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Record of Decision

North Railroad Avenue Plume Superfund Site
Española, New Mexico

September 2001

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
SUPERFUND DIVISION

PART 1
Declaration - North Railroad Avenue Plume Site

DECLARATION
NORTH RAILROAD AVENUE PLUME SITE
RECORD OF DECISION

A. SITE NAME AND LOCATION

North Railroad Avenue Plume Superfund Site
Española, New Mexico
NMD986670156

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the North Railroad Avenue Plume Superfund Site ("the Site"), in Española, New Mexico, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601 9601-9675 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. This decision is based on the Administrative Record for the Site.

The State of New Mexico and the Santa Clara Pueblo concur with the selected remedy.

C. ASSESSMENT OF SITE

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

D. DESCRIPTION OF SELECTED REMEDY

The selected remedy is intended to address the entire Site, and consists of five phases of treatment. These phases may take place concurrently. The first phase involves the mobilization and removal of the Dense, Non-Aqueous Phase Liquid (DNAPL) source; the principal threat waste at the Site. This process will be accomplished through the use of surfactant and/or co-solvent treatment. The second phase consists of remediating the "hot spots" and the down-gradient, dissolved-phase plume in the shallow zone through enhanced in-situ bioremediation. The third phase also consists of treatment in the deep zone through enhanced in-situ bioremediation. For purposes of describing the remediation process, hot-spots are defined as zones within the plume, and affected areas determined to be part of the Site, containing over one order of magnitude higher than the Maximum Contaminant Level concentration of the Contaminant of Concern and occupying less than one fourth of the area within that particular stratigraphic unit. The fourth phase consists of remediating the soils within the vadose zone through soil vapor extraction at the area affected adjacent to the source area, after the DNAPL is treated. Although the vadose zone soils are considered a low-level threat waste, it may be necessary to remediate these soils in order to prevent re-contamination of the ground water. The remediation of soils will not begin however, until the ground water remediation is nearing

completion in order to avoid re-contamination of the soil. The fifth phase consists of monitoring throughout the Site area to ensure effectiveness of the remedy and protectiveness of human health. Monitoring will be performed as the other phases of the Site remedy are being implemented.

The remedy selected is described in the Feasibility Study and the Proposed Plan as:

Alternative GW-16: Surfactant, or Co-Solvent Treatment + Hot Spot Enhanced In-Situ Bioremediation + Enhanced In-Situ Bioremediation of the Dissolved-Phase Plume + Monitoring and;

Alternative S-3: Soil Vapor Extraction

The major components of the selected remedy include:

- In-situ treatment of saturated soils in the source area to remove residual DNAPL;
- Enhanced in-situ bioremediation of hot spots to destroy chlorinated solvent compounds;
- Enhanced in-situ bioremediation of the dissolved-phase plume;
- Soil vapor extraction to treat unsaturated soils in the source area;
- Monitoring of ground water quality to assess performance of the remedial action.

In addition, the selected remedy involves the following "Common Elements." These common elements are included in each of the Remedial Alternatives:

- All costs and time frames for implementation are estimates and should be used only as a basis for a comparative analysis of the not the alternatives – not as an absolute determination. These cost estimates are based on a 30-year project lifetime, accurate from +50 to -30 %. Costs will be re-calculated in the Remedial Design Work Plan.
- Present worth costs are presented in this ROD so that the remedial action alternatives that may involve costs incurred in different time frames can be compared on the basis of a single cost figure for each alternative.
- EPA will conduct a review within five years from the start date of Remedial Action to ensure that human health and the environment are being protected.
- All alternatives will meet Applicable or Relevant and Appropriate Requirements (ARARs).
- All alternatives will support the current and future anticipated land use at the Site – residential, commercial, light industrial, and agricultural.

E. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal, State, and Tribal requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable. The 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).

Although this remedy will allow for unrestricted use of the Site upon completion it will take more than five years to attain remedial action objectives and clean-up levels. Therefore, as a matter of policy, EPA will conduct a review within five years from the start date of the Remedial Action to ensure the remedy protects human health and the environment as described in CERCLA Section 121, 42 U.S.C. § 9621.

F. DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record file for the Site.

- Chemicals of Concern (COCs) and their respective concentrations;
- Baseline risk represented by the COCs;
- Remediation goals 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.

G. AUTHORIZING SIGNATURE

Myron O. Knudson

Myron O. Knudson, P.E., Director
Superfund Division
EPA Region 6

9-27-01
Date

Part 2
Decision Summary - North Railroad Avenue Plume Site

TABLE OF CONTENTS

Acronyms and Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency For Toxic Substances And Disease Registry
BIA	Bureau of Indian Affairs
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CFR	Code of Federal Regulations
COCs	Contaminants of Concern
COPCs	Contaminants of Potential Concern
CPT	Cone Penetrometer Testing
CY	Cubic Yard
DCE	Dichloroethylene
DNAPL	Dense, Non-Aqueous Phase Liquid
EL RAEHA	El Rio Arriba Environmental Health Association
EPA	U.S. Environmental Protection Agency
EPC	Exposure Point Concentration
Facility	Norge Town Laudromat facility
Fed. Reg.	Federal Register
FS	Feasibility Study
GAC	Granular Activated Carbon
HI	Hazard Index
HQ	Hazard Quotient
IEUBK	Integrated Exposure Uptake Biokinetic
LNAPL	Light Non-Aqueous Phase Liquids
LUST	Leaking Underground Storage Tanks
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goals
ND	Not Detected
mg/L	Milligrams Per Liter
NCP	National Contingency Plan
NMAC	New Mexico Administrative Code
NMED	New Mexico Environmental Department
NMEID	New Mexico Environmental Improvement Division
NMF&GD	New Mexico Fish and Game Department
NMHPD	New Mexico Historical Preservation Division
NPL	National Priorities List
NTF	Norge Town Facility
O&M	Operations and Maintenance
OSHA	Occupational, Safety and Health Administration

OSWER	Office of Solid Waste and Emergency Response
PCE	Tetrachloroethylene
PHA	Public Health Assessment
POEP	Pueblo Office of Environmental Protection
POTW	Publicly-Owned Treatment Works
ppm	Parts Per Million
PRB	Permeable Reactive Barriers
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RfDs	Reference Doses
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record Of Decision
Site	North Railroad Avenue Plume
SLERA	Screening Level Ecological Risk Assessment
SSG	Soil Screening Guidance
SVE	Soil Vapor Extraction
SVOCs	Semi-volatile Organic Contaminants
TAG	Technical Assistance Grant
TCE	Trichloroethlyene
TCLP	Toxicity Characteristic Leaching Procedure
QAPP	Quality Assurance Project Plan
UCL	Upper Confidence Limit
U.S.C.	United States Code
USF&WS	US Fish and Wildlife Service
USGS	U. S. Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

Section 1

Site Name, Location, and Description

The North Railroad Avenue Plume Superfund Site is in Española, New Mexico and consists of a contaminated ground water plume approximately 58 acres in area (See Figure 1). The plume extends in an elliptical shape, originating from the Norge Town Dry Cleaner and Laundromat facility, to approximately 3/4 mile south of 113 North Railroad Avenue. The geographic coordinates of the Site are 35 degrees, 59 minutes, 31.0 seconds (35° 59' 31") latitude and 106° 4' 53" west longitude.

The Site consists of contaminated soil and ground water containing chlorinated solvents, including tetrachloroethylene (PCE); trichloroethylene (TCE); cis 1,2-dichloroethylene (cis-1,2-DCE), and trans-1,2-dichloroethylene (trans-1,2-DCE). The contaminated plume affects an aquifer which is the only drinking water source in the City of Española and lies within the exterior boundaries of the Santa Clara Pueblo. (See Figure 2).

The actual source of contamination resulting from the Norge Town facility was the lint trap in which waste water and other material were formerly deposited. This lint trap has been cleaned out, filled with sand, and is no longer in use. Norge Town Dry Cleaners and Laundromat is still operating, but there is no evidence to indicate that the operation is contaminating ground water. The current operator has submitted copies of waste manifests to the New Mexico Environment Department (NMED), indicating that the wastes are handled in accordance with Resource Conservation and Recovery Act (RCRA) regulations (40 CFR 260 to 280) for conditionally exempt small quantity generators. Waste manifests submitted to NMED indicate that wastes from the Norge Town facility are disposed of by an approved hazardous waste handler.

The U.S. Environmental Protection Agency (EPA) is the lead agency for selecting the remedy for the Site. The NMED has been the lead agency for performing the Remedial Investigation/Feasibility Study (RI/FS) and will continue to be the lead agency for implementing the Remedial Design (RD) and the Remedial Action (RA) with support from the Pueblo of Santa Clara ("the Pueblo") and EPA. The national Superfund electronic database identification number for the Site (CERCLIS) is NMD986670156. Activities at the Site are currently Fund-financed.

Figure 1: Site Location Map
North Railroad Avenue Plume Site, Espanola, NM

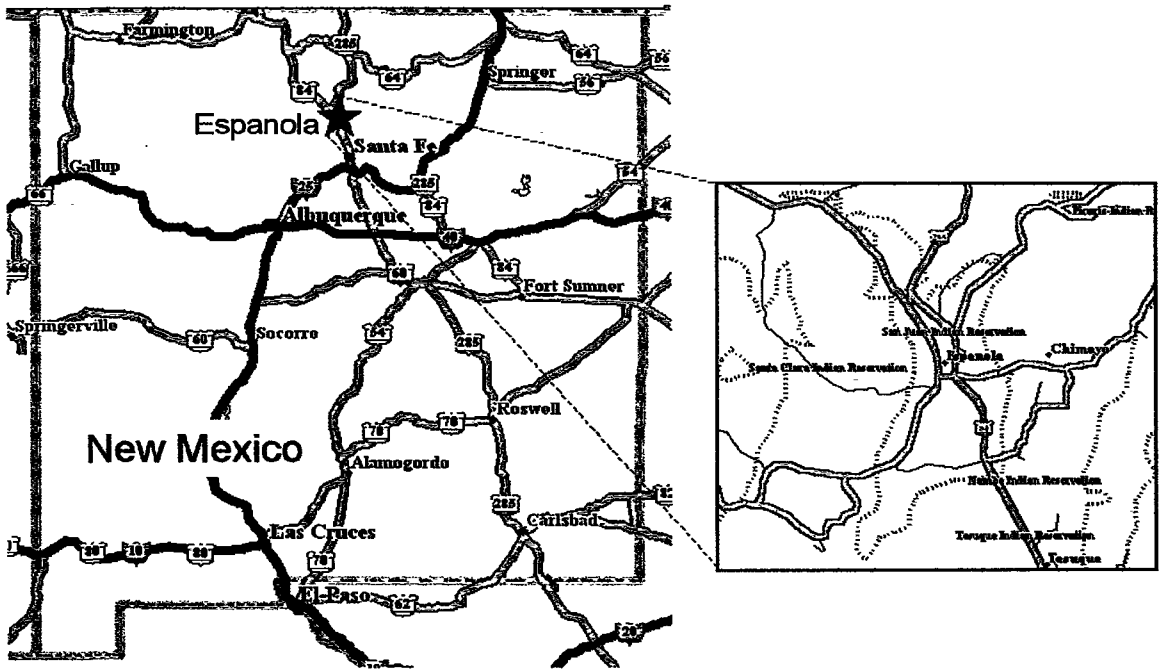
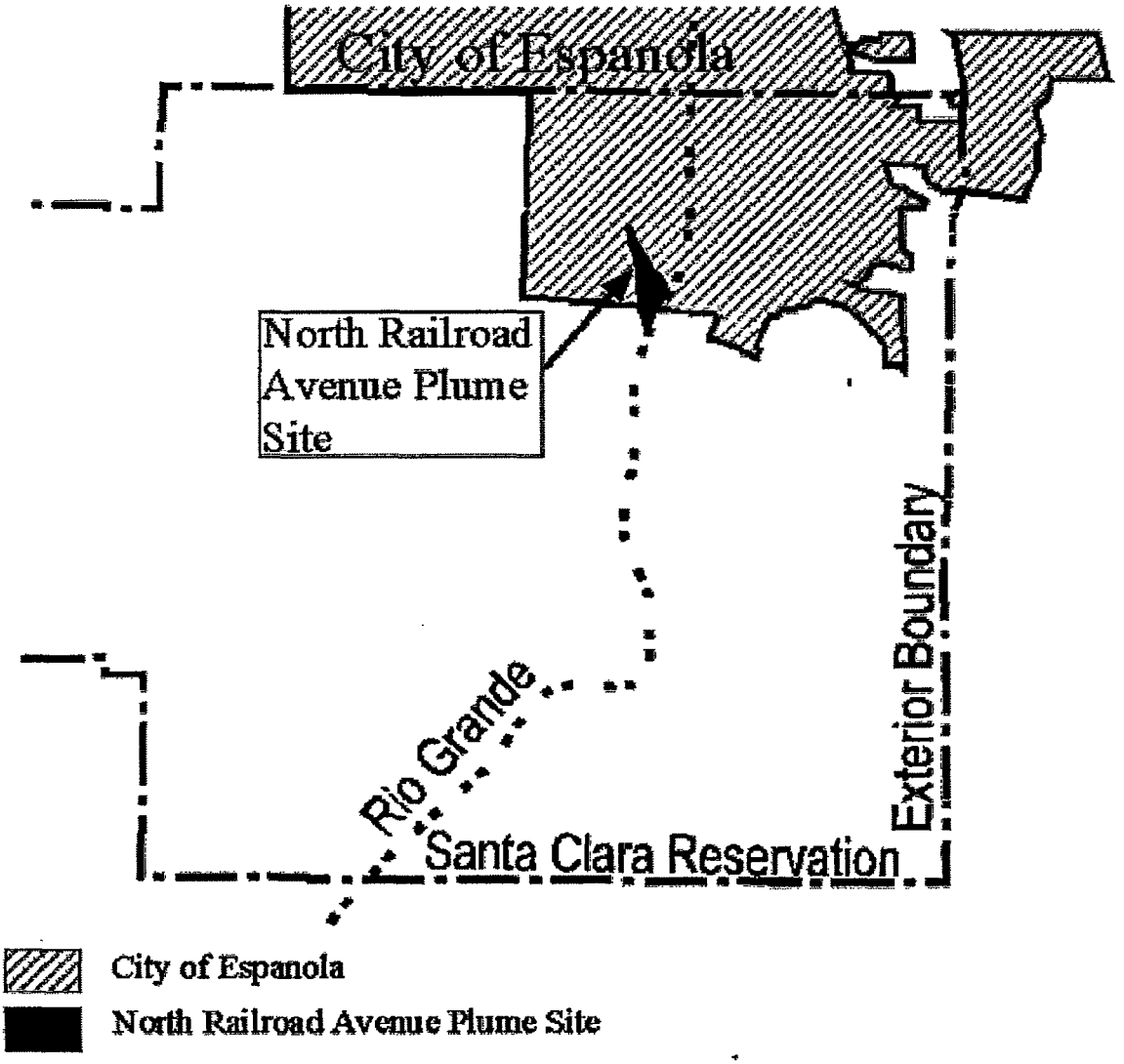


Figure 2: North Railroad Avenue Plume Site position within Espanola and the Santa Clara Pueblo exterior boundary



Section 2

Site History, Investigations, and Enforcement Activities

Summary of Previous Investigations

December 1989 Chlorinated solvent contamination was discovered in ground water samples collected from two City of Española municipal supply wells: the Jemez and Bond wells. The samples were collected as a requirement of the U.S. Safe Drinking Water Act, by the New Mexico Environmental Improvement Division (NMEID), the predecessor of the NMED.

As a result of the findings described above, both the Jemez and Bond Wells were disconnected within a few weeks of receiving results that the wells were contaminated above the MCLs.

March 1990 The NMEID wrote a letter to the City of Española strongly discouraging the use of the Jemez and Bond wells and requested that the Rio Grande well also be tested quarterly as a precautionary measure because of its location with respect to the Jemez and Bond wells. The letter also stated that if the Jemez and Bond wells were put back into use, they would be required to test for volatile organic carbons (VOC's) on a quarterly basis.

July 1990 A Superfund *Preliminary Assessment* (PA) report was performed by the NMEID. PCE and TCE were identified as the primary Contaminants of Potential Concern (COPCs). Ground water was considered to be the primary pathway of concern. Surface water was considered to be a potential pathway due to the location of an open ditch that runs into the Santa Clara Ditch. Air and soil pathways were not evaluated at this time. Based on this assessment, a *Screening Site Assessment* was conducted in September 1991.

March 1992 NMED submitted a *Screening Site Inspection (SSI) Report* to EPA for work performed in September through November 1991. Eighteen private wells were identified within the 1,000-foot radius of the Jemez and Bond wells. Ten of these wells were sampled during the SSI. One of the private irrigation wells, (RG-14798), was contaminated with PCE, TCE, and 1,2-DCE. Based on these results, a Listing Site Inspection was conducted in 1993.

April 1993 A *Listing Site Inspection (LSI) Report* was submitted to EPA by NMED describing the results of the Listing Site Inspection Investigation. During this investigation, four wells were drilled and sampled in the vicinity of Chavez Street. Boreholes were also drilled at various potential source areas to determine if these locations had released PCE and TCE into the environment.

January 1994 The NMED completed the *City of Española, New Mexico Wellhead Protection Study* (NMED, 1994). This study provides information on the Española municipal wells and community wells. The report also describes other possible contamination sources and private

wells located within the 1,000-foot wellhead protection area of each municipal and community well.

April 1995 High levels of PCE ranging from 100 micrograms per liter (µg/L) to 1000 µg/L were detected in samples collected from monitoring wells that were installed as part of two leaking underground storage tank (LUST) investigations. The LUST investigations included the following sites:

- Exxon El Centro; near the corner of Oñate Street and Delgado Street to the west of the Norge Town facility.
- Circle K Store; south of Oñate Street between Hill Street and Bond Street in the area of the current Española Plaza to the southwest of the Norge Town facility.

A plume containing benzene, toluene, ethylbenzene, and xylene (BTEX) was found to be associated with the Exxon El Centro Site. This BTEX ground water plume may have commingled with the PCE originating from the Norge Town facility and affected the fate and transport of the contaminants in this area.

December 1996 The NMED Ground Water Quality Bureau Superfund Oversight Section prepared the *Española Wells Site 1996 Investigation Report*. This report describes the results of a Geoprobe™ investigation and analysis of sludge samples collected from the lint trap located just east of the Norge Town facility. Effluent from the washing machines of the Norge Town facility drained through the lint trap and into the Española sewer system. During this investigation, PCE concentrations of 100 to 100,000 µg/L were found in ground water down-gradient from the Norge Town facility. Relatively low concentrations (less than 10 µg/L) were detected in ground water directly up-gradient of the facility. High levels of PCE, as well as degradation products of PCE (TCE and 1,2-DCE) and several semi-volatile organic contaminants (SVOCs) were found in the lint trap immediately adjacent to the Norge Town facility.

June through August 1997 A sub-surface investigation was conducted adjacent to the Norge Town facility by the NMED. This investigation included drilling one boring to investigate Site stratigraphy and installing five monitoring wells to delineate the plume. The new monitoring wells, private wells, and pre-existing monitoring wells installed for performing the LUST investigation were sampled and evaluated. The lint trap adjacent to the Norge Town facility was also cleaned out and investigated. During this investigation, PCE concentrations as high as 6,900 µg/L were discovered in the shallow monitoring wells closest to the Norge Town facility lint trap. A clay layer was discovered at approximately 25 feet below ground surface (bgs) beneath the Norge Town facility. Contamination was not found below this clay layer.

October 1997 A cooperative agreement was awarded to the NMED by EPA to begin the Remedial Investigation (RI).

June 1998 The NMED Ground Water Quality Bureau Superfund Oversight Section prepared an RI/FS Work Plan. The Work Plan summarizes all investigation activities conducted at the Site before June 1998, and outlines additional investigation activities required to characterize the Site. It was approved by EPA in July 1998. A Health and Safety Plan and a Community Relations Plan were developed for the Site in concert with the RI/FS Work Plan. The Quality Assurance Project Plan (QAPP) was approved by EPA in July 1998.

July 1998 The Site was Proposed to the National Priorities List (NPL) on July 20, 1998, primarily due to the threat of contamination to municipal water supply wells.

January 1999 The EPA added the Site to the final NPL on January 19, 1999, with a Hazard Ranking Score of 50.

November 1999 An aquifer test was performed down-gradient of the source zone. The approximate nature and extent of the free-phase liquids in the source area was determined.

June 2001 The public comment period for the *Proposed Plan* began on June 25, 2001. At the request of area residents, the comment period was extended to August 27, 2001.

Operational History

Chlorinated solvents have a long history of use in dry cleaning and for degreasing in various other industries.

A summary of operation of the Norge Town facility is given below:

1960 to 1965 Based on aerial photographs, it appears that the Norge Town building was built between this time frame.

1970 Records show that the facility began operations as a dry cleaner. From this time until the present, PCE has been used in the dry cleaning process at the facility.

1986 The coin-operated dry cleaning machines were removed and new machines were installed which are still present at the facility.

1996 The pipes connecting the lint trap to the main sewer line were replaced because lint was plugging the lines.

2000 The lint trap was emptied of water and filled with sand. Both the boiler line and discharge from the laundromat were connected directly to the sewer line.

Environmental Compliance Information

In response to a written request from EPA, dated May 29, 2001, the New Mexico Occupational Health and Safety Bureau conducted an inspection of the Norge Town facility to determine whether employees or customers are exposed to harmful levels of PCE, or any of its daughter products while in the facility. The inspection was performed on June 26, 2001, and indicated that the facility was operating below the permissible exposure limit and in compliance with the Occupational, Safety and Health Act (OSHA).

On August 26, 1999, NMED notified the operator of the Norge Town facility of the need to prevent further discharge from the laundromat and lint trap to ground water pursuant to New Mexico Water Quality Control Commission Regulations, 20 NMAC 6.2 Section 1203A. On May 18, 2000, NMED sent a letter to the operator approving the corrective action at the laundromat. The corrective action consisted of updating its discharge practices by changing the point of discharge from the ground to the city sewer.

Applicability of the Resource Conservation and Recovery Act (RCRA) and RCRA Hazardous Waste Regulations to the Site Remedy

Contaminated ground water found near the source area may contain hazardous waste. The EPA generally considers environmental media to "contain" hazardous waste when: (1) they exhibit a characteristic of hazardous waste; or (2) they are contaminated with concentrations of hazardous constituents from listed hazardous waste in amounts above health-based levels. Ground water that contains constituents above the minimum concentration for the toxicity characteristic of hazardous waste (500 µg/L TCE, 700 µg/L PCE) are characteristic hazardous wastes. Ground water withdrawn from the aquifer and considered a characteristic hazardous waste will be stored, treated, or disposed of appropriately to ensure compliance with RCRA and its regulatory requirements including RCRA waste analysis requirements at 40 CFR § 261.20 and 261.30, RCRA manifesting requirements at 40 CFR 262.20, RCRA packaging and labeling requirements at 40 CFR § 262.30, and RCRA hazardous waste treatment, storage, and disposal regulations at 40 CFR Parts 264 and 268.

Air Emission Standards and Requirements for the Norge Town Facility

According to the NMED Air Quality Bureau, the facility also meets all of the requirements for 40 CFR Part 63, Subpart M, National PCE Air Emission Standards for Dry Cleaning Facilities. The facility uses dry cleaning machines with appropriate control equipment installed, and the management conducts bi-weekly leak detection and repair. The facility maintains all PCE and waste containing PCE in covered containers; maintains all draining cartridge filters in closed containers, maintains machine doors shut when clothing is not being transferred; maintains a log of results of leak detection and repair, and a log of the amount of PCE purchased for the past 12 months. The facility also has operation and maintenance manuals on the Site for all of its dry cleaning equipment.

EPA Enforcement Action

With respect to liability under Section § 107(a) of CERCLA, on January 30, 2001, General Notice Letters were mailed to the current owner and current operator of the facility requesting information and explaining potential liability. EPA received a response from the owner, but not from the operator.

Results of Public Health Assessment

On September 10, 1999, the Superfund Site Assessment Branch of the Division of Health Assessment and Consultation of the Agency for Toxic Substances and Disease Registry (ATSDR) released an Initial Public Health Assessment (PHA) for the Site. The Initial PHA described the Site as an indeterminate public health hazard, because of limited data available for ATSDR's review.

Based on data available for review at the time of the Initial PHA, evaluations of public well use that assumed the maximum post-use concentration data reported, evaluations of non-potable water use, and evaluations of ambient air near the former sparging units for the Underground Storage Tank site, ATSDR determined there was no apparent public health hazard for these exposure pathways. ATSDR made the following recommendations in its September 10, 1999, PHA:

- Active private wells being used for non-potable purposes in the vicinity of the ground water plume should be monitored periodically and the installation of new private wells should be discouraged.

- If ground water remediation of the BTEX plume is reactivated, air emissions should be periodically monitored.

- Indoor air monitoring should be conducted in some of the buildings overlying the shallow PCE and BTEX plumes.

- Evaluations should be conducted at Norge Town to confirm whether the repairs at Norge Town have effectively stopped contaminant releases to subsurface soil and ground water.

ATSDR also agreed to evaluate new data for future releases of the PHA and make changes and recommendations as appropriate. ATSDR will evaluate the environmental data collected for the Remedial Investigation and other sources to assist in preparing a Public Comment version of the PHA. The Public Comment version of the PHA is scheduled for release in late Fall of 2001.

- With regard to ATSDR's recommendations, only one private well is affected, but is not used for consumption and will continue as one of the wells monitored for contamination.

- The State Engineer's Office has issued an Order restricting well drilling within the plume site in Española.

- Although the BTEX plume is outside of the purview of this CERCLA action, the UST Program is required to comply with State and Federal air regulations.

