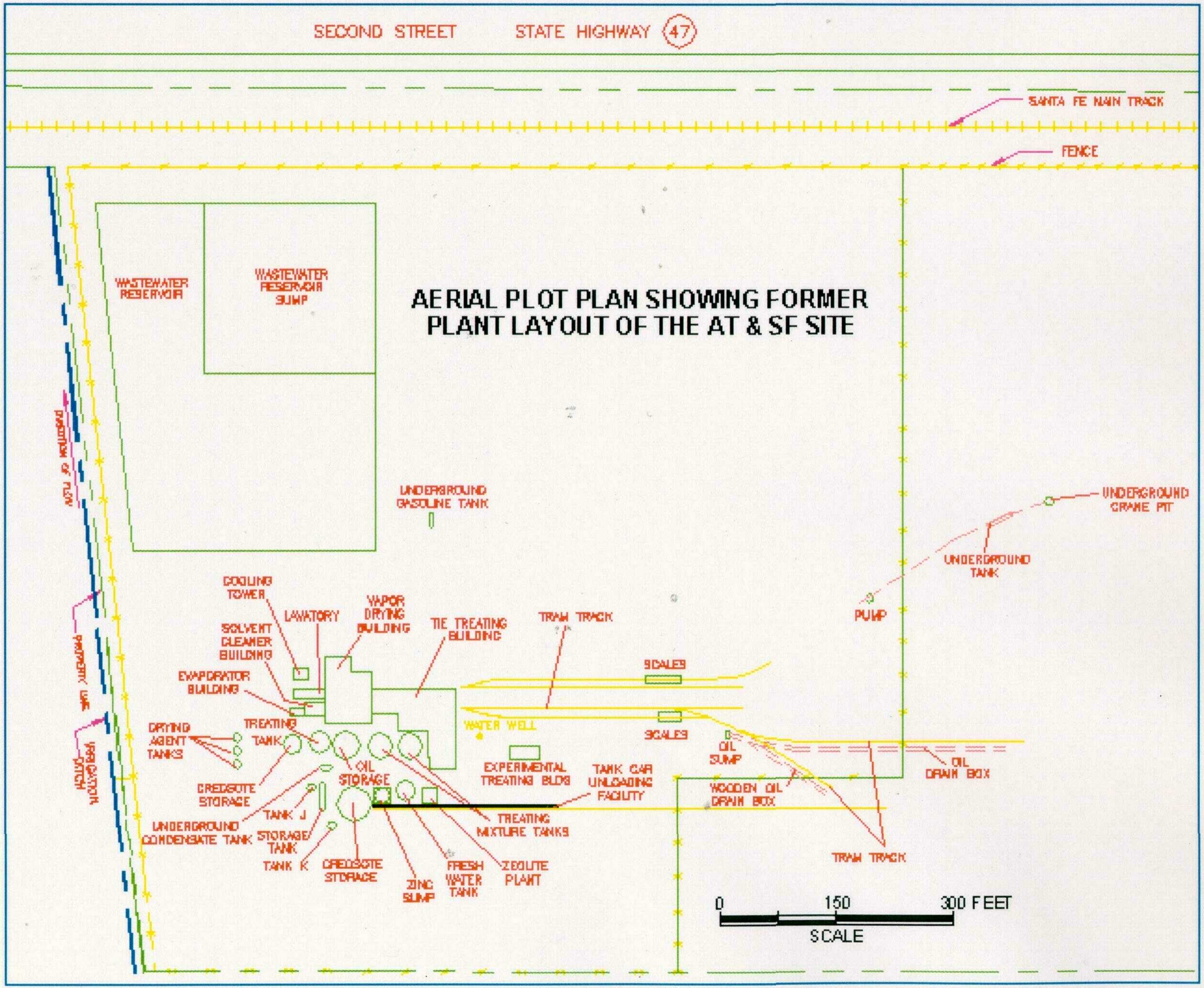


Figure 2 – Historical Site Layout Map

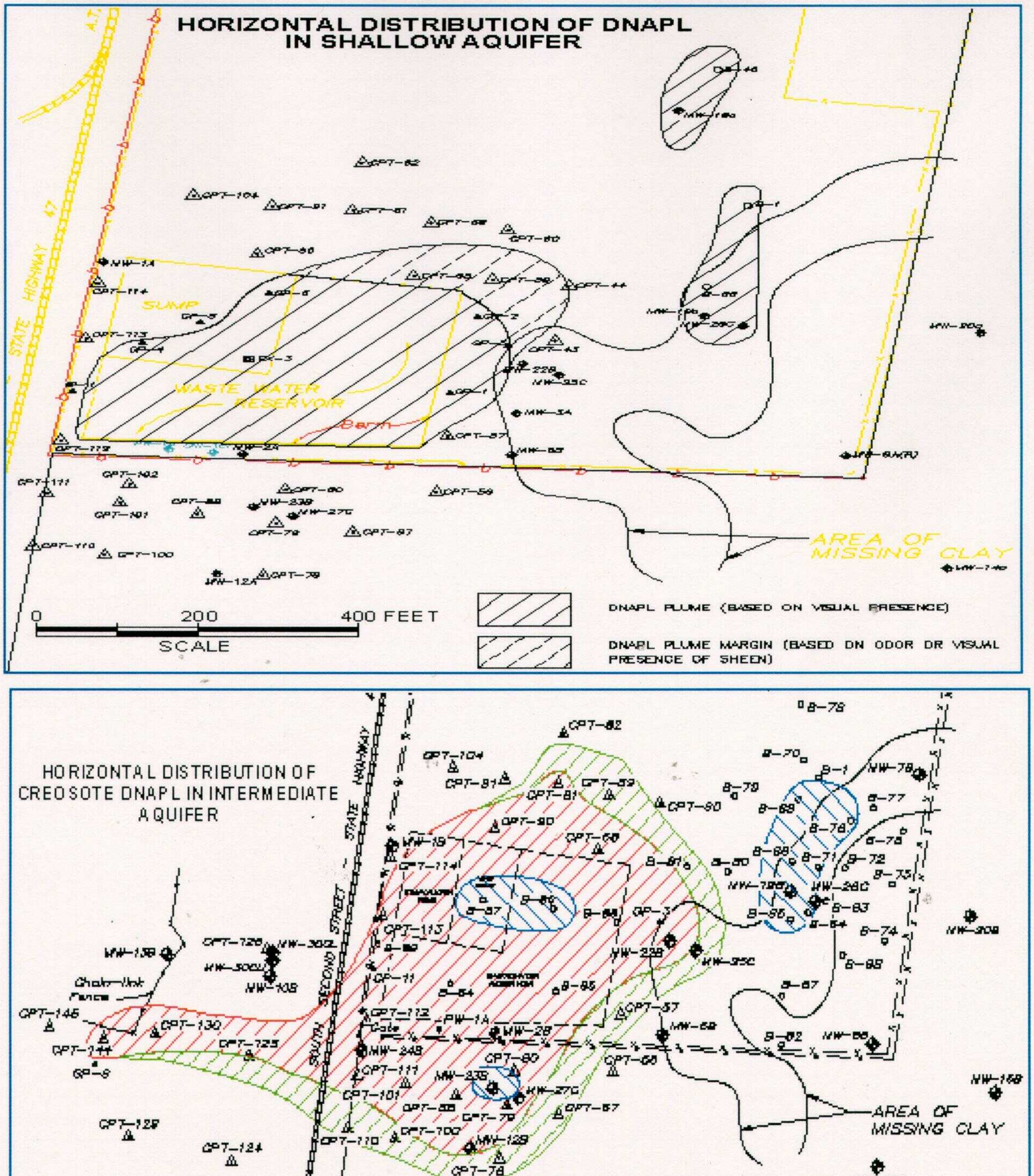


Figure 3 – DNAPL Distribution Map

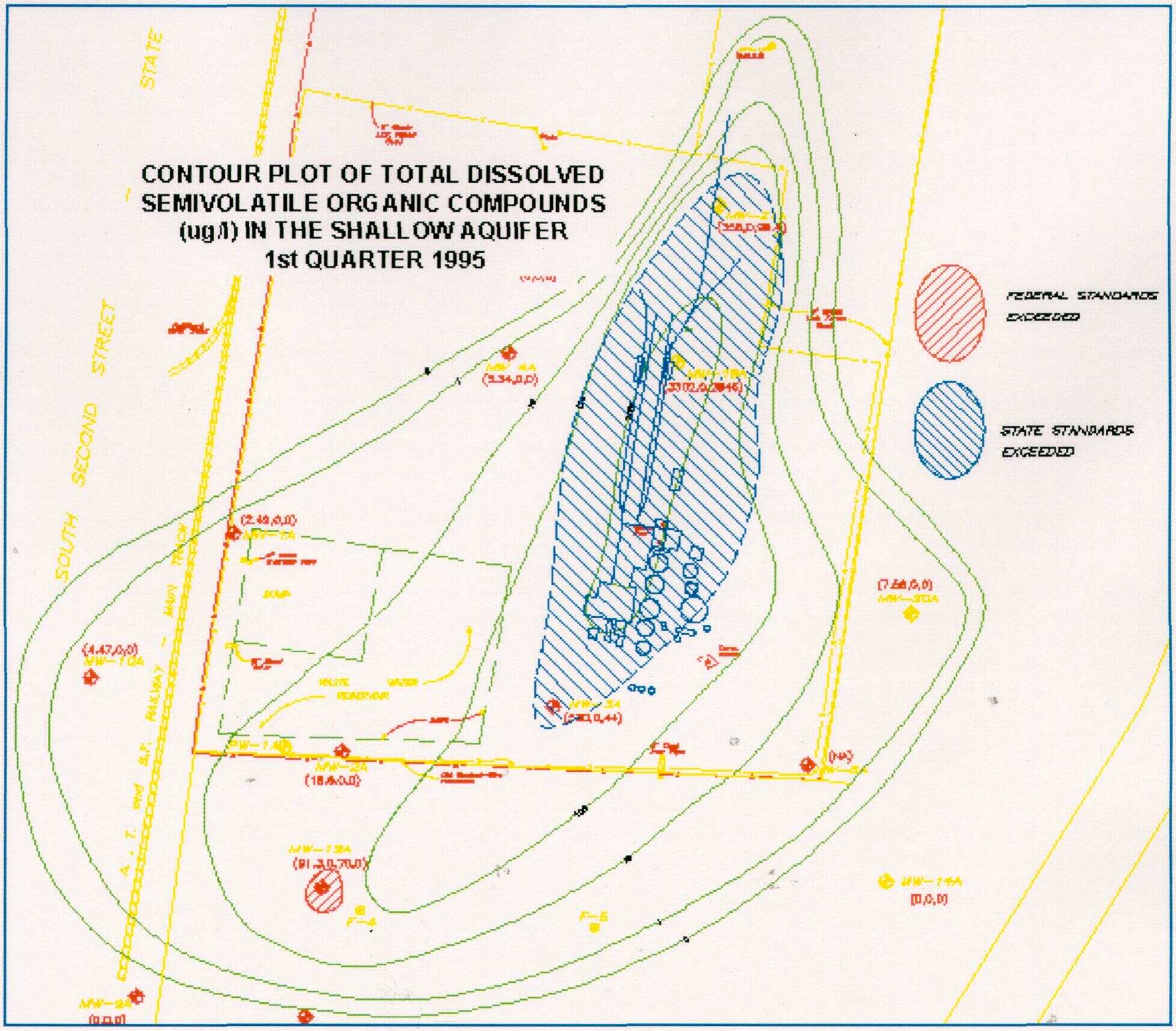


Figure 4 – Shallow Aquifer Contamination

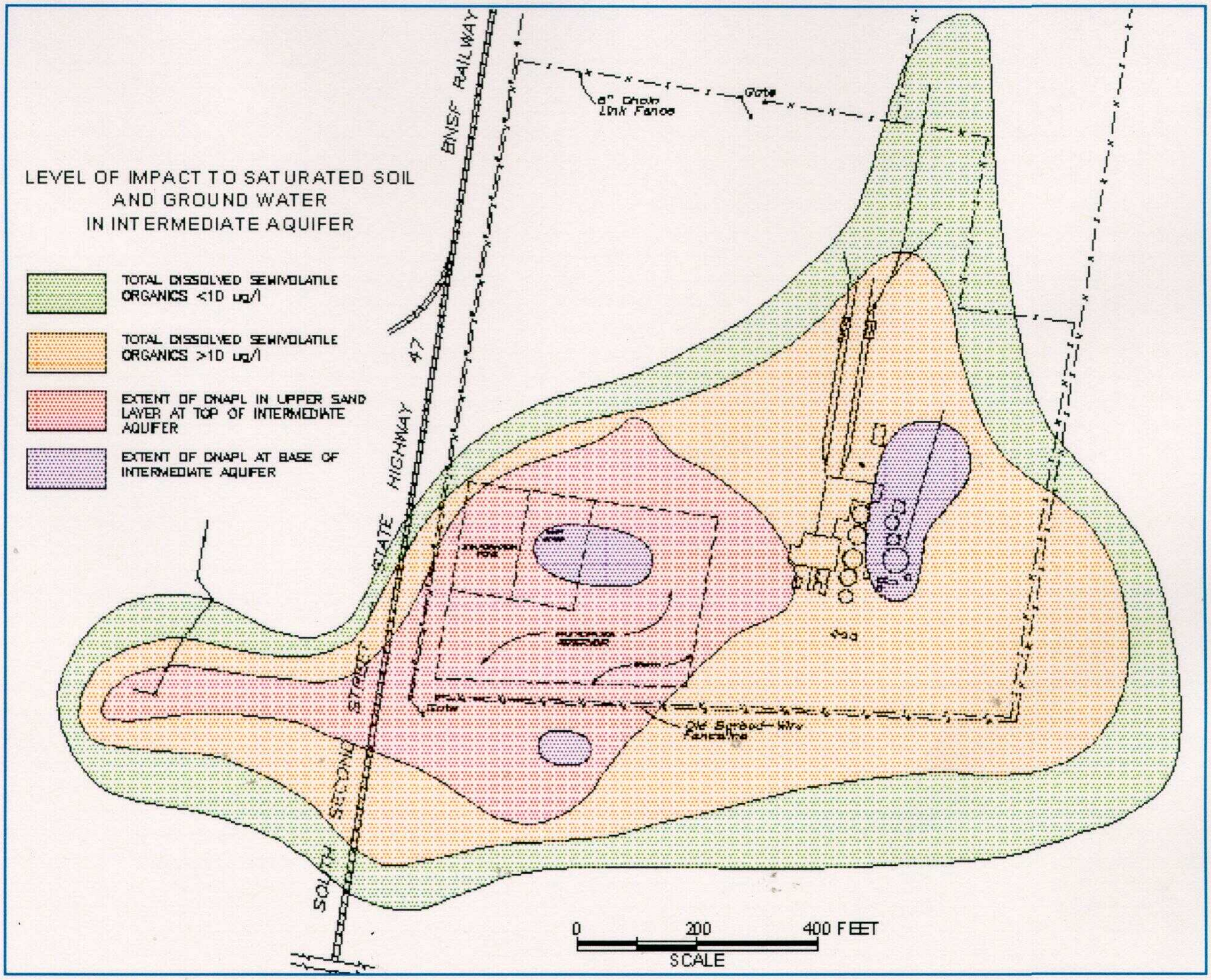


Figure 5 – Intermediate Aquifer Contamination Map

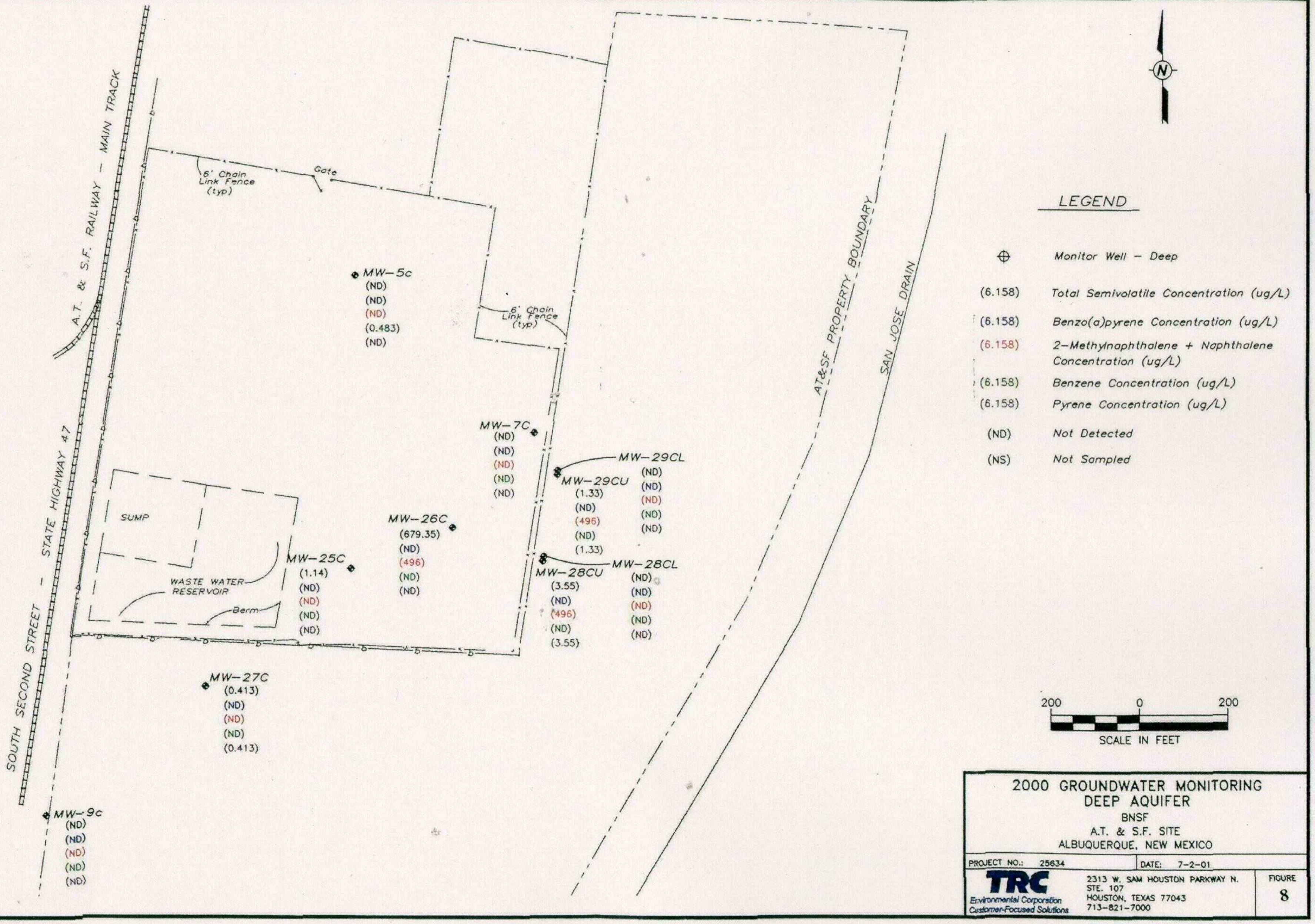
FIGURE 7
EXTENT OF DISSOLVED-PHASE
SEMIVOLATILE ORGANIC COMPOUNDS IN
THE INTERMEDIATE AQUIFER – OCTOBER 2000

AT&SF SITE
ALBUQUERQUE, NEW MEXICO

TRC

PROJ. No.: 25634

DWG. No.: N3399ED_00.DWG



2000 GROUNDWATER MONITORING
DEEP AQUIFER
BNSF
A.T. & S.F. SITE
ALBUQUERQUE, NEW MEXICO

PROJECT NO.: 25634
DATE: 7-2-01

TRC
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Customer-Focused Solutions