- Periodic sampling of indoor air quality at public sites residing over the plume (e.g., the nearby Las Cumbres Learning Center) will remain a part of the overall monitoring strategy.

- Evaluations and compliance monitoring of the Norge Town facility operations are conducted by State enforcement programs, and are outside the authority of CERCLA. To the extent practicable, EPA will continue to coordinate with these authorities.

Section 3

Community Participation

Throughout the Site's history, NMED, EPA, and the Pueblo have kept the community, other governmental entities, and other interested parties informed of Site activities through informational meetings, fact sheets, newspaper notices, radio shows, and public meetings. Below, is a brief chronology of public outreach efforts:

- **October 14, 1997:** A remedial investigation scoping meeting was held with representatives from NMED, EPA, the Pueblo, the Pueblo Office of Environmental Protection (POEP), the Bureau of Indian Affairs (BIA), and the New Mexico Trustees.
- **July 9, 1998:** EPA published an invitation to attend an Open House in Española on July 22, 1998, to discuss the Site status with the community.
- **April 1998 and July 1998:** Fact Sheets were issued by EPA to notify the public of the planned Site activities associated with the RI/FS.
- **July 22, 1998:** An Open House was held in Española to discuss activities associated with the Remedial Investigation with the community.
- **September 23, 1998:** An Open House was held at the Santa Clara Pueblo to inform community members about the Site's proposed listing on the NPL, and the public comment period announcing the listing.
- **April 22, 1999:** ATSDR and NMED presented information at a meeting sponsored by the Rio Arriba Environmental Health Program. The discussion included the Superfund Process and the role of the ATSDR Health Assessment.
- **April 22, 1999:** ATSDR and NMED presented information at the Santa Clara Pueblo. The discussion included the Superfund Process and the role of the ATSDR Health Assessment.
- **July 27, 2000:** NMED, EPA, and ATSDR presented additional information on the Superfund process and the role of ATSDR at a Public Meeting hosted by the Rio Arriba Environmental Health Association.
- **March 6, 2001:** The EPA issued a Technical Assistance Grant (TAG) to the El Rio Arriba Environmental Health Association (EL RAEHA). The grant award totaled $50,000 in Federal funds and $12,500 in matching funds from EL RAEHA. The purpose of the grant is to obtain technical assistance and interpretation of reports for the local community, pertaining to the Site activities.
- **June 15, 2001:** EPA, NMED and the Pueblo participated in a local radio show announcing the upcoming Public Meetings, and the Open Houses' scheduled for June and July 2001, at the El Convento Community Center in Española, and at the Santa Clara Pueblo High School Gymnasium.
- **June 22, 2001:** EPA, NMED and the Pueblo hosted an Open House at the El Convento Community Center in Española. The Open House announced the availability of the Proposed Plan and associated information in the Administrative Record File Record, and upcoming Public Meetings.

- **June 25, 2001:** Official Comment Period on the proposed alternative and the Site documents begins. Site repositories are at the EPA office in Dallas, Texas; the NMED office in Santa Fe, New Mexico; the public library in Española, New Mexico; and the Santa Clara Pueblo public library, at the Pueblo. The Administrative Record maintained at these repositories contains the Site- related investigation reports, and other information forming the basis for the selection of the remedy for the Site.
- June 18, 2001: EPA published a Notice and brief summary of the Proposed Plan in the Rio Grande Sun, the Albuquerque Journal North, and the New Mexican newspapers.
- **June 25 to August 27, 2001:** Public comment period on the proposed plan for the Site remedy.
- **June 23, 2001 and June 28, 2001**: During these two weeks, EPA published a notice and summary of the Proposed Plan in the Rio Grande Sun and the New Mexican newspapers, respectively, announcing the public meetings scheduled for July 11, 2001 at the Pueblo, and July 12, 2001 at Española.
- **July 11 and 12, 2001:** EPA, NMED and the Pueblo hosted Public Meetings at the Santa Clara Pueblo, and Española, New Mexico, respectively, to discuss the RI/FS, the Proposed Plan, and to accept oral comments from the public. The EPA also used these meetings to solicit a wider cross-section of community input on the reasonably anticipated future land use and potential beneficial ground water uses at the Site. A transcript of these meetings is included in the Administrative Record File for the Site. The Responsiveness Summary in Appendix A of this document also contains a response to the comments received at these meetings, as well as the written comments received during the comment period.
- **August 27, 2001:** The comment period closed on August 27, 2001. EPA extended the original 30-day comment period, providing the public an additional 30 days to review and comment on the Site documents.

Section 4

Scope and Role of Response Action

The proposed remedial action will address all areas of the Site found to present a threat to human health and the environment, including the chlorinated solvent plume in the shallow and deeper ground water zones; the unsaturated soils affected by the contaminants of concern; and the saturated soils, and ground water within the aquifer affected by the DNAPL. The primary purpose of this response action is to protect the aquifer from further contamination from the DNAPL and from further contamination of the water supply that provides drinking water and other beneficial uses to the local community.

Section 5
Site Characteristics

Size of Site and Description of Site Location

The Site is approximately 58 acres in size. Most of the Site is in and south of the town of Española between Los Alamos Avenue and the Rio Grande; the northernmost portion of the Site is near Hunter Street, north of Paseo de Oñate; the plume extends south/southeast from this area approximately 3/4 of a mile to the Rio Grande. The location of the plume relative to these streets and the Rio Grande is shown in Figure 3.

Geographical and Topographical Information

The topography of the Site is fairly flat with an elevation variation of 8 feet over a length of 0.75 miles. The elevation near the source is 5,586 feet above mean sea level. To the west of the Site, near Paseo de Las Españolas, the land gains in elevation by approximately 9 vertical feet in 200 feet of horizontal distance. Thus, the westernmost portion of the Site has the highest elevation. The Site is within the 100-year flood-plain for the Rio Grande, as defined by the Federal Emergency Management Agency. The Rio Grande is located approximately 0.5 mile east of the source.

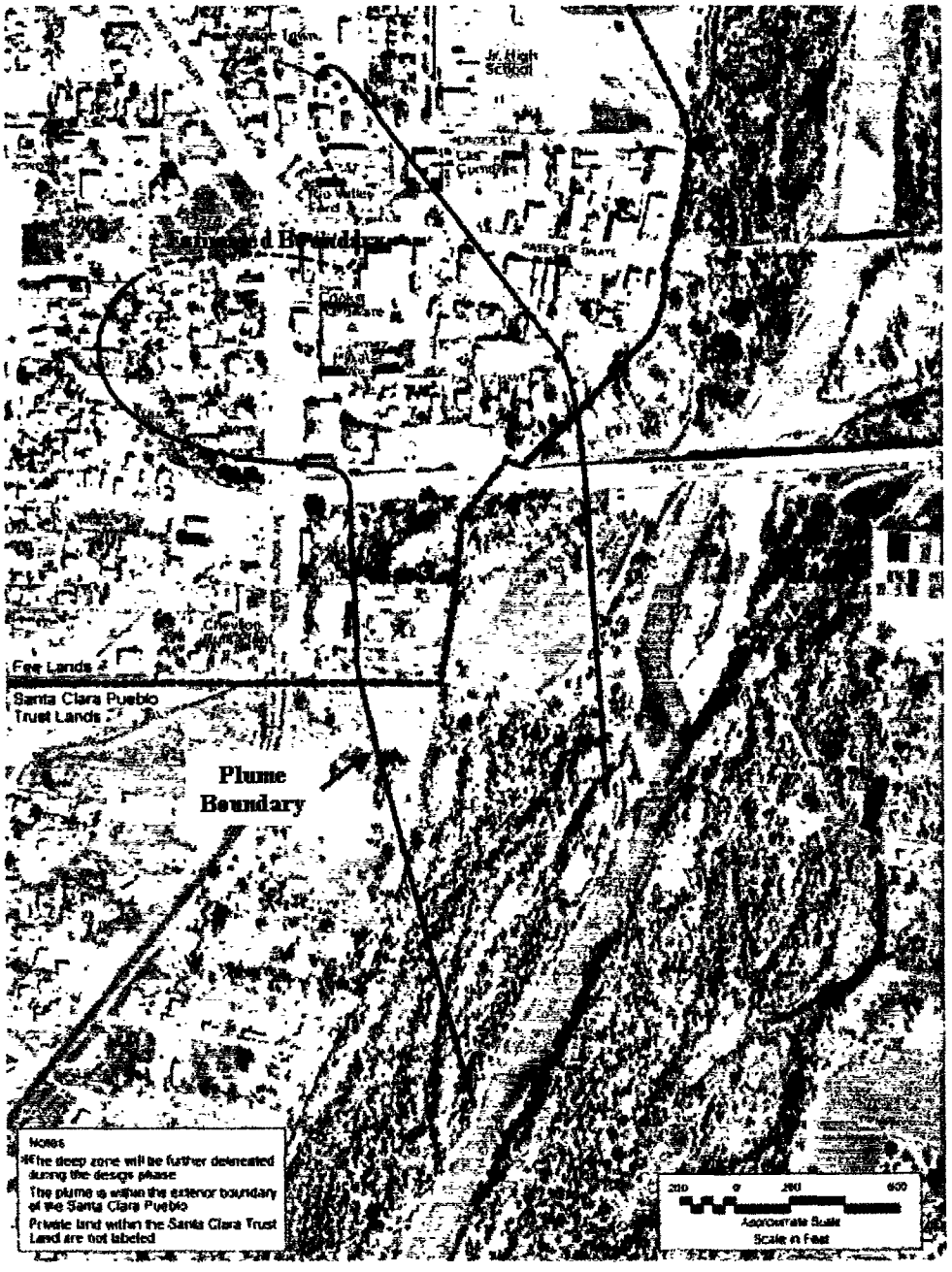
Above the plume, on the surface, the land is occupied by mixed commercial, light industry, residential, and rural properties. Paved roads, unpaved and paved lots, landscaped yards with gardens, and buildings occupy the northern area of the Site. This surface land is primarily fee land, that is, it is owned by private individuals, the City, County, or state. The southern portion of the Site is Santa Clara Pueblo trust land, meaning that it is land owned by the Pueblo. Riparian woodlands near the Rio Grande occupy the southern portion of the Site. The entire Site is within the exterior boundary of the Santa Clara Pueblo.

The climate of the Española valley is continental and predominately arid to semi-arid. The warmest months occur from June to August, and December and January are the coldest months of the year. The average annual temperature is approximately 50°F. Snow falls during winter storms, but normally melts within a few days.

Areas of Archaeological or Historical Importance

The Bond House, located on Bond Street to the west of the Site is the only historical building registered with the New Mexico Historical Preservation Division (NMHPD) in the vicinity of the Site. There are no archaeological sites registered with the NMHPD in the Site vicinity.

Figure 3: North Railroad Avenue Plume Site



Conceptual Site Model

Figure 4 illustrates the Conceptual Site Model (CSM) developed for the Site. The CSM illustrates the current and potential future site conditions, supported by information known about human and environmental exposure through contaminant release and migration to potential receptors. The CSM illustrates that the primary source of the contamination originates from the free-phase DNAPL released from the lint trap and sewer line at the Norge Town laundromat facility. The secondary source of the contamination, through which the ground water became contaminated, is through soil. The air pathway was evaluated for contaminants that may volatilize from the unsaturated soil or ground water. The surface water pathway was not evaluated because no surface water contamination has been detected. The general pathways of the contaminants, and the typical exposure routes for the Site receptors originally considered are as follows:

Site Unsaturated Soils

Exposure of current/future commercial workers, and trespasser/visitors to soils through incidental ingestion and dermal contact.

Ground Water

Exposure of future residents to ground water through ingestion, inhalation, and dermal contact and ingestion through home-grown produce. Exposure of workers to ground water through dermal contact or inhalation of volatiles during construction.

Surface Water

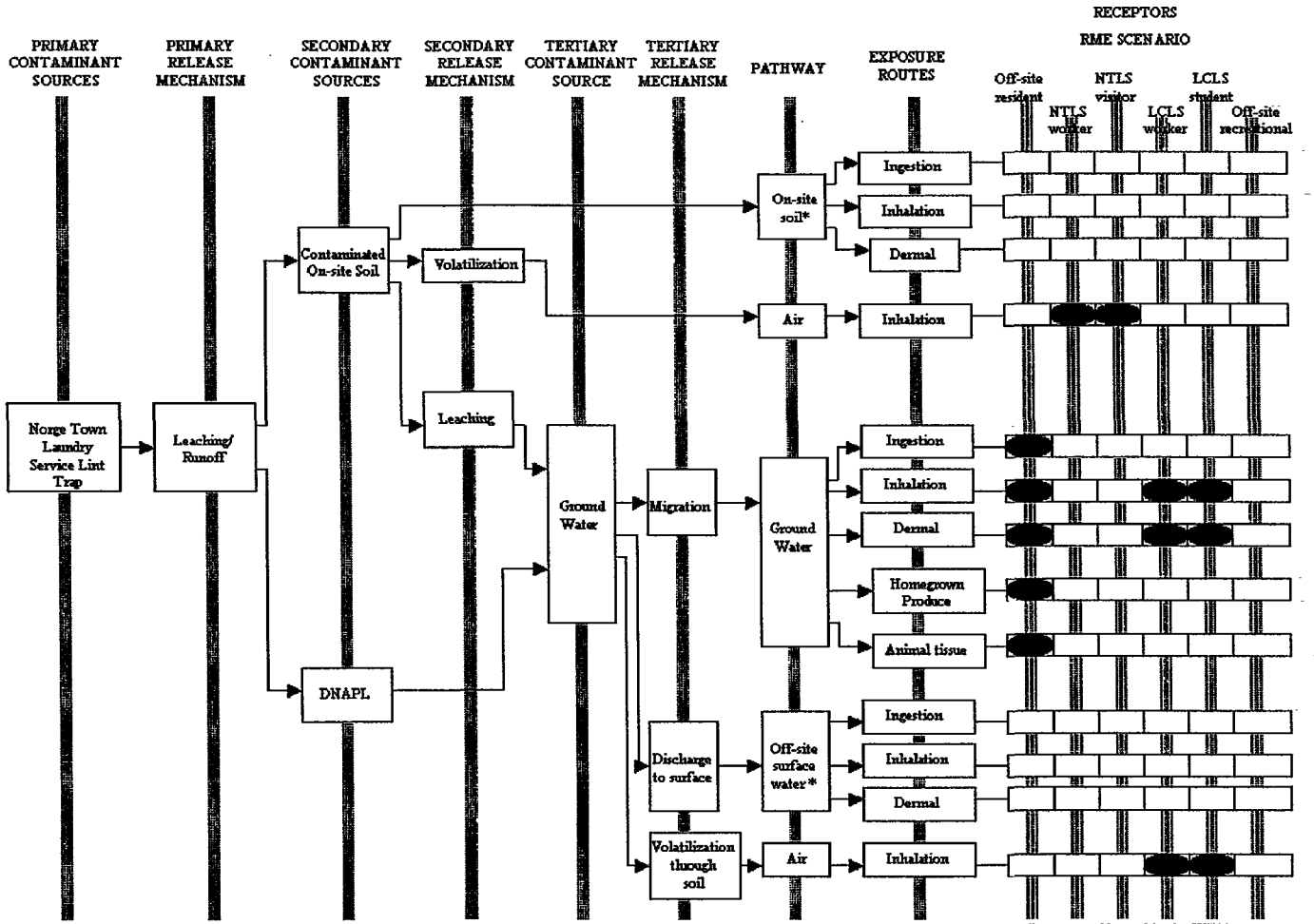
Exposure of current/future on-site children and adults to surface water through dermal contact.

Air

Exposure of current/future commercial workers and students from the Las Cumbres Learning Center through inhalation of indoor air in area buildings and exposure to outside air at the Norge Town facility.

This model and its associated assumptions were further evaluated and refined throughout the Remedial Investigation phase for the Site. The data gathered indicated the following information with regard to exposure pathways:

Figure 4: Human Health Conceptual Site Model



* All scenarios listed above were considered in the development of the RI/FS and HHRA. A solid box indicates that the scenario was included in the HHRA. Surface soil was not addressed in the HHRA due to detects below screening levels. Off-site surface water was not addressed in the HHRA due to non-detects.

Site Contamination-Exposure Pathways

PCE is found in both soil and ground water at the Site although, the primary migration pathway is ground water. The degradation products of PCE, (TCE, cis-DCE, and trans-DCE) are found only in ground water at the Site, and not in the soil.

The source for the PCE release is the Norge Town facility. A primary release of PCE occurred from the lint trap and associated piping. Both the soil and ground water in the vicinity of the facility were contaminated. Pure-phase product, DNAPL, was released below the water table to a depth of approximately 20 feet below ground surface. The DNAPL, which is the principal threat waste for the Site, acts as a continual source of dissolved-phase contamination to ground water. The dissolved phase extends to at least 260 feet depth. Laterally, ground water containing dissolved-phase chlorinated solvent extends south/southeastward from the Norge Town facility through the shallow ground water zone. The concentration of total dissolved solvents decreases laterally with distance from the source facility. The PCE in the shallow ground water appears to be degrading to TCE and DCE a few hundred feet down-gradient from the source area. A concern with PCE degradation is that vinyl chloride can form as a daughter product, although it has not been detected in any samples from monitor wells.

The plume is also found at deeper levels within the aquifer. The deep ground water zone may have been impacted through a vertical migration of contaminated ground water emanating from the shallow zone and into the geologic strata, or through incompletely sealed annular space at the Jemez and Bond municipal supply wells.

The shallow hydrostratigraphic unit is hydraulically connected with the Rio Grande[1] and the dissolved-phase ground water plume extends to within 10 feet of the Rio Grande; however, the contamination has not impacted the river at measurable levels.

PCE also has a potential to contaminate the air. The contaminants are quite volatile and thus, may volatilize into the soil gas phase, which then may be released into the air.

Site Hydrogeology

The soils underlying the Site consist of inter-bedded gravel, sand, clay, and silt, all of which are typical of Rio Grande Basin alluvial deposits in New Mexico. The uppermost unit is quaternary alluvium which consists of sand, gravel and cobbles. Below this is the Pliocene Santa Fe Group which consists of inter-bedded clay, silt, and sand, with some inter-bedded gravel. Generally, the soils are finer in the Santa Fe Group than the overlying Quaternary soils.

The Site investigation revealed that there are at least three hydrostratigraphic units underlying the

[1]The Rio Grande is a gaining stream in this area.

Site from ground surface to 280 feet below ground surface. The hydrostratigraphic units have been designated as the shallow, upper deep, and lower deep units. All three hydrostratigraphic units contain chlorinated hydrocarbons. Hydrostratigraphic units are typically separated by clay layers and are defined by the water elevations similar within each unit. The clays which separate the units below ground are not present everywhere beneath the Site and allow localized ground water to flow between the units.

Zones of Contamination at the Site

For the purpose of evaluating remedies, the Site has been divided into several zones, including the source zone, hot spots, dissolved-phase plume, the shallow zone, and the deep zone. The source zone is defined for these purposes as the location within the aquifer that contains residual-phase DNAPL. The dissolved-phase plume refers to areas of the plume that do not contain DNAPL, but carry the dissolved contaminant. Hot spots are the zones within the plume containing over one order of magnitude higher than the Safe Drinking Water Act Maximum Contaminant Level (MCL) concentrations of the Contaminants of Concern and occupying less than one fourth of the area within that particular stratigraphic unit. Hot spots may include both the source zone and portions of the dissolved-phase plume.

For the purpose of evaluating remedies, the contaminated plume was further divided into two vertical zones: the shallow zone and the deeper zone. The shallow zone includes the upper part of the shallow hydrostratigraphic unit and extends down to 40 feet below ground surface. The deeper zone includes the lower part of the shallow unit, the upper deep unit, and the lower deep unit. This zone is 40 to approximately 260 feet below ground surface.

Current and Potential Future Surface and Subsurface Routes of Human or Environmental Exposure

Potential human exposure routes considered in this investigation are shown in Figure 4. These routes include ingestion or dermal contact with contaminated soil, ingestion or dermal contact with contaminated ground water, and inhalation of contaminated air, or water vapor. Ground water was also considered to be used for irrigation and livestock watering. Downstream of the Site, surface water from the Rio Grande is used for irrigation, livestock watering, fishing, and general recreation. No contamination was detected in the surface water however, so the surface water pathway was not further evaluated. There are no drinking water intakes from the Rio Grande for at least 15 miles downstream from the Site.

Evaluation of Human and Ecological Populations

Contaminants have been detected in soil at the Norge Town facility, but there is no human exposure to contaminated ground water at this time. Surface water has not been impacted at detectable levels and no supply wells within the contaminated ground water plume boundaries are currently being used. The Santa Clara Pueblo municipal supply wells and other private residential

drinking water supply wells are off-gradient from the plume. Potentially, these wells could become contaminated if pumping significantly increases, thereby changing the flow pathway of the shallow and deep zone contamination. Future human exposure could result if these wells become contaminated or if supply wells are drilled within the contaminated ground water plume boundary.

Additionally, there is one private irrigation well that is within the plume boundary that has contaminants detected above health based levels. The well owner has continued to provide access for monitoring and assessment. The owner is aware of the risks associated with its present use and will continue to receive updates on the sampling results of the well. The residents are on municipal water supply, and do not rely on the private well for home-use.

Contaminants were not detected in surface waters or sediment samples taken near the bosque (riparian woodlands). The fate and transport model indicated that it is unlikely that contaminants in ground water will enter surface water in detectable amounts. It was also determined in the Screening Level Ecological Risk Assessment (SLERA) that the most likely ecological receptors that could be affected by ground water are terrestrial plants in contact with ground water. Data from six wells located closest to the bosque were used for screening this scenario. Site-related contaminants did not exceed their screening levels in any of these wells.

Investigative Approach

Under the National Contingency Plan (NCP), 40 CFR Part 300, EPA must ensure that the public has appropriate opportunities for involvement in a wide variety of site-related decisions, including site analysis and characterization, and remedial alternative and analysis (40 CFR §300.430(c)(2)(ii)(A)).

To keep the public informed of Site activities, EPA held public meetings throughout the Remedial Investigation. Technical documents have also been made available through the repositories. Representatives from Santa Clara Pueblo, Pueblo Office of Environmental Protection (POEP), City of Española, Bureau of Indian Affairs (BIA), the New Mexico Fish and Game Department, (NMF&GD), the U.S. Fish and Wildlife Service (US F&WS), the Agency for Toxic Substances and Disease Registry (ATSDR) have been involved in meetings and have been provided technical documents for review and comment. The Santa Clara Pueblo is a partner with EPA and the State and has been directly involved in the Site planning, the development of technical documents and decisions made regarding the Site.

Sampling Strategy

Data has been collected for this Site since 1989, when the Bond and Jemez municipal wells were found to be contaminated. However, the majority of the data on the Site was collected after 1998, once the Superfund Remedial Investigation began. Because of the volatile nature of the contaminants, all media pathways could have been affected. Therefore, samples were collected at

the source (lint trap and source zone DNAPL), the ground water, surface water, air, and soil. Described below is a summary of the data collected and the rationale for the sampling strategy.

Source Zone Investigation - Locating the DNAPL

In 1996, and 1997, samples were collected from the lint trap. In September 1999, saturated zone soil samples were collected from boreholes in the vicinity of the Norge Town facility to determine the extent of DNAPL near the facility.

Unsaturated zone soil samples were collected at soils on the Norge Town facility property, at the Las Cumbres Learning Center, and at various locations within the bosque near the southern portion of the Site. Soil samples at the Norge Town facility were collected from a depth of one foot to five feet below ground surface to delineate the soil contamination and determine the concentration distribution. Soil samples were collected at the Las Cumbres Learning Center because of the potential risk to children and the adult employees at the Center. Soil samples from the bosque were collected to determine whether a risk existed, or potentially existed, and to determine whether additional assessments would be required beyond the screening ecological risk assessment.

Ground Water Sampling

After the initial investigation and sampling activity, it was determined that the most affected medium was ground water. Several methods were employed to sample the ground water, including the use of a geoprobe, cone penetrometer testing (CPT), and ground water monitoring wells. The comprehensive sampling plan considered private, community, and municipal wells. The geoprobe and CPT were used to determine the approximate location of the contamination near the water table. Monitor wells were installed to confirm these locations and to delineate the contamination at depth. Quarterly sampling took place in selected wells from September 1998, through December 1999, to determine whether contaminant distribution was changing with time. A full suite of analytes was evaluated at least once in 1998. This included volatile and semi-volatile organic analytes, dissolved and total metals, and natural attenuation parameters.

Surface Water Sampling

Grab samples were also collected from sediments and surface water in the Site vicinity. Samples were collected from the Rio Grande where the ground water contamination was known to be near the river and from surface water bodies located over the shallow plume (Santa Clara Ditch and the Guachupangue Arroyo). In the future, samples will also be taken in the Vigiles Ditch.

Air Sampling

Seven air samples were collected, including both indoor and outdoor air samples. Six of these

samples were collected over the contaminated ground water plume. One sample was also collected outside the boundary of the plume.

Aquifer Investigation

Data was collected during the RI to determine characteristics of the aquifer and to define the aquifer parameters to be considered during the fate and transport modeling. Data collection included taking geological logs of boreholes that were to be used for monitor wells. The deepest boreholes were also geophysically logged. Both pump and slug tests were performed in the three hydrostratigraphic units to determine the hydraulic conductivity and transmissivity in the test vicinity.

Results of Sampling and Analysis

Source Zone

Samples of the sludge in the lint trap were taken at the Norge Town facility and in ground water wells immediately up-gradient and down-gradient of the facility; both indicated that the lint trap and its associated piping were the source of contamination. One sample of sludge from the lint trap contained 270,000 micrograms per kilogram (µg/kg) of PCE. Ground water immediately up-gradient had less than 10 micrograms per liter (µg/L), whereas ground water down-gradient of the facility contains up to 110,000 µg/L.