2313 W. SAM HOUSTON PARKWAY N.
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HOUSTON, TEXAS 77043
713-821-7000

FIGURE
8

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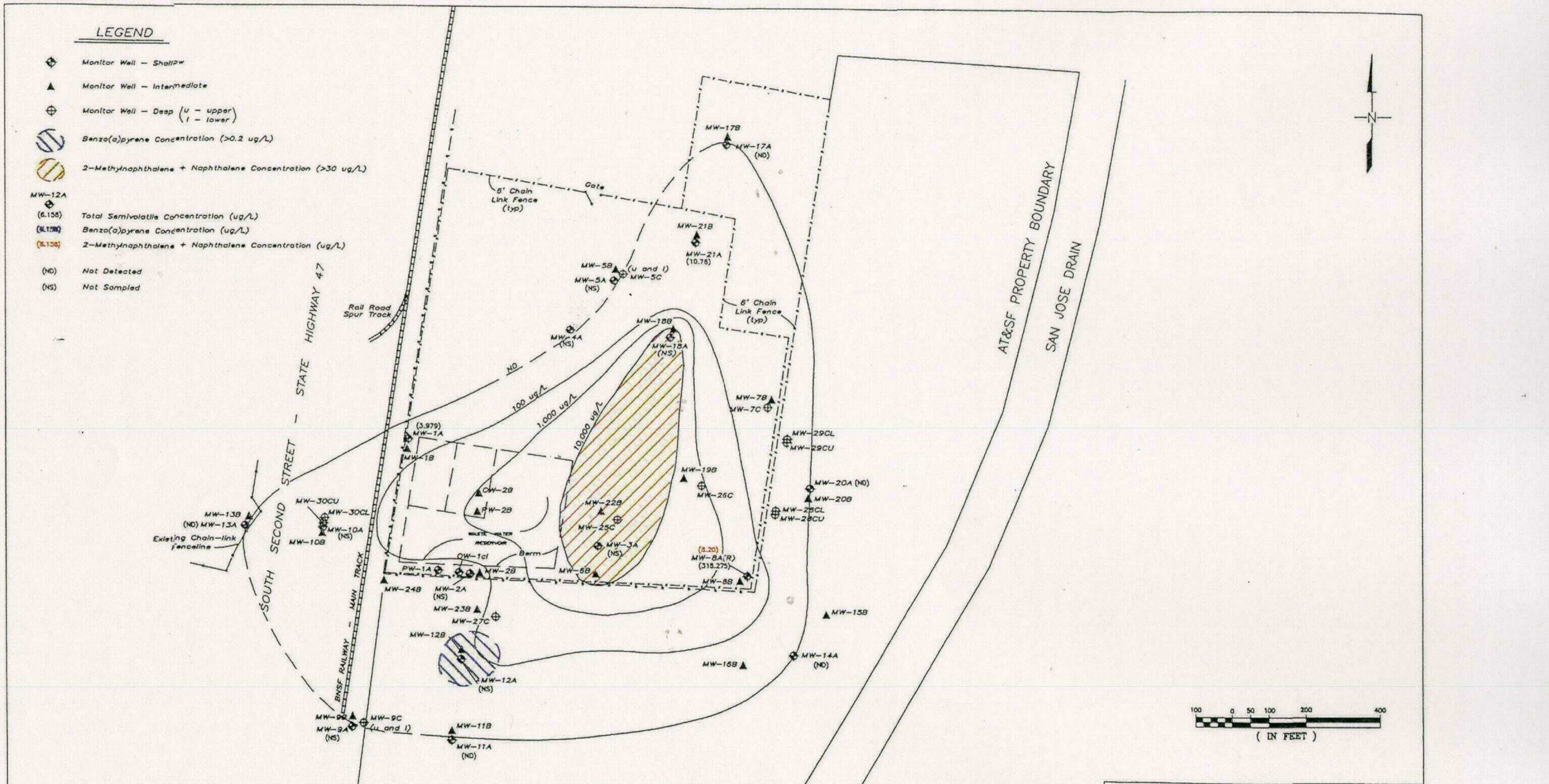

FIGURE 6
EXTENT OF DISSOLVED-PHASE SEMIVOLATILE ORGANIC COMPOUNDS IN THE SHALLOW AQUIFER – OCTOBER 2000

AT&SF SITE
ALBUQUERQUE, NEW MEXICO

TRC

PROJ. No.:	25634
DWG. No.:	N3128ED_00.DWG

TABLES

Table 1
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations
AT&SF Albuquerque Superfund Site

Scenario Timeframe: Current/Future

Exposure Point	Medium	Chemical of Concern	Conc. Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
			Min	Max					
Ditch	Surface Soil	Zinc	35.4	511	mg/kg	100%	511	mg/kg	Max
		Benz(a)anthracene	0.0268	3.21	mg/kg	73%	3.21	mg/kg	Max
		Benz(a)pyrene	0.0929	3.07	mg/kg	55%	3.07	mg/kg	Max
		Benzo(b)fluoranthene	0.0485	8.56	mg/kg	73%	8.56	mg/kg	Max
		Benzo(k)fluoranthene	0.0485	8.56	mg/kg	73%	8.56	mg/kg	Max
		Dibenz(a,h)anthracene	0.0474	0.693	mg/kg	18%	0.693	mg/kg	Max
		Dibenzofuran	0.0823	0.568	mg/kg	36%	0.568	mg/kg	Max
		Indeno(1,2,3-c,d)pyrene	0.0295	1.61	mg/kg	64%	1.61	mg/kg	Max
		2-Methylnaphthalene	0.0519	0.369	mg/kg	45%	0.369	mg/kg	Max
		Naphthalene	0.0354	0.872	mg/kg	55%	0.872	mg/kg	Max
Tie Treatment Area and WWR Area	Surface and Subsurface Soil	Zinc	8.26	7,650	mg/kg	92%	7,650	mg/kg	Max
		Benz(a)anthracene	0.0844	566	mg/kg	41%	566	mg/kg	Max
		Benz(a)pyrene	0.0474	1,200	mg/kg	33%	1,200	mg/kg	Max
		Benzo(b)fluoranthene	0.0985	300	mg/kg	36%	300	mg/kg	Max
		Benzo(k)fluoranthene	0.0662	200	mg/kg	36%	200	mg/kg	Max
		Dibenz(a,h)anthracene	0.797	6.67	mg/kg	5%	6.67	mg/kg	Max
		Dibenzofuran	0.08	1,900	mg/kg	40%	1,900	mg/kg	Max
		Indeno(1,2,3-c,d)pyrene	0.0664	350	mg/kg	31%	350	mg/kg	Max
		2-Methylnaphthalene	0.0984	1,800	mg/kg	28%	1,800	mg/kg	Max
		Naphthalene	0.0953	3,500	mg/kg	40%	3,500	mg/kg	Max
Deep Aquifer Off-Site	Ground Water	Benzene	0.0335	0.0335	ug/l	25%	0.0335	ug/l	Max
		Dibenzofuran	1.81	4.95	ug/l	50%	4.95	ug/l	Max
		2-Methylnaphthalene	5.55	5.55	ug/l	25%	5.55	ug/l	Max
		Naphthalene	23.6	23.6	ug/l	25%	23.6	ug/l	Max
Shallow Aquifer On-Site	Ground Water	Benzene	0.0505	120	ug/l	68%	120	ug/l	Max
		Benz(a)anthracene	0.329	1.15	ug/l	23%	1.15	ug/l	Max
		Benz(a)pyrene	0.165	0.165	ug/l	3%	0.165	ug/l	Max
		Benzo(b)fluoranthene	0.242	0.242	ug/l	3%	0.242	ug/l	Max
		Benzo(k)fluoranthene	0.319	0.319	ug/l	3%	0.319	ug/l	Max
		Bis(2-ethylhexyl) phthalate	12.7	966	ug/l	5%	966	ug/l	Max
		Carbazole	121	479	ug/l	67%	479	ug/l	Max
		Chrysene	0.325	22.9	ug/l	23%	22.9	ug/l	Max
		Dibenzofuran	0.225	303	ug/l	45%	303	ug/l	Max
		2-Methylnaphthalene	394	901	ug/l	33%	901	ug/l	Max
		Naphthalene	0.758	14,400	ug/l	45%	14,400	ug/l	Max
Intermediate Aquifer On-Site	Ground Water	Benzene	0.0543	240	ug/l	64%	240	ug/l	Max
		Benz(a)anthracene	3.72	98.7	ug/l	12%	98.7	ug/l	Max
		Benz(a)pyrene	1.01	31.6	ug/l	12%	31.6	ug/l	Max
		Benzo(b)fluoranthene	1.29	32.8	ug/l	12%	32.8	ug/l	Max
		Benzo(k)fluoranthene	0.79	26.2	ug/l	12%	26.2	ug/l	Max
		Bis(2-ethylhexyl) phthalate	0.463	534	ug/l	9%	534	ug/l	Max
		Carbazole	11	11	ug/l	50%	11	ug/l	Max
		Chrysene	0.761	88.3	ug/l	15%	88.3	ug/l	Max
		Dibenz(a,h)anthracene	4.25	4.25	ug/l	4%	4.25	ug/l	Max
		Dibenzofuran	3.12	582	ug/l	88%	582	ug/l	Max
		Indeno(1,2,3-c,d)pyrene	2.92	8.63	ug/l	7%	8.63	ug/l	Max
		2-Methylnaphthalene	0.799	680	ug/l	27%	680	ug/l	Max
		Naphthalene	0.944	12,800	ug/l	42%	12,800	ug/l	Max
Deep Aquifer On-Site	Ground Water	Benzene	0.0474	0.158	ug/l	38%	0.158	ug/l	Max
		Carbazole	32.3	32.3	ug/l	50%	32.3	ug/l	Max
		Dibenzofuran	44.8	76.6	ug/l	50%	76.6	ug/l	Max
		2-Methylnaphthalene	25.5	59.4	ug/l	50%	59.4	ug/l	Max
		Naphthalene	606	1,120	ug/l	50%	1,120	ug/l	Max

KEY

mg/kg: milligrams per kilograms
ug/l: microgram per liter
MAX: Maximum Concentration
Reference: Human Health Risk Assessment Tables 2.1, 2.2, 2.3, 2.4, 2.9, 2.10, 2.11, 2.12, 2.13

This table presents the chemicals of concern (COCs) and exposure point concentrations for each of the COCs that could be detected for ground water and soil. This table includes the range of concentration detected for each COC, as well as the frequency of detection in ground water samples, the exposure point concentration (EPC), and the basis for derivation of the EPC.

TABLE 2
CANCER TOXICITY DATA - ORAL/DERMAL
AT&SF Albuquerque Superfund Site
Albuquerque, New Mexico

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Type of Cancer	Sources of Slope Factor/Target Organ	Date
INORGANICS								
Arsenic	1.50E+00	0.7	2.14E+00	mg/kg/d^{-1}	A	Liver, kidney, lung, bladder	IRIS	01/18/01
Manganese	NA	0.055	NA		D			
VOLATILES								
Benzene	5.50E-02	0.97	5.67E-02	mg/kg/d^{-1}	A	Leukemia	Occup./IRIS	11/22/00
SEMIVOLATILES								
Benzo(a)anthracene (a)	7.30E-01	0.31	2.35E+00	mg/kg/d^{-1}	B2	Forestomach	Diet/IRIS	11/22/00
Benzo(a)pyrene	7.30E+00	0.31	2.35E+01	mg/kg/d^{-1}	B2	Forestomach	Diet/IRIS	11/22/00
Benzo(b)fluoranthene (a)	7.30E-01	0.31	2.35E+00	mg/kg/d^{-1}	B2	Forestomach	Diet/IRIS	11/22/00
Benzo(k)fluoranthene (a)	7.30E-02	0.31	2.35E-01	mg/kg/d^{-1}	B2	Forestomach	Diet/IRIS	11/22/00
bis(2-Ethylhexyl)phthalate	1.40E-02	0.31	4.52E-02	mg/kg/d^{-1}	B2	Liver	Diet/IRIS	11/22/00
Carbazole	2.00E-02	0.31	6.45E-02	mg/kg/d^{-1}	B2	Liver	Diet/HEAST	FY97, July
Chrysene (a)	7.30E-03	0.31	2.35E-02	mg/kg/d^{-1}	B2	Forestomach	Diet/IRIS	11/22/00
Dibenzofuran	NA	0.31	NA		D			
Dibenz(a,h)anthracene (a)	7.30E+00	0.31	2.35E+01	mg/kg/d^{-1}	B2	Forestomach	Diet/IRIS	11/22/00
Indeno(1,2,3-cd)pyrene (a)	7.30E-01	0.31	2.35E+00	mg/kg/d^{-1}	B2	Forestomach	Diet/IRIS	11/22/00
Methylnaphthalene, 2-	NA	0.31	NA					
Naphthalene	NA	0.31	NA		C			
Phenanthrene	NA	0.31	NA		D			
DIOXINS/FURANS								
TCDD-TEQ	1.5E+05	0.31	4.84E+05	mg/kg/d^{-1}	B2	Respiratory System, Liver	Diet/HEAST	FY97, July

(a) Cancer slope factor for Benzo(a)pyrene with appropriate TEF applied.
(1) SFd = SFo / Oral to Dermal Adj. Factor
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables

EPA Group:
- A - Human carcinogen
- B1 - Probable human carcinogen - indicates that limited human data are available
- B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
- C - Possible human carcinogen
- D - Not classifiable as a human carcinogen
- E - Evidence of noncarcinogenicity

Weight of Evidence:
- Known/Likely
- Cannot be Determined
- Not Likely

TABLE 2a
CANCER TOXICITY DATA - INHALATION
AT&SF Albuquerque Superfund Site
Albuquerque, New Mexico

Chemical of Potential Concern	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Type of Cancer	Sources of Slope Factor/ Target Organ	Date
INORGANICS									
Arsenic	4.30E-03	(ug/m^3)$^{-1}$	3.50E+03	1.51E+01	mg/kg/d^{-1}	A	Lung	Occup./IRIS	1/18/2001
Manganese	NA			NA		D			
VOLATILES									
Benzene	7.71E-06	(ug/m^3)$^{-1}$	3.50E+03	2.70E-02	mg/kg/d^{-1}	A	Leukemia	Occup./IRIS	11/22/2000
SEMIVOLATILES									
Benzo(a)anthracene	NA			NA		B2			
Benzo(a)pyrene	NA			NA		B2			
Benzo(b)fluoranthene	NA			NA		B2			
Benzo(k)fluoranthene	NA			NA		B2			
bis(2-Ethylhexyl)phthalate	NA			NA		B2			
Carbazole	5.71E-06	(ug/m^3)$^{-1}$	3.50E+03	2.00E-02	mg/kg/d^{-1}	B2	Liver	Diet/HEAST	FY97, July
Chrysene	NA			NA		B2			
Dibenzofuran	NA			NA		D			
Dibenz(a,h)anthracene	NA			NA		B2			
Indeno(1,2,3-cd)pyrene	NA			NA		B2			
Methylnaphthalene, 2-	NA			NA					
Naphthalene	NA			NA		C			
Phenanthrene	NA			NA		D			
DIOXINS/FURANS									
TCDD-TEQ	3.21E-02	(ug/m^3)$^{-1}$	4.67E+06	1.50E+05	mg/kg/d^{-1}	B2	Respiratory System, Liver	Diet/HEAST	FY97, July

IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables

Weight of Evidence:
Known/Likely
Cannot be Determined

EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

TABLE 3
NON-CANCER CHRONIC TOXICITY DATA -- INHALATION
AT&SF Albuquerque Superfund Site
Albuquerque, New Mexico

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD	Units	Primary Target Organ/ Effects	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (2) (MM/DD/YY)
INORGANICS									
Arsenic		NA							
Manganese	Chronic	5.00E-05	mg/m^3	1.43E-05	mg/kg-d	Neurobehavioral functions	1000	Occup./IRIS	1/18/2001
VOLATILES									
Benzene		NA		NA					
SEMIVOLATILES									
Benzo(a)anthracene		NA		NA					
Benzo(a)pyrene		NA		NA					
Benzo(b)fluoranthene		NA		NA					
Benzo(k)fluoranthene		NA		NA					
bis(2-Ethylhexyl)phthalate		NA		NA					
Carbazole		NA		NA					
Chrysene		NA		NA					
Dibenzofuran	Chronic	1.40E-02	mg/m^3	4.00E-03	mg/kg-d			EPA Region VI MSCs	Sep-00
Dibenz(a,h)anthracene		NA		NA					
Indeno(1,2,3-cd)pyrene		NA		NA					
Methylnaphthalene, 2- (a)	Chronic	3.00E-03	mg/m^3	8.57E-04	mg/kg-d	Upper Respiratory Tract	3000	Inhalation/IRIS	11/22/2000
Naphthalene	Chronic	3.00E-03	mg/m^3	8.57E-04	mg/kg-d	Upper Respiratory Tract	3000	Inhalation/IRIS	11/22/2000
Phenanthrene (a)		NA		NA					
DIOXINS/FURANS									
TCDD-TEQ		NA		NA					

(a) Cross-assigned from Naphthalene
N/A = Not Applicable

TABLE 3a
NON-CANCER SUB-CHRONIC TOXICITY DATA -- INHALATION
AT&SF Albuquerque Superfund Site

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD (1)	Units	Primary Target Organ/ Effects	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (2) (MM/DD/YY)
INORGANICS									
Arsenic		NA		NA					
Boron	Sub-Chronic (1)	2.00E-02	mg/m^3	5.71E-03	mg/kg/d	Respiratory Tract	100	Inhalation/HEAST	FY97, July
Cadmium		NA		NA					
Copper		NA		NA					
Mercury (a)	Sub-Chronic (1)	3.00E-04	mg/m^3	8.57E-05	mg/kg/d	Autonomic Nervous System	30	Occup./IRIS	11/22/2000
Tin		NA		NA					
Zinc		NA		NA					
VOLATILES									
Acetone		NA		NA					
Benzene		NA		NA					
Carbon tetrachloride		NA		NA					
Ethylbenzene	Sub-Chronic (1)	1.00E+00	mg/m^3	2.86E-01	mg/kg/d	Developmental Effects	300	Inhalation/IRIS	11/22/2000
Methylene chloride	Sub-Chronic	3.00E+00	mg/m^3	8.57E-01	mg/kg/d	Liver	100	Inhalation/HEAST	FY97, July
Toluene	Sub-Chronic	4.00E+00	mg/m^3	1.14E+00	mg/kg/d	Neurological effects	300	Occup./IRIS	1/18/2001
Xylene, Total		NA		NA					
SEMIVOLATILES									
Acenaphthene		NA		NA					
Acenaphthylene		NA		NA					
Anthracene		NA		NA					
Benzo(a)anthracene		NA		NA					
Benzo(a)pyrene		NA		NA					
Benzo(b)fluoranthene		NA		NA					
Benzo(g,h,i)perylene		NA		NA					
Benzo(k)fluoranthene		NA		NA					
Carbazole		NA		NA					
Chrysene		NA		NA					
Di-n-butylphthalate		NA		NA					
Dibenzofuran	Sub-Chronic (1)	1.40E-02	mg/m^3	4.00E-03	mg/kg/d			EPA Region VI MSCs	Sep-00
Dibenz(a,h)anthracene		NA		NA					
Fluoranthene		NA		NA					
Fluorene		NA		NA					
Indeno(1,2,3-cd)pyrene		NA		NA					
Methylnaphthalene, 2- (b)	Sub-Chronic (1)	3.00E-03	mg/m^3	8.57E-04	mg/kg/d	Upper Respiratory Tract	3000	Inhalation/IRIS	11/22/2000
N-Nitrosodiphenylamine		NA		NA					
Naphthalene	Sub-Chronic (1)	3.00E-03	mg/m^3	8.57E-04	mg/kg/d	Upper Respiratory Tract	3000	Inhalation/IRIS	11/22/2000
Phenanthrene (b)	Sub-Chronic (1)	NA		NA			3000	Inhalation/IRIS	11/22/2000
Phenol		NA		NA					
Pyrene		NA		NA					
DIOXINS/FURANS									
TCDD-TEQ		NA		NA					

(a) As elemental mercury
(b) Cross-assigned from Naphthalene
N/A = Not Applicable
(1) Provide equation used for derivation in text.
(2) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For NCEA values, provide the date of the article provided by NCEA.