Soil samples collected below the water table near the lint trap contained the highest concentrations of PCE (up to 800,000 µg/kg). These high levels are confined to the area in the immediate vicinity of the Norge Town facility. Based on these high concentrations measured in the soil below the water table, a DNAPL was determined to be present.

DNAPLs are heavier than water; when they are released into the ground, they may sink and pool on top of clay layers in the ground water zone. The Site investigation further indicated that only a "residual-phase" DNAPL is present. This means that the DNAPL is immobile and has been trapped in the soil near the Norge Town facility. Data indicate that the residual-phase PCE DNAPL is restricted to the shallow soils and ground water between 10 to 20 feet below ground surface and within a 20-foot lateral distance of the lint trap and the Norge Town facility. Other findings that indicate the DNAPL has not sunk below this depth include the results of two wells screened at approximately 48 to 58 feet that were installed down-gradient of the residual DNAPL zone. No contamination has been detected in these wells. One of the wells is approximately 25 feet southeast of the Norge Town facility lint trap; the second well is located approximately 80 feet south/southeast of the facility lint trap.

Based on the lateral distribution of PCE detections in saturated soil, it appears that the source zone, or zone of residual-phase DNAPL, is restricted to an area of approximately 1,600 square feet (sq ft). Assuming that the source zone is restricted to a vertical depth interval of 10 to 20 feet

below ground surface, this equates to a total contaminated soil volume of 600 cubic yards (CY). An average PCE concentration of 260 milligrams per kilogram (mg/kg) in soil was calculated to be present, based on the analytical results of the source investigation. PCE mass was assumed to partition in equilibrium among the aqueous, sorbed, and immiscible phases. Based on this equilibrium, a total PCE mass of approximately 375 pounds was calculated to be currently present in the source zone.

Unsaturated Zone Soils (soils located above the water table)

Soils above the water table are also referred to as unsaturated zone or vadose zone soils. Measurements of the ground water levels show that the vadose zone varies from 5 to 13 feet through the Site, with the area near the source having the smallest vadose zone, as the water table in this area is 5 feet below ground surface. Contaminated soils occupy an area of about 45 by 45 feet, or approximately 2,000 square feet of contaminated soil. By assuming the depth of the unsaturated zone to be 5 feet, the total volume of unsaturated soils contaminated with PCE is assumed to be 375 cubic yards (CY). Based on this analysis, approximately 0.5 pound of PCE is calculated to be present in vadose zone soils. For estimation purposes, it is assumed that 20% of the 375 CY of the contaminated soil or 75 CY reside beneath the Norge Town facility. The maximum distance from the lint trap to where PCE was detected above the analytical detection limit was approximately 25 feet. Because of the difficulty of collecting samples under the building, no samples were collected under the Norge Town facility to confirm PCE contamination in unsaturated zone soils.

Vadose zone soils ranged in concentration from 0.013 to 2.2 mg/kg. The highest concentration of PCE was 2.2 mg/kg. This sample was collected at about 2 feet below ground surface, within 3 feet of the Norge Town facility.

Ground Water

The upper portion of the shallow dissolved-phase PCE, TCE and DCE plume has extended southward from the Norge Town facility a distance of approximately 3,700 feet toward the Rio Grande. Contamination in ground water extends to a depth of approximately 260 feet below ground surface. Approximately 280 million gallons of ground water are contaminated, and based on plume dimensions and average concentration in various zones, calculations estimate that the total mass of the dissolve-phase contaminant is 275 pounds. The average concentration of the Contaminants of Concern, and the area, volume, and mass within each aquifer zone are provided in Appendix B of the Feasibility Study.

A map showing the distribution of PCE is given in Figure 5 and the distribution of TCE is shown in Figure 6. The highest PCE concentration found in ground water was 110,000 µg/L and was collected using cone penetrometer technology (CPT) and was located near the source facility. A sample from a well within 20 feet down-gradient of this CPT location showed as much as 28,000 µg/L PCE. The next well to the south along the axis of the shallow plume, approximately 250

feet south of the Norge Town facility contained 150 µg/L (high bias) in the most recent sampling event (September 2000).

Down-gradient from the source area, the concentration of the Contaminants of Concern decreases because of physical processes effectively diluting the contaminated ground water, and biological processes that degrade PCE to TCE, cis-DCE, and trans-DCE. These substances begin to appear in the plume approximately 250 feet south of the Norge Town facility at concentrations of up to 37 µg/L for TCE, up to 18 µg/L for cis-1,2-DCE, and up to 4.7 µg/L for trans-1,2-DCE. The highest levels of TCE (greater than 100 µg/L) and DCE (greater than 10 µg/L) in ground water occur about 900 feet south of the source zone near Calle Chaves.

The approximate lateral distribution of the Contaminants of Concern (COCs) in the deep zone to the southwest of the source area is shown in Figures 5 and 6. The deep zone contamination is greater than 40 feet below ground surface and as deep as 260 feet below ground surface. Contamination has not been detected at a depth of 340 feet below ground surface. PCE in the deep zone has been measured at levels up to 720 µg/L.

Figure 5: PCE Distribution
North Railroad Avenue Plume Site, Espanola, NM

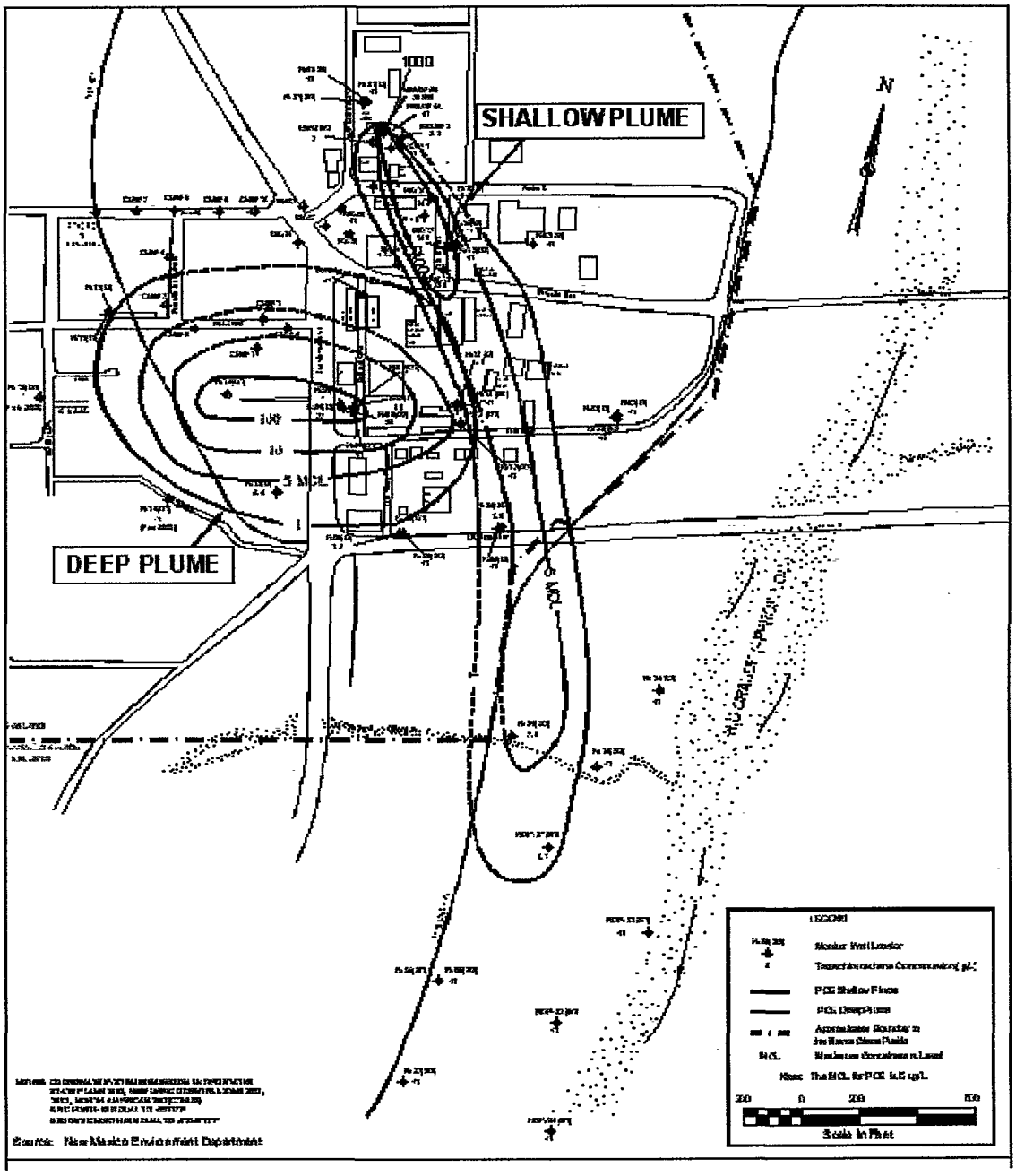
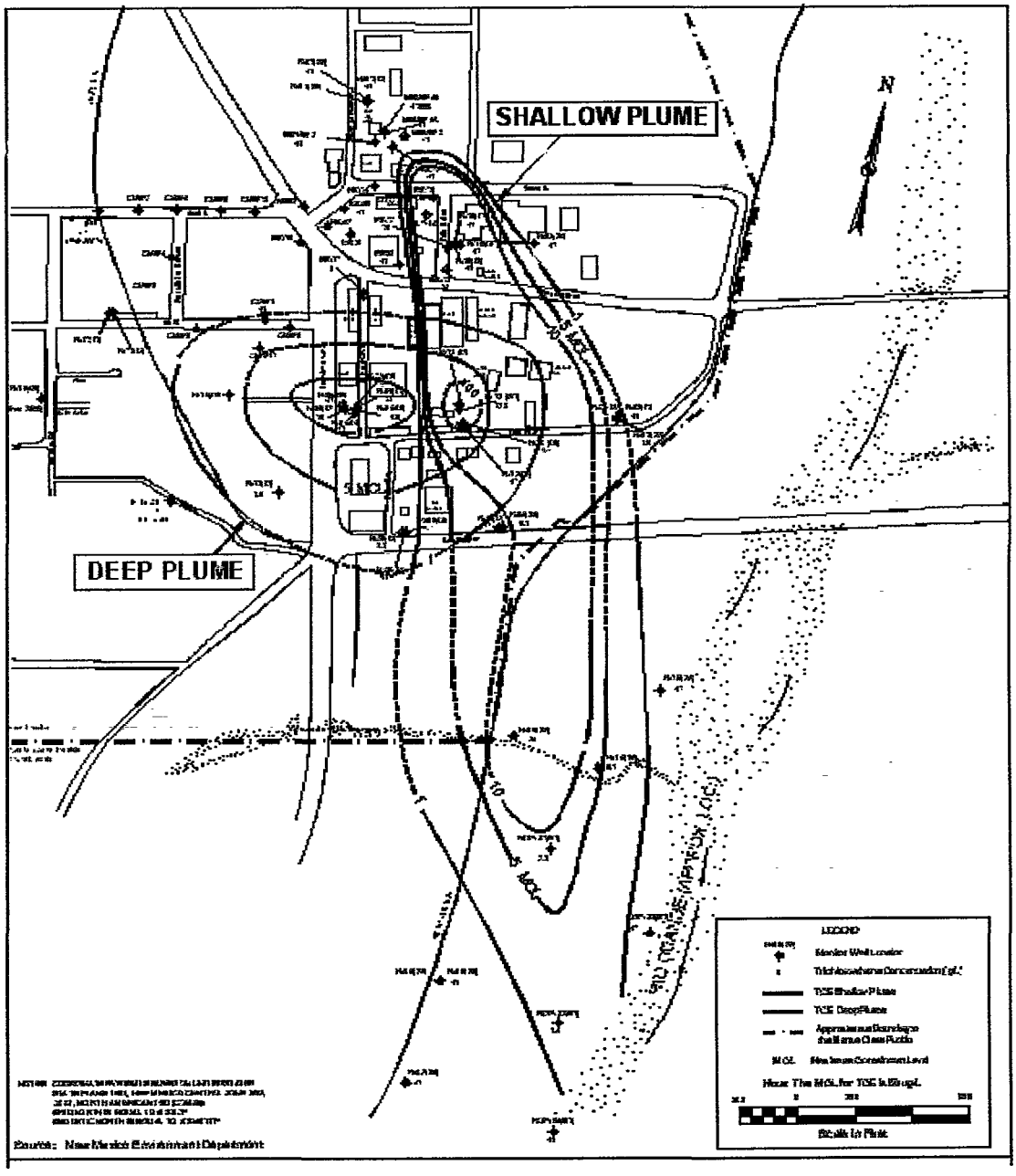


Figure 6: TCE Distribution
North Railroad Avenue Plume Site, Espanola, NM



BTEX Plume

There are two leaking Underground Storage Tank sites that are adjacent to, but not part of the Site. In the past, these leaking tanks released contamination, including benzene, toluene, ethylbenzene, and xylene (BTEX) to ground water. The BTEX contamination is to the west of the Site. Currently, this BTEX plume does not appear to be commingled with the chlorinated solvent plume although they may have mixed in the past because the daughter products that have been measured could be the result of enhanced degradation from the presence of the BTEX compounds.

Model Used for Ground Water Fate and Transport

A contaminant transport model was developed for simulating future contaminant concentrations in ground water for developing a risk assessment and a Feasibility Study. A description of the model and results of the modeling are summarized in the Ground Water Flow and Contaminant Transport Model Report, found in Appendix A of the Feasibility Study.

The flow modeling was performed using the USGS code MODFLOW, developed by McDonald and Harbaugh (1988). Preparation of the input files and analysis of the simulation results were performed using the Ground Water Vistas Modeling Platform (Rumbaugh and Rumbaugh, 1998). Source zone contaminant behavior, namely dissolution of residual-phase PCE to produce dissolved-phase PCE contamination, was modeled using the multi-phase, multi-species flow and transport simulator, UTCHEM, which is a public domain code available on the Internet (www.epa.gov/ada/csmos/models/utchem.html).

Parameter inputs for the model included ground water flow direction, gradient, hydraulic conductivities and the use of several stratigraphic layers which were based on geologic logs and geophysical logs from boreholes. Piezometric surface data, and aquifer test data indicate the ground water flow direction in the shallow unit is to the south-southeast with a gradient of approximately 0.002 feet/foot; hydraulic conductivities in the shallow zone are estimated to be between approximately 57 and 535 feet/day; the ground water flow direction in the upper deep hydrostratigraphic unit to the east-southeast, with a gradient of approximately 0.003 feet/foot in the area of the Site; hydraulic conductivities in the upper deep unit are estimated to be between 0.77 and 1 foot/day; the ground water flow direction in the lower deep hydrostratigraphic unit is to north-northwest with a gradient of approximately 0.002 feet/foot; hydraulic conductivities in this unit are estimated to be between 4.3 and 11.6 feet/day.

The fate and transport model was unable to simulate contamination transport to the deeper zone without affecting the shallow-zone calibration. Therefore, simulations in the upper deep zone were completed starting from the contamination that is known to be present in the zone instead of starting from the contamination at the source facility.

Surface Water

The dissolved-phase ground water plume extends to the Rio Grande, but to date, has not had a measurable impact on the river or other surface waters. There is a potential impact to surface water at the Site if concentrations of dissolved-phase contaminants increase in ground water flowing into the Rio Grande, the irrigation ditches, or the arroyo that crosses over the shallow ground water plume.

Indoor and Outdoor Air

Of the seven locations that were sampled for air, only one location, outside of the Norge Town Laundromat, indicated that Site contaminants were being released into the air. The one sample collected at this location, had a concentration of 0.98 milligrams per cubic meter (mg/m^3) of PCE. One sample that was collected at the Las Cumbres Learning Center had 1.1 mg/m^3 of 1,1-DCE; however, it is unlikely that this contamination is related to the Site. It is possible that this substance instead resulted from the heating of plastic material in a microwave oven at the time, because none of the Contaminants of Concern were detected at this location again. Furthermore, three subsequent sampling events at the Learning Center did not detect 1,1-DCE. Periodic sampling of indoor quality at the Learning Center will remain a part of the overall monitoring strategy for the Site.

Section 6

Current and Potential Future Land and Water Uses

Demography and Land Use

The area within the town of Española that is in the vicinity of the Site is zoned as a Central Business District with a Historic Zone Overlay, according to contacts with the City of Española, Rio Arriba County, New Mexico. Land uses in the vicinity of the Site include land that is within and outside the jurisdiction of the City of Española and includes commercial, light industrial, residential, and small-scale agriculture. These are the reasonably anticipated future land uses for the Site. The potential future use of ground water will continue to be as a drinking water source for the community.

Current On-Site Land Uses

The aquifer in which the plume is located is the only source of drinking water for the City of Española and the Santa Clara Pueblo. As of the 1990 Census, approximately 78.4 percent of the population in Española were connected to the municipal water system. Current trends in population growth reveal estimated population growth within the City from 11,908 people in the year 2000, to 13,657 people in the year 2050. Total ground water extracted in 1998 was 428,129,000 gallons. The City of Española is currently preparing a Phase II Water System Master Plan, which will consider future growth and expansion of the water system service area.

Both businesses and residences are above the ground water plume. (Figure 3) The nearest residence is located 250 feet to the east of the Norge Town facility. Some of the nearby residences use well water for irrigation; however, investigations conducted by NMED determined that the wells in the vicinity of the plume were not affected by the contaminants, with the exception of one private well. Private wells in the vicinity of the Site will continue to be sampled to ensure protection and to determine whether the plume has reached any private wells.

Several buildings lie over the plume. The northernmost building on the Site is the Norge Town facility. An unpaved parking area surrounds it. In the next lot south of the Norge Town facility are two office buildings, both surrounded by paved lots or concrete sidewalks. One of these buildings is currently vacant. To the south of these buildings across Hunter Street is an automobile dealership, Rio Valley Ford. This property consists of several buildings and paved parking areas. To the west of the dealership, across Calle Espinosa, is a school building (Las Cumbres Learning Center) which serves physically challenged children from Northern New Mexico. On the southwest side, there is an outdoor play area behind this building. The play area consists of a variety of surfaces including concrete, wood chips, grass, sand, and tile. A paved lot is to the east of the learning center. Currently, there is an empty, unpaved lot to the south of the learning services building. South of the learning center and the automobile dealership, across Paseo de Oñate, are several businesses including a hardware store, a furniture store, an office building, an auto transmission repair shop, the municipal courthouse, and an auto tow-yard.

Residences also occupy this area. Riparian woodlands, pasture land and small-scale agricultural areas are found to the south of the residential/commercial area across State Road 201.

The plaza area and a residential area lie to the west of the plume. A junior high school is one block east of the Norge Town facility. The plaza includes a park area, tourist center, and a post office. To the north of the Site is a mostly residential area, but a day care facility is located a few blocks north. A community center with a swimming pool and library is located a few blocks to the northwest of the Norge Town facility. The offices of the City of Española are located a few blocks to the north and northwest of the Norge Town facility. The southern portion of the Site is occupied by residences, commercial buildings, and the riparian woodlands (bosque).

In the southern most portion of the Site, the plume crosses onto Pueblo lands and includes the bosque area. The leading edge of the plume currently intersects the Rio Grande and adjacent riparian/wetland areas. The river and adjacent bosque is used for obtaining natural resources such as fishing and hunting of small game, as well as for gathering edible and medicinal plants. Recreational swimming is also part of the land use of the river and bosque. There are agricultural lands near the southern plume location, including both crops and livestock.

Community Demographics

The 1994 population of Española was 9,797. The Pueblo, located one mile to the south of Española has a population of 2,400. Population composition figures are available at the county level for Rio Arriba. Approximately 9% of the population is under 5 years of age, 17% between the ages of 5 and 15, and 14% over 60 years of age. Racially, the majority of the population is White (83.5%), but includes a high percentage of Native Americans (15.6%). Less than 1% of the population is made up of other racial groups. With respect to ethnicity, 73.5% of the population is Hispanic, and 12% Anglo or non-Hispanic White.

Section 7
Principal and Low Level Threat Wastes

Definitions

Principal threat wastes are wastes that cannot be reliably controlled in place, such as liquids, highly mobile materials (e.g., solvents), and high concentrations of toxic compounds (e.g., concentrations that are several orders of magnitude[2] above levels that allow for unrestricted use and unlimited exposure.[3] 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 source material of low toxicity and low concentrations of low toxicity source material.

The principal threat wastes at the Site is the DNAPL located in the source zone, and the aqueous-phase chlorinated solvents and degradation products in the down-gradient zone and the deep zone. The low-level threat wastes associated with the Site are the unsaturated zone soils near the source area (up to 5 feet depth below ground surface). PCE was detected at concentrations below residential screening levels for direct contact (e.g., inhalation, ingestion, and direct contact) therefore, this soil does not present an exposure risk. The Soil Screening indicated that surface soils do not exceed the residential screening levels for direct contact, (e.g., inhalation, ingestion, dermal contact).

Dense Non-Aqueous Phase Liquids (DNAPLs)

DNAPLs are defined as dense organic liquids with specific gravity greater than one that can pool as a separate phase layer at the bottom of the saturated zone or as a separate phase trapped in the pore spaces of the saturated and unsaturated zones (residual DNAPL). The DNAPL is found below the water table at the Norge Town facility and is the principal threat waste at the Site because it is a pure-phase contaminant that acts as a source of contamination to the aquifer. Contaminants are continuously released from the DNAPL into the aquifer, causing high concentrations of dissolved-phase contaminants in the aquifer.

The DNAPL at the source zone and the down-gradient dissolved-phase plume are considered to be the principal threat wastes at the Site. The evaluation of current risk for residents using ground water involved two sets of exposure concentrations. The first set used the 95% upper confidence

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[2] An "order of magnitude" is a multiple of ten.

[3] "Unlimited use and unrestricted exposure" means that there are no restrictions on the potential use of land or other natural resources.

limit of the mean of site-wide concentrations for each Contaminant of Potential Concern. The second set used the same site-wide concentrations for all Contaminants of Potential Concern, except for PCE, which instead used the maximum detected concentrations from ground water near the source (DNAPL). This second set of concentrations represents a conservative high-end exposure.

Incidental Exposure to Ground Water During Construction Activities

The contaminated soils do not pose a risk to human health through contact, inhalation, or ingestion. In the event of excavation below the water table in the contaminated area of the plume and the possibility of de-watering during construction, the risk assessment indicates that exposure to workers who excavate down to the ground water would not present a risk above health-based levels, even at the highest concentrations found near the Norge Town facility. However, any individuals or contractors de-watering contaminated portions of the aquifer must contact NMED to make sure that their de-watering operation will not affect the remedy or discharge contaminated ground water to surface water.

Contaminated Soil Near the Norge Town Facility

PCE contamination occurs in soil in the immediate vicinity of Norge Town in the vadose (or unsaturated) zone, covering an area approximately 45 feet by 45 feet and less than five feet in depth. Vadose zone soils ranged in concentration from 0.013 to 2.2 mg/kg. The highest concentration of PCE was 2.2 mg/kg. These samples were collected at approximately 2 feet below ground surface, within 3 feet of the Norge Town facility. The remediation goal for PCE in soil is set at a level such that, if remediation goals are met, ground water cannot become impacted above the MCLs for this compound through contaminant migration from soils. This goal meets the requirements of 20.6.2 New Mexico Administrative Code (NMAC) Section 4103, for treating soils at hazardous wastes sites.

Section 8

Summary of Site Risks

Human Health Risks

Under the NCP, 40 CFR § 300.430, the role of the baseline risk assessment is to characterize the risk associated with a site in the absence of any remedial action or control, including institutional controls. The baseline assessment is an evaluation of the risk associated with a no-action alternative.[4] The baseline risk assessment also provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the May 2001 Baseline Risk Assessment for the Site.

Types and Characteristics of the Contaminants of Concern (COC)

The Contaminants of Concern for the Site are *tetrachloroethlylene* (PCE) and *trichloroethylene* (TCE). Both of these substances are mobile, as they occur in pure form as a liquid, and are very volatile. At the Site, they have dissolved into the ground water at concentrations that are unsafe for exposure. PCE and TCE are both chlorinated aliphatic hydrocarbon solvents, and the MCL for each of these chemicals in ground water is 5 µg/L.

Tetrachlorethylene (PCE)

PCE is used as a dry cleaning and textile-processing solvent and for degreasing in metal cleaning operations. Biodegradation products of PCE in ground water are primarily TCE and cis- and trans-DCE.

Data on PCE toxicity indicate that PCE may be a class C or B2 carcinogen (where C is a possible human carcinogen and B2 is a probable human carcinogen in the weight-of-evidence classification). EPA's Science Advisory Board has not adopted a final position on the weight-of-evidence classification.

PCE also has several non-carcinogenic effects with the primary target organs being the kidneys, liver, and central nervous system. Short term (acute) exposure to PCE can result in central nervous system depression, and exposure to very high levels can be fatal. Long term (or chronic) exposures are associated with neurotoxicity as well as kidney and liver toxicity. Some reproductive effects have been observed in women occupationally exposed, as well as in animal studies. Once absorbed into the body through inhalation or ingestion, PCE is distributed to fatty tissues such as the brain, liver, and placento-fetal tissue, and the amniotic fluid.

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[4] See 55 Fed. Reg. 8666, 8710-8711 (March 8, 1990)

Trichloroethylene (TCE)

The presence of TCE at the Site most likely is the result of degradation of PCE, the original contaminant released at the Norge Town facility. TCE is evaluated as a carcinogen, although its cancer classification and toxicity information have been withdrawn by EPA. This is because it is thought that TCE may not, in itself, be carcinogenic, but rather that its biological degradation produces a carcinogenic product.

TCE can also have several non-carcinogenic effects similar to those identified for PCE. TCE is associated with central nervous system depression, and with longer-term exposure, can result in damage to the liver and kidneys. Acute inhalation has been associated with coma and death. It has also been associated with impaired heart function, and long periods of exposure can cause nerve, lung, kidney, and liver damage. At low concentrations for short periods of time, TCE inhalation can cause headaches, lung irritation, dizziness, poor coordination, and difficulty in concentrating. Direct contact with the skin can result in skin irritation. Because TCE is readily absorbed into the blood stream, similar effects are reported for exposure in drinking water as for inhalation.

Other degradation products of PCE are found at the Site, such as cis-DCE and trans-DCE, but their concentrations are below MCLs. They are considered Contaminants of Potential Concern (COPCs) because they have been detected at the Site and are degradation products.

Risk Characterization

The Risk Assessment involved three calculations of the exposure point concentration (EPC) for chlorinated solvents in ground water. One Exposure Point Concentration, representing a worst-case scenario, was the highest concentration of PCE found at the Site. Calculations based on these numbers do not represent the risk for the entire Site, but rather the risk localized in the vicinity of the source. Another EPC used for risk calculations was based on the 95% upper confidence limit of the mean, for the most contaminated wells at the Site. Wells used as the most contaminated wells are the ones that lie along the central axis of the shallow plume and were shown in Figure 2-1 of the risk assessment. This excluded the well with the maximum concentration of PCE (EWMW 4B), which is at the source and is represented by the "worst-case" calculations. These contaminated wells were used for both reasonable maximum and central tendency exposures. The third exposure point concentration used for ground water was modeled for future use. While providing information on potential risk, this future scenario has a high degree of uncertainty due to a modeled EPC.

Toxicity Assessment

Site contaminants were assessed for carcinogenicity and for non-carcinogenic systemic toxicity. To protect human health, EPA has set the target risk range for carcinogens at Superfund sites from 1 in 10,000 to 1 in 1,000,000 (expressed as 1×10^{-4} to 1×10^{-6}). A risk of 1×10^{-6} means that one

person out of one million people could be expected to develop cancer based on a lifetime evaluation of exposure to the site contaminants. Where the aggregate risk from COCs based on existing Applicable or Relevant and Appropriate Requirements (ARARs) exceeds 1×10^{-4}, or where remediation goals are not determined by ARARs, EPA uses the risk level of 1×10^{-6} as a point of departure for establishing preliminary remediation goals. This means that a cumulative risk level of 1×10^{-6} is used as the starting point (or initial protectiveness goal) for determining the most appropriate risk level that alternatives should be designed to attain. Factors related to exposure, uncertainty, and technical limitations may justify modification of initial cleanup levels that are based on the 1×10^{-6} risk level.

For non-carcinogenic toxic chemicals, the toxicity assessment is based on the use of reference doses (RfDs) whenever available. A reference dose is the concentration of a chemical known to cause adverse health effects. The estimated potential site-related intake of a compound is compared to the RfDs in the form of a ratio, referred to as the hazard quotient (HQ). If the HQ is less than one, no adverse health effects are expected from exposure. When environmental exposure involves a variety or mixture of compounds, a hazard index (HI) is used to assess the potential adverse effects for this mixture of compounds. The HI represents a sum of the hazard quotients calculated for each individual compound. HI values that approach or exceed the value of one, generally represent a health risk that requires remediation.

Results from the calculations for this Site indicate that PCE cancer risks exceed the EPA benchmark of concern of 1 in 10,000 if ground water from the Shallow and Upper Deep Hydrostratigraphic Units is used for residential purposes. This applies to both the maximum concentrations that are found near the Norge Town facility and to the average concentrations down-gradient of the facility that are more representative of exposure. This exposure risk applies to children and adults, should ground water be used for domestic purposes including ingestion, inhalation, bathing, and irrigation and ingestion of home-grown produce. The modeled future exposure concentrations also showed risks exceeding benchmarks of concern from potential PCE exposures.

Excessive non-cancer hazards from PCE and TCE exposure could result from domestic use of the ground water in the Shallow Hydrostratigraphic Unit near the Norge Town facility. These exposure hazards apply to both children and adults for similar routes.

Human Health Characterization

Risk estimates were for current and future land use scenarios for potential human receptors at the Site. The Human Health Risk Assessment contains tables that show the details of how risk was evaluated. Cancer risks were estimated as the probability of an individual developing cancer over a lifetime as a result of exposure to carcinogenic contaminants. Toxicity risk estimates are presented for non-carcinogenic chemicals that have available toxicity values. The potential for non-carcinogenic hazards due to potential exposures to chemicals was evaluated by calculating a Hazard Index.

The Baseline Risk Assessment organized the types of risks at the Site according to various exposure scenarios. Each exposure scenario specifies the type of human receptor (e.g., child resident, adult utility worker, etc.) the exposure route (e.g., inhalation, ingestion, dermal contact) and the contaminant. If a contaminant in a particular medium is found to require a remedial action (based on either an exceedance of the carcinogenic risk range or a Hazard Quotient equal to one), that contaminant is said to drive the risk or drive the need for action. Remediation goals are set for site-related contaminants that pose an excess risk. The following contaminants in their specified media are driving the need for action at the Site, based on calculations performed with the 95% UCL for the mean of the ground water data. These drivers are defined as exceeding the carcinogenic risk level of 1×10^{-4} or a Hazard Quotient of 1.0.

Ground Water

Carcinogenic Risks

For the exposure scenario based on the potential ingestion of contaminants in ground water, PCE is driving the carcinogenic risk for both adults and children (risks of 2.4×10^{-4} and 1.3×10^{-4} respectively). For the exposure scenario based on the potential ingestion of contaminants in homegrown produce either irrigated by or with roots in contact with ground water, PCE is driving the carcinogenic risk for both adults and children (risks of 8.3×10^{-4} and 1.9×10^{-4}, respectively).

Non-Carcinogenic Hazards

For the exposure scenario based on the potential ingestion of contaminants in ground water, PCE is driving the non-carcinogenic hazard for adults, with an HQ of 1.1. TCE is driving the non-carcinogenic hazard for children with an HQ of 1.1. For the exposure scenario based on the potential ingestion of contaminants in home-grown produce either irrigated by, or with roots in contact with ground water, PCE is driving the non-carcinogenic hazard for adults, with an HQ of 3. For the exposure scenario based on inhalation of contaminants in ground water while showering, TCE is driving the non-carcinogenic hazard for adults and children, with HQs of 1.3 and 6.4, respectively.

For the exposure scenario based on inhalation of contaminants in ground water while showering,

TCE is driving the non-carcinogenic hazard for adults. Manganese was shown to exceed a hazard quotient of 1 for non-carcinogenic effects, but it is a naturally-occurring metal and has been detected at concentrations equivalent to background levels; therefore, it is not considered a contaminant of concern. Manganese will be monitored and evaluated during remedial activities however, to ensure that levels do not exceed background, due to other influences, such as the biological transformation of PCE.

Surface Soils

Concentrations in surface soils were below the Region 6 screening values for direct contact and therefore were not found to pose a health risk.

Surface Water

Contaminants were not detected in surface water samples taken from the Rio Grande, the Santa Clara Ditch, and the Guachupangue Arroyo; therefore, surface water was not found to pose a health risk.

Sediment

Sediments were found not to pose a risk because contaminants were not detected in sediment samples taken from the Rio Grande, and the Guachupangue Arroyo.

Air

Air monitors were placed outside the Norge Town facility and in locations closest to human receptors. One outdoor air sample collected at the Norge Town facility contained PCE at a concentration that resulted in a cancer risk of 2.2×10^{-6}. This area will continue to be evaluated through the Site's monitoring program, due to the fact that this risk was evaluated, using only one sample as well as the fact that the Norge Town facility is still operating. 1,1-DCE was detected in one air sample at the Las Cumbres Learning Center. The concentration level was such that, if the concentration was inhaled over the exposure time evaluated in the risk assessment, 1,1-DCE could result in carcinogenic and non-carcinogenic risks to children and adults. This contaminant, however, is not thought to be related to Site releases, and it did not appear in subsequent samples taken at the Learning Center. 1,1-DCE has been shown to be released as a result of heating vinyl products such as those used in food packaging. Because this chemical was not detected in the three subsequent samples taken, it was not considered as a contaminant of concern. Air quality, however, will continue to be assessed, particularly during remediation of the Site, to ensure the protection of children and workers. Air samples taken outside the Learning Center did not indicate a carcinogenic risk above the risk range. Air quality for the Site and surrounding area, however, will be monitored during remediation.

Table 1: Summary of Human Health Risks

PATHWAYS AND RISK DRIVERS	carcinogenic risk - adult resident	carcinogenic risk - child resident	non-carcinogenic hazard quotient - adult resident	non-carcinogenic hazard quotient - child resident
Ingestion of PCE in ground water	$2x10^{-4}$	$1x10^{-4}$	*1*	< 1
Ingestion of TCE in ground water	$< 1x10^{-4}$	$< 1x10^{-4}$	< 1	*1*
Ingestion of PCE in homegrown produce watered with or in contact with ground water	$8x10^{-4}$	$2x10^{-4}$	*3*	< 1
Inhalation of TCE in ground water while showering	$<1x10^{-4}$	$<1x10^{-4}$	*1*	*6*

* All numbers have been rounded to one significant figure.

Risk Assessment Uncertainty

Within the Superfund process, baseline quantitative risk assessments are performed in order to provide risk managers with a numerical representation of the severity of contamination present at a Site, as well as to provide an indication of the potential for adverse public health effects. There are many inherent and imposed uncertainties in the risk assessment methodologies. Uncertainties in the human health risk assessment include sampling data that may not fully characterize the contaminants at the Site, toxicity values that are extrapolated from animal or laboratory studies, and the use of default values in exposure assumptions. These uncertainties could lead to either overestimation or underestimation of risk. These uncertainties are further described in Section 6 of the Human health Risk Assessment for the Site.

Ecological Risk Characterization

Site contaminants could primarily affect ecological receptors through a potential ground water to terrestrial plant pathway. A surface water pathway was determined to be highly unlikely, due to the nature of the contaminants of concern affecting ground water, and their necessary route of conveyance. Due to the sensitive ecology of the bosque, its cultural uses by the Santa Clara Pueblo, and its location adjacent to the Rio Grande, a screening level ecological risk assessment (SLERA) was performed to provide a conservative evaluation of risk factors potentially affecting the environment.

The results of the SLERA indicated that there was a low likelihood of significant ecological impacts occurring at the bosque. This is because Site-related contamination was not detected in the various media sampled, and it was therefore concluded that performing a Baseline Ecological Risk Assessment was not required.

Analysis of the Site data for the ecological area of concern showed contaminants were not reaching the various media (i.e., soil, sediment) in measurable quantities or were reaching them in quantities below detection limits. The SLERA evaluated any possible effects the Site could have on the bosque before a final determination regarding ecological risk was reached. The SLERA evaluated the following ecological exposure scenarios by comparing maximum concentrations to appropriate ESLs:

- ground water uptake by taproot of terrestrial plants;
- ground water exposure to aquatic community organisms via direct contact (conservative evaluation);
- surface water ingestion by aquatic dependent or terrestrial wildlife (birds and mammals);
- root uptake of surface water by terrestrial plants;
- aquatic community organism in direct contact with surface water;
- aquatic dependent wildlife (birds) ingesting food items associated with contaminated sediment;
- aquatic community organism in direct contact with sediment;
- terrestrial wildlife (birds) ingesting food items associated with contaminated soil and incidental ingestion of soil;
- terrestrial wildlife (mammals) ingesting food items associated with contaminated soil and incidental of soil;
- root uptake by plants growing in contaminate soil;
- direct contact or uptake of contaminants from soil by invertebrates.

Basis for Action

It is EPA's judgement that the remedial alternative selected in this ROD is necessary to protect the public health or welfare or the environment from actual releases of hazardous substances into the environment, or from the substantial threat of such release. The Site affects a public water supply, for the city of Española and the Santa Clara Pueblo which must be protected and kept from further contamination. The remedy is necessary to prevent further migration of the ground water plume from its current location.

Section 9

Remedial Action Objectives and Goals

In developing and screening the alternatives as appropriate, NMED, the lead agency for the Feasibility Study, working with the support agencies, EPA and Santa Clara Pueblo, established remedial action objectives specifying contaminants and media of concern, potential exposure pathways, and remediation goals. Initially, preliminary remediation goals are developed based on readily available information, such as chemical-specific ARARs or other reliable information. Final remediation goals are presented here. Remediation goals establish acceptable exposure levels that are protective of human health and the environment.

The remedial action objectives (RAOs) presented here were developed after considering all Federal, State, and Tribal ARARs, policies and guidance, and risk-based considerations. Based on the Human Health Risk Assessment, the primary medium of concern is the ground water.

The Remedial Action Objectives for the ground water are to:

- Prevent human ingestion, inhalation, or dermal contact of ground water that contains Site related Contaminants of Concern at concentrations which exceed the corresponding non-zero Maximum Contaminant Level Goals (MCLGs) established under the Safe Drinking Water Act (SDWA).
- Prevent human ingestion or inhalation of ground water containing Safe Drinking Water Act Maximum Contaminant Levels (MCLs) of these Contaminants of Concern when the corresponding Maximum Contaminant level Goals are zero.

The Contaminants of Concern and their corresponding numerical values for this objective are:

PCE:	5µg/L	(MCL)
TCE:	5µg/L	(MCL)

- Restore the ground water at the Site such that it contains concentrations of the Contaminants of Concern less than the Maximum Contaminant Levels (MCL) or non-zero maximum Contaminant level Goals, as applicable.

- Prevent the residual-phase PCE, DNAPL, the principal threat wastes at the Site, from causing concentrations of Contaminants of Concern in ground water to exceed the Maximum Contaminant Levels or Maximum Contaminant Level Goals.

- Prevent the transport of Contaminants of Concern 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 RAO for soil is:

- Prevent the ground water from being impacted above Maximum Contaminant Levels through transport of Contaminants of Concern from the unsaturated zone soils at levels of greater than 0.019 milligrams per kilogram for PCE.

The RAO for surface water is:

- Prevent the degradation of surface water by ensuring that the concentrations of ground water Contaminants of Concern and Contaminants of Potential Concern are in compliance with applicable surface water standards.

- The current surface water standards for the ground water Contaminants of Potential Concern listed in the Water Quality Code of the Pueblo of Santa Clara are as follows:

COC / COPC*	CONCENTRATION
PCE	8.85 µg/L
TCE	81 µg/L
cis-1,2-DCE	No standard
trans-1,2-DCE	100 µg/L
1,1-DCE	3.2 µg/L

*coc = Contaminant of Concern; COPC = Contaminant of Potential Concern.
At the time of this document's development, the Pueblo of Santa Clara Water Quality Code is revising standards for the triennial review.

The proposed surface water standards are:

COC / COPC*	CONCENTRATION
PCE	5 µg/L
TCE	5 µg/L
1,2-(cis)-DCE	70 µg/L
1,2-(trans)-DCE	100 µg/L
1,1-DCE	7 µg/L
Vinyl Chloride	2 µg/L
Manganese	50 µg/L

The surface water quality standards for the Site will be those that are in effect as fully promulgated and enforceable standards when the remedial design is completed.

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 indoor air) at a site after implementation of the ROD through the Remedial Action. Remediation goals are concentrations of contaminants for each exposure route that are protective of human health and the environment. Generally, remediation goals are based on ARARs. Where no ARARs exist or where ARARs are not sufficiently protective, the NCP prescribes methods for selection of remediation goals. There are no ARARs for Site soil; consequently, according to NCP procedure, remediation goals were calculated based on risk to human health. That is, soil remediation goals were calculated in accordance with the risk levels that are acceptable under the NCP. For ground water remediation goals, in keeping with the NCP, EPA identified non-zero MCLGs (or MCLs where MCLGs equal zero) as ARARs.

Unsaturated Zone Soil

The remediation goal for soil at the Site was calculated using the EPA's *Soil Screening Guidance: Users Guide,* EPA publication 9355.4-23. The EPA guidance details the methodology through which a concentration in soil, protective of ground water, may be calculated. For this Site, the total organic carbon content, porosity, and infiltration rates were used to calculate these remediation goals, as detailed in a memorandum prepared by the NMED Project Manager, Robin Brown, which is part of the administrative record file for the Site. The remediation goal for PCE in soil is set at a level such that, if remediation goals are met, ground water cannot become impacted above the MCLs for these compounds through contamination migration from soils. This goal meets the requirements of 20.6.2 NMAC § 4103 of the New Mexico guidance document for treating soils at hazardous waste sites.

Surface Water

The Remediation Goals for surface water are the surface water standards established by the Santa Clara Pueblo.

Section 10
Description of Alternatives

Sixteen ground water remedial alternatives and four soil remedial alternatives were developed for the Site. Table 1 and 2 describe the ground water and soil remedial alternatives, respectively.

In formulating these alternatives, the major components considered were: treatment technologies and materials addressed by the technology, institutional controls, operation and maintenance, and monitoring.

Remedy Components

Components Evaluated for Remedies Involving Ground Water Contamination

Source Zone Treatment Components for Ground Water *(Surfactant or Co-Solvent Treatment; Chemical Oxidation; and Thermal Treatment)*

- Source zone to be treated is approximately 40 feet wide by 40 feet long by 17 feet deep.
- Source zone treatment technologies would remove 90 to 98% of residual DNAPL.
- Localized clay layer in source zone would serve as an adequate confining layer.

Ground Water and Source Zone Treatment Components *(Hydraulic Treatment; Permeable Reactive Barrier (PRB))*

- Source zone treatment technologies include hydraulic containment or "pump and treat" technology and a permeable reactive barrier with zero-valent iron as the reactive material.
- Ground water containment technologies include hydraulic containment, permeable reactive barriers (zero-valent iron and biological stimulants as the reactive media), and an air sparging curtain.
- Source zone containment technologies would contain the source zone and a shallow zone hot spot area near the source zone. This area has approximate dimensions of 200 feet wide by 200 feet long by 17 feet deep.
- Clay layers in the source zone would serve as an adequate confining layer.
- Containment technologies would treat plumes to below the RAOs just down-gradient of the containment systems.
- The PRB would not actively remove DNAPL but would passively treat ground water flowing out from the source area, would require precautions on excavation in the saturated zone in the source area for at least 80 year.
- A minimum of thirty years of operation and maintenance could be required including sampling and analysis and reactive media (for PRBs) replacement or regeneration.

***Ground Water Extraction and Treatment Components** (Hydraulic Treatment)*

- Ground water would be extracted from the shallow zone (source zone, hot spot, and down-gradient plume) and the deep zone hot spot area.
- Extracted ground water would be treated with an aboveground air stripper and aqueous-phase granular activated carbon.
- Vapor-phase discharge from the aboveground treatment system would be treated by vapor-phase granular activated carbon. Spent granular activated carbon (aqueous- and vapor-phase) would be collected and regenerated by the activated carbon vendor.
- Treated ground water disposal options include: surface water discharge, discharge to publicly owned treatment works, re-injection into the subsurface, reuse, irrigation, and surface application.
- Ground water monitoring would be conducted to determine the effectiveness of the ground water extraction and treatment components.
- A minimum of thirty years of operation and maintenance, could be required, including sampling and analysis.

***Dissolved-Phase Treatment for Ground Water** (Enhanced In-Situ Bioremediation; Air Sparging; Permeable Reactive Barrier; Monitored Natural Attenuation)*

- Enhanced In-Situ Bioremediation results after injecting substances into the aquifer that cause dissolved oxygen concentrations to decline, and allow natural bacteria to de-chlorinate the PCE and TCE to harmless end products, under anaerobic conditions.
- Air sparging includes the use of wells, at or beneath the bottom of the plume, into which air would be injected. As this air rises through the plume, it causes the PCE and TCE to volatilize and move upward with the air. This air is then captured above the water table using soil vapor extraction, and treated to remove the COCs before discharge to the atmosphere.
- Permeable reactive barriers function by placing a reactive substance such as zero-valent iron in the path of the flowing ground water, using trenches or closely-spaced treatment wells. The COCs are destroyed by the reactive substance.
- The down-gradient portion of the dissolved-phase plume (e.g., area down-gradient of the shallow zone hot spot) may be treated through monitored natural attenuation.
- Hydrogeologic and geochemical data indicate that PCE is being partially bio-degraded to TCE and cis-1,2-DCE. Monitored natural attenuation would not be used as a stand-alone remedy to treat the dissolved-phase plume.
- Monitored natural attenuation may be used a complimentary technology for ground water containment and treatment remedies.

Institutional Control Components for Ground Water

- Includes government controls such as zoning, local permits, tailored ordinances, controls, easements, and covenants that would reduce potential for ground water to be contaminated

by transport from contaminated soil.

- The New Mexico Office of the State Engineer has issued an Order restricting future well drilling within a portion of the aquifer contaminated by the plume. This restriction is limited to enforcement by the State Engineer's Office, and cannot be enforced by EPA.

Components Evaluated for Remedies Involving Soil Contamination

- Soil vapor extraction (SVE) to treat soil with elevated levels of COCs.
- SVE would treat approximately 375 cubic yards (CY) of contaminated soils.
- SVE would be performed after ground water treatment so that soils will not be re-contaminated from contaminated ground water.
- Contaminated soils would be treated to the RAO, or 0.019 mg/kg for PCE in soil.
- Extracted soil gas would be treated by vapor-phase granular activated carbon and discharged to the atmosphere. There would be minimal gas-phase emissions to the atmosphere as a result of SVE treatment.
- Two years of operation and maintenance, including sampling and analysis would be included for SVE treatment.

Excavation Components for Soils

- Soil excavation would be used to remove approximately 30 CY of soils contaminated with COCs. Excavation would not address contaminated soils presumed to reside underneath the laundromat (approximately 75 CY).
- Soil excavation would be conducted after ground water treatment so that soils would not be re-contaminated from contaminated ground water.
- Contaminated soils would be removed so that the COC concentrations in remaining soils would be below the RAO of 0.019 mg/kg for PCE.
- There would be minimal emissions or residual waste (other than the approximately 75 CY of contaminated soil under the building) as a result of soil excavation.
- There would be minimal risks associated with emissions and /or residual waste as a result of soil excavation.
- No operation and maintenance would be needed for soil excavation.

Institutional Control Components for Soil

- Includes government controls like zoning, local permits, tailored ordinances, and proprietary controls like easements, covenants that would reduce potential for ground water to be contaminated by transport from contaminated soil.

Common Elements of Remedial Alternatives GW-3 to GW-16, and S-3, S4

Feasibility Study Assumptions

Each of the remedial alternatives (other than No-Action and Institutional Controls, Alternatives 1 and Alternative 2 respectively) evaluated as part of the detailed analysis have certain assumptions and aspects in common. These are called the common elements. Common elements which concern assumptions used in the Feasibility Study for Alternatives S-3 and S-4, and GW-3 through GW-16 follow:

- All costs were based on a 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 (RI/FS) Under CERCLA - Interim Final*" OSWER Directive 9355.301 (October 1988). This guidance was followed to the extent that 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 and time which will be expended during the project. Costs will be recalculated in the Remedial Design Work Plan.
- Any changes to the common elements, since publication of the cost estimates in the FS, that could result in a change in cost for one alternative, will result in a proportional change in cost to all alternatives; consequently, the comparisons between the alternatives remain valid.
- Present worth costs are presented in this ROD so that the remedial action alternatives which may have cost 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 implement, a maximum cost period of 30 years is used for comparison purposes. For example, Alternative GW-3, which would implement hydraulic treatment of the source zone, has its cost estimated over a 30-year period, although it would probably take much longer to meet remediation goals. Present worth or present value cost 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.
- Under CERCLA, 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, EPA must review the remedial action in five years. Although the performance of five-year reviews is not itself part of a remedial alternative, upon implementation of any of the proposed remedial alternatives, EPA would perform five-year reviews. These reviews are not required by statute, because upon completion, the remedy will allow for unrestricted use of the Site. As a matter of policy however, and because the remediation will take longer than five years to complete, EPA will conduct a review within five years from the date that Remedial Action for the Site begins to ensure that human health and the environment are being protected. (See 42 U.S.C.§ 9621(c)).
- All alternatives will meet ARARs.

- All alternatives will support the current and future anticipated land use at the Site–residential, commercial, and light industrial.

Technical Features

- The vadose zone soils (soils between ground surface and the water table) do not contain hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) and are therefore not subject to the RCRA land disposal restrictions if the waste is excavated and treated or removed from the area of contamination.
- In order to further characterize the vertical and horizontal extent of contamination in the intermediate and deep zones, in the area to the southwest and parallel to the shallow plume, subsurface investigations will be conducted during the remedial design phase. Ground water and soil samples will be collected for the intermediate and deep zones; a range of 40-300 feet below ground surface between the Norge Town facility and Well R-15. The purpose of the investigation will be to assist in the design and implementation of the remediation alternative.
- All ground water remedies include restrictions of drilling new supply wells. Consistent with expectations set out in the Superfund regulations, none of the alternatives rely exclusively on institutional controls to achieve protectiveness.
- Specifically, the New Mexico Office of the State Engineer issued an Order to restrict use of a portion of the aquifer contaminated by the plume until remediation goals have been met. This institutional control is also restricted to enforcement by the Office of the State Engineer's Office only, and not the offices of EPA.
- Monitoring to ensure the effectiveness of the remedy has been included as a component of each alternative except the "no-action" alternative.
- All ground water alternatives include an operation and maintenance component that involves ground water monitoring to assess progress toward achieving the Remedial Action Objectives.
- All alternatives will support the current and future anticipated land and ground water use at the Site; commercial, light industrial, and residential, and small-scale agriculture.