TABLE 3b
NON-CANCER CHRONIC TOXICITY DATA - ORAL/DERMAL
AT&SF Albuquerque Superfund Site
Albuquerque, New Mexico

Chemical of Potential Concern	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor	ref.	Adjusted Dermal RfD (1)	Units	Primary Target Organ/ Effects	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
INORGANICS										
Arsenic	3.00E-04	mg/kg-d	0.7	ATSDR	2.10E-04	mg/kg-d	Keratosis, vasculare	3	Oral/IRIS	1/18/2001
Manganese	1.40E-01	mg/kg-d	0.055	ATSDR	7.70E-03	mg/kg-d	CNS	1	Diet/IRIS	1/18/2001
VOLATILES										
Benzene	NA		0.97	ATSDR	NA					
SEMIVOLATILES										
Benzo(a)anthracene	NA		0.31	ATSDR	NA					
Benzo(a)pyrene	NA		0.31	ATSDR	NA					
Benzo(b)fluoranthene	NA		0.31	ATSDR	NA					
Benzo(k)fluoranthene	NA		0.31	ATSDR	NA					
bis(2-Ethylhexyl)phthalate	1.40E-02	mg/kg-d	0.25	ATSDR	3.50E-03	mg/kg-d	None Observed	N/A	EPA, REG. VI	Sep-00
Carbazole	NA		0.7	ATSDR	NA					
Chrysene	NA		0.31	ATSDR	NA					
Dibenzofuran	4.00E-03	mg/kg-d	0.5	ATSDR	2.00E-03	mg/kg-d			EPA Region VI MSCs	Sep-00
Dibenz(a,h)anthracene	NA		0.31	ATSDR	NA					
Indeno(1,2,3-cd)pyrene	NA		0.31	ATSDR	NA					
Methylnaphthalene, 2- (a)	2.00E-02	mg/kg-d	0.8	ATSDR	1.60E-02	mg/kg-d	Body Weight	3000	Oral/IRIS	11/22/2000
Naphthalene	2.00E-02	mg/kg-d	0.8	ATSDR	1.60E-02	mg/kg-d	Body Weight	3000	Oral/IRIS	11/22/2000
Phenanthrene (a)	2.00E-02	mg/kg-d	0.31	ATSDR	6.20E-03	mg/kg-d	Body Weight	3000	Oral/IRIS	11/22/2000
DIOXINS/FURANS										
TCDD-TEQ	NA		0.19	ATSDR	NA					

(a) Cross-assigned from Naphthalene
N/A = Not Applicable
(1) RfDd = RfDo x Oral to Dermal Adj. Factor

TABLE 3c
NON-CANCER SUB-CHRONIC TOXICITY DATA – ORAL/DERMAL
AT&SF Albuquerque Superfund Site
Albuquerque, New Mexico

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor	ref.	Adjusted Dermal RfD (2)	Units	Primary Target Organ/ Effects	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
INORGANICS											
Arsenic	Subchronic (1)	3.00E-04	mg/kg-d	0.7	ATSDR	2.10E-04	mg/kg-d	Keratosis, vasculare	3	Oral/IRIS	1/18/2001
Boron	Subchronic (1)	#REF!	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Male reproductive System	100	Diet/IRIS	11/22/2000
Cadmium	Subchronic (1)	1.00E-03	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Kidney	10	Diet/IRIS	11/22/2000
Copper (a)	Subchronic (1)	#REF!	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d			Oral/HEAST	FY97, July
Mercury (b)	Subchronic	3.00E-03	mg/kg-d	0.2	ATSDR	6.00E-04	mg/kg-d	Autoimmune Effects	100	Diet/HEAST	FY97, July
Tin	Subchronic (1)	6.00E-01	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Liver, Kidney	100	Diet/HEAST	FY97, July
Zinc	Subchronic (1)	3.00E-01	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Decrease in EOSE	3	Diet/IRIS	1/18/2001
VOLATILES											
Acetone	Subchronic	1.00E+00	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Increased liver and kidney weights	1000	Oral/IRIS	1/18/2001
Benzene		NA		0.97	ATSDR	NA					
Carbon tetrachloride	Subchronic (1)	7.00E-04	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Liver	1000	Oral/IRIS	11/22/2000
Ethylbenzene	Subchronic (1)	1.00E-01	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Liver and Kidney	1000	Oral/IRIS	11/22/2000
Methylene chloride	Subchronic (1)	6.00E-02	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Liver	100	Water/IRIS	FY97, July
Toluene	Subchronic	2.00E+00	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Liver and Kidney	1000	Oral/IRIS	1/18/2001
Trichlorofluoromethane	Subchronic	7.00E-01	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Increased Mortality	1000	Oral/HEAST	FY97, July
Xylene, o	Subchronic (1)	2.00E+00	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Increased Mortality, CNS, Decreased body weight	100	Oral/IRIS	11/22/2000
Xylene, Total	Subchronic (1)	2.00E+00	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Increased Mortality, CNS, Decreased body weight	100	Oral/IRIS	11/22/2000
SEMIVOLATILES											
Acenaphthene	Subchronic	6.00E-01	mg/kg-d	0.31	ATSDR	1.86E-01	mg/kg-d	Liver	300	Oral/HEAST	FY97, July
Acenaphthylene		NA		0.31	ATSDR	NA					
Anthracene	Subchronic	3.00E+00	mg/kg-d	0.31	ATSDR	9.30E-01	mg/kg-d	None Observed	300	Oral/HEAST	FY97, July
Benzo(a)anthracene		NA		0.31	ATSDR	NA					
Benzo(a)pyrene		NA		0.31	ATSDR	NA					
Benzo(b)fluoranthene		NA		0.31	ATSDR	NA					
Benzo(g,h,i)perylene		NA		0.31	ATSDR	NA					
Benzo(k)fluoranthene		NA		0.31	ATSDR	NA					
Carbazole		NA		0.7	ATSDR	NA					
Chrysene		NA		0.31	ATSDR	NA					
Di-n-butylphthalate	Subchronic	1.00E+00	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Increased Mortality	100	Diet/HEAST	FY97, July
Dibenzofuran	Subchronic (1)	4.00E-03	mg/kg-d	0.31	ATSDR	1.24E-03	mg/kg-d			EPA Region VI MSCs	Sep-00
Dibenz(a,h)anthracene		NA		#REF!	ATSDR	NA					
Fluoranthene	Subchronic	4.00E-01	mg/kg-d	0.31	ATSDR	1.24E-01	mg/kg-d	Liver, Blood, Clinical Signs	300	Oral/HEAST	FY97, July
Fluorene	Subchronic	4.00E-01	mg/kg-d	0.5	ATSDR	2.00E-01	mg/kg-d	Blood	300	Oral/HEAST	FY97, July
Indeno(1,2,3-cd)pyrene		NA		0.8	ATSDR	NA					
Methylnaphthalene, 2- (c)	Subchronic (1)	2.00E-02	mg/kg-d	0.31	ATSDR	6.20E-03	mg/kg-d	Body Weight	3000	Oral/IRIS	11/22/2000
N-Nitrosodiphenylamine		NA		#REF!	ATSDR	NA					
Naphthalene	Subchronic (1)	2.00E-02	mg/kg-d	0.8	ATSDR	1.60E-02	mg/kg-d	Body Weight	3000	Oral/IRIS	11/22/2000
Phenanthrene (c)	Subchronic (1)	2.00E-02	mg/kg-d	0.31	ATSDR	6.20E-03	mg/kg-d	Body Weight	3000	Oral/IRIS	11/22/2000
Phenol	Subchronic	6.00E+00	mg/kg-d	#REF!	ATSDR	#REF!	mg/kg-d	Reduced fetal body weights	100	Oral/IRIS	1/18/2001
Pyrene	Subchronic	3.00E-01	mg/kg-d	0.31	ATSDR	9.30E-02	mg/kg-d	Kidney	300	Oral/HEAST	FY97, July
DIOXINS/FURANS											
TCDD-TEQ		NA		0.19	ATSDR	NA					

(a) Calculated from current drinking water standard
(b) As Mecuric Chloride
(c) Cross-assigned from Naphthalene
N/A = Not Applicable
(1) Cross-assigned from chronic values
(2) RfDd = RfDo x Oral to Dermal Adj. Factor
(3) Subchronic values presented only for COCs in Future Utility and Excavation Scenario

Table 4
Cost of Selected Remedy S-8 In-situ solidification/stabilization and run-off/run-on management
AT&SF Albuquerque Superfund Site
Costs Prepared by TRC Solutions

task	unit	unit cost	quantity	cost		
General						
Supervision	week	4800	18	$ 86,400.00		
Project manager	week	3840	18	$ 69,120.00		
Superintendent	week	2200	18	$ 39,600.00		
Engineer	week	2720	18	$ 48,960.00		
Technicians	week	2200	30	$ 66,000.00		
					$ 310,080.00	
Temporary facilities						
office trailer	month	600	5	$ 3,000.00		
storage trailer	month	600	5	$ 3,000.00		
portable toilet	month	120	5	$ 600.00		
electric hook up	ls	5000	1	$ 5,000.00		
site security	day	350	120	$ 42,000.00		
surveying	day	650	90	$ 58,500.00		
mob/demob	ls	10000	1	$ 10,000.00		
misc supplies	ls	16000	1	$ 8,000.00		
ppe	ls	12000	1	$ 12,000.00		
					$ 142,100.00	
Site Access Control						
Signs	lf	300	1	$ 300.00		
Decon						
decon pad construction	ls	10000	1	$ 10,000.00		
pressure washer	ls	4000	1	$ 4,000.00		
water treatment plant	ls	12000	1	$ 12,000.00		
				$ -		
Clear and grub	acre	600	3	$ 1,800.00		
Well abandonment	ea	1200	15	$ 18,000.00		
excavation		1.74	5,134	$ 8,933.16		
S/S	sheet 3					
process	cy (clu-in)	$ 80.00	5603	$ 448,240.00		
1' clay cap						
Clay Cap	CY	$ 13.86	1486	$ 20,595.96		
crushed stone			old volume * 1.3 increase			
crushed stone	CY	$ 22.96	1531	$ 35,151.76		$ 51,821.87
stone placement	sy	$ 3.28	4330	$ 14,202.40	rough grading 17 03 0101	
backfill WWR	cy	6.79	17136.00	$ 116,353.44		
backfill excavation	cy	6.79	5134	$ 34,859.86		
verification sampling		24000	1	$ 24,000.00		
construction testing		25000	1	$ 25,000.00		
final grading and seeding		2000	3	$ 6,000.00		
soil treatment contingency 20%				$ 118,396.63		
disposal of IDW		275	100	$ 27,500.00		
O&M, 7% discount rate						
10% area for 2 yrs	cy	6.79	4 x a year	$ 18,491.72	p/a @7%=1.80835	
density testing 1/yr/10 yr	each	151.97		$ 1,069.12	p/a @7%=7.0351	
phyto upkeep 4xyr/ 10 yr	acre	60.16	1.25	$ 2,116.16	p/a @7%=7.0351	
					$ 21,677.00	
Project Cost				$ 1,399,190.21		
contingency (20%)				$ 279,838.04		
Contractor Overhead (6%)				$ 83,951.41		
Contractor Profit (7%)				$ 97,943.31		
Total				$ 1,860,922.98		
NM 5% tax				$ 93,046.15		
Project TOTAL				$ 1,953,969.12		

Table 4a
Estimated Cost of DNAPL Contaminated Soil Incineration
AT&SF Albuquerque Superfund Site

task	unit	unit cost	quantity	cost
Decon				
decon pad construction	ls	10000	1	$ 10,000.00
pressure washer	ls	4000	1	$ 4,000.00
DNAPL excavation	cy	3.25	1,000	$ 3,250.00
Incinerator				
Incinerator	ton	$ 500.00	1000	$ 500,000.00
transportation	ton	$ 150.00	1000	$ 150,000.00
fuel surcharge				$ 20,000.00
Ash Disposal (landfill)	ton	$ 50.00	300	$ 15,000.00
backfill excavated area	cy	6.79	1000	$ 6,790.00
verification sampling		12000	1	$ 12,000.00
disposal of IDW		275	25	$ 6,875.00
Project Cost				$ 727,915.00
contingency (20%)				$ 145,583.00
Total				$ 873,498.00
NM 5% tax				$ 43,674.90
Project TOTAL				$ 917,172.90

Note: This estimate is based on 1,000 tons of DNAPL contaminated soil. The actual amount will be determined during the implementation of the Preferred Alternate S-8. Any DNAPL contaminated soil that is encountered during the excavation process will be segregated and transported for disposal at an approved incinerator.

Table 5
Summary Cost of Ground Water Remedial Options
AT&SF Albuquerque Superfund Site
Costs Prepared by TRC Solutions

SUMMARY (w/tax)

350 gpm SYSTEM:	Capital Cost, $	Annual O&M Cost $, Years 1 - 3	Annual O&M Cost $, Years 4 - 30	NPV, 7% discount rate, 30 years	Capital Cost, $/gallon	O&M cost, $/1000 gal, Year 1 - 3	O&M cost, $/1000 gal, Year 4 - 30
Alternate GW-2: UV-Oxidatio	$10,284,880	$2,113,522	$1,654,522	$32,020,407	$20.41	$11.49	$8.99
Alternate GW-3: FBR	$13,495,771	$1,549,404	$1,090,404	$28,231,151	$26.78	$8.42	$5.93
Alternate GW-4: Clay/carbon	$10,132,291	$2,474,315	$2,015,315	$36,344,891	$20.10	$13.45	$10.96
Alternate GW-5: Steam Flush	$27,080,043	$3,194,895	$2,422,695	$59,169,761	$53.73	$17.37	$13.17
Alternate GW-7: In-situ Oxida	$12,634,737	$2,026,900	$1,260,100	$30,283,640	$25.07	$11.02	$6.85

Cost factor = **1.08** Includes 5% tax and 3% contingency

DNAPL Cost Difference: Years 1-3 vs years 4-30:
560,000 - 135,000 = **$425,000**
$425,000 x 1.08 = **$459,000**

Alt GW-5 Delta O&M = **$772,200**

Alt GW-7 Delta O&M = **$766,800**

Note: If P&T for Alternate GW-5 stops at year 5, NPV = $39,039,589
Note: If P&T for Alternate GW-7 stops at year 5, NPV = $19,813,472
Note: If P&T for Alternate GW-2 stops at year 5, NPV = $19,170,987

SUMMARY (w/tax)

500 gpm SYSTEM:	Capital Cost, $	Annual O&M Cost $, Years 1 - 3	Annual O&M Cost $, Years 4 - 30	NPV, 7% discount rate, 30 years	Capital Cost, $/gallon	O&M cost, $/1000 gal, Year 1 - 3	O&M cost, $/1000 gal, Year 4 - 30
Alternate GW-2: UV-Oxidatio	$12,739,140	$2,037,852	$1,578,852	$33,535,676	$17.69	$7.75	$6.01
Alternate GW-3: FBR	$16,716,240	$1,449,938	$990,938	$30,217,348	$23.22	$5.52	$3.77
Alternate GW-4: Clay/carbon	$12,550,140	$2,363,612	$1,904,612	$37,389,036	$17.43	$8.99	$7.25
Alternate GW-5: Steam Flush	$33,542,100	$3,362,769	$2,590,569	$67,714,968	$46.59	$12.80	$9.86
Alternate GW-7: In-situ Oxida	$15,649,740	$1,967,868	$1,201,068	$32,566,118	$21.74	$7.49	$4.57

DNAPL Cost Difference: Years 1-3 vs years 4-30:
560,000 - 135,000 = **$425,000**
$425,000 x 1.08 = **$459,000**

Alt GW-5 Delta O&M = **$772,200**

Alt GW-7 Delta O&M = **$766,800**

Notes:

COST DRIVERS (sensitivities) for the alternates:

1 Assumed need for UV light and peroxide with hydraulically induced cavitation.
2 Assumed off-gas treatment of fixed film bio-system required for volatiles or odors.
3 Eleven changeouts of carbon and clay with clay/GAC adsorber system; could be less depending upon load. Other alternates assume 4 changes per year of GAC. No GAC adsorbers used on FBR-GAC system.
4 FBR units could be reduced in size if organic load is less at influent point. FBR costs influenced not only by hydraulics, but organic loading.
5 Slightly high O&M cost factor on UV-peroxide system due to lamp replacement costs.
6 Disposal cost on clay adsorber material assumed - could be higher.
7 Disposal cost on concentrated DNAPL based on verbal quote of $0.30 to $0.40 /lb based on BTU content and. hazardous constituents; need to add transportation.
8 DNAPL and O&G emulsion amount for disposal drive O&M costs. Assumed less material in years 4 - 30, however amount was reduced from 2.5% based on flow to 0.60% which could be low.
Used $0.34/lb for both transport and disposal costs.
9 Normal analytical monitoring for 30 year period to be added to above table options based on E.T's "No Action" NPV costs ($90,000 per year first 5 years, $60,000 per year second five years)

Table 5a
Detailed Cost of Ground Water Remedial Options
AT&SF Albuquerque Superfund Site
Costs Prepared by TRC Solutions

	Equipment: (common to all trains)	**Base Capital Cost for 500 gpm system, $**	**Base Capital Cost for 350 gpm system, $**	
1	Skimmer tank and Air flotation unit for O&G / DNAPL, rated 350 gpm	355,000	286,607	$355,000*(350/500)^0.60 = $286,607
2	IAF float tk & pump, rated 10 gpm	17,000	13,725	
3	Concentrated DNAPL Separator, rated 75 gpm	65,500	52,881	
4	DNAPL Storage Tk	55,000	44,404	
5	DNAPL transfer pumps	18,000	14,532	
6	EQ - Jet mixer system	67,000	54,092	
7	Equalization Tank (covered)	75,000	60,551	
8	Scrubber System	130,000	104,955	
9	Vapor phase carbon canisters	37,000	29,872	
10	Misc. chemical feed tanks	30,000	24,220	
11	KMnO4 feed system	12,000	9,688	
12	pH / Polymer feed systems	33,000	26,642	
13	Building	90,000	72,661	
14	EQ.Trans. pumps & rapid mix	100,000	80,734	
15	Clarifier & sludge tk	200,000	161,469	
16	Treatment system - SEE ALTERNATIVES below:			
17	Filter feed tank	20,000	16,147	
18	Filter feed pumps	45,000	36,330	
19	Filtration	98,000	79,120	
20	Clearwell / treated water tk.	62,000	50,055	
21	Re-injection pumps	53,000	42,789	
22	Sludge Dewatering: Precoat VF system with supersack feeders	295,000	238,167	
	Sludge pumps	20,000	16,147	
23	Filtrate tank & pumps	75,000	60,551	
24	System Piping	375,000	302,754	
25	25,000 ft @ $15/ft		0	
26	Flow meters & control valves	76,000	61,358	
27	MCC Equipment & wire racks	58,000	46,826	
28	Facility air compressor	32,500	26,239	
29	Line Insulation	45,000	36,330	
30	Utility gas lines & water	70,000	56,514	
31	DCS System / MMIs	27,000	21,798	
32	SCADA System	15,000	12,110	
33	Capitalized commissioning supplies	85,000	85,000	similar cost
34	Structural Steel	72,000	58,129	
35	Site Improvements	20,000	16,147	
	Subtotal:	**$2,828,000**	**$2,299,546**	

Alternative Treatment Train Costs	Equipment 500 gpm System	Equipment 350 gpm System
Alt. GW-2		
UV-oxidation		
Base:	475,000	370,052
GAC filter	50,000	38,953
GAC Ads.	150,000	116,858
W-Carbon	30,000	23,372
Misc.	4,000	3,116
Instrumentation / flowmeters	20,000	15,581
Equipment Subtotal:	729,000	567,932
Alt. GW-3		
FBR-GAC		
Base:	1,800,000	1,402,301
Clarifier	135,000	105,173
filter:	50,000	38,953
W-Carbon	0	0
Misc.	4,000	3,116
Instrumentation / flowmeters	20,000	15,581
Equipment Subtotal:	2,009,000	1,565,123
Alt. GW-4		
Clay - Carbon		
Piping, Valves	35,000	27,267
Base: 2-Adsorbers, 20,000 #	150,000	116,858
Ch. Tk	75,000	58,429
Clay Filters	150,000	116,858
Ch. Tk	75,000	58,429
Clay guard filter	64,000	49,860
Clay:	60,000	46,743
Carbon for Ads. $0.70/#	30,000	23,372
Misc.	4,000	3,116
Flow meters	16,000	12,465
Equipment Subtotal:	659,000	513,398
Alt. GW-5		
In-situ Steam Stripping		
Per Steamtech:		
I.A. Source zone, only	$12,000,000	$12,000,000
I.A. Dissolved Plume (total)	$25,000,000	$25,000,000
Upgrade their system to FBR	1,000,000	1,000,000
Misc.	4,000	4,000
Flow meters	16,000	16,000
Equipment Subtotal:	26,020,000	26,020,000

Alt GW-7

In-Situ Oxidation (Ozone) 500 gpm system $ = 350 gpm system $

SVE Odor control extraction well & equip.	75,000	
Inlet air filters		
Air Compressor		
Piping / distribution manifold		
Inlet Air cooler & Air Dryer		
Cooling water System		
Ozone Generator	945,000	Confirm
Power supply / freq. converter		
Transformer		
Ozone Conc, Monitor		
Ambient ozone monitor		
Dew Point Monitor		
PLC unit / process controls	20,000	
Misc.	4,000	
40 injection wells @ $5,500	220,000	220,000
System Piping	350,000	Confirm
Equipment Subtotal:	1,614,000	

Additional costs:

Modeling (hydraulic)	$60,000,	
Surveying	3,500	
Foundation Soil Tests / Study	7,500	
Permitting/fees	72,000	
Public Notice/community meet.	12,000	
Legal	90,000	
Development / Bank fees	80,000	
Lender's consultant	50,000	
Interest during construction	125,000	
BNSF Admin.	50,000	
Outside engineering	168,000	
TRC Engineering	360,000	
TRC Project management	107,500	
Maintenance Reserve	300,000	**Assume $300,000 initial maintenance reserve to offset major maintenance in later years**
Subtotal:	1,425,500	

Phy./Chem.Treatabiltiy Studies:		
Elect.R.Tm. Sub. Imaging	45,000	2002 Baseline
Onsite Expenses	17,000	
Cavitation:	33,000	
Ozonation	42,000	
Induced Air flotation	26,000	
Overall Process / metals removal	25,000	
Analytical (for above)	135,000	
TRC Review	20,000	
Waste Disposal	35,000	
Subtotal:	378,000	

Biological Treatability Studies	
Phase I Toxicity	10,000
Phase II Treatability	40,000
Phase III Loading Adjustments	15,000
Analytical	65,000
Onsite Expenses/utilities	25,000
TRC Coordination/Review	38,000
Waste Disposal	35,000
Subtotal:	193,000

Wells: 316 ss		$4,500 per MB for PVC
Plume control		
10 injection @ $5,500	55,000	
20 extraction @ $5,500	110,000	
20 pumps at $1,500	30,000	
Spare Pumps, controllers	18,000	
Subtotal:	213,000	

	500 gpm	**500 gpm**			
500 gpm System	**Base Equipment Cost**	**Technology Equip. Cost**	**Plume Control Well System**	**Treatability Sudy cost**	**Equip. Capital Cost ***
Alt. GW-2 - UV-oxidation	2,828,000	729,000	213,000	378,000	4,148,000
Alt. GW-3 - FBR-GAC	2,828,000	2,009,000	213,000	571,000	5,621,000
Alt. GW-4 - Clay - Carbon	2,828,000	659,000	213,000	378,000	4,078,000
Alt. GW-5 - In-situ Steam Stri	2,828,000	26,020,000	213,000	571,000	29,632,000
Alt. GW-7 - In-Situ Oxidation	2,828,000	1,614,000	213,000	571,000	5,226,000

***: Alt GW-5 is installed cost**

	Eng. & Fees	Equip. Capital Cost	500 gpm Installed Cost (2.5 multiplier on Equipment cost)	Total Project Installed Cost	Detail Eng. As % of Cost	Detail Eng. & Management As % of Cost
Alt. GW-2 - UV-oxidation	1,425,500	$4,148,000	$10,370,000	$11,795,500	4.5	5.4
Alt. GW-3 - FBR-GAC	1,425,500	$5,621,000	$14,052,500	$15,478,000	3.4	4.1
Alt. GW-4 - Clay - Carbon	1,425,500	$4,078,000	$10,195,000	$11,620,500	4.5	5.5
Alt. GW-5 - In-situ Steam Stri	1,425,500	$29,632,000	----	31,057,500	1.7	2.0
Alt. GW-7 - In-Situ Oxidation	1,425,500	$5,226,000	$13,065,000	$14,490,500	3.6	4.4

Assumptions: 500 gpm and 350 gpm treatment systems

Treatment Train flows:
6 wells at 2.5 gpm/well = 15 gpm of DNAPL emulsion & water, assume 2.5% DNAPL:
Therefore, 0.375 gpm DNAPL = 540 gallons/day = 197,100 gals/year (4,503 lbs/day)
Assume 2.5% DNAPL first three years, thereafter assume 0.6% DNAPL emulsion (130 gallons/day)

Use 7 to 10 extraction wells
Plume Treament Wells: 260 gpm total (includes chemical additions)
Treatment Train return streams = 45 gpm
DNAPL Future reserve capacity = 30 gpm
Total Flow: (15 + 260 + 45 + 30) = 350 gpm

Hazardous Waste Disposal: 350 gpm system
Typical Incineration cost = $400/ton plus transportation
Verbal Quote from USA Environmental for creosote, Houston, TX = $0.50/lb
or $1,000 per ton.

Assume we can get quantity discount; $0.34/lb or $680/ton, including transportation.

Cost per lb, $	0.34		
DNAPL gals/day, yrs 1 - 3	540	822	tons/year
DNAPL gals/day, yrs 4 - 30	130	198	tons/year

Yearly cost (years 1 - 3) =	558,897	Use:	$560,000	For 350 gpm total system
Yearly cost (years 4 - 30) =	134,549	Use:	$135,000	

Difference between Years 1-3 and 4-30 is $1,500,000 - 450,000 = $425,000

500 gpm system:
Assume same as above; more flow capacity for plume control, but same overall DNAPL production.

500 gpm System
ANNUAL O&M Costs:

Alternate GW-2: power & che	520,000		
Alt. GW-2 W-carbon (4 chang	120,000		
Labor	305,800	Includes 39% burden on $220,000	
Maint. @ 7.5% of equipment	311,100	7.5% used due to lamp replacements	
Misc. / subcontract / supplies	25,000		
Oil and solids disposal	45,000	Non-hazardous assumed	
DNAPL disposal	560,000	Use decreased cost in years 4-30	$135,000
Subtotal:	**1,886,900**		

Alternate GW-3: power & chemicals	208,000		
Alt. GW-3 W-carbon (makeup only)	2,000		
Labor	305,800	Includes 39% burden on $220,000	
Maint. @ 3.5% of equipment	196,735		
Misc. / subcontract / supplies	25,000		
Oil and solids disposal	45,000	Non-hazardous assumed	
DNAPL disposal	560,000	Use decreased cost in years 4-30	$135,000
Subtotal:	**1,342,535**		

Alternate GW-4: power & chemicals			
Alt. GW-4 clay (11 / yr)	660,000		
Alt. GW-4 W-carbon (11 / yr)	330,000		
Labor	305,800	Includes 39% burden on $220,000	
Maint. @ 3.5% of equipment	142,730		
Misc. / subcontract / supplies	25,000		
Oil and solids disposal	45,000	Non-hazardous assumed	
DNAPL disposal	560,000	Use decreased cost in years 4-30	$135,000
Clay Disposal	120,000		
Subtotal:	**2,188,530**		

Alternate GW-5: Steam Stripping		Use decreased cost in years 4-30	
Fuel & power	550,000	**Confirm** Estimate 260,000 total	
Labor	305,800	Above grd P&T = $208,000	
Maint. @ 0.5% of Proj.cost	1,552,875		
Misc. / subcontract / supplies	100,000		
Oil and solids disposal	45,000	Non-hazardous assumed	
DNAPL disposal	560,000	Use decreased cost in years 4-30	$135,000
Subtotal:	**3,113,675**		
		Note: Years 4-30: Decrease in O&M =	$715,000

Note: Assume 7 years of treatment after first 3 years of steam flushes: 10 total for first option

Alternate GW-7: In-situ Oxidation

Adjunct chemicals	75,000	**Confirm** peroxide	
Power & Water	550,000	**Confirm** Above grd P&T = $208,000	
Labor	305,800	Includes 39% burden on $220,000	
Maint. @ 5.0% of equipment	261,300		
Misc. / subcontract / supplies	25,000		
Oil and solids disposal	45,000	Non-hazardous assumed	
DNAPL disposal	560,000	Use decreased cost in years 4-30	$135,000
Subtotal:	**1,822,100**		

Use decreased cost in years 4-30
Estimate 265,000 total power
Above grd P&T = $208,000
Note: Years 4-30: Decrease in O&M = $710,000

Note: Assume 7 years of treatment after first 3 years of oxidation flushes: 10 total for first option
Assume 27 years of treatment after first 3 years of oxidation flushes: 30 total for second option

Present Worth Factors:

(P/A, 7%, 30 years) =	12.409
(P/A, 7%, 3 years) =	2.624
(P/A, 7%, 15 years) =	9.108
(P/A, 7%, 10 years) =	7.042
(P/A, 7%, 7 years) =	5.389
(P/A, 7%, 5 years) =	4.1
(P/A, 7%, 4 years) =	3.387

Difference in O&M O&G and DNAPL disposal (later years) = $425,000

Year 2001 Dollars (no escalation)

500 gpm SYSTEM:	**Installed Capital Cost, $**	**Annual O&M Cost, Years: 1-3, $**	**Annual O&M Cost, Years: 4-30, $**	**NPV, 7% discount rate, 30 years**	Based on 720,000 gpd **Capital Cost, $/gallon**	**Year 1-3 O&M cost, $/1000 gal**	**Year 4-30 O&M cost, $/1000 gal**
Alternate GW-2: UV-Oxidation	$11,795,500	1,886,900	1,461,900	$31,051,551	$16.38	$7.18	$5.56
Alternate GW-3: FBR	$15,478,000	1,342,535	917,535	$27,979,026	$21.50	$5.11	$3.49
Alternate GW-4: Clay/carbon	$11,620,500	2,188,530	1,763,530	$34,619,478	$16.14	$8.33	$6.71
Alternate GW-5: Steam Flushi	$31,057,500	3,113,675	2,398,675	$62,699,044	$43.14	$11.85	$9.13
Alternate GW-7: In-situ Oxidat	$14,490,500	1,822,100	1,112,100	$30,153,813	$20.13	$6.93	$4.23

Note: If P&T for Alternate GW-5 stops at year 15, NPV =	$54,781,018
Note: If P&T for Alternate GW-5 stops at year 10, NPV =	$49,825,355
Note: If P&T for Alternate GW-5 stops at year 7, NPV =	$45,860,346
Note: If P&T for Alternate GW-5 stops at year 5, NPV =	$42,768,453

Also: may not have to run option 9 for 30 years
Note: If P&T for Alternate GW-7stops at year 10, NPV = $24,185,173

O&M
350 GPM System COSTS

Maintenance Reserve = 300,000 X 0.807 = $242,100

Cost of 500 gpm system x (350/500)^0.6
Multiplier = 0.807344

Alternate	Factored Equipment Cost		Maintenance factor, %	Equipment Maintenance Cost
Alternate GW-2: UV-Oxidation	$3,348,863		7.5	$251,165
Alternate GW-3: FBR	$4,538,081		3.5	$158,833
Alternate GW-4: Clay/carbon	$3,292,349		3.5	$115,232
Alternate GW-5: Steam Flushi	$23,923,217	Installed	0.05 of project	1,267,436
Alternate GW-7: In-situ Oxidat	$4,219,180		5.0	$210,959
350 gpm System				

ANNUAL O&M Costs:

Alternate GW-2: power & che	$520,000		
Alt. GW-2 W-carbon (4 chang	$120,000		
Labor	$305,800	Includes 39% burden on $220,000	
Maint. @ 7.5% of equipment	$251,165	due to lamp replacements	
Misc. / subcontract / supplies	$50,000		
Oil / Solids disposal	$45,000		
DNAPL disposal	$560,000	Use decreased cost in years 4-30	135,000
Subtotal:	**$1,851,965**		

Alternate GW-3: power & che	$208,000		
Alt. GW-3 W-carbon (makeup	$2,000		
Labor	$305,800	Includes 39% burden on $220,000	
Maint. @ 3.5% of equipment	$158,833		
Misc. / subcontract / supplies	$50,000		
Oil / Solids disposal	$45,000		
DNAPL disposal	$560,000	Use decreased cost in years 4-30	135,000
Subtotal:	**$1,329,633**		

Alternate GW-4: power & chemicals			
Alt. GW-4 clay (11 / yr)	$660,000		
Alt. GW-4 W-carbon (11 / yr)	$330,000		
Labor	$305,800	Includes 39% burden on $220,000	
Maint. @ 3.5% of equipment	$115,232		
Misc. / subcontract / supplies	$50,000		
Oil / Solids disposal	$45,000		
DNAPL disposal	$560,000	Use decreased cost in years 4-30	135,000
Clay Disposal	$120,000		
Subtotal:	**$2,186,032**		

Alternate GW-5: Steam Stripping		Use decreased cost in years 4-30	
Fuel & power	$550,000	**Confirm** Estimate $260,000.00	total
Labor	$305,800	Above grd P&T = $208,000	
Maint. @ 0.5% of Proj.cost	$1,267,436		
Misc. / subcontract / supplies	$125,000		
Oil / Solids disposal	$45,000		
DNAPL disposal	$560,000	Use decreased cost in years 4-30	135,000
Subtotal:	**$2,853,236**		
		Total decrease in O&M Cost =	$715,000

Alternate GW-7: In-situ Oxidation

Adjunct chemicals	$50,000	**Confirm** Treatment & cooling water	
Power & water use	$550,000	**Confirm** grd P&T = $208,000	
Labor	$305,800	Includes 39% burden on $220,000	
Maint. @ 5.0% of equipment	$210,959		
Misc. / subcontract / supplies	$50,000		
Oil / Solids disposal	$45,000		
DNAPL disposal	$560,000	Use decreased cost in years 4-30	135,000
Subtotal:	**$1,771,759**		
		Total decrease in O&M Cost =	$710,000
		year 4-30 (Dnapl savings & power @ 265,000)	

NOTES:

1 Assume $300,00 initial maintenance reserve to offset major maintenance in later years
This is included in fees
Difference in O&M O&G and DNAPL disposal (later years) = $425,000
2 Add $80,000 analytical to each annual O&M alternative cost
3 Add $25,000 Electrical Resistance Tomography - annual scan
4 Year 2001 Dollars (no escalation)

Present Worth Factors:

(P/A, 7%, 30 years) =	12.409
(P/A, 7%, 15 years) =	9.108
(P/A, 7%, 10 years) =	7.042
(P/A, 7%, 7 years) =	5.389
(P/A, 7%, 5 years) =	4.1
(P/A, 7%, 4 years) =	3.387
(P/A, 7%, 3 years) =	2.624

For 350 gpm System:
Assumes 260 gpm from wells
45 gpm from internal recyles & sidestreams
15 gpm initial DNAPL extraction, with aditional 30 gpm capacity

Adjust capital cost based on flow ratios to the 0.6 power
= (500/350)^0.6 = **1.238628**
O&M costs for 350 gpm system noted above Based on
360,000 gpd

Difference in O&M O&G and DNAPL disposal (later years) = $425,000

Table 6

Potentially Applicable or Relevant and Appropriate Requirements (ARARs)

Standard, Requirement, Criteria, Or Limitation	Citation	Description	Media	Rationale & Discussion
Action Specific				
Clean Air Act, 42 U.S.C. § 7401, *et seq.* **New Mexico Air Quality Control Act, N.M. Stat. Ann. § 74-2-1, *et seq.*** **New Mexico Environmental Improvement Act, N.M. Stat. Ann. § 74-1-1, *et seq.***	20 NMAC, Chapter 11 (Bernalillo County, N.M.) 42 U.S.C. § 7411 40 C.F.R. 60.110b	Regulatory requirements for sources of fugitive emissions of particulate matter and emissions of volatile organic compounds (VOCs).	Air	Concentration of particulates and selected VOCs may need to comply with the Bernalillo State Implementation Plan (SIP) regulations at 20 NMAC 11.20 and 20 NMAC 11.65. Activities associated with air stripping extracted ground water may trigger NSPS, Subpart Kb. Emissions from air stripping may trigger other Clean Air Act and NMAQCA standards or requirements.
Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901, *et seq.* **New Mexico Hazardous Waste Act, N.M. Stat. Ann. § 74-4-1, *et seq.*** **New Mexico Solid Waste Act, N.M. Stat. Ann. § 74-9-1, *et seq.***	40 CFR 260, 261, 262, 263, 264, 266, 267, and 268 40 CFR 239 20 NMAC, Chapter 4 20 NMAC, Chapter 9	Generation, collection, transportation, storage, treatment and disposal of solid waste is subject to the requirements of RCRA Subtitles C and D.	Soils & Residuals	Excavation of contaminated soils and its treatment and/or disposal may be subject to RCRA solid and hazardous waste identification and characterization, generation, transportation, treatment, storage, disposal, recycling, and permitting (substantive) requirements. Excavated soils may be subject to land disposal restrictions detailed in 40 CFR 268.30. Any on-site treatment facility will have to meet substantive requirements of 40 CFR 268, including the Minimum Technology Requirement (MTR).

Standard, Requirement, Criteria, Or Limitation	Citation	Description	Media	Rationale & Discussion
Safe Drinking Water Act (SDWA), 33 U.S.C. § 300f, *et seq.* Federal Drinking Water Regulations.	40 CFR 141	SDWA Maximum Contaminant Level Goals (MCLGs).	Ground Water	Ground water will be treated to meet non-zero MCLGs. Where MCLGs are zero, ground water will be treated to meet MCLs. Ground water may need to meet these standards prior to contact with human population.
New Mexico Regulations for Public Drinking Water Systems.	20 NMAC, Ch. 7	State primary drinking water regulations. Health-based maximum contaminant levels (MCLs) for public water systems.		
New Mexico Water Quality Control Commission Regulations.	20 NMAC, Chapter 6, Part 2	Water Quality Control Commission Standards for ground water.		Ground water may need to be restored to these standards, if more stringent than MCLs or MCLGs.
Underground Injection Control (UIC) Regulations.	40 CFR 144-147	Re-injection of treated groundwater would need to comply with substantive provisions of 40 CFR 144-147.		The selected alternative for disposal of treated groundwater is on-site re-injection.

Standard, Requirement, Criteria, Or Limitation	Citation	Description	Media	Rationale & Discussion
Clean Water Act (CWA), 33 U.S.C. § 1251, *et seq.* **CWA National Pollutant Discharge Elimination System (NPDES)**	33 U.S.C. § 1342 40 CFR 122–125	Discharge of effluent to receiving bodies of water must meet the regulations of 40 CFR 122, which establishes limitations and standards for discharge.	Surface Water	An alternative for discharge of treated ground water is to a receiving stream. This discharge would need to meet NPDES criteria.
CWA Water Quality Criteria	40 CFR 131	Criteria for water quality based on toxicity to aquatic organisms and public health.		An alternative for discharge of treated ground water is to a receiving stream. This discharge would need to meet NPDES water quality criteria.
CWA Pretreatment Requirements	40 CFR 403	Discharge of effluent to public works (POTW) must comply with the requirements of 40 CFR 403 as well as any Albuquerque, New Mexico requirements.		Another alternative for discharge of treated ground water is to the POTW.
New Mexico Water Quality Act, **N.M. Stat. Ann. § 74-6-1, *et seq.***				
State of New Mexico Standards for interstate and intrastate streams	20 NMAC, Chapter 6, Part 1	Provides for the protection of surface water through narrative and numerical standards.		Ground water that is discharged to surface water must not degrade the surface water quality.
Location Specific				
Historic Sites Act, 16 USC §§461-467	40 CFR 6.301(a)	Requires Federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts upon such landmarks.	Land, Buildings, & Resources	Construction of remedial alternatives will meet this ARAR where designated properties exist.

Standard, Requirement, Criteria, Or Limitation	Citation	Description	Media	Rationale & Discussion
National Historic Preservation Act, **16 U.S.C. §470, *et seq.***	40 CFR §6.301© 36 CFR Part 800	Provides for preservation of historical and archaeological sites, which might be destroyed.	Land, Buildings, & Resources	The Selected Remedy will meet this ARAR by ensuring that construction areas are surveyed for archeological and historic impact and taking any required actions.
Archaeological and Historic Preservation Act of 1974, 16 U.S.C. §§469, 469a-1.		Provides for notice/preservation of historic/archaeological sites where terrain is altered as a result of a Federal construction project or a Federally licensed activity or program, or where railroads are moved.		
		Chemical Specific		
New Mexico Cultural Properties Act, N.M. Stat. Ann. § 18-6-1, et seq.	N.M. Stat. Ann. §18-6-1	Requires identification of cultural resources, assessment of impacts on those resources that may be caused by the proposed project, and consultation with the State Historic Preservation Officer.	Land, Buildings, & Resources	Construction of remedial alternatives will meet this ARAR by ensuring that construction areas are surveyed for cultural resources impact.
Safe Drinking Water Act (SDWA), 33 U.S.C. § 300f, *et seq.* Federal Drinking Water Regulations.	40 CFR 141	SDWA Maximum Contaminant Level Goals (MCLGs).	Ground Water	Ground water will be treated to meet non-zero MCLGs. Where MCLGs are zero, ground water will be treated to meet MCLs. Ground water may need to meet these standards prior to contact with human population.
New Mexico Regulations for Public Drinking Water Systems.	20 NMAC, Ch. 7	State primary drinking water regulations. Health-based maximum contaminant levels (MCLs) for public water systems.		
New Mexico Water Quality Control Commission Regulations.	20 NMAC, Chapter 6, Part 2	Water Quality Control Commission Standards for ground water.		Ground water may need to be restored to these standards, if more stringent than MCLs or MCLGs.