Screening of Alternatives

To reduce the number of alternatives that would undergo detailed evaluation, a preliminary screening was performed to identify the most promising alternatives. This screening process used effectiveness, implementability, and cost as the criteria. For soils, because some action is required and only two alternatives included remedial actions, both alternatives S-3 and S-4 were retained for detailed evaluation. Because of the large number of for ground water alternatives, screening was conducted using the balancing criteria for each alternative as shown in the following table.

Table 2: Ground Water Alternatives

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	PRESENT WORTH (2000)
GW-1: No Action	No risks are posed to the community or workers. Contaminated ground water is not addressed by this alternative. Alternative does not generate treatment residuals or remaining waste in the long term. RAOs will not be met for more than 100 years.	Action is technically feasible. There are no administrative barriers that would prevent the implementation of this alternative. No resources are required.	$0
GW-2: Monitoring + Institutional Controls	No risks are posed to the community or workers. Contaminated ground water is not addressed by this alternative. Alternative does not generate treatment residuals or remaining waste in the long term. RAOs will not be met for more than 100 years.	Action is technically feasible. There are no administrative barriers that would prevent the implementation of this alternative. No resources are required.	$1,518,000
GW-3: Source Zone Hydraulic Treatment + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Alternative does not generate treatment residuals or remaining waste in the long term. RAOs will not be met for more than 70 to 80 years.	Action is technically feasible. Numerous hydraulic containment systems have been implemented in similar geologic environments. There are administrative barriers that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$1,980,000
GW-4: Source Zone Permeable Reactive Barrier + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Short-term and localized effects on ground water geochemistry. Alternative does not generate treatment residuals or remaining waste in the long term. RAOs will not be met for more than 70 to 80 years.	This alternative may present technical challenges because of high ground water velocity and high PCE concentration in source that result in a 9-ft thick permeable reactive barrier. There are no administrative barriers that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$4,174,000
GW-5: Source Zone In Situ Chemical Oxidation Treatment + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Short-term and localized effects on ground water geochemistry, possibly impacting intrinsic biodegradation. Alternative does not generate treatment residuals or remaining waste in the long term. RAOs will not be met within 30 years.	This alternative requires the use of specially trained personnel to handle oxidizers. High alkalinity may make it difficult to maintain optimum pH. There are no administrative barriers that would prevent the implementation of this alterative. Services, equipment, and materials are readily available.	$1,778,000

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	PRESENT WORTH (2000)
GW-6: Source Zone Surfactant or Co-solvent Treatment + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Short-term and localized effects on ground water geochemistry, possibly impacting intrinsic bio degradation. Alternative does not generate treatment residuals or remaining waste in the long term. RAOs will not be met within 30 years.	This alternative is technically feasible. Aboveground treatment of effluent is required. There are no administrative barriers that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$1,993,000
GW-7 : In Situ Thermal Treatment + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Alternative requires significant electrical power for a short period of time. Alternative does not generate treatment residuals or remaining waste in the long term. RAOs will not be met within 30 years.	Site hydrogeology is not critical for success of this alternative as it is for other technologies that rely on the flushing of treatment fluids. High ground water velocity may reduce subsurface heating efficiency. There are no administrative barriers that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$2,013,000
GW-8: Source Zone Hydraulic Treatment = Source Zone Surfactant or Co-solvent Treatment +Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Alternative requires significant electrical power for a short period of time. Alternative does not generate treatment residuals or remaining waste in the long term. RAOs will not be met within 30 years.	Technical feasibility is similar to GW-3 and GW-6. There are no administrative barriers that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$2,013,000
GW-9: Plume Hydraulic Treatment + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Ground water resource will be unavailable due to this alternative. Alternative does not generate treatment residuals or remaining waste in the long term. RAOs will not be met for more than 70 to 80 years.	Technical feasibility is similar to GW-3. There are no administrative barriers that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$2,408,000

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	PRESENT WORTH (2000)
GW-10: Shallow Zone Plume Permeable Reactive Barrier + Deep Zone Hot Spot Permeable Reactive Barrier + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Short-term and localized effects on ground water geochemistry. This Alternative does not generate treatment residuals or remaining waste in the long-term. RAOs will not be met for the entire plume for more than 70 to 80 years. RAOs will be met south of State Road 201 in 30 years.	Technical feasibility is the same as GW-4. Deeper PRB installation rely on more innovative technology and less field-tested installation methods. There are no administrative barriers that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$11,987,000
GW-11: Plume Air Sparging + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Short-term and localized effects on ground water geochemistry; possibly impacting intrinsic biodegradation. Low levels of soil-gas COCs will be generated. This alternative does not generate treatment residuals or remaining waste in the longterm. RAOs will not be met for the entire plume for more than 70 to 80 years. RAOs will be met south of State Road 201 in 30 years.	This alternative is technically feasible. Technology has been applied at numerous sites to control plume migration. There are no administrative that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$2,466,000
GW-12: Plume Enhanced In-Situ Bioremediation + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Short-term and localized effects on ground water geochemistry (reduction of re-dox potential). This alternative does not generate treatment residuals or remaining waste in the long-term. RAOs will not be met for the entire plume for more than 70 to 80 years. RAOs will be met south of State Road 201 in 30 years.	This alternative is technically feasible. Site geology and hydrology are favorable for injecting biostimulants. There are no administrative that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$3,270,000

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	PRESENT WORTH (2000)
GW-13: Source Zone Surfactant or Co-Solvent Treatment + Monitored Natural Attenuation (MNA) + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Surfactant or co-solvent treatment may cause short-term and localized effects on ground water geochemistry, possibly impacting intrinsic biodegradation. This alternative does not generate treatment residuals or remaining waste in the long-term. RAOs will not be met within 30 years in the source zone. RAOs will be met south of State Road 201 in 30 years.	Technical feasibility the same as GW-6. MNA may not be reducing concentrations of PCE dechlorination products (e.g., DCE) to an acceptable level. There are no administrative barriers that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$2,477,000
GW-14: Source Zone Surfactant or Co-Solvent Treatment +Plume Hydraulic Treatment + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Surfactant or co-solvent treatment may cause short-term and localized effects on ground water geochemistry, possibly impacting intrinsic biodegradation. Ground water resource will be unavailable due to this alternative. Alternative does not generate treatment residuals or remaining waste in the long-term. RAOs will not be met within 30 years in the source zone. RAOs will be met south of State Road 201 in 30 years.	Technical feasibility is similar to GW-3 and GW-6. There are no administrative barriers that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$2,833,000

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	PRESENT WORTH (2000)
GW-15: Source Zone Surfactant or Co-Solvent Treatment + Hot Spot Enhanced In-Situ Bioremediation + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Surfactant or co-solvent treatment may cause short-term and localized effects on ground water geochemistry, possibly impacting intrinsic biodegradation. Enhanced bioremediation will cause short-term and localized effects on ground water geochemistry (reduction of redox potential). Alternative does not generate treatment residuals or remaining waste in the long-term. RAOs will not be met within 30 years for the entire plume. RAOs will be met south of State Road 201 in 30 years.	Technical feasibility is similar to GW-6 and GW-12. There are no administrative barriers that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$4,899,000
GW-16: Source Zone Surfactant or Co-Solvent Treatment + Hot Spot Enhanced In-Situ Bioremediation + Enhanced In-Situ Bioremediation of the Dissolved-Phase Plume + Monitoring	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. Surfactant or co-solvent treatment may cause short-term and localized effects on ground water geochemistry, possibly impacting intrinsic biodegradation. Enhanced bioremediation will cause short-term and localized effects on ground water geochemistry (reduction of redox potential). Alternative does not generate treatment residuals or remaining waste in the long-term. RAOs will not be met within 30 years for the entire plume. RAOs will be met south of State Road 201 in 30 years	Technical feasibility the same as GW-6 and GW-12. There are no administrative barriers that would prevent the implementation of this alternative. Services, equipment, and materials are readily available.	$5,822,000

The ground water alternatives can be grouped as follows:

- Alternatives that include no remedial actions (GW-1, GW-2);
- Alternatives that include remedial actions only for the source zone (GW-3, GW-4, GW-5, GW-6, GW-7, GW-8, GW-13);
- Alternatives that include remedial actions only for the plume (GW-9, GW-11, GW-12);
- Alternatives that include remedial actions for the source zone and the plume (GW-10, GW-14, GW-15, GW-16).

Because only this latter grouped can be considered "effective" in that it addresses both the source area and the down-gradient plume, and the deep zone, the first three categories above were not retained for detailed evaluation. Many of their components are combined in the remedies in the last group. Because Alternative GW-15 would treat only hot spots in the plume, and does not offer a significant cost advantage relative to Alternative GW-14 and GW-16, only the following three alternatives were retained for detailed analysis: GW-10, GW-14, and GW-16.

Table 3: Soil Alternatives

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	PRESENT WORTH (2000)
S-1: No Action	No risks are posed to the community and workers. Contaminated soil is not addressed by this alternative. Alternative does not generate treatment residuals or remaining waste in the long term.	Action is technically feasible. There are no administrative barriers that would prevent the implementation of this alternative. No resources are required.	$0
S-2: Institutional Controls	No risks are posed to the community and workers. Contaminated soil is not addressed by this alternative. Alternative does not generate treatment residuals or remaining waste in the long term.	Action is technically feasible. There are no administrative barriers that would prevent the implementation of this alternative. No resources are required.	$0
S-3: Soil Vapor Extraction	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. There will be short-term disruptions to traffic and local business. RAOs will be met within 2 years after the treatment is started provided that ground water has been cleaned up to levels that will not re-contaminate soil. Alternative does not generate residual waste.	Action is technically feasible. Services, equipment, and materials are readily available. Site hydrogeology is favorable for this technology. Shallow ground water table and high permeability soils may require an asphalt plenum to minimize short-circuiting of soil gas from subsurface. There are no administrative barriers that would prevent the implementation of this alternative.	$138,000

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	PRESENT WORTH (2000)
S-4: Excavation + Disposal	Protection of community and workers is possible with the use of engineering controls and adherence to safe work practices. The volume of unsaturated, contaminated soil assumed to be present beneath the Norge Town Laundry will not be addressed by this alternative. Excavation will generate contaminated soil, requiring off-site treatment and/or disposal. Short-term disruption to traffic and local businesses. RAOs will be met for areas addressed by excavation after the ground water has been treated to levels near RAOs. Alternative does not generate residual waste.	Action is technically feasible. Services, equipment, and materials are readily available. The shallow depth to ground water is favorable as this will require less soil to be excavated. The presence of the Norge Town Facility will make the excavation more difficult. There are no administrative barriers that would prevent the implementation of this alternative.	$105,000

Expected Outcomes of Each Alternative

This section of the ROD presents the expected outcomes of the retained alternatives (S-3, S-4, GW-10, GW-14, GW-16) in terms of resulting land and ground water uses and risk reduction achieved as a result of the response action.

Land Use

None of the Site contaminants or remedial alternatives will restrict the use of any property above the ground water plume. However, the New Mexico Office of the State Engineer will restrict the drilling of wells in areas affected by the plume until the ground water meets the Remedial Action Objectives.

Ground Water Use

- All three retained alternatives for ground water would produce improvements in the quality of ground water in the down-gradient plume, resulting in achievement of water quality objectives in approximately 30 years for the down-gradient plume. Alternative 10 however, would not allow for unlimited use in the source area.
- The goal of the soil alternatives is to protect ground water. Either alternative S-3 or S-4 would be implemented as the time approached when ground water concentrations in the source zone were becoming close to the MCLs.

Section 11
Comparative Analysis of Alternatives

Under the NCP, EPA uses nine criteria to evaluate remedial alternatives for the cleanup of a release. These nine criteria are categorized into three groups: threshold, balancing, and modifying. The two 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 five balancing criteria used to evaluate the major tradeoffs among alternatives 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 table 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 alternatives use of treatment to reduce the harmful effects of principal hazardous substances, pollutants, or contaminants, their ability to move in the environment, and the amount of contaminants 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 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.

In the following analysis, the five remedial alternatives are evaluated in relation to each other with regard to the nine criteria in order to identify the relative advantages and disadvantages of each alternative.

Ground Water Alternatives

COMPARATIVE ANALYSIS

Overall Protection of Human Health and the Environment

- Alternative GW-10 (Shallow Zone Plume Permeable Reactive Barriers (PRB); Deep Zone Hot Spot Permeable Reactive Barrier; and Monitoring) is protective of human health and the environment. However, the residual-phase source DNAPL is not directly addressed by this alternative and will continue to pose a risk to ground water and potential receptors for 80 years or more.
- Alternative GW-14 (Surfactant or Co-Solvent Treatment; Hydraulic Treatment; and Monitoring) and GW-16 (Surfactant or Co-Solvent Treatment; Hot Spot Enhanced In-Situ Bioremediation; Enhanced In-Situ Bioremediation of the Dissolved-Phase Plume; and Monitoring) both treat the principal threat waste, residual-phase DNAPL, and can meet the Remedial Action Objectives of preventing residual-phase DNAPL from impacting ground water within 10 years after initial treatment. Contaminants may remain above the MCLs in the dissolved phase for at least 30 years.
- Alternative GW-16 has the highest potential to remediate the plume to below the MCLs in less than 30 years.
- Alternatives GW-10, GW-14 and GW-16 will address the contaminants in the deep zones.
- Alternative GW-14 using ground water pumping and treatment, has some risk of inadvertently spreading higher concentrations of contaminants to areas with lower concentrations, if pumping wells are not in the aquifer zones of highest concentration. This situation could arise in any aquifer zone, because characterization is always based on monitoring wells spaced far apart relative to the size of potential "hot spots" in the plume.

Compliance with ARARs

All of the ground water alternatives would meet Federal, State, and Tribal Applicable, or Relevant and Appropriate Requirements. Compliance with ARARs was determined from a review of chemical-specific, action-specific, and location-specific ARARs as discussed in the Feasibility Study.

Long-Term Effectiveness and Permanence

Long-term effectiveness of a remedy is measured by the magnitude of remaining risk, such as that posed by remaining waste or treatment residuals, after the RAOs have been met.

- Once the selected treatment is completed, monitored natural attenuation processes such as diffusion and volatilization will reduce any remaining contaminants to levels below

ARARs. Therefore, all three treatment options will have a similar long-term effectiveness and permanence because none of the alternatives generate treatment residuals or have remaining waste.

Reduction of Toxicity, Mobility, and Volume Through Treatment

- Alternatives GW-14 and GW-16 will have the greatest immediate reduction in DNAPL mass (approximately 98% removal). GW-10 does not directly treat the DNAPL, thus, it has the least immediate reduction of the treatment options.
- For contaminants in the down-gradient plume (shallow and deep aquifers), Alternative GW-16 would achieve the greatest degree of reduction in toxicity, mobility, and volume of contaminants because it would use in-situ biological treatment to destroy contaminants dissolved in the ground water as well as those adsorbed on aquifer soil particles. Alternative GW-10 would also achieve in-situ destruction of contaminants, but would act more slowly than GW-16 because GW-10 would rely on natural ground water flow to carry contaminants to the reactive barriers.

Short-Term Effectiveness

Protection of the community and workers is possible for all of the alternatives with the proper use of engineering controls and strict adherence to safe work practices. However, Alternative GW-14 would include a treatment plant for pumped ground water and the equipment in that system would require long-term maintenance, posing a small added risk relative to the other remaining alternatives that rely on in-situ treatment.

- Alternative GW-10 provides less long-term effectiveness and permanence than Alternative GW-14 and GW-16 because it does not address residual DNAPL in the source area.
- Alternative GW-16 has the highest potential to remediate the plume to below the MCLs in less than 30 years.

Implementability

- ***Technical Feasibility*** Alternative GW-10 may present some implementability problems due to the high ground water velocity requiring a thicker wall (approximately 9 feet in width) to be installed down-gradient from the source area. In Remedial Design, this issue may be overcome by designing multiple walls in parallel. All three remaining alternatives rely in part on relatively new technologies for in-situ treatment, but these technologies have all been used at full scale and are technically feasible.

- ***Administrative Feasibility*** The down-gradient components of the three remedies considered all present issues related to property access. Permeable reactive barriers, pumping wells, and ex-situ ground water treatment systems however, do not need to be precisely sited as determined by technical factors. The Remedial Design process for locating these facilities will consider ease of access as well as technical factors.

- ***Availability of Equipment and Services*** Contractors and hardware are available to achieve the remedial actions encompassed by all three remaining alternatives. Equipment to achieve deep zone treatment under Alternative GW-10 (passive wells containing zero-valent iron) is not yet available "off-the-shelf" in commercial quantities, but the Remedial Design process is expected to yield design details that can be implemented readily to achieve the intent of the remedy.

In summary, all three remedies considered for implementation appear readily implementable.

Cost

- All three alternatives have an annual site-wide monitoring cost of $110,000 for 30 years. GW-14 has the lowest present worth cost of $2,833,000. GW-10 has the highest present worth cost of $11,987,000. GW-16 has an intermediate present worth cost of $5,822,000.

Comparative Analysis-Soil Alternatives

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment is based on a combination of compliance with Applicable or Relevant and Appropriate Requirements and short-and long-term effectiveness.

- None of the vadose zone remedial actions will meet the 19 µg/L Remedial Action Objective for PCE in soil until the underlying ground water is nearing remediation goals. PCE dissolved in the underlying ground water will continue to volatilize into the soil gas and migrate through the vadose zone. Therefore, any soil alternative will not begin until the underlying ground water approaches concentrations that would not pose this risk of volatilization and re-contamination of the soil.
- Alternative S-3 (SVE) has the best overall protection of human health and the environment because nearly 100% of the PCE present in the initial soil mass will be treated by this alternative.
- The S-3 alternative will not generate treatment residuals that require off-site disposal. The activated carbon used to treat SVE off-gas would be recovered and regenerated by a supplier.

- Alternative S-4 will only address approximately 80% of the initial PCE contaminated soil at the Site following ground water remediation, because contamination beneath the Norge Town building would remain. Alternative S-4 is therefore less protective of human health and the environment than S-3.

Compliance with ARARs

- Both of the unsaturated soil alternatives (S-3 and S-4) will comply with all of the ARARs. Compliance with ARARs was determined from a review of chemical-specific, action-specific, and location-specific ARARs as discussed in the Feasibility Study.

Long-Term Effectiveness and Permanence

- Alternative S-3 (SVE) is more effective in the long term than S-4 (excavation) because it addresses the entire contaminated area. The area of influence of SVE wells will extend beneath the building.
- Alternative S-4 does not address contaminated soil beneath the Norge Town facility, and therefore has a lower long-term effectiveness than Alternative S-3. Natural degradation processes would need to be relied upon to remediate the contamination under the building.

Reduction of Toxicity, Mobility, and volume Through Treatment

- Alternative S-3 will remove and treat nearly 100% of the PCE-contaminated soil (approximately 0.5 pound of PCE). Initial treatment will consist of immobilization of contaminants via sorption Granular Activated Carbon (GAC). Ultimate destruction of toxicity, mobility, and volume will occur at an off-site GAC regeneration facility.
- Alternative S-4 will remove approximately 80% of the PCE in vadose zone soils, but any treatment will depend on future decisions regarding off-site disposal of the excavated soils.

Short-Term Effectiveness

- Protection of the community and workers is possible for both Alternatives S-3 and S-4.
- S-4 (excavation and disposal) presents a greater risk to on-site workers and the community due to the use of heavy machinery.
- S-3 (SVE) will meet Remedial action Objectives for soil. Alternative S-3 will take place for approximately 2 years near the end of ground water remediation.
- Alternative S-4 also would take place near the end of the ground water remediation. It would be completed within a few weeks after beginning excavation, but will not meet Remedial Action Objectives for soil quickly because excavation will not remove contaminated soil presumed to be present underneath the Norge Town facility. It is uncertain when RAOs for soil would be met by S-4 because it would depend on natural

attenuation processes such as volatilization and diffusion.

Implementability

- ***Technical Feasibility*** Alternative S-3 (SVE) is an easy technology to implement from a technical standpoint. This alternative has been implemented at many sites to reduce the size and magnitude of soil gas plumes. The only technical challenge that exists at the Site is the possibility of soil-gas short-circuiting to the atmosphere due to the shallow water table and the high permeability of soils. However, the design can include an asphalt surface to help minimize short circuiting.
- Alternative S-4 (excavation) is also easy to implement from a technical standpoint and the depth to ground water is relatively shallow at 5 feet below ground surface. The soil type makes it easy to remove using traditional excavators because soil would be excavated to a maximum depth of 5 feet.

- ***Administrative Feasibility*** Neither Alternative S-3 nor S-4 should encounter any administrative obstacles. Both alternatives would occur entirely on the Norge Town property, so no access issues should arise.

- ***Availability of Equipment and Services*** Both Alternatives S-3 and S-4 can be implemented with readily available contractors and hardware.

Cost

- Alternative S-3 has a total capital cost of $40,000. O&M costs are $35,000 per year for approximately two years.
- Alternative S-4 has a capital cost of $105,000. O&M cost is zero.

State and Pueblo Acceptance

The State of New Mexico, represented by NMED has worked with EPA in the investigation of the Site and assisted in developing the Proposed Plan and the ROD. The NMED documented its support for the Selected Remedy in a letter to EPA dated August 21, 2001. This letter is included in Appendix B. The Santa Clara Pueblo has also been a partner at this Site and has worked closely with NMED and EPA throughout the process. At the Public Meeting held at the Pueblo, questions arose concerning the Preferred Alternative, its implementation, and how the plume would be kept from affecting the Rio Grande or the Pueblo water supply. The Pueblo has indicated it supports the Selected Remedy but has some concerns with the schedule, its implementation and ensuring protectiveness of natural resources.

Community Acceptance

No official comments were received from the City of Espanola, however, city officials did communicate that they would have preferred a remedy that could address the Site contaminants much sooner. The public comments received at the Public Meeting were questions on the proposed alternative, its implementation, risks that were perceived to be associated with the Site and on the Site investigation. Comments received varied between those believing the Site was not a serious problem to those who believed not enough investigating of the plume had taken place. The responses to these comments are included in Appendix A, the Responsiveness Summary.

Section 12
Selected Remedy

Summary of the Rationale for the Selected Remedy

The remedy selected for the Site represents the best balance among the nine evaluation criteria in the NCP. A number of treatment technologies were evaluated; the selected remedy is the most innovative of these technologies. The selected remedy will treat the principal threat waste in lieu of containment of the waste. The selected remedy is also cost effective compared to other demonstrated technologies. The remedy provides appropriate protection to human and ecological receptors, and is expected to meet remedial goals. The selected remedy is less invasive, results in less impacts to private property and local business, and associated access issues while meeting the intended cleanup goals for the Site.

Another critical factor carefully evaluated in selecting the remedy was the limited water resources in this high desert community. The desirability of a remedy that meets community objectives and balances the needs of the stakeholders, was an important consideration. Accordingly, EPA sought to select a remedy that will maximize source control, conservation of ground water, protection of the drinking water resources, and prevents the further migration of the plume. The remedy is expected to provide the earliest and most practicable level of cleanup among the technologies evaluated for the Site.

Alternative GW-16 is the selected remedy for ground water for the following additional reasons:

- Best overall protection of human health and the environment.
- Compliance with ARARs under short-term effectiveness superior to GW-10 because GW-10 does not directly address the source area, and GW-16 addresses the source area in the least amount of time.
- GW-16 will likely treat the plume more quickly than GW-14.
- GW-14 would either cause a large amount of water resource to be removed from the aquifer or would require re-injection of ground water back into the aquifer to minimize loss of resource. Re-injection of treated water would be more expensive and difficult than other water disposal options.
- GW-14 (hydraulic treatment component) may spread contamination from more contaminated to less contaminated areas and would require additional monitoring requirements to prevent this from occurring.
- GW-16 is easiest to implement, in comparison to the other alternatives.
- GW-16 costs more than GW-14, but less than GW-10.
- GW-16 provides superior protection of human health and the environment as well as superior reduction in toxicity, mobility, and volume of contaminants, and is therefore considered the most cost-effective alternative.

- GW-16 uses proven technology, but is also innovative, and is expected to be less invasive on private property and ground water resources than the other two remedies.

Alternative S-3 is the selected remedy for unsaturated soils for the following additional reasons:

- Best overall protection of human health and the environment.
- Complies with ARARs.
- Superior long-term effectiveness because it can treat the soils under the building.
- Most extensive reduction in toxicity, mobility, and volume through treatment.
- Short-term effectiveness greater that S-4 because S-3 uses less heavy equipment and poses less risk to construction workers and local community during implementation.
- Ease in implementation.
- Approximately equal in cost to S-4.

Description of the Selected Remedy

Alternative GW-16 and S-3, the Selected Remedy, consists of Source Zone Surfactant or Co-Solvent Treatment; Enhanced In-Situ Bioremediation in Hot Spots; Enhanced In-Situ Bioremediation of the Dissolved Phase Plume; Soil Vapor Extraction; Monitoring. This remedy includes the comment elements and the following elements:

- Surfactant or co-solvent treatment to remove residual DNAPL in the source area;
- Enhanced in-situ bioremediation of hot spots to destroy chlorinated solvent compounds;
- Enhanced in-situ bioremediation of the dissolved-phase plume;
- Soil vapor extraction to treat unsaturated soils in the source area;
- Monitoring of groundwater quality to assess performance of the remedial actions.

Source Zone Surfactant or Co-Solvent Treatment

DNAPL will be recovered using a surfactant or co-solvent treatment. A surfactant or co-solvent will be injected into the subsurface near the source areas. The treatment solution is swept through the source zone by means of a hydraulic gradient induced by a series of injection and extraction wells. After removal, the extraction solution, containing a mixture of the injected fluid, the contaminant, and the affected ground water, is brought to the surface. The extracted fluid and recovered DNAPL and other waste residuals will be separated for treatment, disposal, or recycling. During the process design phase, it will be determined if re-use of treatment solution by re-injection is appropriate.