NOTES:

ARAR	Applicable or Relevant and Appropriate Requirements	NMAC	New Mexico Administrative Code
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	NMSA	New Mexico Statutes Annotated
CFR	Code of Federal Regulations	NPDES	National Pollutant Discharge Elimination System
EPA	Environmental Protection Agency	POTW	Publicly Owned Treatment Works
MCL	Maximum Contaminant Level	RCRA	Resource Conservation and Recovery Act
MCLG	Maximum Contaminant Level Goal	USC	United States Code

APPENDIX A - RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY
AT&SF Albuquerque Superfund Site

The purpose of this responsiveness summary is to address comments that the public has made regarding the U.S. Environmental Protection Agency's (EPA) proposed plan for the cleanup of hazardous substance contamination at the AT&SF Albuquerque Superfund Site (the "Site"). An informal Open House was held on December 18, 2001, at 7:00 P.M. at the Jack Candelaria Community Center, located at 400 San Jose Street SE, Albuquerque, New Mexico, to summarize the activities conducted as part of the Remedial Investigation/Feasibility Study (RI/FS), and introduce the Proposed Plan. The EPA announced a 30-day public comment period on the Proposed Plan from February 7, 2002, to March 9, 2002, to enable citizens to review and comment on the Agency's recommended alternatives. A public notice containing a brief summary of the cleanup action, dates of the comment period, and instructions on how to submit comments was published in the *Albuquerque Journal* and the *Albuquerque Tribune* on February 7, 2002. In addition, a fact sheet was mailed to approximately 500 people who are on the Site mailing list. Additional copies of the fact sheet were also hand delivered to members of the community by the ASJCAC. A formal public meeting was held on February 27, 2002, at 7:00 P.M. at the South Broadway Cultural Center, located at 1025 Broadway SE, Albuquerque, New Mexico. The public was invited to orally comment on this Proposed Plan during the February public meeting. A transcript from the public meeting is included in the Administrative Record. The Albuquerque San Jose Community Awareness Council (ASJCAC) requested a 30-day extension to the public comment period. The extension was granted and the public comment period ended to April 8, 2002.

This responsiveness summary serves two vital functions: first, it provides the decision maker with information about the views of the public, government agencies, the support agency, and potentially responsible parties (PRPs) regarding the proposed remedial action and other alternatives. Second, it documents the way in which public comments have been considered during the decision-making process and provides answers to all significant comments.

Responsiveness summaries are divided into two parts. The first part is generally a summary of commenters' major issues and concerns, and generally it will expressly acknowledge and respond to those issues and concerns raised by major stakeholders. At this Site, the stakeholders are the local community, the New Mexico Environment Department (NMED), the City of Albuquerque, and Bernalillo County. "Local community" here means those individuals who have identified themselves as living and/or working in the immediate vicinity of the Superfund site, and who are threatened from a health or environmental standpoint. This includes the ASJCAC. Typically, the first part of a responsiveness summary is presented by subject in nontechnical terms that are intended for the lay person.

The second part of a responsiveness summary is a comprehensive response to all significant comments. It will be comprised mostly of specific legal and technical questions and, if necessary, will elaborate with technical detail on answers covered in the first part of the responsiveness summary. Rather than divide the Site responsiveness summary into two parts, however, EPA decided that, in this case, it made more sense, and provided a more cohesive discussion, if each comment was dealt with completely in one unified response.

For more information regarding EPA's policy regarding responsiveness summaries, please see *Superfund Responsiveness Summaries (Superfund Management Review: Recommendation Number 43E)* (OSWER 9230.0-06, June 1990) which is a part of the Administrative Record for the Site. Documents referenced in this responsiveness summary as part of the Administrative Record for the Site may be viewed at the Albuquerque Public Library - Main Downtown Branch, 510 Copper Street NW, Albuquerque, NM 87102. The phone number to the library is (505) 768-5140.

ASJCAC and Community Members' Comments

1. **Comment:** The Albuquerque San Jose Community Awareness Council, Inc.'s (ASJCAC) requests that their three page document be entered into the "official" Public Record. It is intended to serve as our (Public Comment) response to the United States Environmental Protection Agency's proposed plan of action on the AT&SF Albuquerque Superfund site, Albuquerque, NM.

   EPA Response: The ASJCAC three page document and their supporting letters from community members are part of the Administrative Record for the Site.

2. **Comment:** We appreciate your efforts and thank you for all of the support that we receive as we represent and protect the best interests of the people and the greater good. We believe, therefore, that you commensurate that our submittal is delivered with deep regard and respect for you, your colleagues, Region 6, and the agency within the official and authorized timeline of April 9, 2002.

   EPA Response: Comment noted.

3. **Comment:** The ASJCAC, in collaboration with their consultant, Glorieta Geoscience, Inc. (GGI) has determined that the EPA "Preferred Remedy" for the AT&SF is unacceptable. We question if the "plan" eliminates, reduces or controls threats to public health and the environment through institutional – engineering controls or treatments. We do not believe that EPA's analyses and preferred alternative provides for the overall protectiveness of human health and environment. Therefore, for the "Public Record" we respectfully, disagree with the US-EPA Region 6, decision.

   EPA Response: The preferred alternatives for both soil and ground water in the proposed plan are protective of both human health and the environment. However, the EPA has modified the soil remedy to include the off-site-incineration of DNAPL-contaminated soils pursuant to comments received during the public comment period. Protection of human health and the environment is based on a combination of criteria, including compliance with ARARs, short-term effectiveness, long-term effectiveness, and reduction in toxicity, mobility, and volume.

   Soil: The Site Risk Assessments concluded that the contaminated soils currently pose a low level risk to human health and the environment. The NCP states that low-level threat wastes are those source materials that generally can be reliably contained and treated on-site and that contain contaminant concentrations not greatly above the acceptable levels. In addition, the concentration of contaminants in the soil could continue to contaminate the ground water above the MCLs. All of the soil alternatives, with the exception of S-1, are protective of human health and the environment as far as direct exposure to soil is concerned. These remediation goals for the Site soils are set at a level such that ground water will not become impacted above the MCLs for these compounds through contaminant migration from soils. In addition, when the remediation goals are met, ecological receptors will not be adversely impacted by on-site contamination.

   The preferred alternative S-8 will significantly reduce the mobility of the contaminants by chemically binding and encapsulating them with the solidification/stabilization process. The clay cap serves as an infiltration barrier that will prevent leaching of contaminants to the ground water. The crushed rock layer prevents contaminants from migrating via surface run-off and enhances the mobility reduction of this alternative. By segregating all of the DNAPL-contaminated soils and sending them off-site for disposal, the principal threat waste will be prevented from re-contaminating the ground water.

Ground water: The Site Risk Assessments concluded that the contaminated ground water currently poses a low level, but significant risk to human health and the environment. All of the ground water alternatives, with the exception of GW-1, are protective of human health and the environment.

All of the ground water alternatives involve treatment and provide the same high degree of long-term effectiveness once the remediation goals have been met, so no additional engineering or administrative controls will be necessary. However, because the complete removal of DNAPLs from the subsurface is often not practicable, long term monitoring will be required to verify hydraulic control and treatment system efficiency to ensure that migration of contaminants does not occur.

All ground water treatment alternatives, except for Alternative GW-1, use treatment to reduce toxicity, mobility, and volume of contaminants. Any ex-situ treatment (Alternatives GW-2, GW-3, and GW-4), or enhanced extraction process (Alternatives GW-5, GW-6, and GW-7) must combine with aggressive pumping to achieve reduction in mobility, toxicity, and volume of contaminants in the ground water.

In order to ensure the short term effectiveness of the ground water remedial action, institutional controls for ground water will be implemented to restrict use of the portion of the aquifer that is contaminated by the Site until remediation goals have been met. Despite any limitations associated with institutional controls, they will be implemented to the greatest extent possible to help minimize risk to human health and the environment during the implementation of the remedy.

4. **Comment:** Based upon the technical assistance from the GGI review of the proposed plan, the ASJCAC, Inc. believes that the PP is biased with regard to the comparison of soil treatment alternatives, and vague with regard to the ground water treatment alternatives.

EPA Response: The EPA looked at the viable remedial alternatives for both soil and ground water at this Site. The EPA then used the nine NCP criteria to evaluate these remedial alternatives. These nine criteria are categorized into three groups: threshold, balancing, and modifying. The threshold criteria must be met in order for an alternative to be eligible for selection. The threshold criteria are overall protection of human health and the environment, and compliance with ARARs. The balancing criteria are used to weigh major tradeoffs among alternatives. The five balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; short-term effectiveness; implementability; and cost. The modifying criteria are state acceptance and community acceptance.

The preferred alternative for soil, as described in the proposed plan, and as modified in this ROD, is protective of both human health and the environment, and is the best balance of of the criteria listed in the NCP.

The aggressive performance-based approach for remediation of the contaminated Site ground water consists of ground water restoration through pump and treat and DNAPL source removal/hot spot treatment utilizing conventional and innovative technologies. The level of detail in the proposed plan and this ROD is sufficient to conduct the remedial design. Any additional site-specific information that is required will be collected during the remedial design phase.

5. **Comment:** Based upon the technical assistance from the GGI review of the proposed plan, the ASJCAC states that it appears that the characterization of the extent of DNAPL {in this case, mostly creosote} in the Santa Fe Group Aquifer is incomplete. Specifically toward the north, i.e., down gradient.

   EPA Response: There was an extensive amount of site characterization and removal work completed at this Site. This site characterization consisted of over 145 cone penetrometer tests, 90 geoprobes, 150 soil borings, 56 ground water monitoring wells, 3 recovery trenches, ground water pump tests, and bioremediation studies for a Site that is less than 30 acres in size. As a result of this large amount of data, the EPA has determined that sufficient information has been collected to proceed with this ROD and the remedial action. If additional Site-specific information is required, it will be collected during the remedial design phase.

   With respect to the north boundary of the DNAPL extent, the EPA has determined that sufficient data has been collected to show that ground water is flowing towards the east in the aquifers. The latest ground water annual report that was prepared for this Site in February 2002, indicates that the ground water flow direction is still towards the east. This report has been added to the Administrative Record file. In addition, the generalized geological information for the south valley area shows that the general dip direction of the shallow Santa Fe formation is towards the east. However, due to the depositional characteristics, there are localized variations within the formation itself. If it is determined that additional Site information is needed, it will be collected during the remedial design phase.

6. **Comment:** Based upon the technical assistance from the GGI review of the proposed plan, ASJCAC believes that the proposed plan does not completely and fully address the remediation of the vadose zone (the sediment that lies between the upper soil zone and groundwater—in this case from approximately 5-20 feet bgs).

   EPA Response: The soil excavation will be down to a maximum depth of three feet, or until the PRG of 7.8 mg/kg BAP equivalents is reached. This will remove the direct exposure threat of the contamination. If DNAPL contaminated soil is encountered during this excavation process it will be excavated down to as deep as practicable and then sent to an off-site incinerator. If there are areas of DNAPL contamination in portions of the Site which are not being excavated, then this "hot-spot" contamination will be remediated utilizing conventional and innovative technologies.

7. **Comment:** Based upon the technical assistance from the GGI review of the proposed plan, the ASJCAC, Inc. believes that the hydrology at the site was incorrectly described as the three- (03) separate aquifers. Per its assessment of the previous work attempting to characterize this site, GGI determined that pumping tests on the Santa Fe Group aquifer were incorrectly conducted and incorrectly interpreted.

   EPA Response: The Remedial Investigation report and all of the historical information briefly describe the Site hydrogeology in basically the following manner:

   The site is located in the inner Rio Grande Valley, which is incised into the sedimentary basin fill of the Albuquerque basin. The sedimentary basin fill consists largely of the Santa Fe Formation with some overlying recent deposits represented by the Rio Grande Alluvium. The Santa Fe Formation has been divided into three parts (upper, middle and lower) that are inter-connected. The

Santa Fe Formation is approximately 4,750 feet thick in the area. The upper Santa Fe Formation is estimated to be about 650 feet thick in the vicinity of the site and flows in a northerly direction. This is probably in response to ground water withdrawn from the San Jose Municipal Well Field located about 2 miles north of the site.

At the site, the Rio Grande Alluvium is about 53 to 82 feet thick and consists of two water-bearing zones: the Shallow Aquifer and the Intermediate Aquifer. A discontinuous silty clay layer separates these two aquifers. At the site, ground water flow is generally in the east-southeast direction.

For the purposes of the remedial design and delineating the vertical extent of contamination, ground water (aquifer) zones are based on depth below the ground surface (bgs). The designated aquifer zones are defined primarily by the depths of existing monitoring and water supply wells. These aquifer zones are:

Shallow (S) *- The shallow Aquifer extends to an average depth of 20 feet below ground surface (bgs).*
Intermediate (I) *- The Intermediate Aquifer extends to an average depth of 60 feet bgs.*
Santa Fe Formation (D) *- The Santa Fe Formation Aquifer starts at approximately 60 feet bgs, and extends for several thousand feet below the Site.*

Even though the Site has three different water bearing zones or aquifers, they are interconnected. The deep aquifer acts as an unconfined aquifer at the Site. Sufficient hydrogeologic information has been collected to date to develop the remedial design for this Site. The nomenclature for the aquifers will continue to be utilized for Site consistency. If additional Site-specific hydrogeologic information is required, it will be collected during the remedial design phase.

8. **Comment:** Based upon the technical assistance from our advisors, GGI review of the US-EPA's *Proposed Plan of Action (PP)*, the ASJCAC, Inc. believes that sediments in the Santa Fe Group are often tilted. There is no data presented as to the orientation of bedding in the site vicinity. Note that this is particularly relevant at a site with DNAPL contamination (AT&SF-Albuquerque) with regards to transport directions.

   EPA Response: Please see the response to comment 5 above.

9. **Comment:** ASJCAC recommends that the proposed plan be withdrawn from consideration, and resubmitted after the hydrologic conditions in the Santa Fe Group alluvial aquifer and the exact extent of DNAPL in the subsurface (especially towards the north) are properly investigated.

   EPA Response: The EPA believes that sufficient information has been collected to select remedies for the soil and ground water at the Site and begin the remedial design. If additional Site-specific information is required, it will be collected during the remedial design phase. Please see the response to comments 5 and 7 above.

10. **Comment:** ASJCAC recommends that the proposed plan be withdrawn from consideration, and resubmitted after more appropriate soil and groundwater treatment plans are considered, including the following additional ASJCAC, Inc. preferred scenarios:

Soil: All of the technically accessible DNAPL-impacted soil should be excavated and removed from the site via railcar for incineration at a properly permitted facility—not just highly contaminated material as proposed in the PP.

Groundwater: steam injection or co-solvent alcohol flushing, coupled with in-situ oxidation or enhanced bio-remediation of perimeter areas and residual DNAPL's.

EPA Response: Again, the EPA believes that sufficient information has been collected to select remedies for the soil and ground water at the Site and begin the remedial design. If additional Site-specific information is required, it will be collected during the remedial design phase. Specifically:

Soil: The Selected Remedy will address low-level threat wastes in the soil medium through the treatment of the soil via Alternative S-8, in-situ solidification/stabilization and run-off/run-on management.

The primary expected outcome of implementation of the soil portion of the Selected Remedy is that the Site soils will no longer present an unacceptable risk of re-contaminating the ground water, and that the Site will continue to be suitable for residential and commercial development.

Shallow DNAPL-contaminated Soil: The Selected Remedy will address a principal threat waste at the Site, shallow DNAPL-contaminated soil, through removal of the DNAPL from the subsurface and treatment via Alternative S-6, incineration.

The primary expected outcome of implementation of this Selected Remedy is that the shallow DNAPL-contaminated soil will no longer act as a source of contamination to surrounding soils or to the aquifer, and that the Site will continue to be suitable for residential and commercial development.

Ground Water: The Selected Remedy will address the low level, but significant threat waste at the Site, ground water contamination, through removal of the COCs from the subsurface with a pump and treat extraction and re-injection system for the shallow and intermediate portions of the aquifer. The Selected Remedy requires periodic environmental monitoring of the ground water to ensure that contamination is not migrating to non-contaminated areas, and it requires ground water use restrictions to protect human health until remediation goals are met. Under the EPA's Selected Remedy, the expected outcome 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.

The primary expected outcome of implementation of the ground water portion of the Selected Remedy is 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 residential and commercial development.

DNAPL: The Selected Remedy will address the principal threat waste at the Site, DNAPL contamination, through removal of the DNAPL from the subsurface. The Selected Remedy requires periodic environmental monitoring of the ground water to ensure that the DNAPL is not migrating to non-contaminated areas, and it requires ground water use restrictions to protect human health until remediation goals are met. Under the EPA's Selected Remedy, the expected outcome is that the threat to human health posed by DNAPL at the Site will be addressed through removal.

The primary expected outcome of implementation of the DNAPL portion of the Selected Remedy is that the DNAPL will no longer act as a source of contamination of a drinking water resource, and that the Site will continue to be suitable for residential and commercial development.

The EPA is committed to reviewing the potential use of innovative technologies at this Site to achieve the remedial goals in a timely manner. However, because of the unique geological characteristics, i.e., several thousand vertical feet of sands and gravel, the inherent nature of the DNAPL to sink (until an aquitard is encountered, or the DNAPL mass becomes residual in the aquifer matrix and can no longer migrate downward via gravity) and the fact that the Site is located over the only drinking water aquifer for the Albuquerque Region, the potential risks may outweigh the potential benefits of the available innovative technologies that were reviewed. As new technologies are developed, or as existing innovative technologies are refined, these alternatives will be reviewed to determine if they can successfully remediate the DNAPL creosote in the future. At a minimum, innovative technologies will be reviewed during each five-year review for their applicability to this Site.

11. **Comment:** ASJCAC recommends that the PPA be withdrawn from consideration, and resubmitted after the scenarios and cost estimates are revised to describe the nature and expense of each entire proposed treatment as a separate scenario, where each scenario includes all appropriate technologies that is part of that treatment. The current PP splits the scenarios into specific technologies, rendering the cost estimates irrelevant.

    EPA Response: The original cost estimates were prepared by the PRP during the feasibility study. The cost summary is based on the construction and annual O&M activities anticipated to implement the major components of the Selected Remedies. The information for the cost estimate is based on the best available information regarding the anticipated scope of the Selected Remedies. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternatives. Changes in cost for the Selected Remedies will be documented in the form of a memorandum in the Site file, an Explanation of Significant Differences (ESD), or a ROD amendment depending upon NCP requirements for the change in question. The cost estimate in this ROD is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

12. **Comment:** ASJCAC suggests and recommends that the EPA also require the potentially responsible party (PRP) to be required to post a bond to guarantee surety – sufficient funds for perpetual operation and maintenance of on-site disposal of contaminated media.

    EPA Response: EPA will review the financial assurance options for the PRP to conduct the remedial work at this Site. At the current time, the exact financial mechanism has not been determined. The mechanism for financial assurrance will be determined in the negotiation process for the remedial action prior to remedy implementation and will be included in the final agreement between EPA and the responsible party for implementation of the remedy.

    Several steps in the Superfund process must be taken prior to implementation of the remedy and O&M activities. These steps are as follows: The EPA will issue this ROD. The EPA will send a letter to the PRP requesting that the PRP provide a good faith offer within 60 days stating the PRP's intent to perform the cleanup. Providing that this good faith offer is received, EPA and the PRP will enter into 60 days of negotiations. Once an agreement is reached, a legal document called a Consent Decree

(CD) will be signed by the parties and lodged with the court. After a 30-day public comment period, the Department of Justice will request the court to enter the CD. If the court enters the CD it becomes final. Once the CD is final, the PRP will begin the design of the remedy. The Remedial Action (remedy implementation) will start after EPA approves the Remedial Design. These procedures are specified in CERCLA. It is EPA's policy to have the PRPs perform cleanups whenever possible, in order to conserve limited Superfund money.

13. **Comment:** ASJCAC suggests and recommends that the EPA also require the PRP to provide funds for the ASJCAC, Inc. for administration and to support technical assistance to provide community oversight of all future remedial activities at the site.

    EPA Response: Comment noted. This information will be presented to the PRPs during the negotiations discussed in the above comment.

14. **Comment:** ASJCAC suggests and recommends that the EPA also require that the formation of an oversight committee be established, enforced, and funded to include pertinent government agencies. This group's function would assure meaningful participation from the public and accountability to the community within the scope and perimeters of all of the activities related to the site. The ASJCAC would chair this group.

    EPA Response: It is the EPA's intent to continue to involve the NMED, City of Albuquerque, Bernalillo County, and the community through the ASJCAC during the remedial design and remedial action. The EPA will continue to have meetings with these entities and agrees with the concept of forming a design review committee. However, it is the intent of the EPA to act as the chair of this committee to facilitate the process.

15. **Comment:** ASJCAC suggests and recommends that the EPA also require that each environmental contractor bidding to work on this site performs both soil and groundwater remediation strategies, and the contractor must take into account the results of the excavation prior to final design of the groundwater remediation system. We also strongly suggest that the EPA consider phasing the stages of the project.

    EPA Response: The contractor that performs the actual remedial work at the Site will be chosen for its technical expertise. There is typically one consultant that oversees the entire project at the Site who has the ultimate responsibility to ensure that the remedial action is appropriate for all media involved. The PRP actually hires the consultants and contractors to perform the work.

    In addition, both the EPA and the NMED will have oversight responsibilities for the remedial action. As in the past, the EPA will also ensure that the community is heavily involved in this remedial process.

16. **Comment:** Several community members submitted letters that stated that they did not believe the remedy in the proposed plan is in the best interest of the environment or the citizens of San Jose.

    EPA Response: Comments noted.

17. **Comment:** The ASJCAC requests a 30-day extension to the public comment period.

EPA Response: The EPA granted the extension and the public comment period was extended from March 9, 2002, until April 8, 2002.

Comments from the Public Meeting Transcript -- February 27, 2002

18. **Comment:** Are the underground storage tanks still present at the Site?

EPA Response: Two underground storage tanks are still present at the Site. Five underground storage tanks have been completely removed, but there are two that are still in place; they have been cut open and are filled with soil and concrete debris. Soil sampling data indicates that there are not elevated constituent concentration migrating from the underground storage tanks. The remaining tanks will be removed during the remedial action.

19. **Comment:** One commenter wanted to ensure that contamination stayed on-site and does not migrate off-site because of the limited amount of ground water in Bernalillo County. In addition, he wanted the EPA to continue to pursue innovative technologies at the Site.

EPA Response: The EPA is committed to the use of appropriate innovative technologies at the Site. In addition, the remedial actions at the Site will be designed to meet the following objectives to ensure that contamination stays on-site and does not migrate off-site.

Prevent human ingestion, inhalation, or dermal contact with ground water that contains unsafe concentrations of site related COCs.

Prevent the DNAPL from causing concentrations of COCs in ground water to exceed the MCLs.

Remove the DNAPL 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 ARARs in the receiving surface water body.

Prevent the ground water from being impacted above MCLs 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 on-site 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 on-site contamination.

20. **Comment:** My family lived on the Site in the small housing subdivisions until we were moved in the San Jose area. We used to drink the water from the Site well when I was six to twelve years old. My

youngest sister died from cancer that might have come from the water at the Site. I want the Site cleaned up.

EPA Response: The EPA agrees that this Site must be cleaned up. There is the possibility that ground water in the Site water supply well could have been contaminated with creosote constituents in the 1950's. However, it is difficult to determine the impact of past short-term exposures to unknown concentrations of Site constituents.

21. **Comment:** Were there any primary community stakeholders at the table when the proposed plan was written?

EPA Response: That is the purpose of this formal public meeting being held today. The proposed plan is a proposal that looks at all of the alternatives that were evaluated for remediating the Site. Throughout the investigative process, the EPA and NMED have held open houses and informal meetings with community leaders and area residents to seek public input. The following are some examples of meetings with the community in the activities that led up to the proposed plan.

A public information repository is located at the Albuquerque Public Library, Main Branch, located at 510 Copper Avenue NW in downtown Albuquerque. The repository contains copies of reports generated for the Site and the Administrative Record file.

The EPA has held open houses, and will continue to hold them in order to provide residents, civic leaders, public officials, environmental groups, news reporters, and others with current information about site activities and the Superfund program. Open houses may include a project update from the EPA and any other involved parties and a question and answer period. In addition to EPA sponsored open houses, the EPA has given numerous presentations at community meetings held by the ASJCAC.

The ASJCAC has received two Technical Assistance Grants in order to provide technical advice at the Site. This site also represents a significant partnership with not only the community, but also with the City of Albuquerque, Bernalillo County, the State of New Mexico, and elected officials.

An informal open house was held on November 20, 1993, at noon at the San Jose Parish Hall, located at 2401 Broadway SE, Albuquerque, New Mexico to discuss the Superfund Program, and the AT&SF Site as a proposed NPL Site.

An informal open house was held on May 11, 1994, at 6:00 P.M. at the San Jose Community Awareness Council Office, located at 2401 Broadway SE, Albuquerque, New Mexico to discuss the AT&SF Superfund Site remedial activities.

An informal open house was held on April 21, 1999, at 7:00 P.M. at the Jack Candelaria Community Center, located at 400 San Jose Street SE, Albuquerque, New Mexico to discuss the removal activities for the sludge and contaminated soils in the old impoundment area.

An informal open house was held on November 4, 2001, in the evening at the San Jose Parish Hall, located at 2401 Broadway SE, Albuquerque, New Mexico to discuss the remedial activities and the pending release of the Proposed Plan. An English-to-Spanish interpreter was at the open house to translate the presentation into Spanish.

An informal open house was held on December 18, 2001, at 7:00 P.M. at the Jack Candelaria Community Center, located at 400 San Jose Street SE, Albuquerque, New Mexico to summarize the activities conducted as part of the RI/FS. The Proposed Plan was introduced at this meeting. An English-to-Spanish interpreter was at the open house to translate the presentation into Spanish. Representatives from the EPA, NMED, City of Albuquerque, and BNSF attended the open house to answer questions about the Site activities.

In addition, at least seven other open house meetings have been held in conjunction with the ASJCAC in 1995, 1997, 1998, 1999, 2000, and 2001.

The EPA announced a 30-day public comment period on the Proposed Plan from February 7, 2002, to March 9, 2002, to enable citizens to review and comment on the Agency's recommended alternatives. The ASJCAC requested a 30-day extension to the public comment period. The extension was granted and the public comment period ended on April 8, 2002. A public notice containing a brief summary of the cleanup action, dates of the comment period, and instructions on how to submit comments was published in the *Albuquerque Journal* and the *Albuquerque Tribune* on February 7, 2002. In addition, a fact sheet was mailed to approximately 500 people who are on the Site mailing list. Additional copies of the fact sheet were also hand delivered to members of the community by the ASJCAC.

The formal public meeting was held on February 27, 2002, at the South Broadway Cultural Center, 1025 Broadway, SE, Albuquerque, New Mexico. The public was invited to orally comment on the Proposed Plan during the formal public meeting. A court reporter was at the meeting to create a transcript of the proceedings. An English-to-Spanish interpreter was also present at the formal public meeting to translate the presentation into Spanish, as needed.

22. **Comment:** My family has been impacted by the Site. My husband used to work there and he died of cancer. What is going to be done about this?

EPA Response: There really isn't anything that EPA can do about past exposures. Our mission at the EPA is to prevent future exposures. Potential other damages from past exposures should be pursued in the civil courts.

23. **Comment:** What about the person who has potentially been exposed from drinking the water? What will be done for him?

EPA Response: If you are concerned about past exposures and perhaps future impacts from those exposures, we recommend that you talk to the Agency For Toxic Substances and Disease Registry (ATSDR). It's a branch of the Center for Disease Control that works in conjunction with the Superfund Program. The Superfund Remedial Action Branch addresses contaminated sites and the releases from those contaminated sites and determines the best way to get the Sites cleaned-up.

24. **Comment:** I just want to respond about ATSDR. ATSDR has been in our community a couple of times already and we all know that they are funded out of the EPA and they are also funded out of CDC, the Center for Disease Control. They don't have enough money and they don't have enough human resources and financial resources to be able to provide needs for communities. And in places

like San Jose, they have come into our communities and asked us for all this information. But we don't have the resources to provide the information. And so I just wanted to go on record saying that, because from the President of the United States on down, including Heather Wilson the Congresswoman, knows about this. And we're going to have a tour in our community, but the funding keeps shrinking from EPA, it keeps shrinking, and it further disenfranchises communities like San Jose, and I just want to respond to that, because, you know, I am very empathic and sympathetic to our community as well as to the governmental entities that are made to provide services without enough money, because they don't have any money.

EPA Response: Comment noted.

25. **Comment:** I don't think that referring people to a disease registry is what people want. What we want to know is, what kind of financial responsibility do the poisoners have to help the people that have been hurt, whose lives have been altered by the poison?

    EPA Response: In the Superfund process, the potentially responsible party is liable for remediating the Site. Any other damages must be pursued in the civil courts.

26. **Comment:** One commentor suggested that transportation and off-site incineration of the waste could be completed for approximately $3.5 million, not $8.4 million estimated in the proposed plan.

    EPA Response: Comment noted. The subsequent bid that the commentor presented to the PRP was $4.9 million. This number does not include excavation or backfill costs. Please see comment No. 48.

27. **Comment:** A commentor stated that he had a question on the preliminary remediation goals for the soil, specifically section 5.2 in the proposed plan. Other states, and specifically Indiana, have soil remediation goals for this constituent at 39 milligrams per kilogram for benzo(k)fluoranthene and the proposal here is for 130 milligrams per kilogram.

    EPA Response: The PRGs for the soil are risk-based numbers based on site-specific data utilizing an industrial scenario on-site. The EPA has determined that a BAP Equivalent of 7.8 mg/kg will be used as the remediation goal for soil PAHs. The BAP Equivalent of 7.8 mg/kg provides a very conservative level for the Site clean-up and will be protective of human health and the environment.

28. **Comment:** One commentor requested the number of people that lived within ½ mile and one mile of the Site.

    EPA Response: An exact count of the residences in the vicinity of the Site has not been conducted. However, the closest residence is approximately 600 feet west of the Site and a residential area is located approximately one-half mile southwest of the Site

29. **Comment:** One commentor requested whether EPA identified differences in how the various remediation methods will effect the community? Specifically as they relate to other forms of nuisance and pollution, such as noise, traffic, dust, and air contamination?

    EPA Response: Excavation, solidification/stabilization, and cap construction are full-scale technologies that will address site contaminants in a relatively short period of time. However, during the remedial activities, short-term risks will be posed to site workers involved in handling and processing the contaminated soil. These risks may include dermal contact and inhalation. Nearby residents may also be at risk due to inhalation of fugitive emissions. Appropriate measures such as use of personal protective equipment will be used to protect workers. Monitoring along the property fence line boundary will guide the implementation of onsite controls and monitoring to reduce fugitive emissions to eliminate risk to residents. Water suppression techniques will be utilized to minimize the formation of dust and particulate matter in the air.

There is the potential for short term risks from increased truck traffic and potentially rail traffic as the DNAPL-contaminated soils are sent off-site to an incinerator. The appropriate actions will be implemented to minimize neighborhood disturbances from the truck and rail traffic.

There is the potential for increased noise pollution due to the construction equipment that will be utilized for the installation of ground water recovery wells, excavation, and in-situ mixing of materials. The appropriate actions will be implemented to minimize potential noise pollution.

30. **Comment:** Has EPA remediated other wood treating Sites like this one, or is this an experiment and the first time remediating this type of pollution?

EPA Response: Yes, the EPA is in the process of remediating numerous wood treating Sites across the United States under both the RCRA and Superfund program. Most wood treating facilities typically have soil and ground water contamination from historical operations. This contamination is generally from releases from the process areas, drip tracks, and old impoundments. The alternatives reviewed in the proposed plan are typically the remedial options that the EPA and/or the responsible parties utilize to remediate these types of wood treating Sites. Another technology that has been successful in remediateing creosote-contaminated soils is on-site thermal desorption. However, the community did not want an on-site thermal desorption unit.

31. **Comment:** Has EPA thought about buying us out?

EPA Response: Purchasing property is not necessary to provide a protective remedy at the Site.

32. **Comment:** I just want to know if someone can explain how it's safer to do incineration than the bioremediation, because it sounds like those are the two things that get rid of the contamination, and the other remedial actions, just kind of contain them, so if somebody can explain that it will help people make a decision.

EPA Response: Incineration and bioremediation both remove the organic contamination. With bioremedition, the waste is degraded using naturally occurring bacteria into safer forms. With off-site incineration, the waste is treated off-site and there is not any residual waste on-site. The in situ stabilization remedy treats the soil by chemically binding it in place. By mixing the cement, fly-ash, and cement kiln dust, a chemical reaction occurs that binds the contaminated material in place. In essence, a large concrete block will be created below the ground surface. This chemical reaction will prevent the contaminated material from leaching out into the ground water and acting as a source. The original material is still on-site, but in a much safer form. Each of these alternatives offer equal protection.

33. **Comment:** By sending the material to an off-site incinerator, don't you just pollute another property?

EPA Response: That's one potential problem with utilizing off-site incinerators. You take the waste from one site and transport it to another site, and potentially, in this case, another country. The potential is always there for a truck or rail accident to impact another area if there is a spill or leak. Once it gets to the incinerator, and even though the incinerators have an efficiency in excess of 99 percent, the potential is there for a release into the environment during the incineration process. This risk is minimal, but it does exist.

34. **Comment:** What is the chemical composition of creosote?

EPA Response: Creosote is an oily, brown to black liquid that is a very complex mixture of organic compounds, containing approximately 85% polynuclear aromatic hydrocarbons (PAHs), 10% phenolic compounds, and 5% of other additives. It is a distillate of coal tar. In addition the creosote is typically mixed with diesel during the wood treating process to improve its performance.

35. **Comment:** What is the timing of the different remedies?

EPA Response: The specific timeframes for each remedy is presented in both the proposed plan and the ROD. The shortest timeframe for soil remediation is for incineration since the remedial design is straightforward and field studies do not need to be conducted prior to implementation. The longest soil remedial timeframe is for bioremediation. Ground water pump and treat has the potential to last for over 30 years.

36. **Comment:** If the material is excavated and incinerated, how big is the hole in the ground? Won't there be an added expense to backfill the excavation?

EPA Response: The current estimate for the contaminated soil is 5,600 cubic yards. Any material that is excavated from the Site will have to be replaced with clean backfill. There is an expense for both the excavation and backfill process.

37. **Comment:** When the sludge and contaminated material was removed in the past, were land disposal restrictions (LDRs) in place?

EPA Response: The previous removal actions that were conducted at the Site in 1990 and 1999 disposed of the excavated materials in permitted landfills. All federal, state, and local regulations were met and complied with, including LDRs.

38. **Comment:** How deep is ground water and how deep will you excavate the contaminated soil?

EPA Response: Ground water at the Site is approximately 15 feet below the ground surface. The soil excavation will be down to a maximum depth of three feet, or until the PRG of 7.8 mg/kg BAP equivalents is reached. If DNAPL-contaminated soil is encountered during this excavation process it will excavated and then sent to an off-site incinerator.

39. **Comment:** What about on-site thermal desorption?

EPA Response: On-site thermal desorption has been used successfully at wood treating sites across the country. However, early on in the remedial investigation, the community stated that they did not want, and would not accept, an on-site incinerator or thermal desorption unit in their neighborhood. They were very clear in that respect. As a result, on-site thermal desorption and on-site incineration were not carried through in the remedial alternatives.

40. **Comment:** Is the community a driver in the remedial process?

EPA Response: Community acceptance is one of the nine NCP criteria to evaluate remedial alternatives at Site. The EPA considered community concerns in the rejection of on-site incineration and on-site thermal desorption as potential remedies at the Site. The EPA has also modified the selected remedy to include the off-site incineration of DNAPL contaminated soils. The community is clearly one of the drivers in the decision process.

41. **Comment:** If the on-site option is selected, what long-term maintenance and monitoring will be required?

EPA Response: If we go with the on-site option, we will have to do groundwater monitoring for at least 30 years at the site. EPA will be conducting five-year reviews at that site to make sure that the remedy is still protective. During those five years we also look at different technologies to improve the remedial performance. The PRP, BNSF is responsible for maintaining ensuring the remedy remains protective of human health and the environment.

42. **Comment:** One commentor was concerned that Superfund is running out of money. Is this going to affect this site or any of the other sites in Albuquerque? Who is paying for the clean-up of this Site?

EPA Response: It should not affect this site, because the potentially responsible party, who in this case is BNSF, is responsible for conducting the work and paying for it. As for other sites in the Albuquerque area, EPA doesn't know how the future budget will affect what we can do on those. The EPA is currently conducting the remedial design for the Fruit Avenue Plume Site. That portion has already been funded, so we're moving forward. When we get to the point where we're ready to implement the remedy, we will just see what the budget looks like at that point in time. The South Valley Superfund Site is also a PRP-lead Site and 100% of the cost is being funded by the PRPs.

43. **Comment:** I know you said ATSDR is not involved and you don't represent them, and that they have been involved in the past. I'm wondering if anyone, including the railroad, has attempted to list people that are exposed, even the occupational exposure of the people who work at the site until the time it closed?

EPA Response: The ATSDR report is in the Administrative Record; however, a complete list of all potential exposures has not been compiled by any party.

44. **Comment:** Will there be a potential threat again in the same community if waste is left on-site?

EPA Response: If the waste is left on-site, there is a very, very slight chance that the cap may fail in the distant future. However, with proper maintenance by BNSF, the remedy will remain protective. In addition, the EPA will conduct five-year reviews to ensure that the remedy remains protective.

45. **Comment:** Just a clarification, didn't you say earlier that contamination has not moved off the site? And, if so, is it in a residential area?

EPA Response: The contamination is confined on-site except for a small portion of the ground water plume in the southwest quadrant of the Site. There is not any ground water or soil contamination in any residential areas. The off-site portion of the ground water plume is under a metal recycling facility. The current ground water flow direction is bringing the off-site plume back on-site. The ground water pump and treat system will facilitate the remediation of this portion of the plume.

46. **Comment:** Is the PRP required to put up a performance bond for the ultimate remediation and maintenance of the cap? How does the EPA make the determination whether or not a bond will be necessary?

EPA Response: The PRP will be required to have a financial assurance mechanism in place that ensures that the selected remedy will be implemented. The exact nature of this financial assurance will be negotiated with the PRP. It is not a requirement of Superfund that a bond be in place. One of the factors that is reviewed to determine whether a bond is necessary is the viability of the PRP. EPA will review the financial assurance options for the PRP to conduct the remedial work at this Site. At the current time, the exact financial mechanism has not been determined. The mechanism for financial assurance will be determined in the negotiation process for the remedial action prior to remedy implementation and will be included in the final agreement between EPA and the responsible party for implementation of the remedy.

47. **Comment:** Will the transcript be published in English or Spanish, or both?

EPA Response: The current plan is to have the transcript in English. However, all fact sheets and Site update sheets are distributed in both English and Spanish.

Potentially Responsible Party's Comments

General Comments

48. **Comment:** Comments made at the public comment meeting, held on February 27, 2002, indicated that off-site incineration could be cost-competitive with the preferred soil treatment alternative. A Bennett Environmental, Inc. representative was present at the meeting and stated that his company could incinerate soils at the site for a significantly cheaper cost than the Proposed Plan. A cost evaluation for this option, based on a non-binding quotation from Bennett Environmental, Inc, dated March 5, 2002, shows that the estimated cost for this remedial alternative would be $4,900,000 ($4,600,000 capital, and $2,500 O&M). The Bennett Environmental, Inc. costs do not include a fuel-surcharge, so the total cost for this option will increase. Our cost estimate for this option also includes excavation, non-binding quotes for transportation and incineration of impacted soil, backfill with clean material, temporary site facilities, ash disposal and other relevant site activities. The costs included in the Proposed Plan, based on a quotation from Safety-Kleen for the same treatment scenario, were $8,640,000 ($8,110,000 capital, and $2,500 O&M). At an estimated cost of $4.9 million, the incineration alternative using Bennett Environmental, Inc. is still approximately 2.5 times greater than the cost of the Preferred Alternative of in-situ stabilization/solidification and run/on-run/off management.

EPA Response: Comment noted.

49. **Comment:** Incineration poses a greater short-term risk to community members, due to the risks associated with transportation of the soil to the incineration facility. Communities along the transportation route are at risk to exposure should there be an accident where contaminated soils are released.

    EPA Response: Comment noted.

50. **Comment:** Shipping the contaminated soils to the Bennett Environmental, Inc. facility in Toronto, Canada will raise additional issues of transporting hazardous waste across international boundaries for disposal. These issues may delay the disposal of the soils and may increase costs due to administrative issues.

    EPA Response: Comment noted.

51. **Comment:** We feel that incineration is a poor use of resources, as the principal threat waste in the soil was removed from the site in 1999. Only low concentrations remain in on-site soils. As such, there is the potential that the soils excavated for incineration will have a low BTU value and will produce a larger amount of ash from the incineration process. This additional ash disposal will increase costs and total remedy time. Upon completion of the removal action in 1999, the analysis of surface soils showed contaminant concentrations ranged from 100 mg/kg to 1,000 mg/kg. Incineration may have been a more appropriate alternative if BNSF had not spent several million dollars to remove the more contaminated soils from the site. This removal action was performed to provide protection to the community as soon as possible and it was done under EPA and NMED approval and consent. The soil remaining on site is minimally impacted and does not warrant incineration. The material, in fact, may be left in place without a cap (see below comments). However, BNSF is willing to be conservative in providing protection of human health and the environment by agreeing to stabilize the material in-situ and cap it.