This surfactant, or co-solvent treatment is expected to remove 98% of the DNAPL and the treatment will remain in-situ for approximately six weeks. The remaining 2% of the DNAPL is modeled to be removed within 5 years after the surfactant or co-solvent treatment through in-situ

bioremediation and through natural attenuation processes. The source area to be treated is estimated to be 1600 square feet. The specific location where DNAPL is present will be further defined during the design phase. These tests will be done in order to appropriately locate the point of injection and extraction wells, relative to the DNAPL distribution. Bench-scale treatability studies will also be done to determine what treatment solution will work best for this Site.

Hot Spot and Lower Concentration Dissolved-Phase Treatment

In-situ bioremediation will be used for hot spot and lower concentration dissolved-phase treatment including treatment of all vertical zones of the aquifer. Bioremediation involves the addition of an electron donor or food source, nutrients, and/or microbes to accelerate the rate of the degradation of contaminants to harmless products. Bench scale studies will be performed to determine the best bioremediation treatment material for the Site. Additional drilling may be required to better define the distribution of contaminants in the deeper zone that need treatment.

Bioremediation in hot spot areas will be performed by injecting treatment materials so that they are distributed throughout the hot spot areas. The locations of the hot spots will be determined during the treatability studies and the development of the remedial design, and the performance evaluation during the remedial action.

Bioremediation treatment in the lower-concentration shallow zone of the dissolved phase plume will be injected in a linear fashion across the width and depth of the shallow plume so that ground water flowing through the treatment area will be treated. It is anticipated that these linear treatment zones will be placed in one or two locations across the width of the plume.

Most of the dissolved-phase plume will be treated through bioremediation, but there could be some areas down-gradient of the southernmost treatment area in the shallow zone and surrounding the hot spot in the deeper zone which will be addressed by monitored natural attenuation.

Because bioremediation injectates will affect the general chemistry of the aquifer, there is some potential that manganese, iron, and possibly arsenic could be temporarily and locally mobilized in the ground water. Bench-scale studies and sampling will be conducted during remedial design to evaluate the potential to increase these metals above a hazard quotient of 1 (one), the design will include factors to address the increased concentrations of these trace elements.

Cleanup of PCE Contaminated Unsaturated Zone Soils

Soil vapor extraction (SVE) will be used for this component of the remedy to treat soil contaminated with PCE to the remedial action goal of 0.019 mg/kg. Extraction wells would be installed near the source area to remediate both the known extent of contaminated unsaturated zone soils which exist outside of the Norge Town facility building and to clean up contamination

which may exist under the building. Extracted soil gas would be treated by vapor-phase granular activated carbon and then discharged to the atmosphere after treatment. There would be minimal gas-phase emissions to the atmosphere as a result of SVE treatment of soils.

This process would be conducted near the end of ground water treatment so that soils will not be re-contaminated from contaminated ground water. Soil monitoring will be performed before installing an SVE system to make sure that the system is needed. Monitoring will also be performed during the system operation to evaluate performance.

SVE treatment of the unsaturated zone soils would take approximately two years of operation and maintenance.

Environmental Monitoring will include:

- One time monitoring of DNAPL quantities to evaluate the effectiveness of the surfactant or co-solvent treatment.
- Monitoring of soil or soil vapor concentrations before implementing a SVE system to determine whether cleanup is still needed, and monitoring during SVE operation to determine the effectiveness of the operation.
- Ground water monitoring to track the location of the dissolved-phase contaminants of concern and contaminants of potential concern. Ground water monitoring will include ground water sampling and water level measurements in order to track the direction and rate of contaminant plume migration. Ground water monitoring will be performed at least semiannually (twice per year) using an appropriate number of monitoring wells to adequately characterize and monitor the plumes and their migration. After the ground water meets the RAO's, the ground water will be monitored quarterly for two years before the site is closed.

Cost Estimate for the Selected Remedy

The following tables present the estimated capital and operating costs for the two components of the selected remedy, (Alternative GW-16 and S-3), along with the other alternatives evaluated for the Site. The information in these cost estimate summary tables is based on the best available information regarding the anticipated scope of the remedial alternative. 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. Major changes may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Difference (ESD) or a ROD amendment. These are order-of-magnitude engineering cost estimates that are expected to be within +50 to -30 percent of the actual project cost.

Table 4: Cost Tables

Alternative	Capital Cost	Operation & Maintenance Cost	Present Worth (2000)
GW-1: No Action	$0.00	$0.00	$0.00
GW-2: Monitoring + Institutional Controls	$0.00	$110,000.00	$1,518,000.00
GW-3: Source Zone Hydraulic Treatment + Monitoring	$100,000.00	$137,000.00	$1,980,000.00
GW-4: Source Zone Permeable Reactive Barrier + Monitoring	$2,030,000.00	$500,000.00	$4,174,000.00
GW-5: Source Zone In Situ Chemical Oxidation Treatment + Monitoring	$260,000.00	$110,000.00	$1,778,000.00
GW-6: Source Zone Surfactant Enhanced Remediation Treatment + Monitoring	$475,000.00	$110,000.00	$1,993,000.00
GW-7: In Situ Thermal Treatment + Monitoring	$495,000.00	$110,000.00	$2,013,000.00
GW-8: Source Zone Hydraulic Treatment + Source Zone SEAR Treatment + Monitoring	$570,000.00	$137,000.00	$2,450,000.00
GW-9: Plume Hydraulic Treatment + Monitoring	$220,000.00	$160,000.00	$2,408,000.00
GW-10: Shallow Zone Plume Permeable Reactive Barriers and Deep Zone Hot Spot Permeable Reactive Barrier + Monitoring	$6,615,730.00	$330,000.00	$11,987,000.00
GW-11: Plume Air Sparging + Monitoring	$210,000.00	$165,000.00	$2,466,000.00
GW-12: Plume Enhanced In Situ Bioremediation + Monitoring	$210,000.00	$225,000.00	$3,270,000.00
GW-13: Source Zone SEAR Treatment + Monitored Natural Attenuation + Monitoring	$490,000.00	$145,000.00	$2,477,000.00
GW-14: Source Zone SEAR Treatment + Plume Hydraulic Treatment + Monitoring	$695,000.00	$160,000.00	$2,833,000.00
GW-15: Source Zone SEAR Treatment + Hot Spot Enhanced In Situ Bioremediation + Monitoring	$2,911,900.00	$145,000.00	$4,899,000.00
GW-16: Source Zone SEAR Treatment + Hot Spot Enhanced In Situ Bioremediation + Enhanced In Situ Bioremediation of the Dissolved-Phase Plume + Monitoring	$3,009,000.00	$206,500.00	$5,822,000.00

Alternative	Capital Cost	Operation & Maintenance Cost	Present Worth (2000)
S-1: No Action	$0.00	$0.00	$0.00
S-2: Institutional Controls	$0.00	$0.00	$0.00
S-3: Soil Vapor Extraction	$40,000	$35,000	$138,000
S-4: Excavation + Off-Site Disposal	$105,000	$0.00	$105,000

Expected Outcomes of the Selected Remedy

The Selected Remedy, Alternatives GW-16 and S-3 meets the remedial action objectives in all of the affected media.

Ground Water

The primary expected outcome of implementation for the ground water portion of the Selected Remedy is that the ground water will reach MCLs throughout the Site, and thus be available for use as drinking water. The expected outcome should be achieved within 30 years from implementing remediation.

The Selected Remedy will address the principal threat wastes at the Site, the DNAPL, which is a major source of the Site ground water contamination, through removal of the DNAPL from the subsurface using surfactant or co-solvent treatment. The Selected Remedy will also address contaminated ground water at the Site, where Site contaminants exists above MCLs. The Selected Remedy requires periodic environmental monitoring of the ground water to ensure that it is not migrating to non-contaminated areas and to monitor the effectiveness of the remedy. Under the Selected Remedy, the threat to human health posed by contaminated ground water at the Site during remediation implementation and operation will be addressed by preventing human exposure through institutional controls in the form of an Order from the New Mexico Office of the State Engineer. This Order restricts the drilling of new supply wells within the boundary of the Site.

Unsaturated Soil

The Selected Remedy will address significant low-level threat wastes in the soil medium through soil vapor extraction and treatment. This treatment will take approximately two years and will be implemented when the ground water has nearly reached Remedial Action objectives.

The primary expected outcome of implementation of the soil portion of the Selected Remedy is that the Site soil will no longer present an unacceptable risk of re-contaminating ground water

above MCLs.

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.

Land Use

None of the Site contaminants or remedial alternatives will restrict the use of any property above the ground water plume. However, the New Mexico Office of the State Engineer will restrict the drilling of wells in areas affected by the plume until the ground water meets the Remedial Action Objectives.

Section 13
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 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.

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 through soil vapor extraction of contaminated soils, treatment and extraction of DNAPL, in-situ treatment of the dissolved-phase contaminated ground water, monitoring, and institutional controls. More specifically, soil vapor extraction of contaminated vadose zone soils will eliminate the risk from these soils to contaminate ground water above the MCLs. Extraction and treatment of DNAPL will remove a primary source of contamination to the aquifer so that the ground water does not continue to be contaminated for many years into the future. In-situ treatment of the dissolved-phase contaminated ground water will treat contaminated ground water to the MCLs, eliminating the potential risk from this ground water to human receptors through this media. Institutional controls in the form of restrictions on permitting new ground water wells within the plume boundary through an Order from the New Mexico State Engineer's Office will be an effective management tool for the Site. It will restrict exposure to contaminated ground water during the Site's remediation and thus, prevent and help control the risk to human health from possible exposure to Site contaminants.

The Selected Remedy will reduce potential human health risk levels from exposure to Site ground water such that they do not exceed EPA's acceptable risk range of 10^{-4} to 10^{-6} for carcinogenic risk. It will also reduce the non-carcinogenic hazards to below a level of concern, i.e., to a level at which the Hazard Index will not exceed 1.0. It will reduce potential human health risk levels to protective ARAR 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.

Applicable or Relevant and Appropriate Requirements (ARARs)

ARARs establish the criteria for selecting cleanup remedies for a Site. They are an integral part of the decision-making process, as specified by the NCP.

The NCP at 40 CFR § 300.400(g)(2), provides the factors listed below to be considered in determining whether a requirement addresses problems or situations sufficiently similar to the circumstances of the release or remedial action contemplated, and whether the requirement is well-suited to the Site and, therefore, is both relevant and appropriate. The pertinence of each of the following factors depends, in part, on whether a requirement addresses a chemical, location, or action. Following is an example of the necessary determination for two chemical specific ARARs. Where pertinent, EPA has made the comparisons contemplated by each § 300.400(g)(2) factor in order to determine whether MCLGs and MCLs are relevant and appropriate requirements for the remediation of ground water at this Site:

The purpose of the requirement and the purpose of the CERCLA action:

- MCLs and MCLGs are promulgated to protect the quality of drinking water; this is similar in purpose to a CERCLA action to restore ground water aquifers to drinkable quality (see 55 Federal Register (FR) 8666, 8743 [March 9, 1990]); therefore, the MCLGs and MCLs are relevant and appropriate under this factor.

The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA Site:

- The medium regulated or affected by MCLGs and MCLs is water, and the contaminated medium is also water (ground water); therefore, the MCLGs and MCL are relevant and appropriate under this factor.

The substances regulated by the requirement and the substances found at the CERCLA Site:

- The substances regulated by the MCLGs or MCL requirements are chemicals that can contaminate water; and the substances found in the ground water at the Site are chemicals that can contaminate water (ground water); therefore, MCLGs and MCLs are relevant and appropriate under this factor.

The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA Site:

- This factor is not pertinent in that MCLGs and MCLs are chemical-specific and not action-specific (see 53 FR 51394, 51437 [December 21, 1988]).

Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA Site:

- Variances and waivers from National Primary Drinking Water Regulations, 40 CFR Part 141, may be granted pursuant to § 1415 and 1416 of the Public health Services Act, 42

USC § 300g-4 and §300g-5. These waivers are not pertinent to the circumstances the the Site. Specifically, § 11415 waivers are based on conditions of the raw water supply which do not apply to the Site, and the § 1416 exemptions apply to circumstances affecting public water supplies which do not apply to the Site.

The type of place regulated and the type of place affected by the release or CERCLA action:

- This factor is not pertinent in that MCLGs and MCLs are chemical-specific and not location-specific (see 53 FR 51394, 51437 [December 21, 1988]).

The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action:

- This factor is not applicable.

Any consideration of use or potential use of affected resources in the requirement and the use or potential use of affected resources at the CERCLA Site:

- MCLGs and MCLs are promulgated to protect water used as drinking water. Based on an evaluation of existing ground water data, the ground water beneath the Site meets the requirements for a sole-source drinking water classification. Therefore, the resource use considerations in the MCLG and MCL requirements are similar to the considerations for the potential use of ground water at the Site (see 55 FR 8744). The MCLGs and MCLs are relevant and appropriate requirements under the pertinent factors described in the NCP at 40 CFR § 300.400(g)2). Accordingly, pursuant to NCP § 300.430(e)(2)(i), ground water remediation goals for the various ground water contaminants found at the Site are set at non-zero MCLGs or MCLs as summarized in Table 5.Other chemical-specific, action-specific, and location-specific ARARs are listed in Table 5.

Table 5: Potentially Applicable or Relevant and Appropriate Requirements (ARARs)

Standard, Requirement, Criteria, or Limitation	Citation	Description	Media	Status	Rationale & Discussion
CHEMICAL-SPECIFIC					
Federal Drinking Water Standards	42 U.S.C. §§ 300f to 300j-26 40 CFR 141	Maximum Contaminant Level Goals (MCLGs) and Maximum Contaminant Levels (MCLs). For COCs and COPCs, the MCLGs, or MCLs if MCLGs are zero, are: PCE – 5 µg/L; TCE – 5 µg/L; cis-1,2-DCE – 70 µg/L; trans-1,2-DCE – 100 µg/L; 1,1-DCE – 7 µg/L; and VC – 2 µg/L.	Ground water	Relevant and Appropriat	These levels are considered relevant and appropriate for ground water aquifers potentially used for drinking water. The selected remedy will comply with these requirements through treatment of the source and the dissolved phase contaminated ground water.
New Mexico Standards for Public Drinking Water Systems	NMSA 1978, § 74-1-7(2) 20.7.1 NMAC	State primary drinking water regulations. Health-based maximum contaminant levels (MCLs) equal to federal standards for public water systems.	Ground water	Relevant and Appropriate	These levels are considered relevant and appropriate for ground water aquifers potentially used for drinking water.
New Mexico Water Quality Control Commission Standards	NMSA 1978, §§ 74-6-1 to 74-6-17 20.6.2 NMAC	Water Quality Control Commission Standards for ground water and surface water and discharges not subject to NPDES. The ground water standards for COCs and COPCs are: PCE – 20 µg/L; TCE – 100 µg/L; 1,1-DCE – 5 µg/L; and VC – 1 µg/L. The standards for cis-1,2-DCE and for trans-1,2-DCE is a cancer risk of 10^{-5}; where this produces a number more stringent than the federal standards above, the state standard will be the ARAR.	Ground water and surface water	Applicable	These standards are applicable because ground water and surface water are required to meet these standards.

Standard, Requirement, Criteria, or Limitation	Citation	Description	Media	Status	Rationale & Discussion
State of New Mexico Standards for Interstate and Intrastate Surface Waters	NMSA 1978, §§ 74-6-1 to 74-6-17 20.6.4 NMAC	Provides for the protection of surface water through narrative and numerical surface water quality standards (though there are no numerical standards for chlorinated solvents). NMAC Section 20.6.4.12f states how to determine standards in the absence of listed numerical levels.	Surface water	Applicable	These standards are applicable because waters downstream from the Santa Clara Pueblo are under New Mexico Jurisdiction, and water flowing into this water must meet New Mexico State surface water standards. The standards will apply to any discharge of treated water into surface water.
Water Quality Code of the Pueblo of Santa Clara	Water Quality Code § ILO.1	Provides for the protection of surface water through narrative and numerical standards. The Water Quality Code for the Pueblo of Santa Clara standards for COPCs are: PCE – 8.85 µg/L; TCE – 81 µg/L; cis-1,2-DCE – no standard; trans-1,2-DCE – 100 µg/L; 1,1-DCE – 3.2 µg/L; and VC – 525 µg/L.	Surface water	Applicable	These standards are applicable because surface water within the exterior boundary of the Santa Clara Pueblo is required to meet these standards. Surface waters that lie over the site include the Rio Grande, the Guachupangue Arroyo, and the Santa Clara Ditch. The standards will apply to any discharge of treated water into surface water.
ACTION-SPECIFIC					
Resource Conservation and Recovery Act (RCRA)	42 U.S.C.A. §§ 6901 to 6992K 40 CFR 260 et seq.	Identification and Listing of Hazardous Waste. Defines those solid wastes which are subject to regulation as hazardous wastes under 40 CFR Parts 262–265, and Parts 270, 271, and 124.	Solid waste*	Applicable	This requirement is applicable if contaminated ground water and residuals from treatment operations are characteristic hazardous waste. Characteristic hazardous waste occurs if concentrations are greater than 500 µg/L for TCE or greater than 700 µg/L for PCE. Ground water that is removed from the source zone during surfactant or co-solvent treatment flooding may be characteristic hazardous waste.
New Mexico Hazardous Waste Act	NMSA 1978, §§ 74-4-1 to 74-4-14 20.4.1 NMAC	Identification and Listing of Hazardous Waste. Defines those solid wastes which are subject to regulation as hazardous wastes.	Solid waste*	Applicable	This requirement is applicable if contaminated ground water and residuals from treatment operations are characteristic hazardous waste. Characteristic hazardous waste occurs if concentrations are greater than 500 µg/L for TCE or greater than 700 µg/L for PCE. Ground water that is removed from the source zone during surfactant or co-solvent treatment may be characteristic hazardous waste.

Standard, Requirement, Criteria, or Limitation	Citation	Description	Media	Status	Rationale & Discussion
Clean Air Act	42U.S. C.A. §§ 7401 to 7671 40 CFR 50	Regulation of air emissions, including hazardous air pollutants.	Air	Applicable	National ambient air quality standards are applicable because emissions from an applicable source must meet these standards. Air emissions from air stripping treatment of extracted soil vapor or ground water from the source zone during surfactant or co-solvent treatment and emissions from equipment used for air stripping will meet air quality standards for chlorinated solvents.
New Mexico Air Quality Control Act	NMSA 1978, §§ 74-2-1 to 74-2-18 Including 20.2.70, 20.2.72, and 20.2.73 NMAC	Identifies permit requirements for facilities with air pollution emissions, which includes compliance and monitoring requirements.	Air	Applicable	State ambient air quality standards are applicable because emissions from an applicable source must meet these standards. No permit is required for the CERCLA response, but it will comply with the substantive elements of any permits that would otherwise have been required. Air emissions from air stripping treatment of extracted soil vapor or ground water from the source zone during surfactant or co-solvent treatment and emissions from equipment used for air stripping will meet air quality standards for chlorinated solvents.
Clean Water Act	33 U.S.C. §§ 1251 to 1387 33 U.S.C. § 1344 et seq.	Regulation of discharges from point sources (33 CFR Parts 322, 323, and 325).	Surface water and connected ground water	Applicable	These requirements will be applicable and will be met if water resulting from the surfactant or co-solvent treatment at the source zone is discharged directly to waters of the U.S.
NPDES	40 CFR 122-125, 33 U.S.C. 1342	Discharge of effluent to navigable waters must meet the regulations of 40 CFR Parts 122 and 125, which establish limitations and standards for discharge.	Surface water	Applicable	These requirements will be applicable and will be met if water resulting from the surfactant or co-solvent treatment at the source zone is discharged directly to waters of the U.S.
POTW Discharge	40 CFR 403	Discharge of effluent to public works must comply with the requirements of 40 CFR 403 as well as any Española, New Mexico, requirements.	Surface water	Applicable	This requirement is potentially applicable because ground water that has been removed from the source area during the surfactant or co-solvent portion of the remedy may be discharged to the POTW. If discharged to the POTW, the water will be treated to meet the requirements of the POTW.

Standard, Requirement, Criteria, or Limitation	Citation	Description	Media	Status	Rationale & Discussion
State of New Mexico Standards for interstate and intrastate surface waters	NMSA 1978, §§ 74-6-1 to 74-6-17 20.6.4 NMAC	Provides for the protection of surface water through narrative and numerical standards.	Surface water	Applicable	These standards are applicable because waters downstream from the Santa Clara Pueblo are under New Mexico Jurisdiction, and water flowing into this water must meet New Mexico State surface water standards. The standards will apply to any discharge of treated water into surface water.
Water Quality Code of the Pueblo of Santa Clara	Water Quality Code § II.O.1	Provides for the protection of surface water through narrative and numerical standards.	Surface water	Applicable	This requirement is applicable because discharge of ground water to the Rio Grande, Santa Clara Ditch, Guachupangue Arroyo, or Vigil ditch must not contaminate the surface water body to levels above these standards.
LOCATION-SPECIFIC					
National Historic Preservation Act	40 CFR 6.301(c) 16 U.S.C. 470-470-1 36 CFR Part 800 40 CFR 6.301(b)	Provides for preservation of historical and archaeological sites which might be destroyed through alteration of terrain as a result of a Federal construction project or a Federally licensed activity or program.	Land, buildings, & resources	To Be Considered	There are no known archaeological sites that will be affected by remediation; this requirement may become applicable if during ground disturbance, archaeological sites are found. The Historic Preservation Division of the New Mexico Office of Cultural Affairs "recommend[s] that a cultural resource survey/pedestrian archaeological survey be conducted wherever possible ground disturbances may occur."
American Indian Religious Freedom Act	42 U.S.C. 1996	Requires consultation with local tribal leadership if a project may impact culturally sensitive properties such as ceremonial, burial, or religious sites.	Cultural sites	Potentially Applicable	EPA has been consulting with the Santa Clara Pueblo during this project; to date EPA is not aware of any culturally sensitive properties that may be affected by the response action. Construction of remedial alternatives will meet this ARAR if during remedial design it appears that the project may impact such properties.
Native American Graves Protection and Repatriation Act	25 U.S.C. §§ 3001 to 3013 43 CFR 10.1 et seq.	Regulates identification and appropriate disposition of cultural artifacts.	Federal and Indian land	Potentially Applicable	EPA has been consulting with the Santa Clara Pueblo during this project; to date EPA is not aware of any cultural artifacts that may be affected by the response action. Construction of remedial alternatives will meet this ARAR if during remedial design it appears that the project may impact such artifacts.

Standard, Requirement, Criteria, or Limitation	Citation	Description	Media	Status	Rationale & Discussion
Endangered Species Act	16 U.S.C. 1531-1544 50 CFR Parts 17 and 402 40 CFR 6.302(h)	Requires Federal agencies to insure that any action authorized, funded, or carried out by the agency will not jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat.	Land, surface water	Potentially Applicable/ TBC	The only area of the Site that is considered potential habitat for endangered species is the riparian vegetation near the Rio Grande. If the remedy includes action (such as in-situ bioremediation) in the riparian woodlands, the remediation will meet this ARAR. The U.S. Fish and Wildlife Service has recommended that species-specific surveys be done during the appropriate breeding/flowering season in species habitat areas. For candidate species and species of concern, the Act will be a TBC.
New Mexico Wildlife Conservation Act	NMSA 1978, §§ 17-2-37 to 17-2-46 19.21.2 NMAC	Requires that an assessment be conducted within a proposed project area to determine whether endangered animal species (as listed by the State Department of Game and Fish and Department of Natural Resources, respectively) will be impacted and that consultation occur with the appropriate state agencies to avoid or mitigate impacts.	Land	Potentially Applicable/ TBC	The only area of the Site that is considered potential habitat for endangered species is the riparian vegetation near the Rio Grande. If the remedy includes action (such as in-situ bioremediation) in the riparian woodlands, the remediation will meet this ARAR. The New Mexico Department of Game and Fish has recommended a biological assessment for endangered species (particularly the southwestern willow flycatcher) before any remediation activities in the riparian area.
Executive Order on Protection of Wetlands	Executive Order No. 11,990 40 C.F.R. Part 6 Appendix A	Requires Federal agencies to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists.	Land	Potentially Applicable	This will be an applicable requirement if remediation takes place in areas occupied by wetlands, which may occur near the Rio Grande. Therefore, if remediation takes place in wetland areas, specific measures to minimize adverse impacts will be identified following consultation with the appropriate agencies during the remedial design phase before implementation of a selected remedy.
Executive Order on Floodplain Management	Executive Order No. 11988 40 C.F.R. Part 6 Appendix A	Requires that federally funded or authorized actions within the 100-year floodplain avoid, to the maximum extent possible, adverse impacts associated with the development of a floodplain.	Land	Potentially Applicable	This will be an applicable requirement if remediation takes place in the floodplain. Specific measures to minimize adverse impacts will be identified following consultation with the appropriate agencies during the remedial design phase before implementation of a selected remedy.

Cost Effectiveness

In EPA's judgement the Selected Remedy is cost-effective because the remedy's costs are proportional to its overall effectiveness (see 40 CFR § 430(f)(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 all Federal and any more stringent ARARs, or as appropriate). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination- long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness. 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 present worth cost of Alternative 16, the Selected Remedy, at $5.82 million, moderately greater than the present worth cost of Alternative 14 at $2.83 million and is lower than the present worth of cost of Alternative 10 at $ 11.98 million. The Selected Remedy offers by far the highest degree of protectiveness and overall effectiveness because it aggressively and directly recovers DNAPL and the dissolved-phase PCE over the Site in the shortest time period. The benefits of the Selected Remedy compared to all the other alternatives are much higher than the incremental increase in cost over the other alternatives.