    EPA Response: Comment noted. However, if any DNAPL contaminated soil is encountered during the remedial activities, it shall be removed and sent to an approved off-site incinerator.

52. **Comment:** During the public meeting, a discussion took place about in-situ treatment of soils present at the site. We emphasize that Alternative S-8 – The Preferred Soil Alternative – In-Situ Solidification/Stabilization and Run-on/run-off Management is *overly* protective of human health and the environment. This Alternative proposes stabilizing the contaminated soil in the wastewater reservoir and placing both a clay cap and a liner over the stabilized material. A Hydrologic Evaluation of Landfill Performance (HELP) model was run to simulate and compute the quantity of infiltration at the site. The HELP model evaluation indicated that on average and under existing ground conditions at the site, for a scenario where a 6-foot thick soil cover was placed over cemented soils, only 0.05% of the total precipitation, or 0.004 inches (approximately 15 cubic feet per acre of area) per year would infiltrate into the groundwater. This model was run for stabilized soils with a *soil* layer and showed that it was protective of groundwater at the site. As such, the Preferred Alternative is over and above what is necessary to protect human health and the environment. Again, it should be noted that BNSF spent several million dollars to remove the highly contaminated material from the site to

protect human health and the environment from any principal threat wastes in the soil.

EPA Response: Comment noted.

53. **Comment:** We feel that the language in the proposed plan may be interpreted that hot spot treatment, as detailed in Alternatives GW-5, GW-6, and GW-7, is going to be implemented at the same time as conventional pump-and-treat operations. We would prefer language for any reference to this be changed from "DNAPL source removal and hot spot treatment" to "DNAPL source removal by conventional methods and/or hot spot treatment." This comment is consistent with the presentation given by the EPA at the public meeting held on February 27, 2002.

    EPA Response: Conventional methods of DNAPL removal are currently being employed that are having limited success in removing the DNAPL. However, since there may be between 59,000 to 70,000 gallons of DNAPL in the subsurface, a more aggressive approach will be required. Additional information for the appropriate technology to remove the DNAPL source material will be developed in the remedial design phase. The EPA is committed to reviewing the potential use of innovative technologies at this Site. However, because of the unique geological characteristics, i.e., several thousand vertical feet of sands and gravel, the inherent nature of the DNAPL to sink (until an aquitard is encountered, or the DNAPL mass becomes residual in the aquifer matrix and can no longer migrate downward via gravity) and the fact that the Site is located over the only drinking water aquifer for the Albuquerque Region, the potential risks may outweigh the potential benefits of the available innovative technologies that were reviewed in the proposed plan. As new technologies are developed, or as existing innovative technologies are refined, these alternatives will be reviewed to determine if they can successfully remediate the DNAPL creosote in the future. It is not the intent of the EPA to select an innovative technology that will exacerbate the situation.

54. **Comment:** We agree with EPA's intent to remove DNAPL from the site. As noted in the Proposed Plan, we have been removing DNAPL using Blackhawk Pumps installed in 5 recovery wells. We have performed modifications to these pumps to further enhance their reliability and performance. We intend to continue this current DNAPL removal action and will continue to evaluate the performance of this system, as well as to evaluate any other technology that may become available in the future. We, however question the viability and effectiveness of thermal treatment or co-solvent/alcohol flushing as a site-wide technology to remove DNAPL. As noted in the Feasibility Study and the Proposed Plan, the injection of steam or the addition of cosolvents/alcohol will result in the dispersion of DNAPL in both the horizontal and the vertical directions. Vertical dispersion could further spread contaminants into the Santa Fe Aquifer, which so far has only been minimally impacted. In-situ oxidation may be applied on a localized basis without enhancing the threat of spreading contaminants further into the aquifer. It should be noted that use of any of these technologies proposed for hot spot treatment will not result in total removal of DNAPLs. Total removal of DNAPLs is a requirement needed to achieve MCLs. It has been demonstrated that it is not feasible to remove all the DNAPL, both free and residual, in an aquifer. We believe that the risk of impacting the Santa Fe Aquifer through dispersion of DNAPL facilitated by these treatment methods far outweighs the limited benefit. Hence, we do not see how MCLs can be achieved at this site in the near, and probably distant, future.

    EPA Response: In order to achieve MCLs, the DNAPL source material must be removed. Conventional methods of DNAPL removal are currently being employed that are having limited success in removing the DNAPL. However, since there may be between 59,000 to 70,000 gallons of

DNAPL in the subsurface, a more aggressive approach will be required. Please see the response to comment 52 above..

Specific Comments

55. **Comment:** On Page 12 of 57of the PP, change "70,000" to *59,300*. 59,300 gallons is the estimated volume of DNAPL at the site. TRC performed this estimation based on site data provided in the Remedial Investigation Report.

EPA Response: The EPA's calculation show that there are potentially 70,000 gallons of DNAPL at the Site. The ROD will reference a range of 59,300 to 70,000 gallons of DNAPL

56. **Comment:** In Section 3.5, page 16 of 57 of the PP, insert "*In the 92 years since the facility started operation, the groundwater contamination has traveled only 900 feet (radially) from the source. Further, ground water monitoring since 1995 has shown the plume to be relatively stable.*" After the sentence "It should be noted that the contamination...private water wells."

Change "However, there is the possibility, that if unaddressed, contamination from the Site may reach municipal supply wells for the City of Albuquerque and private water wells." To "*However, the possibility, that if unaddressed, contamination from the Site may impact municipal supply wells for the City of Albuquerque and private water wells cannot be discounted.*"

Change "It should be noted that the DNAPL contamination has not yet reached any of the municipal supply wells or private water wells. However, there is the possibility, that if unaddressed, contamination from the Site may reach municipal supply wells for the City of Albuquerque and private water wells." To "*It should be noted that free-phase DNAPL presence is limited to a few locations, all within BNSF property boundaries. Most of the DNAPL is situated where it is due to loss of head, stopping its movement downward. Further, most of the mobile constituents, such as naphthalene have preferentially moved out and degraded. The remaining DNAPL is highly immobile and has a very low solubility. Barring these inherent physical properties, if unaddressed, DNAPL's impact on the municipal water supply cannot be discounted.*

EPA Response: The EPA agrees that the DNAPL and ground water contamination have not migrated very far from the source areas. However, the EPA still believes that there is the possibility, that if unaddressed, contamination from the Site may reach municipal supply wells for the City of Albuquerque and private water wells.

57. **Comment:** In Section 6.1, page 28 of 57 of the PP, change "All alternatives include an operations and maintenance (O&M) component that involves ground water monitoring to assess the extent of contamination and the risks to human health." to "*All ground water alternatives include an operations and maintenance (O&M) component that involves ground water monitoring to assess the extent of contamination and the risks to human health.*"

EPA Response: Ground water monitoring will be required at the Site to assess the ground water flow regime as it relates to the contaminant plume. Initially the ground water monitoring will be conducted quarterly.

58. **Comment:** In Section 6.13, page 38 of 57 of the PP, remove "Santa Fe Aquifer" from the 3rd paragraph, when discussing the location of the steam injection wells. In addition, insert the following as a paragraph above the cost summary:

> *Drawbacks to steam flushing are its high cost, when compared to other alternatives, increased mobilization of DNAPL in the downward direction, and safety when dealing with high voltage and high temperatures.*

EPA Response: In theory, a properly designed steam injection system will determine the number and location of required steam injection wells during the design phase to remove the DNAPL and prevent deeper mobilization of the DNAPL. However, additional field studies are needed for this technology.

59. **Comment:** The PRP provided numerous other specific comments related to revising specific language in the proposed plan.

EPA Response: These specific comments have been reviewed by the EPA and, as appropriate, the comments have been incorporated into the proposed plan.

APPENDIX B - CONCURRENCE LETTERS

State of New Mexico
ENVIRONMENT DEPARTMENT
Office of the Secretary
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502-6110
Telephone (505) 827-2855
Fax (505) 827-2836

GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

May 30, 2002

Myron Knudson, Director
Superfund Division
US Environmental Protection Agency
Region 6
1145 Ross Avenue
Dallas, TX 75202-2733

RECEIVED
02 JUN 12 AM10: 39
SUPERFUND DIV
DIRECTOR'S OFC

RE: Concurrence with the Proposed Plan of Action for the AT&SF Albuquerque Superfund Site, Albuquerque, New Mexico

Dear Mr. Knudson:

The New Mexico Environment Department (NMED) has reviewed the United States Environmental Protection Agency (EPA) Proposed Plan of Action (the Plan) for the AT&SF Albuquerque Superfund Site located in Albuquerque, New Mexico. NMED appreciates having had the opportunity to review and consider the public comments concerning the Plan that were submitted to EPA on or prior to April 8, 2002. The comments were submitted from numerous interested parties including the City of Albuquerque, concerned citizens, community leaders, the Albuquerque San Jose Community Awareness Council, Inc. and Burlington Northern and Santa Fe Railway Company (BNSF).

NMED concurs with the proposed approach to ground water clean-up through the use of a performance based remedy as set forth in the Plan. NMED also supports and concurs with the use of innovative technologies that are proposed in the Plan for remediating the Dense Non-Aqueous Phase Liquid (DNAPL) in the saturated zone.

NMED supports the proposed solidification and stabilization alternative for only those soils not contaminated with DNAPL. The NMED advocates that EPA require DNAPL contaminated soils to be physically removed from the site and transported to an off-site incinerator for treatment. NMED requests that the Record of Decision (ROD) include language that will direct

BNSF to use an appropriate, scientific and objective method for segregating DNAPL impacted soils from those soils not containing DNAPL. Also, should DNAPL materials be encountered during the excavation, that excavation will continue to as great a depth as practicable, in order to remove a possible source of ground water contamination. With the inclusion of a provision in the ROD that addresses the removal and off site incineration of DNAPL impacted soils, NMED is in full support of the proposed remedial action.

As you know, NMED has worked very closely with EPA on the oversight of site activities, often fulfilling the role of on-site support during well installation and removal activities. NMED appreciates the continued close working relationship with EPA at this site. If you have any questions, please call me at (505) 827-2855, or Susan Morris of my staff at (505) 827-2890.

Sincerely,

Peter Maggiore

PETER MAGGIORE
Secretary

PM: SAM: sam

Cc: Don Williams, New MexicoTeam Leader, Superfund Division, USEPA Region 6
Greg Lyssy, Remedial Project Manager, USEPA Region 6
George Schuman, Program Manager, NMED, SOS.

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Environmental Health Department

Martin J. Chavez, Mayor

RECEIVED
02 APR 15 PM 2:44
SUPERFUND DIV.
DIRECTOR'S OFC.

April 9, 2002

Mr. Greg Lyssy
Remedial Project Manager
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, TX 75202-2733

Dear Mr. Lyssy:

Albuquerque Environmental Health Department (AEHD) staff reviewed the January 2002 AT&SF Albuquerque Superfund Site Proposed Plan of Action and attended the February 27, 2002 public meeting. AEHD offers the following comments regarding the proposed Plan of Action for remediating soil and groundwater contamination at the site.

The City of Albuquerque is presently totally dependent on the groundwater resource to provide our municipal water supply and we will continue to rely on this resource in future decades to meet a significant portion of our water needs. AEHD concurs with the proposed aggressive approach to groundwater remediation. The proposed remedial action objectives (RAOs) for groundwater are adequately protective of this vital resource and the proposed level of flexibility in selection and implementation of the remedial approach appears warranted given the complexity of the problem at hand.

Although AEHD generally supports the specified remedial action objectives for soil contamination, we have some reservations regarding the proposed preferred alternative (Alternative S-8, In-situ solidification/stabilization of contaminated soil with run-on/run-off management). Properly implemented, this alternative should be adequately protective of human health, groundwater, surface water and ecological receptors. However, stabilizing the waste in place will permanently remove a portion of the property from beneficial use, will require long-term maintenance and monitoring and leaves at least the possibility of some type of recurring problem in the future. AEHD is most supportive of an option that actually removes and treats contaminated soil. AEHD supports a closer evaluation and reconsideration of Alternative S-6 (Excavation and off-site incineration).

Thank you for providing the opportunity to comment on this proposal. AEHD staff is available to discuss any associated issues or concerns that you may have.

Sincerely

Alfredo R. Santistevan, Director
City of Albuquerque
Environmental Health Department

PART 3
ADMINISTRATIVE RECORD INDEX

Prepared for

United States Environmental Protection Agency

Region 6

FINAL
ADMINISTRATIVE RECORD INDEX

for

AT&SF (ALBUQUERQUE)
SUPERFUND SITE

EPA ID No. NMD980622864

ESS II
Task Order No. 083-017

Greg Lyssy
Remedial Project Manager
U.S. EPA Region 6

Prepared by:

TechLaw, Inc.
750 N. St. Paul Street, Suite 600
Dallas, Texas 75201

June 27, 2002

PREAMBLE

The purpose of this document is to provide the public with an index to the Administrative Record (AR) for a U.S. Environmental Protection Agency's (EPA) selected remedial action to respond to conditions at the AT&SF (Albuquerque) Superfund site (the "Site"). EPA's remedial action is authorized by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. Section 9601 et seq.

Section 113 (j)(1) of CERCLA, 42 U.S.C. Section 9613 (j)(1), provides that judicial review of the adequacy of a CERCLA response action shall be limited to the administrative record. Section 113 (k)(1) of CERCLA, 42 U.S.C. Section 9613 (k)(1), requires the EPA to establish an administrative record upon which it shall base the selection of its remedial actions. As the EPA decides what to do at the site of a release of hazardous substances, it compiles documents concerning the site and the EPA's decision into an "administrative record file." This means that documents may be added to the administrative record file from time to time. Once the EPA Regional Administrator or the Administrator's delegate signs the Record of Decision memorializing the selection of the action, the documents which form the basis for the selection of the response action are then known as the "administrative record."

Section 113(k)(1) of CERCLA requires the EPA to make the Administrative Record available to the public at or near the site of the response action. Accordingly, the EPA has established a repository where the record may be reviewed near the Site at:

Albuquerque Public Library
501 Copper Ave. N.W.
Albuquerque, NM 87102
(505) 768 - 5141

The Administrative Record may also be reviewed at the New Mexico Environment Department by contacting Susan Morris at the following address:

New Mexico Environment Department
Superfund Division
1190 St. Francis Drive
Santa Fe, NM 87502
(505) 827-0184

The public may also review the administrative record at the EPA Region 6 offices in Dallas, Texas, by contacting the Remedial Project Manager at the address listed below. The record is available for public review during normal business hours. The record is treated as a non-circulating reference document. Any document in the record may be photocopied according to the procedures used at the repository or at the EPA Region 6 offices. This index and the record were compiled in accordance with the EPA's Final Guidance on Administrative Records for

Selecting CERCLA Response Actions, Office of Solid Waste and Emergency Response (OSWER) Directive Number 9833.3A-1 (December 3, 1990).

Documents listed as bibliographic sources for other documents in the record might not be listed separately in the Site index. Where a document is listed in the Site index but not located among the documents which EPA has made available in the repository, EPA will, upon request, include the document in the repository or make the document available for review at an alternate location. This applies to documents such as verified sampling data, chain of custody forms, guidance and policy documents, as well as voluminous site-specific reports. Copies of guidance documents also can be obtained by calling the RCRA/Superfund/Title 3 Hotline at (800) 424-9346. Documents in EPA's confidential file are not available for review. These requests should be addressed to :

Greg Lyssy
Remedial Project Manager
U.S. EPA Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 665- 8317

The documents included in the AR index are arranged predominantly in chronological order. The AR index helps locate and retrieve documents in the file. It also provides an overview of the response action history. The index includes the following information for each document:

- **Doc ID** - The document identifier number.
- **Date** - The date the document was published and/or released. "01/01/2525" means no date was recorded.
- **Pages** - Total number of printed pages in the document, including attachments.
- **Title** - Descriptive heading of the document.
- **Document Type** - General identification, (e.g. correspondence, Remedial Investigation Report, Record of Decision.)
- **Author** - Name of originator, and the name of the organization that the author is affiliated with. If either the originator name or the organization name is not identified, then the field is captured with the letters "None".
- **Addressee**- Name and affiliation of the addressee. If either the originator name or the organization name is not identified, then the field is captured with the letters "None".

ADMINISTRATIVE RECORD INDEX

FINAL 06/27/2002

REMEDIAL

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 61823
Date: 06/06/1994
Pages: 107
Title: ATCHISON TOPEKA & SANTA FE ADMINISTRATIVE ORDER ON CONSENT FOR RI/FS
Doc Type: ADMINISTRATIVE ORDER (AOC)

	Name	Organization
Author:	DAVIS , ALLYN M	U.S. ENVIRONMENTAL PROTECTION AGENCY
	FRANKE , MICHAEL	ATCHISON TOPEKA & SANTA FE RAILWAY COMPANY

	Name	Organization
Addressee:	NONE ,	NONE

Docid: 906121
Date: 08/09/1994
Pages: 12
Title: [LETTER ENCLOSING CORRECTED PAGES FROM THE ADMINISTRATIVE ORDER ON CONSENT SIGNED BY EPA AND ATCHISON TOPEKA & SANTA FE ON 6/06/1994]
Doc Type: ADMINISTRATIVE ORDER (AOC)

	Name	Organization
Author:	MALONE , GEORGE	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	FRANKE , M.W.	ATCHISON, TOPEKA & SANTA FE RAILWAY CO

Docid: 906114
Date: 04/19/1999
Pages: 8
Title: SUPERFUND SITE UPDATE-REMOVAL ACTIVITIES AT THE AT&SF SUPERFUND SITE
Doc Type: FACTSHEET

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	NONE ,	PUBLIC

Docid: 139016
Date: 04/19/1999
Pages: 39
Title: UNILATERAL ADMINISTRATIVE ORDER FOR REMOVAL RESPONSE ACTION
Doc Type: ADMINISTRATIVE ORDER (AOC)

	Name	Organization
Author:	KNUDSON , MYRON O	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	NONE ,	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

ADMINISTRATIVE RECORD INDEX

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REMEDIAL

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 906117
Date: 04/20/1999
Pages: 3
Title: [CORRESPONDENCE REGARDING A LETTER FROM BURLINGTON NORTHERN SANTA FE RAILWAY COMPANY TO THE ENVIRONMENTAL PROTECTION AGENCY PROVIDING INFORMATION REQUIRED BY THE UNILATERAL ADMINISTRATIVE ORDER ON CONSENT]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	DUTTON , DIANA	AKIN GUMP STRAUSS HAUER AND FELD
Addressee:	TURNER , JAMES	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 906115
Date: 04/21/1999
Pages: 2
Title: [CONFIRMATION OF BNSF INTENT TO WAIVE OPPORTUNITY FOR CONFERENCE AND COMMENT]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	DUTTON , DIANA	AKIN GUMP STRAUSS HAUER AND FELD
Addressee:	TURNER , JAMES	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 906116
Date: 04/21/1999
Pages: 1
Title: [FAX TRANSMITTAL OF CORRESPONDENCE REGARDING BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY ALBUQUERQUE TIE PLANT]
Doc Type: FAX TRANSMITTAL / COVER SHEET

	Name	Organization
Author:	DUTTON , DIANA	AKIN GUMP STRAUSS HAUER AND FELD
Addressee:	TURNER , JAMES	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 906113
Date: 04/21/1999
Pages: 2
Title: YOU ARE INVITED TO THE AT&SF [ALBUQUERQUE] SUPERFUND SITE OPEN HOUSE
Doc Type: NOTICE

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY
Addressee:	NONE ,	PUBLIC

ADMINISTRATIVE RECORD INDEX

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REMEDIAL

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 109273
Date: 06/09/1999
Pages: 9
Title: REMOVAL ACTION ADMINSTRATIVE RECORD INDEX FOR THE AT&SF (ALBUQUERQUE) SUPERFUND SITE - THE ADMINISTRATIVE RECORD IS INCORPORATED BY REFERENCE
Doc Type: INDEX

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 906119
Date: 07/01/1999
Pages: 1413
Title: REMOVAL ACTION-FINAL REPORT
Doc Type: REPORT / STUDY

	Name	Organization
Author:	AHMED , RIAZ	TRC ENVIRONMENTAL CORPORATION

	Name	Organization
Addressee:	NONE ,	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

Docid: 906120
Date: 08/02/1999
Pages: 1
Title: [TRANSMITTAL OF THE FINAL REPORT FOR THE REMOVAL ACTION]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	AHMED , RIAZ	TRC ENVIRONMENTAL CORPORATION

	Name	Organization
Addressee:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 906118
Date: 11/10/1999
Pages: 1
Title: NOTICE OF COMPLETION, CONTINUATION, AND ADDITIONAL WORK
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	CLARK , DAVID	ATCHISON TOPEKA & SANTA FE RAILWAY COMPANY