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery 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, Tribal, and community acceptance, while also considering the statutory preference for treatment as a principal element and the bias against off-site treatment and disposal and against containment.

The Selected Remedy utilizes treatment to address the principal threat waste at the Site, the residual-phase DNAPL. The DNAPL will be treated through surfactant, or co-solvent treatment. Once extracted, the DNAPL will be sent off-site for resource recovery. The dissolved-phase contaminants will be remediated through enhanced bioremedation. The EPA expects that removal of the residual-phase DNAPL will achieve significant reduction in the concentration of the pollutants of concern, and its daughter products.

For the low level threats to the Site posed by soil contaminated with PCE, soil vapor recovery will meet the State soil cleanup goals.

Preference for Treatment as a Principal Element

By extracting the DNAPL through surfactant, or co-solvent treatment, and treating the contaminants in the dissolved-phase plume through enhanced bioremediation, the Selected Remedy addresses principal threats posed by the Site through the use of treatment technologies. By utilizing treatment as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

Five-year Review Requirements

Although this remedy will allow for unrestricted use of the Site on completion, it will take more than five years to attain remedial action objectives and cleanup levels. Therefore as a matter of policy, EPA will conduct a review within five years from the date the Remedial Action for the Site begins to ensure that the remedy continue to provide adequate protection of human health and the environment as described in CERCLA §121. 42 U.S.C. § 9621.

Appendix A - Responsiveness Summary

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 North Railroad Avenue Plume 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 Action Memorandum or 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:

Santa Clara Pueblo Community Library
1 Kee Street, Los Alamos Highway
Española, NM 87532
(505)753-7326

Española Public Library
314-A Onate Street N.W.
Española, NM 87532
(505)747-6087

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), and in accordance with Superfund Removal Procedures Public Participation Guidance for On-Scene Coordinators: Community Relations and the Administrative Record, OSWER 9360.3-05 (July 1992).

EPA Public Meeting - Santa Clara Pueblo July 11, 2001

Comments From Community Members' From the Public Meeting Transcript:

1. **If the wells were discovered to be contaminated in 1989, why did it take almost twelve years to get to the stage we are presently at?**

> **Response:** *Before a Site gets listed on the National Priorities List (NPL), an appropriate assessment of the site conditions must take place to determine if the site meets the listing criteria. This action is done at the state and local level under EPA's direction. In 1999, the Site was listed on the NPL as a ground water plume; in the past, ground water plumes alone were not necessarily enough to get a site listed on the NPL. During this timeframe, the State performed the Preliminary Investigation, Site Investigation, and other CERCLA activities (1990 through 1999), in order to eventually get the Site remediated. These activities and the investigation findings are provided in the Administrative Record.*

2. When detergents are injected into the hot-spots, what safeguards do we have that it won't spread the contaminants downstream? Or that it doesn't go into other areas?

> **Response:** *The downstream flow will not be accelerated because the injection of surfactants/co-solvent solution will not place significant increased head on the system. The mobilized contaminants will be captured through a pumping system to assure that they do not spread into new areas or flow beyond where the pumping system is installed. The system will be designed so that the pure-phase product is not mobilized downward. This will be controlled by ensuring that there is a continuous non-permeable layer under the area being treated, or using a treatment solution that results in a lighter or equal density as the ground water, so that it will not cause the DNAPL to sink any deeper.*

3. **Is the contaminated area 360 feet deep to the west of the Site? Will the detergent be able to take care of that area?**

> Response: *The deeper contamination is southwest of the source area.*
> *The surfactant or co-solvent treatment (detergent-like substance) removes residual non-aqueous phase liquids,(DNAPL) which exist only in the source area. Therefore, the surfactant or co-solvent will not be used in the deep zone. The deep zone area will be treated through enhanced in-situ bioremediation. This remedy is effective even at great depths.*

4. **If you pump the water in, will it accelerate the flow coming to the Rio Grande?**

> **Response:** *The remedies will not accelerate flow towards the Rio Grande. For the in-situ bioremediation, the materials that will be injected into in the down-gradient and*

deeper zones of the aquifer will be injected slowly. Under low pressure, no hydraulic effects (such as accelerated flow) will be detectable except in the immediate vicinity of the injection points. The DNAPL treatment will also not affect the ground water flow beyond the immediate vicinity of the Norge Town property. The flow rate of ground water containing mobilized DNAPL to be pumped out of the aquifer and treated will be designed to prevent migration of this mobilized DNAPL into the aquifer outside of the small treatment zone.

5. **One commenter stated they would like to see another barrier put in place, where the plume ends so that if anything happens that would accelerate the contaminant flow to the downstream areas and that the other two treatment zones cannot catch, at least the last one would keep it from going into the Rio Grande.**

Response: *The number and placement of treatment barriers will be determined during design. The treatment objective will be to locate the treatment in areas that will achieve optimum treatment of the aquifer. The remediation system will also be designed to make sure the water quality standards for the river are not exceeded.*

6. **A commenter strongly urged stringent data collection and monitoring, suggesting data collection be done on a timely basis, e.g., weekly monitoring, monthly, whatever is necessary, in order to protect the Rio Grande, and keep the contaminants from affecting the river.**

Response: *The frequency of monitoring will be determined during remedial design.*

7. **What about the cost associated with the clean-up, for installing wells, monitoring, etc., the cost should not compromise the over protection of the environment, resources.**

Response: *90% of the cost will come from the federal government and 10% from the State. The pueblo is not required to pay for anything. Relative to the overall cost for the remedy, the monitoring costs associated to the remedy are relatively low, and will not be compromised. The design will take into consideration the technical team's input.*

8. **What is the cost of the proposed remedy?**

Response*: $5.8 million.*

9. **A commenter expressed concern with the the deep plume to the west of Norge Town facility and the movement of the plume, and asked what the geographic relationship is between the Pueblo wells and the deep plume. The commenter asked if there had been analysis of the ground water flow, such as modeling an increase to the pumping rates, or considering population growth at the Pueblo? How could that affect the movement of this deep plume towards those wells?**

Response: *Water supply wells are off-site, and unaffected by the plume according to our*

Pueblo contacts. Should a significant increase in pumping rates occur, the lateral distance of the plume could be affected. The Pueblo pumping rates would have to experience a significant increase from its present rates in order to draw the contamination toward the supply wells. The project monitoring program will continue to evaluate the water quality and flow direction in order to ensure the plume is not migrating off-site; data will continue to be shared with the Pueblo office.

10. **Have there been any pilot, or laboratory bench scale tests done for the effectiveness of the in-situ bacteria soil? Have there been any tests down on the in-situ soil samples from the Site to see whether the proposed nutrients would actually have the proposed effect on the contaminants?**

Response: *Yes. Laboratory tests for in-situ bioremediation of chlorinated solvents have been reported for at least several dozen sites throughout the U.S. Pilot and full-scale remedies using this technology have been implemented in the field at many industrial, military, and dry cleaner sites. One documents that lists case studies is entitled, "Technical and Regulatory Requirements for Enhanced In-Situ Bioremediation of Chlorinated Solvents in Ground water" an Interstate Technology and Regulatory Cooperation Work Group document, dated December 1997. This document lists case studies for active, not passive, in-situ bioremediation site remedies. Other documents are, "Accelerated Bioremediation of Chlorianted Compounds in Ground Water, Selected Battelle Conference Papers 1999-2000" and "Accelerated Bioremediation Using Slow Release Compounds, Selected Battelle Conference Papers: 1993-1999", also, "Bioremediation and Phytoremediation of Chlorianted and Recalcitrant Compounds." These books are produced by Battelle Press and can be obtained through the internet; www.battelle.org/bookstore or by calling 800-451-3543. Site conditions strongly indicate that in-situ bioremediation will be an effective remedy.*

Site specific laboratory studies are scheduled to take place during the Remedial Design to determine what the most effective substrate will be for the Site and to develop the site-specific basis for the design.

11. **One commenter noted that chlorinated solvents tend to be particularly recalcitrant to clean-up with bioremediation. The commenter asked if there would be any hydraulic controls on the plume at all, or if the remedy is relying on the action of the bacteria to chemically control the contaminants and to halt the flow of the plume or to contain the plume? The commenter asked if any physical controls are planned for the treatment? Will the biotic action be limited to areas located quite close to the injection points?**

Response: *The need for hydraulic control is a possible design feature that will be evaluated during remedial design. If a passive system is used, the injection points will be close enough to each other so that the amendments injected will overlap, forming a zone through which the plume will flow. Treatment will occur in this zone, and the ground water, having been treated, will continue to flow down-gradient so that clean ground*

water spreads down-gradient.

12. **What is the actual volume of contaminated water?**

Response: *Approximately 280 million gallons.*

EPA PUBLIC MEETING - ESPANOLA, JULY 12, 2001

Comments From Community Members' From the Public Meeting Transcript:

1. **A commenter asked about the historical timeline presented in the Remedial Investigation (RI) and asked for clarification on when and if both the Jemez and the Bond were shut down as soon as the contamination was found. The commenter stated that the timeline in the RI continues to state the wells were shut down immediately but also indicates that the New Mexico Environmental Improvement Division sent a letter to the City of Espanola suggesting that the wells be closed in 1990, and that it appeared some lag time before an actual response action took place. The commenter stated she continues to hear that the wells were shut down immediately but also reads that the other well was shut down in 1992. The commenter asked for a specific and accurate timeline.**

Response: *According to a record of communication from local officials, wells were removed from distribution immediately after finding out the wells were contaminated. The electrical source was removed and the lines were cut from distribution either December 1989, or January 1990.*

2. **Were both wells plugged?**

Response: *According to local officials, the Bond Well was plugged in 1990. The Jemez Well has not been plugged, but has not been used since the contamination was discovered. The well is not connected to the City distribution system.*

3. **In relation to the preferred alternative; will new wells be drilled, or will you rely only on existing wells?**

Response: *Yes, new wells will need to be drilled to implement the remedy.*

4. **How many new wells will need to be drilled?**

Response: *This will be determined during the remedial design. New wells will most likely be needed in the source area for performing the surfactant or co-solvent treatment; for the deep zone bioremediation, wells will be needed for further definition of the deep zone and for monitoring. It is estimated that 30 new wells will be needed. Wells will not be installed for shallow zone bioremediation; however, one to two hundred injection points will be needed to implement the selected remedy. The injection points inserted in the ground are not considered*

wells because no well construction material is needed (i.e., casing, annular fill). The injection points used for this type of treatment are not as intrusive as conventional wells.

5. **Will the federal government pay for 90% of the cost for only the first 10 years?**

Response: *The majority of the Capital costs for the Site remedy will be covered in the first few years of treatment through the 90% federal cost share.*

6. **Once commenter questioned the urgency of implementing a remedy at the Site. The commenter also questioned the time needed to complete the ground water restoration.**

Response: *One of the tenets of Superfund program is that we try to restore resources to their most beneficial use. In this case, that use has always been the drinking water supply. The primary objective of this remedy is to restore the aquifer so that it can be used as a drinking water supply sometime in the future. The second objective is to protect the tribal resources, the environmental and cultural resources that are particularly important to the Santa Clara Pueblo.*

Ground water remedies are slow, just by the nature of what they do, and the nature in this case, of the kind of contamination we are treating. The DNAPL will continue to add chlorinated solvents to the ground water in a dissolved form for years if we do not do something to address the source area (the DNAPL). We do not believe it would be in the community's best interest to leave the plume untreated. The purpose of the surfactant/co-solvent treatment remedy is to address this source area. We believe this treatment remedy is the most expeditous alterative available to us for this Site. Due to the size of the plume, the treatment will take a significant amount of time for the Site to be restored for drinking water purposes. This may take up to thirty years in order to restore the aquifer to drinking water quality. Our role here is two-fold: to restore the aquifer for future water supply and the other is to protect the resources of the Pueblo.

7. **Is that $5.8 million for the entire Superfund Site?**

Response: *Yes.*

8. **What is the date for the original improper function of the Norge Town facility which lead to the ground water contamination**?

Response: *We don't have a record of exactly what the operators were doing and when. What we do know is that the facility began operating in 1970, and so possibly, that's when they started discharging chlorinated solvents into the environment.*

9. **Is there any period of time within 1970 and 1989 that the Jemez and Bond Wells were in use and were used as a source for public water supply?**

Response: *According to the state and local officials, the information available for these*

wells is sketchy. Documented information indicates that prior to 1989, the wells had several problems and so consequently, most likely were not consistently used as production wells.

10. **One commenter noted that the Vigiles Ditch was never sampled possibly due perhaps to construction work at the ditch. Since there is contamination at monitoring well R-15, the commenter asked if EPA will further characterize the Vigiles Ditch.**

Response: *The contamination at Well R-15 is deep; and samples have been collected at the surface that indicate that ground water at the water table is not contaminated. There is no evidence suggesting a hydraulic connection between the NRAP Site contamination and the Vigiles Ditch however we will sample the ditch during the Remedial Design phase of the project in light of this concern.*

Appendix B - State and Pueblo 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

PAUL RITZMA
DEPUTY SECRETARY

August 21, 2001

Mr. Donald Williams
New Mexico Team Leader
USEPA Superfund Division Region 6 (6SF-LT)
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

RE: Concurrence of Proposed Plan of Action and Record of Decision for the North Railroad Avenue Plume Superfund Site (EPA ID #NMD 986670156), Española, New Mexico.

Dear Mr. Williams:

The New Mexico Environment Department (NMED) has reviewed the United States Environmental Protection Agency (EPA) Proposed Plan of Action and the draft Record of Decision for the North Railroad Avenue Plume Superfund Site located in Española, New Mexico. NMED concurs with the remedial actions outlined in the Record of Decision to address contamination associated with this Site. The plan is a culmination of careful work conducted by the EPA, NMED, and the Santa Clara Pueblo.

NMED appreciates the continued supportive working relationship with EPA. If you have any questions, please call me at (505) 827-2855, or Robin Brown of my staff at (505) 827-2434.

Sincerely,

PETER MAGGIORE
Secretary

PM:rb

cc: Petra Sanchez, EPA Remedial Project Manager
Joseph Chavarria, Santa Clara Pueblo, Director of the Office of Environmental Affairs
Robin Brown, NMED Project Manager

SANTA CLARA INDIAN PUEBLO

POST OFFICE BOX 580
(505) 753-7326
(505) 753-7330

ESPANOLA, NEW MEXICO
87532

OFFICE OF GOVERNOR

September 6, 2001

Ms. Petra Sanchez
NRAP Project Officer
US EPA Region 6
1445 Ross Avenue (6PD-L)
Dallas, TX

Re: Santa Clara Pueblo comments and issues regarding the North Railroad Avenue Plume Superfund Site Record of Decision

Dear Ms. Sanchez:

The Pueblo of Santa Clara in cooperation with our technical arm, the All Indian Pueblo Council/Pueblo Office of Environmental Protection, has reviewed the Draft Record of Decision (ROD) for the North Railroad Avenue Plume (NRAP) site. Based on this review and comments gathered from the community and Tribal Council, the following issues are presented to you as our formal response to the Draft ROD.

In the ROD, on page 56, there is a paragraph regarding the plans to further characterize the extent of contamination in the intermediate and deep zone. Since this pertains to the remedial design for the selected remedy, Santa Clara Pueblo requests that this language be placed in the Selected Remedy section of the ROD as an integral component of the selected remedy and its implementation.

Santa Clara Pueblo requests that the Hot Spots be defined not only as areas with concentrations exceeding one order of magnitude over MCLs for the COCs but also for COPCs including vinyl chloride.

Santa Clara Pueblo requests that the remedial action objectives, the remediation goals, and all future monitoring include COPCs, (including vinyl chloride) for both groundwater and soils.

In reference to the ARARs, Santa Clara Pueblo requests that the chemical specific ARAR for the Water Quality Code of Santa Clara Pueblo be applicable for any discharges to surface water, not just to "treated water" as stated in the rationale.

Santa Clara Pueblo requests that language be placed in the Selected Remedy Section of the ROD, (Section 12) to address the situation concerning the treatability/ bench scale studies that will take place during the Remedial Design (RD). Due to the variability in possible outcomes of these studies, we request a commitment to modification or amendment of the remedy based on the results. This would encompass 1) Bioremediation: full degradation of contaminants, for example no intermediate stalling and accumulation of breakdown products such as vinyl chloride. Also, no release of by-products such as reduced metals (Mn). 2) SEAR treatment: material balance estimates, % recovery, etc. Essentially, we request that the remedy and design be contingent upon treatability/ bench scale study results. Professional judgement should be used beyond specific guidelines to make this determination, and the remedy modified appropriately. This would be considered typical to have occurred during the feasibility study (FS), however Santa Clara Pueblo concurs with the ROD under the commitment that the treatability/ bench mark studies will be addressed appropriately after the ROD is signed. Such unforeseen matters that may affect the remedy are dictated by site specificity and will become apparent. The flexibility to adjust accordingly must be included in the ROD so that these specific matters can be addressed.

Protective measures need to be planned which can be readily implemented in the event that the concentrations of COCs or COPCs down-gradient become elevated before implementation and during remediation. The contaminated ground water plume down gradient of highway 201 will be left to naturally attenuate under the planned remedy. Santa Clara Pueblo requests that analysis/modeling and documentation be provided to demonstrate that this area of the plume, when left to its own devices, will meet clean up levels in a similar time period as the remainder of the plume. Otherwise, it becomes apparent that another barrier or remediation method will need to be placed further down gradient than highway 201, possibly at the edge of the Rio Grande, to contain this portion of the plume

The reasoning behind the remediation of the groundwater sequentially before the vadose zone soils stands as a method of preventing cleaning the soil, and then recontaminating it again from the still contaminated groundwater. The plan calls for initiating remediation of the soil as the groundwater nears clean up levels. If further investigation, such as the angle drilling project, shows high concentrations of vadose zone contamination, then is it suggested that this could be addressesed by remediating both the soil and groundwater simultaneously.

In Section D on pages 1-2 there is an error in the number of phases - there are two 4th phases. In the draft ROD with Pueblo comments this has been corrected however in the latest draft of the ROD, it was not corrected.

Based on the stated concerns and requests, and provided these issues are addressed and incorporated into the final ROD, Santa Clara Pueblo is prepared to concur with the selected remedy and ROD document.

Concurrence with this ROD is based on the facts presented in this ROD and on the available data collected to date. Any new information, including adverse health risks identified in the ATSDR final Public Health Assessment or in ATSDR's review of the ROD or presented in the Tribal Risk Assessment document, which are not presented in this ROD, are not part of this concurrence. Likewise, any new data regarding extent of contamination and migration of the contaminants, which is not part of this ROD, is not in this concurrence.

The intent in requesting these changes to the ROD is to strengthen the document and allow for a thorough remediation of this precious resource, which is of unlimited value to the residents of the Espanola Valley. The citizens of this area will be the ones who will live with the remediation aftermath. It is with this knowledge and responsibility that Santa Clara Pueblo respectfully submits these comments to the US EPA. If you should have any questions, please do not hesitate to contact my office or Mr. Joseph Chavarria, Santa Clara Office of Environmental Affairs Director, at (505) 753-7326.

Sincerely,

Governor Denny Gutierrez,
SANTA CLARA PUEBLO

Cc: file
Tribal Administrator
SC OEA-Superfund
AIPC/POEP-Superfund

Appendix C - Administrative Record Index

Prepared for

United States Environmental Protection Agency

Region 6

FINAL ADMINISTRATIVE RECORD INDEX

for

NORTH RAILROAD AVENUE PLUME SUPERFUND SITE

EPA ID No. NMD986670156

ESS II
Task Order No. 083-017

Petra Sanchez
Remedial Project Manager
U.S. EPA Region 6

Prepared by:

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

September 26, 2001

PREAMBLE

The purpose of this document is to provide the public with an index to the Administrative Record (AR) for the remedial action the U.S. Environmental Protection Agency (EPA) has selected to respond to conditions at the North Railroad Avenue Plume 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 Action Memorandum or 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:

Santa Clara Pueblo Community Library
1 Kee Street, Los Alamos Highway
Española, NM 87532
(505)753-7326

Española Public Library
314-A Onate Street N.W.
Española, NM 87532
(505)747-6087

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), and in accordance with Superfund Removal Procedures Public Participation Guidance for On-Scene Coordinators: Community Relations and the Administrative Record, OSWER 9360.3-05 (July 1992).

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. It does not apply to documents in EPA's confidential file. These requests should be addressed to :

Petra Sanchez
Remedial Project Manager
U.S. EPA Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 665-6686

The EPA response-selection guidance compendium index has not been updated since March 22, 1991 (see CERCLA Administrative Records: First Update of the Compendium of Documents Used for Selecting CERCLA Response Actions [March 22, 1991]); accordingly, it is not included here. Moreover, based on resource considerations, the Region 6 Superfund Division Director has decided not to maintain a Region 6 compendium of response-selection guidance. Instead, consistent with 40 CFR Section 300.805(a)(2) and 300.810(a)(2) and OSWER Directive No. 9833.3A-1 at page 37, the AR Index includes listings of all guidance documents which may form a basis for the selection of the response action in question.

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 "N/A".
- **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 "N/A".

ADMINISTRATIVE RECORD INDEX

FINAL 09/26/2001

REMEDIAL

Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 901048
Date: 07/17/1990
Pages: 9
Title: PRELIMINARY ASSESSMENT QUESTIONNAIRE REGARDING THE ESPAÑOLA WELLS
Doc Type: QUESTIONNAIRE

	Name	Organization
Author:	FLUK , LINDA	U S EPA

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 901050
Date: 07/31/1990
Pages: 208
Title: PRELIMINARY ASSESSMENT REPORT FOR ESPAÑOLA WELLS (NORTH RAILROAD AVENUE PLUME) SITE
Doc Type: REPORT / STUDY

	Name	Organization
Author:	N/A	NEW MEXICO ENVIRONMENTAL IMPROVEMENT DIVISION

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 901049
Date: 07/31/1990
Pages: 2
Title: POTENTIAL HAZARDOUS WASTE SITE IDENTIFICATION
Doc Type: FORM

	Name	Organization
Author:	FLUK , LINDA	U S EPA

	Name	Organization
Addressee:	N/A	U S EPA

ADMINISTRATIVE RECORD INDEX

FINAL 09/26/2001

REMEDIAL

Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 901051
Date: 08/01/1990
Pages: 1
Title: TRANSMITTAL LETTER FOR THE PRELIMINARY QUESTIONNAIRE DATED JULY 17, 1990 AND PRELIMINARY ASSESSMENT REPORT DATED JULY 31, 1990
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	CARY , STEVEN J	NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	SATTERWHITE , MARK	U S EPA

Docid: 901082
Date: 03/15/1991
Pages: 1
Title: TRANSMITTAL LETTER FOR THE SCREENING SITE INSPECTION WORKPLAN AND PRELIMINARY ASSESSMENT REPORT DATED MARCH 15, 1990
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	MERKER , RANDY	NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	DRISCOLL , BARBARA	U S EPA

Docid: 901083
Date: 03/15/1991
Pages: 200
Title: WORKPLAN FOR THE SCREENING SITE INSPECTION OF THE ESPAÑOLA WELLS SITE (NORTH RAILROAD AVENUE PLUME)
Doc Type: WORK PLAN / AMENDMENT

	Name	Organization
Author:	SLIFER , DENNIS	NEW MEXICO ENVIRONMENTAL IMPROVEMENT DIVISION

	Name	Organization
Addressee:	N/A	U S EPA

ADMINISTRATIVE RECORD INDEX

FINAL 09/26/2001

REMEDIAL

Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 901084
Date: 02/27/1992
Pages: 1
Title: LETTER TRANSMITTING THE SCREENING SITE INSPECTION REPORT DATED MARCH 6, 1992
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	MERKER , RANDY	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	ROSS , LONNIE	U S EPA

Docid: 901085
Date: 03/06/1992
Pages: 205
Title: SCREENING SITE INSPECTION REPORT FOR ESPAÑOLA WELLS (NORTH RAILROAD AVENUE PLUME) SITE
Doc Type: REPORT / STUDY

	Name	Organization
Author:	SLIFER , DENNIS	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 901088
Date: 04/15/1993
Pages: 233
Title: LISTING SITE INSPECTION FOR ESPAÑOLA WELLS (NORTH RAILROAD AVENUE PLUME) SITE
Doc Type: REPORT / STUDY

	Name	Organization
Author:	SLIFER , DENNIS	NEW MEXICO ENVIRONMENTAL DEPARTMENT

	Name	Organization
Addressee:	N/A	U S EPA

ADMINISTRATIVE RECORD INDEX

FINAL 09/26/2001

REMEDIAL

Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145450
Date: 06/18/1994
Pages: 6
Title: INITIAL NOTIFICATION REPORT
Doc Type: REPORT / STUDY

	Name	Organization
Author:	ROYBAL , SERAFIN, JR.	NORGE TOWN DRY CLEANER AND LAUNDROMAT

	Name	Organization
Addressee:	N/A	NEW MEXICO ENVIRONMENT DEPARTMENT

Docid: 902446
Date: 06/14/1996
Pages: 1
Title: [RECORD OF COMMUNICATION SUBJECT OPERATION OF NORGE TOWN CLEANERS]
Doc Type: RECORD OF COMMUNICATION

	Name	Organization
Author:	BROWN , ROBIN	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	N/A	N/A

Docid: 901090
Date: 12/10/1996
Pages: 689
Title: ESPAÑOLA WELLS SITE 1996 INVESTIGATION REPORT [NORTH RAILROAD AVENUE PLUME]
Doc Type: REPORT / STUDY

	Name	Organization
Author:	BROWN , ROBIN L	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	N/A	U S EPA