ADMINISTRATIVE RECORD INDEX

FINAL 06/27/2002

REMEDIAL

Site Name ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS NMD980622864
OUID N/A
SSID ATSF (ALBUQUERQUE) (1R)
Action REMEDIAL

Docid: 905381
Date: 02/01/2001
Pages: 56
Title: ECOLOGICAL RISK ASSESSMENT AT&SF ALBUQUERQUE TIE TREATING PLANT FINAL REPORT
Doc Type: REPORT / STUDY

	Name	Organization
Author:	NONE ,	TRC ENVIRONMENTAL CORPORATION

	Name	Organization
Addressee:	NONE ,	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

Docid: 905379
Date: 02/16/2001
Pages: 5
Title:
Doc Type: OTHER

	Name	Organization
Author:	NONE ,	TRC ENVIRONMENTAL CORPORATION

	Name	Organization
Addressee:	NONE ,	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

Docid: 905380
Date: 02/16/2001
Pages: 1
Title:
RISK ASSESSMENT]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	AHMED , RIAZ	TRC ENVIRONMENTAL CORPORATION

	Name	Organization
Addressee:	CLARK , DAVID C	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

Docid: 905386
Date: 04/01/2001
Pages: 38
Title: BASELINE HUMAN HEALTH RISK ASSESSMENT FOR THE FORMER TIE TREATING FACILITY ADDENDUM RISK-BASED CLEAN-UP LEVELS
Doc Type: REPORT / STUDY

	Name	Organization
Author:	NONE ,	TRC ENVIRONMENTAL CORPORATION

	Name	Organization
Addressee:	NONE ,	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

ADMINISTRATIVE RECORD INDEX

FINAL 06/27/2002

REMEDIAL

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 905382
Date: 04/20/2001
Pages: 6
Title: RESPONSE TO COMMENTS ADDENDUM TO THE RISK ASSESSMENT FORMER TIE TREATING FACILITY
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	AHMED , RIAZ	TRC ENVIRONMENTAL CORPORATION
Addressee:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 905387
Date: 05/01/2001
Pages: 136
Title: SURFACE SOIL SAMPLING REPORT AT&SF ALBUQUERQUE TIE TREATING PLANT REMEDIAL INVESTIGATION REPORT ADDENDUM
Doc Type: REPORT / STUDY

	Name	Organization
Author:	NONE ,	TRC ENVIRONMENTAL CORPORATION
Addressee:	NONE ,	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

Docid: 905378
Date: 07/01/2001
Pages: 2401
Title:
Doc Type: REPORT / STUDY

	Name	Organization
Author:	NONE ,	TRC ENVIRONMENTAL CORPORATION
Addressee:	NONE ,	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

Docid: 905388
Date: 07/01/2001
Pages: 171
Title: GROUNDWATER FEASIBILITY STUDY FOR THE FORMER AT&SF TIE TREATING FACILITY ALBUQUERQUE, NEW MEXICO FINAL REPORT
Doc Type: REPORT / STUDY

	Name	Organization
Author:	NONE ,	TRC ENVIRONMENTAL CORPORATION
Addressee:	NONE ,	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

ADMINISTRATIVE RECORD INDEX

FINAL 06/27/2002

REMEDIAL

Site Name ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS NMD980622864
OUID N/A
SSID ATSF (ALBUQUERQUE) (1R)
Action REMEDIAL

Docid: 905389
Date: 07/01/2001
Pages: 114
Title: FINAL REPORT
Doc Type: REPORT / STUDY

	Name	Organization
Author:	NONE ,	TRC ENVIRONMENTAL CORPORATION
Addressee:	NONE ,	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

Docid: 905384
Date: 07/13/2001
Pages: 3
Title: [MEMO CONCERNING RESPONSE TO EPA COMMENTS DATED 6/13/01 REGARDING REMEDIAL INVESTIGATION FOR THE FORMER TIE TREATING FACILITY]
Doc Type: MEMORANDUM

	Name	Organization
Author:	AHMED , RIAZ	TRC ENVIRONMENTAL CORPORATION
Addressee:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 905385
Date: 07/18/2001
Pages: 1
Title: [TRANSMITTAL OF FORMER TIE TREATING FACILITY ALBUQUERQUE, NEW MEXICO FINAL REMEDIAL INVESTIGATION REPORT - NOT ENCLOSED - AND RESPONSE TO COMMENTS, ENCLOSED]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	AHMED , RIAZ	TRC ENVIRONMENTAL CORPORATION
Addressee:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 905383
Date: 08/20/2001
Pages: 2
Title: [RECORD OF COMMUNICATION FOR THE FORMER TIE TREATING FACILITY ALBUQUERQUE, NEW MEXICO FEASIBILITY STUDIES AND REMEDIAL INVESTIGATION REPORTS]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	TRAIL , ERIN	TRC ENVIRONMENTAL CORPORATION
Addressee:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY

ADMINISTRATIVE RECORD INDEX
FINAL 06/27/2002
REMEDIAL

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 907506
Date: 08/28/2001
Pages: 2
Title: TAG QUARTERLY PROGRESS REPORT
Doc Type: REPORT / STUDY

	Name	Organization
Author:	NONE ,	NONE
Addressee:	NONE ,	NONE

Docid: 907505
Date: 10/22/2001
Pages: 2
Title: TAG QUARTERLY PROGRESS REPORT
Doc Type: REPORT / STUDY

	Name	Organization
Author:	NONE ,	NONE
Addressee:	NONE ,	NONE

Docid: 907158
Date: 12/14/2001
Pages: 47
Title: AT&SF ALBUQUERQUE TIE TREATING FACILITY RESPONSE TO DRAFT NRRB COMMENTS
Doc Type: CORRESPONDENCE
REPORT / STUDY

	Name	Organization
Author:	TRAIL , ERIN	TRC ENVIRONMENTAL CORPORATION
Addressee:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 907504
Date: 12/18/2001
Pages: 2
Title: ALBUQUERQUE SITE PROPOSED PLAN-OPEN HOUSE CHECKLIST
Doc Type: NOTICE

	Name	Organization
Author:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY
Addressee:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 907916
Date: 12/18/2001
Pages: 1
Title: [PUBLIC INVITATION TO AN AT&SF ALBUQUERQUE SUPERFUND SITE OPEN HOUSE]
Doc Type: NOTICE

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	NONE ,	PUBLIC

Docid: 914028
Date: 12/18/2001
Pages: 8
Title: [POWERPOINT SLIDES OF THE AT&SF OPEN HOUSE BRIEFING]
Doc Type: PHOTOGRAPH / SLIDE

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	NONE ,	PUBLIC

Docid: 907156
Date: 12/19/2001
Pages: 1
Title: EPA PLAN CLEANS CONTAMINATED WATER
Doc Type: MEDIA CLIPPING

	Name	Organization
Author:	MCKAY , DAN	ALBUQUERQUE JOURNAL

	Name	Organization
Addressee:	NONE ,	PUBLIC

Docid: 905390
Date: 01/01/2002
Pages: 923
Title: BASELINE HUMAN HEALTH RISK ASSESSMENT FOR THE FORMER TIE TREATING FACILITY
Doc Type: REPORT / STUDY

	Name	Organization
Author:	NONE ,	TRC ENVIRONMENTAL CORPORATION

	Name	Organization
Addressee:	NONE ,	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

Docid: 907159
Date: 01/01/2002
Pages: 4
Title: [NEIGHBORHOOD NEWSLETTER FOR THE SAN JOSE COMMUNITY-JANUARY 2002 VOLUME 23 NUMBER 1]
Doc Type: MEDIA CLIPPING

	Name	Organization
Author:	NONE ,	ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL
Addressee:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 908157
Date: 01/30/2002
Pages: 1
Title: [LETTER TRANSMITTING FINAL BASELINE HUMAN HEALTH RISK ASSESSMENT]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	TRAIL , ERIN	TRC ENVIRONMENTAL CORPORATION
Addressee:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 908160
Date: 02/01/2002
Pages: 76
Title: PROPOSED PLAN OF ACTION
Doc Type: PROPOSAL

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY
Addressee:	NONE ,	PUBLIC

Docid: 913802
Date: 02/01/2002
Pages: 61
Title: GROUNDWATER MONITORING PROGRAM FOR THE FORMER AT&SF TIE TREATING FACILITY-2001 ANNUAL REPORT
Doc Type: REPORT / STUDY

	Name	Organization
Author:	NONE ,	TRC ENVIRONMENTAL CONSULTANTS INCORPORATED
Addressee:	NONE ,	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

ADMINISTRATIVE RECORD INDEX

FINAL 06/27/2002

REMEDIAL

Site Name ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS NMD980622864
OUID N/A
SSID ATSF (ALBUQUERQUE) (1R)
Action REMEDIAL

Docid: 908158
Date: 02/07/2002
Pages: 1
Title: U S EPA PUBLIC NOTICE- PROPOSED PLAN
Doc Type: ELECTRONIC RECORD
NOTICE

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	NONE ,	PUBLIC

Docid: 908159
Date: 02/07/2002
Pages: 12
Title: PROPOSED PLAN FACT SHEET
Doc Type: ELECTRONIC RECORD
FACTSHEET

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	NONE ,	PUBLIC

Docid: 914007
Date: 02/07/2002
Pages: 12
Title: [HOJA DE DATOS DEL PLAN PROPUESTO-SPANISH VERSION OF THE PROPOSED PLAN FACT SHEET]
Doc Type: FACTSHEET

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	NONE ,	PUBLIC

Docid: 913803
Date: 02/11/2002
Pages: 1
Title: [TRANSMITTAL OF THE GROUNDWATER MONITORING REPORT FOR THE FORMER AT&SF TIE TREATING FACILITY-2001 ANNUAL REPORT]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	TRAIL , ERIN	TRC ENVIRONMENTAL CORPORATION

	Name	Organization
Addressee:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 914032
Date: 02/19/2002
Pages: 1
Title: [TRANSMITTAL OF PAPER COPIES OF THE PROPOSED PLAN OF ACTION]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY
Addressee:	HERRERA , DOLORES	ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL

Docid: 914033
Date: 02/19/2002
Pages: 1
Title: [TRANSMITTAL OF PAPER COPIES OF THE PROPOSED PLAN OF ACTION]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY
Addressee:	LEONARD , MARY LOU	ALBUQUERQUE ENVIRONMENTAL HEALTH DEPARTMENT

Docid: 914034
Date: 02/19/2002
Pages: 1
Title: [TRANSMITTAL OF PAPER COPIES OF THE PROPOSED PLAN OF ACTION]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY
Addressee:	BRUSUELAS , RICHARD	BERNALILLO COUNTY OF

Docid: 914030
Date: 02/19/2002
Pages: 1
Title: [REGARDING REQUEST FOR STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	WILLIAMS , DONALD	U.S. ENVIRONMENTAL PROTECTION AGENCY
Addressee:	LEAVITT , MARCY	NEW MEXICO ENVIRONMENT DEPARTMENT

Docid: 914031
Date: 02/20/2002
Pages: 1
Title: [CORRESPONDENCE THANKING DOLORES HERRERA FOR HER DEDICATION AND CONCERN FOR THE COMMUNITY]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	NEGRI , BEVERLY	U.S. ENVIRONMENTAL PROTECTION AGENCY
	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	HERRERA , DOLORES	ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL

Docid: 914035
Date: 02/22/2002
Pages: 2
Title: [REGARDING REQUEST FOR CONCURRENCE ON THE PROPOSED ALTERNATIVES IN THE PROPOSED PLAN]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	KNUDSON , MYRON O	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	MAGGIORE , PETER	NEW MEXICO ENVIRONMENT DEPARTMENT

Docid: 914027
Date: 02/26/2002
Pages: 24
Title: COMMUNITY RELATIONS PLAN
Doc Type: COMMUNITY RELATIONS PLAN

	Name	Organization
Author:	NEGRI , BEVERLY	U.S. ENVIRONMENTAL PROTECTION AGENCY
	WILLIAMS , DONALD	U.S. ENVIRONMENTAL PROTECTION AGENCY
	LYSSY , GREG	U.S. ENVIRONMENTAL PROTECTION AGENCY
	TURNER , JAMES	U.S. ENVIRONMENTAL PROTECTION AGENCY
	PEYCKE , MARK A	U.S. ENVIRONMENTAL PROTECTION AGENCY
	STENGER , WREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

	Name	Organization
Addressee:	NONE ,	PUBLIC

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REMEDIAL

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 914029
Date: 02/27/2002
Pages: 5
Title: [POWERPOINT SLIDES- AT&SF PUBLIC MEETING]
Doc Type: PHOTOGRAPH / SLIDE

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY
Addressee:	NONE ,	PUBLIC

Docid: 914090
Date: 02/27/2002
Pages: 80
Title: EPA HEARING
Doc Type: PUBLIC MEETING TRANSCRIPT

	Name	Organization
Author:	SHOLLENBARGER , KIM KAY	JOE JAMESON COURT REPORTERS
Addressee:	NONE ,	PUBLIC

Docid: 914025
Date: 02/28/2002
Pages: 1
Title: SUPERFUND PLAN UNACCEPTABLE
Doc Type: MEDIA CLIPPING

	Name	Organization
Author:	MCKAY , DAN	ALBUQUERQUE JOURNAL
Addressee:	NONE ,	PUBLIC

Docid: 914009
Date: 04/08/2002
Pages: 1
Title: US EPA REGION 6 EXTENDS PUBLIC COMMENT PERIOD FOR AT&SF ALBUQUERQUE SUPERFUND SITE PROPOSED PLAN
Doc Type: NOTICE

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY
Addressee:	NONE ,	PUBLIC

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REMEDIAL

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 914008

Date: 04/03/2002

Pages: 7

Title: PROPOSED PLAN COMMENTS

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	CLARK , DAVID C	BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

	Name	Organization
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914010

Date: 04/04/2002

Pages: 1

Title: [CORRESPONDENCE IN SUPPORT OF THE ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL, INCS POSITION THAT THE EPA REGION 6 PROPOSED REMEDY IS NOT IN THE BEST INTEREST OF THE ENVIRONMENT]

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	DAYTON , SUE	CITIZEN ACTION

	Name	Organization
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914011

Date: 04/05/2002

Pages: 1

Title: [REQUEST THAT THE EPA RECONSIDER THE REMEDIAL PLAN AND DECIDE IN FAVOR OF THE ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL, INCS RECOMMENDATION]

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	BECERRA , STEVEN	SOUTH VALLEY SMALL BUSINESS DEVELOPMENT CENTER

	Name	Organization
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 914012
Date: 04/05/2002
Pages: 1
Title: [CORRESPONDENCE REGARDING REQUEST FOR THE EPA TO RECONSIDER THE REMEDIAL PLAN AND DECIDE IN FAVOR OF THE ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL, INCS RECOMMENDATION]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	ARAGON , MANNY M	NEW MEXICO STATE SENATE
	Name	**Organization**
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914013
Date: 04/05/2002
Pages: 1
Title: [CORRESPONDENCE IN SUPPORT OF THE ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL, INCS POSITION]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	TORRES , NIEVES	MEXICAN AMERICAN LEGAL DEFENSE AND EDUCATIONAL FUND
	Name	**Organization**
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914014
Date: 04/05/2002
Pages: 1
Title: [CORRESPONDENCE IN SUPPORT OF THE ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL, INCS POSITION]
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	GARCIA , JOHN M	BARELAS COMMUNITY DEVELOPMENT CORPORATION
	Name	**Organization**
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 914015
Date: 04/08/2002
Pages: 1
Title: [CORRESPONDENCE URGING THE EPA TO CONSIDER CONCERNS AND RECOMMENDATIONS RAISED BY THE ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL TO INSURE THE THE EPAS PROPOSED REMEDY IS IN THE CITIZENS BEST INTEREST]
Doc Type: CORRESPONDENCE

	Name	**Organization**
Author:	GRIEGO , ERIC	ALBUQUERQUE CITY OF
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914016
Date: 04/08/2002
Pages: 1
Title: [CORRESPONDENCE IN SUPPORT OF ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL, INCS POSITION]
Doc Type: CORRESPONDENCE

	Name	**Organization**
Author:	GALLEGOS , STEVE D	BERNALILLO COUNTY OF
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914017
Date: 04/08/2002
Pages: 1
Title: [CORRESPONDENCE IN SUPPORT OF ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL, INCS POSITION]
Doc Type: CORRESPONDENCE

	Name	**Organization**
Author:	SAVAGE , TOM	ALBUQUERQUE PUBLIC SCHOOLS, SCHOOL-TO-CAREERS
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914018
Date: 04/08/2002
Pages: 1
Title: [CORRESPONDENCE REQUESTING THE EPA TO REVISE AND RESUBMIT]
Doc Type: CORRESPONDENCE

	Name	**Organization**
Author:	ORTEGA , FRANCES T	SOUTHWEST RESEARCH AND INFORMATION CENTER
Addressee:	HERRERA , DOLORES	ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL

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REMEDIAL

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 914019

Date: 04/08/2002

Pages: 1

Title: [REQUEST THAT THE EPA RECONSIDER THE REMEDIAL PLAN AND WORK WITH THE ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL TO FORM A PLAN THAT MEETS THE APPROVAL OF THE COMMUNITIES INVOLVED]

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	STEPHENS , JULIA	RIO GRANDE COMMUNITY DEVELOPMENT CORPORATION

	Name	Organization
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914020

Date: 04/08/2002

Pages: 1

Title: [CORRESPONDENCE IN SUPPORT OF ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL, INCS POSITION]

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	GAUNA , JEANNE	SOUTHWEST ORGANIZING PROJECT
	LEON-GUERRERO , MICHAEL	SOUTHWEST ORGANIZING PROJECT

	Name	Organization
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914021

Date: 04/08/2002

Pages: 1

Title: [CORRESPONDENCE IN SUPPORT OF ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL, INCS POSITION]

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	SAVAGE , TOM	NONE

	Name	Organization
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 914022

Date: 04/09/2002

Pages: 1

Title: [CORRESPONDENCE IN SUPPORT OF PUBLIC COMMENTS PROVIDED BY THE ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL, INC REGARDING THE PROPOSED PLAN OF ACTION]

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	ROMERO , RICHARD	NEW MEXICO STATE SENATE
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914023

Date: 04/09/2002

Pages: 1

Title: [COMMENTS REGARDING THE PROPOSED PLAN OF ACTION FOR REMEDIATING SOIL AND GROUNDWATER CONTAMINATION]

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	SANTISTEVAN , ALFREDO R	ALBUQUERQUE CITY OF
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914024

Date: 04/09/2002

Pages: 3

Title: [REGARDING INVITATION TO COMMENT ON PROPOSED CLEANUP OF THE AT&SF ALBUQUERQUE SUPERFUND SITE]

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	HERRERA , DOLORES	ALBUQUERQUE SAN JOSE COMMUNITY AWARENESS COUNCIL
Addressee:	LYSSY , GREGG	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Docid: 914026

Date: 04/11/2002

Pages: 1

Title: SAFETY COMES FIRST, EPA OFFICIAL SAYS

Doc Type: MEDIA CLIPPING

	Name	Organization
Author:	MCKAY , DAN	ALBUQUERQUE JOURNAL
Addressee:	NONE ,	PUBLIC

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FINAL 06/27/2002

REMEDIAL

Site Name	ATSF (ALBUQUERQUE) (NMD980622864)
CERCLIS	NMD980622864
OUID	N/A
SSID	ATSF (ALBUQUERQUE) (1R)
Action	REMEDIAL

Docid: 913801
Date: 05/30/2002
Pages: 2
Title: CONCURRENCE WITH THE PROPOSED PLAN OF ACTION
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	MAGGIORE , PETER	NEW MEXICO ENVIRONMENT DEPARTMENT
Addressee:	KNUDSON , MYRON O	U.S. ENVIRONMENTAL PROTECTION AGENCY

Docid: 913083
Date: 06/27/2002
Pages: 159
Title: RECORD OF DECISION FOR AT&SF (ALBUQUERQUE)
Doc Type: RECORD OF DECISION / AMENDMENT

	Name	Organization
Author:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY
Addressee:	NONE ,	PUBLIC

Docid: 914091
Date: 01/01/2525
Pages: 12
Title: REFERENCE LIST-AT&SF ALBUQUERQUE ROD
Doc Type: LIST

	Name	Organization
Author:	NONE ,	NONE
Addressee:	NONE ,	NONE

Docid: 1014101
Date: 06/27/2002
Pages: 22
Title: FINAL ADMINISTRATIVE RECORD INDEX FOR AT&SF (ALBUQUERQUE)
Doc Type: INDEX

	Name	Organization
Author:	NONE ,	TECHLAW, INC
Addressee:	NONE ,	U.S. ENVIRONMENTAL PROTECTION AGENCY