ADMINISTRATIVE RECORD INDEX

FINAL 09/26/2001

REMEDIAL

Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 901655

Date: 05/01/1998

Pages: 24

Title: NORTH RAILROAD AVENUE PLUME CERCLIS NUMBER NMD96670156 ESPAÑOLA, NEW MEXICO COMMUNITY RELATION PLAN FINAL DRAFT MAY, 1998

Doc Type: COMMUNITY RELATIONS PLAN
ELECTRONIC RECORD

	Name	Organization
Author:	N/A	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 901656

Date: 05/01/1998

Pages: 29

Title: NORTH RAILROAD AVENUE PLUME CERCLIS NUMBER NMD986670156 ESPAÑOLA, NEW MEXICO HEALTH AND SAFETY PLAN FINAL DRAFT MAY, 1998

Doc Type: ELECTRONIC RECORD
WORK PLAN / AMENDMENT

	Name	Organization
Author:	N/A	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	N/A	U S EPA

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REMEDIAL

Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 901660

Date: 06/01/1998

Pages: 84

Title: REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORKPLAN NORTH RAILROAD AVENUE PLUME SITE, CERCLIS NUMBER NMD986670156 ESPAÑOLA, NEW MEXICO

Doc Type: ELECTRONIC RECORD
WORK PLAN / AMENDMENT

	Name	Organization
Author:	BROWN , ROBIN L	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 901659

Date: 07/01/1998

Pages: 37

Title: NORTH RAILROAD AVENUE PLUME, CERCLIS NUMBER NMD96670156 ESPAÑOLA, NEW MEXICO HEALTH AND SAFETY PLAN QUALITY ASSURANCE PROJECT PLAN COMMUNITY RELATIONS PLAN FINAL DRAFTS MAY, JULY 1998

Doc Type: COMMUNITY RELATIONS PLAN
ELECTRONIC RECORD
WORK PLAN / AMENDMENT

	Name	Organization
Author:	BROWN , ROBIN L	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	N/A	U S EPA

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145213
Date: 07/22/1998
Pages: 1
Title: INVITATION TO U.S. EPA OPEN HOUSES FOR THE NORTH RAILROAD AVENUE PLUME SITE
Doc Type: NOTICE

	Name	Organization
Author:	N/A	U S EPA

	Name	Organization
Addressee:	N/A	PUBLIC

Docid: 145449
Date: 11/20/1998
Pages: 3
Title: DRY CLEANER INSPECTION REPORT
Doc Type: REPORT / STUDY

	Name	Organization
Author:	FLORES , DONALD	STATE OF NEW MEXICO

	Name	Organization
Addressee:	VIGIL , VINCE	STATE OF NEW MEXICO

Docid: 145454
Date: 07/28/1999
Pages: 51
Title: PUBLIC HEALTH ASSESSMENT FOR NORTH RAILROAD AVENUE PLUME, ESPAÑOLA, NEW MEXICO
Doc Type: REPORT / STUDY

	Name	Organization
Author:	N/A	US DEPARMENT OF HEALTH AND HUMAN SERVICES

	Name	Organization
Addressee:	N/A	PUBLIC

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145455
Date: 04/25/2000
Pages: 1
Title: CORRESPONDENCE REGARDING WORK COMPLETED AT THE NORGE TOWN LAUNDRY AND DRY CLEANERS
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	ROYBAL , SERAFIN, JR.	NORGE TOWN DRY CLEANER AND LAUNDROMAT

	Name	Organization
Addressee:	BROWN , ROBIN	NEW MEXICO ENVIRONMENT DEPARTMENT

Docid: 901086
Date: 04/27/2000
Pages: 1
Title: PUBLIC NOTICE REGARDING EPA'S RECEIPT OF LETTER OF INTENT TO APPLY FOR THE TECHNICAL ASSISTANCE GRANT FOR THE NORTH RAILROAD AVENUE PLUME SITE
Doc Type: NOTICE

	Name	Organization
Author:	N/A	U S EPA

	Name	Organization
Addressee:	N/A	PUBLIC

Docid: 145456
Date: 05/18/2000
Pages: 2
Title: APPROVAL OF FINAL CORRECTIVE ACTION REPORT FOR NORGE TOWN LAUNDRY AND DRY CLEANERS, ESPAÑOLA, NEW MEXICO
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	LEAVITT , MARCY	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	ROYBAL , SERAFIN, JR.	NORGE TOWN LAUNDRY AND DRY CLEANERS

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 901658

Date: 06/29/2000

Pages: 15

Title: REGARDING: NORTH RAILROAD AVENUE PLUME SITE POTENTIALLY RESPONSIBLE PARTY INVESTIGATION SUMMARY

Doc Type: CORRESPONDENCE
ELECTRONIC RECORD

	Name	Organization
Author:	BROWN , ROBIN L	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	AISLING , KATHLEEN A	U S EPA

Docid: 901087

Date: 08/15/2000

Pages: 14

Title: NORTH RAILROAD AVENUE PLUME REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORKPLAN ADDENDA 2 AND 4

Doc Type: CORRESPONDENCE
WORK PLAN / AMENDMENT

	Name	Organization
Author:	BROWN , ROBIN L	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	AISLING , KATHLEEN A	U S EPA

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 902450
Date: 12/01/2000
Pages: 4
Title: NORTH RAILROAD AVENUE PLUME SUPERFUND SITE FACT SHEET UPDATED 12/00
Doc Type: FACT SHEET UPDATE

	Name	Organization
Author:	N/A	U S EPA

	Name	Organization
Addressee:	N/A	N/A

Docid: 900618
Date: 01/01/2001
Pages: 821
Title: REMEDIAL INVESTIGATION REPORT FOR NORTH RAILROAD AVENUE PLUME SUPERFUND SITE NATIONAL PRIORITY LIST NUMBER NMD986670156 ESPAÑOLA, NEW MEXICO VOLUME 1 - TEXT AND VOLUME 2 - APPENDICES
Doc Type: REPORT / STUDY

	Name	Organization
Author:	N/A	DUKE ENGINEERING AND SERVICES

	Name	Organization
Addressee:	N/A	NEW MEXICO ENVIRONMENT DEPARTMENT
	N/A	U S EPA

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 902443

Date: 01/30/2001

Pages: 4

Title: GENERAL NOTICE LETTER/INFORMATION REQUEST REGARDING NORTH RAILROAD AVENUE SUPERFUND SITE

Doc Type: NOTICE LETTER

	Name	Organization
Author:	KNUDSON , MYRON O	U S EPA

	Name	Organization
Addressee:	ROYBAL , SERAFIN, JR.	NORGE TOWN LAUNDRY AND DRY CLEANERS

Docid: 145189

Date: 02/13/2001

Pages: 1

Title: TELEPHONE CONVERSATION WITH PAUL SEVEDRA WITH THE NEW MEXICO OFFICE OF THE STATE ENGINEER REGARDING PREVENTING THE PERMITTING OF WELL IN CONTAMINATED PLUMES

Doc Type: RECORD OF COMMUNICATION

	Name	Organization
Author:	BROWN , ROBIN L	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 145312

Date: 02/16/2001

Pages: 1

Title: REGARDING: REQUEST FOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS TO JOSEPH CHAVARRIA

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	WILLIAMS , DONALD	U S EPA

	Name	Organization
Addressee:	CHAVARRIA , JOSEPH	SANTA CLARA PUEBLO OFFICE OF ENVIRONMENTAL AFFAIRS

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Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145313
Date: 02/16/2001
Pages: 1
Title: REGARDING: REQUEST FOR STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS TO MARCY LEAVITT
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	WILLIAMS , DONALD	U S EPA

	Name	Organization
Addressee:	LEAVITT , MARCY	NEW MEXICO ENVIRONMENT DEPARTMENT

Docid: 900856
Date: 02/20/2001
Pages: 2
Title: TABLE 2 - STABILIZED FIELD PARAMETERS FOR NORTH RAILROAD AVENUE PLUME
Doc Type: TABLE

	Name	Organization
Author:	N/A	N/A

	Name	Organization
Addressee:	N/A	N/A

Docid: 900851
Date: 02/20/2001
Pages: 1
Title: ADDITIONAL COMMENTS ON THE DOCUMENT ENTITLED , "FEASIBILITY STUDY REPORT, NORTH RAILROAD AVENUE PLUME SUPERFUND SITE, ESPAÑOLA, NEW MEXICO" DATED FEBRUARY 2001. FOR NORTH RAILROAD AVENUE PLUME
Doc Type: MEMORANDUM

	Name	Organization
Author:	BROWN , ROBIN	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	SANCHEZ , PETRA	U S EPA

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Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 900850
Date: 02/20/2001
Pages: 1
Title: LETTER TRANSMITTING NOVEMBER/DECEMBER 2000 GROUNDWATER SAMPLING REPORT FOR NORTH RAILROAD AVENUE PLUME
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	BROWN , ROBIN	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	SANCHEZ , PETRA	U S EPA

Docid: 900848
Date: 02/20/2001
Pages: 6
Title: GROUNDWATER LEVEL DATA FOR NORTH RAILROAD AVENUE PLUME
Doc Type: TABLE

	Name	Organization
Author:	N/A	N/A

	Name	Organization
Addressee:	N/A	N/A

Docid: 900847
Date: 02/20/2001
Pages: 1
Title: MONITOR WELL STATIC WATER LEVEL FORM FOR NORTH RAILROAD AVENUE PLUME
Doc Type: FORM

	Name	Organization
Author:	N/A	N/A

	Name	Organization
Addressee:	N/A	N/A

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 900846
Date: 02/20/2001
Pages: 17
Title: MONITORING WELL PURGE FORMS FOR NORTH RAILROAD AVENUE PLUME
Doc Type: SAMPLING / ANALYSIS

	Name	Organization
Author:	N/A	N/A

	Name	Organization
Addressee:	N/A	N/A

Docid: 900845
Date: 02/20/2001
Pages: 6
Title: FIELD NOTES FOR NORTH RAILROAD AVENUE PLUME
Doc Type: LOG BOOK

	Name	Organization
Author:	N/A	N/A

	Name	Organization
Addressee:	N/A	N/A

Docid: 900844
Date: 02/20/2001
Pages: 26
Title: TABLES 3 THROUGH 7 SUMMARY OF ANALYTICAL DATA FOR NORTH RAILROAD AVENUE PLUME
Doc Type: TABLE

	Name	Organization
Author:	N/A	N/A

	Name	Organization
Addressee:	N/A	N/A

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145190
Date: 02/20/2001
Pages: 116
Title: REGARDING: NOVEMBER/DECEMBER 2000 GROUNDWATER SAMPLING LETTER REPORT
Doc Type: CORRESPONDENCE
REPORT / STUDY

	Name	Organization
Author:	DANEN , JANIA	DUKE ENGINEERING AND SERVICES

	Name	Organization
Addressee:	BROWN , ROBIN L	NEW MEXICO ENVIRONMENT DEPARTMENT

Docid: 900842
Date: 02/20/2001
Pages: 1
Title: TABLE 1 - SAMPLE IDENTIFICATION TABLE FOR NORTH RAILROAD AVENUE PLUME
Doc Type: TABLE

	Name	Organization
Author:	N/A	N/A

	Name	Organization
Addressee:	N/A	N/A

Docid: 900841
Date: 02/20/2001
Pages: 7
Title: NOVEMBER/DECEMBER 2000 GROUNDWATER SAMPLING LETTER REPORT FOR NORTH RAILROAD AVENUE PLUME SITE
Doc Type: REPORT / STUDY

	Name	Organization
Author:	DANEN , JANIA	DUKE ENGINEERING & SERVICES

	Name	Organization
Addressee:	BROWN , ROBIN	NEW MEXICO ENVIRONMENT DEPARTMENT

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 900849
Date: 02/20/2001
Pages: 41
Title: SUMMARY DATA -YEAR 2000 FOR NORTH RAILROAD AVENUE PLUME
Doc Type: GRAPH

	Name	Organization
Author:	N/A	N/A

	Name	Organization
Addressee:	N/A	N/A

Docid: 145191
Date: 03/01/2001
Pages: 2
Title: FORMAL REQUEST FOR CONSIDERATION OF THE USE OF INSTITUTIONAL CONTROLS WHILE WE CONTINUE TO EVALUATE A SITE REMEDY FOR THE NORTH RAILROAD AVENUE SUPERFUND SITE
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	WILLIAMS , DON	U S EPA

	Name	Organization
Addressee:	SCHUMAN , GEORGE	NEW MEXICO ENVIRONMENT DEPARTMENT

Docid: 902444
Date: 03/15/2001
Pages: 2
Title: [LETTER FROM ROBIN BROWN SUPERFUND OVERSIGHT SECTION STATE OF NEW MEXICO ENVIRONMENT DEPARTMENT TO SERAFIN ROYBAL NORGE TOWN LAUNDRY AND DRY CLEANERS REGARDING INFORMATION REQUEST FOR NORTH RAILROAD AVENUE PLUME SUPERFUND SITE]
Doc Type: RESPONSE LETTER

	Name	Organization
Author:	BROWN , ROBIN	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	ROYBAL , SERAFIN, JR.	NORGE TOWN LAUNDRY AND DRY CLEANERS

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145192

Date: 03/22/2001

Pages: 19

Title: REGARDING: REPLACEMENT PAGES FOR THE NORTH RAILROAD AVENUE PLUME SUPERFUND SITE REMEDIAL INVESTIGATION REPORT DATE JANUARY 2001

Doc Type: CORRESPONDENCE
REPORT / STUDY

	Name	Organization
Author:	BROWN , ROBIN L	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	SANCHEZ , PETRA	U S EPA

Docid: 145193

Date: 03/27/2001

Pages: 5

Title: REGARDING: REQUEST FOR CONSIDERATION OF THE USE OF INSTITUTIONAL CONTROLS WHILE THE SITE REMEDY EVALUATION CONTINUES AT THE NORTH RAILROAD AVENUE SUPERFUND SITE

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	WILLIAMS , DON	U S EPA

	Name	Organization
Addressee:	SCHUMAN , GEORGE	NEW MEXICO ENVIRONMENT DEPARTMENT

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145194
Date: 04/04/2001
Pages: 1
Title: REGARDING: INSTITUTIONAL CONTROLS FOR THE NORTH RAILROAD AVENUE PLUME SUPERFUND SITE
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	SCHUMAN , GEORGE	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	WILLIAMS , DON	U S EPA

Docid: 901671
Date: 04/09/2001
Pages: 2
Title: REGARDING: NORTH RAILROAD AVENUE PLUME SUPERFUND SITE EL RIO ARRIBA ENVIRONMENTAL HEALTH ASSOCIATION TECHNICAL ASSISTANCE GRANT NUMBER 1-98661201
Doc Type: CORRESPONDENCE
ELECTRONIC RECORD

	Name	Organization
Author:	NEGRI , BEVERLY	U S EPA

	Name	Organization
Addressee:	USSERY , JOHN	GRANT ADMINISTRATOR

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145195

Date: 04/11/2001

Pages: 3

Title: REGARDING: EVALUATION OF ECOLOGICAL RISK OF MANGANESE IN GROUNDWATER IN THE RIO GRANDE BOSQUE FOR THE NORTH RAILROAD AVENUE PLUME SITE

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	NEWELL , PATRICIA G	ENVIRONMENTAL HEALTH ASSOCIATES, INCORPORATED

	Name	Organization
Addressee:	BROWN , ROBIN L	NEW MEXICO ENVIRONMENT DEPARTMENT

Docid: 145196

Date: 05/01/2001

Pages: 610

Title: RISK ASSESSMENT REPORT NORTH RAILROAD AVENUE PLUME SUPERFUND SITE NATIONAL PRIORITY LIST NUMBER NMD986670156 ESPAÑOLA, NEW MEXICO PART 1: BASELINE HUMAN HEALTH RISK ASSESSMENT PART 2: SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

Doc Type: REPORT / STUDY

	Name	Organization
Author:	N/A	ENVIRONMENTAL HEALTH ASSOCIATES, INCORPORATED
	N/A	UNIVERSITY OF NEW MEXICO COMMUNITY ENVIRONMENTAL HEALTH PROGRAM

	Name	Organization
Addressee:	N/A	U S EPA
	N/A	NEW MEXICO ENVIRONMENT DEPARTMENT

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145197
Date: 05/17/2001
Pages: 6
Title: TELEPHONE CONVERSATIONS WITH VARIOUS ORGANIZATIONS TO DETERMINE IF THE NATIONAL HISTORIC PRESERVATION ACT SHOULD BE CONSIDERED AS A POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENT FOR THE NORTH RAILROAD AVENUE PLUME SITE
Doc Type: RECORD OF COMMUNICATION

	Name	Organization
Author:	MEEHAN , CHRISTOPHER W	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 145457
Date: 05/24/2001
Pages: 344
Title: APPENDIX A, B, C AND D OF THE FEASIBILITY STUDY REPORT
Doc Type: REPORT / STUDY

	Name	Organization
Author:	N/A	N/A

	Name	Organization
Addressee:	N/A	N/A

Docid: 901060
Date: 06/01/2001
Pages: 23
Title: PROPOSED PLAN OF ACTION NORTH RAILROAD AVENUE PLUME SUPERFUND SITE ESPAÑOLA, NEW MEXICO
Doc Type: PROPOSAL

	Name	Organization
Author:	KNUDSON, P.E. , MYRON O	U S EPA

	Name	Organization
Addressee:	N/A	U S EPA

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145198
Date: 06/01/2001
Pages: 161
Title: INVESTIGATION OF POTENTIAL SOURCES NORTH RAILROAD AVENUE PLUME SITE U.S. EPA NUMBER NMD986670156 ESPAÑOLA, NEW MEXICO
Doc Type: REPORT / STUDY

	Name	Organization
Author:	N/A	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 145448
Date: 06/01/2001
Pages: 6
Title: INVITATION TO COMMENT ON THE PROPOSED CLEANUP OF THE NORTH RAILROAD AVENUE PLUME SITE, ESPAÑOLA, NEW MEXICO
Doc Type: FACTSHEET

	Name	Organization
Author:	N/A	U S EPA

	Name	Organization
Addressee:	N/A	PUBLIC

Docid: 145199
Date: 06/07/2001
Pages: 1
Title: REGARDING: LANGUAGE CONCERNING STATE ENGINEERS IN PROPOSED PLAN
Doc Type: E-MAIL MESSAGE

	Name	Organization
Author:	SAAVEDRA , PAUL	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	BROWN , ROBIN L	NEW MEXICO ENVIRONMENT DEPARTMENT

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145201

Date: 06/11/2001

Pages: 57

Title: MEMO TO FILE : CALCULATION OF SOIL REMEDIAL ACTION OBJECTIVE CONCENTRATIONS

Doc Type: MEMORANDUM

	Name	Organization
Author:	BROWN , ROBIN L	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 145200

Date: 06/11/2001

Pages: 4

Title: REGARDING: POTENTIAL FOR SPECIES COVERED UNDER THE ENDANGERED SPECIES ACT AT THE NORTH RAILROAD AVENUE PLUME SITE IN ESPAÑOLA, NEW MEXICO

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	MEEHAN , CHRISTOPHER W	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	NICHOLOPOLUS , JULIE	U.S. FISH AND WILDLIFE SERVICES

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 901047

Date: 06/11/2001

Pages: 200

Title: FEASIBILITY STUDY REPORT NORTH RAILROAD AVENUE PLUME SUPERFUND SITE NATIONAL PRIORITIES LIST NUMBER NMD986670156 ESPAÑOLA, NEW MEXICO

Doc Type: REPORT / STUDY

	Name	Organization
Author:	N/A	DUKE ENGINEERING AND SERVICES

	Name	Organization
Addressee:	N/A	NEW MEXICO ENVIRONMENT DEPARTMENT
	N/A	U S EPA

Docid: 145212

Date: 06/12/2001

Pages: 4

Title: CONSULTATION FOR A CULTURAL SERVICE INVENTORY AT THE NORTH RAILROAD AVENUE PLUME SUPERFUND SITE IN ESPAÑOLA, NEW MEXICO

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	MEEHAN , CHRISTOPHER W	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	BACA , ELMO	NEW MEXICO HISTORIC PRESERVATION DIVISION

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Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145451

Date: 06/22/2001

Pages: 4

Title: CORRESPONDENCE REGARDING A REQUEST FOR INFORMATION ON THREATENED OR ENDANGERED SPECIES OR IMPORTANT WILDLIFE HABITATS THAT COULD BE AFFECTED BY THE NORTH RAILROAD AVENUE PLUME SUPERFUND SITE

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	NICHOLOPOULOS , JOY E	U.S. DEPARTMENT OF THE INTERIOR

	Name	Organization
Addressee:	SANCHEZ , PETRA	U S EPA

Docid: 145216

Date: 06/26/2001

Pages: 16

Title: REMEDIAL ADMINISTRATIVE RECORD INDEX FILE

Doc Type: OUTLINE

	Name	Organization
Author:	N/A	TECHLAW, INCORPORATED

	Name	Organization
Addressee:	N/A	U S EPA

ADMINISTRATIVE RECORD INDEX

FINAL 09/26/2001

REMEDIAL

Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145453
Date: 06/29/2001
Pages: 3
Title: IMPLEMENTATION OF INSTITUTIONAL CONTROLS AT THE NORTH RAILROAD AVENUE PLUME SUPERFUND SITE IN ESPAÑOLA, NEW MEXICO
Doc Type: CORRESPONDENCE
MAP

	Name	Organization
Author:	LEWIS , GREG	NEW MEXICO ENVIRONMENTAL DEPARTMENT

	Name	Organization
Addressee:	SAAVEDRA , PAUL	NEW MEXICO ENVIRONMENTAL DEPARTMENT

Docid: 145452
Date: 07/05/2001
Pages: 1
Title: FURTHER EXPLANATION OF NMED'S RESPONSIBILITIES AT THE NORTH RAILROAD AVENUE PLUME (NRAP) SITE WITH RESPECT TO THE ENDANGERED SPECIES ACT AND THE MIGRATORY BIRD TREATY ACT
Doc Type: RECORD OF COMMUNICATION

	Name	Organization
Author:	MEEHAN , CHRIS	NEW MEXICO ENVIRONMENTAL DEPARTMENT

	Name	Organization
Addressee:	LUSK , JOEL	U.S. FISH & WILDLIFE SERVICES

ADMINISTRATIVE RECORD INDEX

FINAL 09/26/2001

REMEDIAL

Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 904198

Date: 07/11/2001

Pages: 47

Title: [OFFICIAL COMMENTS RECEIVED DURING THE PUBLIC MEETING JULY 11, 2001 HELD AT SANTA CLARA PUEBLO, NEW MEXICO] NORTH RAILROAD AVENUE PLUME SITE PUBLIC MEETING JULY 11, 2001

Doc Type: TRANSCRIPT

	Name	Organization
Author:	COSTELLO , MAUREEN	HUNNICUTT COSTELLO REPORTING INC

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 145895

Date: 07/11/2001

Pages: 6

Title: EPA PUBLIC MEETING [HELD AT] SANTA CLARA PUEBLO, JULY 11, 2001; EPA PUBLIC MEETING [HELD AT] ESPAÑOLA, JULY 12, 2001 - COMMENTS FROM COMMUNITY MEMBERS' FROM THE PUBLIC MEETING TRANSCRIPT

Doc Type: PUBLIC MEETING TRANSCRIPT

	Name	Organization
Author:	N/A	N/A

	Name	Organization
Addressee:	N/A	N/A

ADMINISTRATIVE RECORD INDEX

FINAL 09/26/2001

REMEDIAL

Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 904199

Date: 07/12/2001

Pages: 49

Title: [OFFICIAL COMMENTS RECEIVED DURING THE PUBLIC MEETING JULY 12, 2001 HELD AT ESPANOLA, NEW MEXICO] NORTH RAILROAD AVENUE PLUME SITE PUBLIC MEETING JULY 12, 2001

Doc Type: TRANSCRIPT

	Name	Organization
Author:	COSTELLO , MAUREEN	HUNNICUTT COSTELLO REPORTING INC

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 145889

Date: 08/21/2001

Pages: 1

Title: CONCURRENCE OF PROPOSED PLAN OF ACTION AND RECORD OF DECISION FOR THE NORTH RAILROAD AVENUE PLUME SUPERFUND SITE, ESPAÑOLA, NEW MEXICO

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	MAGGIORE , PETER	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	WILLIAMS , DONALD	U S EPA

Docid: 145890

Date: 09/06/2001

Pages: 3

Title: SANTA CLARA PUEBLO COMMENTS AND ISSUES REGARDING THE NORTH RAILROAD AVENUE PLUME SUPERFUND SITE RECORD OF DECISION

Doc Type: CORRESPONDENCE

	Name	Organization
Author:	GUTIERREZ , DENNY	SANTA CLARA PUEBLO

	Name	Organization
Addressee:	SANCHEZ , PETRA	U S EPA

ADMINISTRATIVE RECORD INDEX

FINAL 09/26/2001

REMEDIAL

Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 145888
Date: 09/17/2001
Pages: 5
Title: ITEMS FOR THE ADDENDUM TO THE ADMINISTRATIVE RECORD FILE FOR THE NORTH RAILROAD AVENUE PLUME SUPERFUND SITE
Doc Type: CORRESPONDENCE

	Name	Organization
Author:	MEEHAN , CHRISTOPHER W	NEW MEXICO ENVIRONMENT DEPARTMENT

	Name	Organization
Addressee:	WYMAN , STEVEN	U S EPA

Docid: 145897
Date: 09/26/2001
Pages: 32
Title: FINAL ADMINISTRATIVE RECORD INDEX FOR NORTH RAILROAD AVENUE PLUME SUPERFUND SITE
Doc Type: ADMINISTRATIVE RECORD INDEX

	Name	Organization
Author:	N/A	TECH LAW, INC.

	Name	Organization
Addressee:	N/A	U S EPA

Docid: 145896
Date: 09/27/2001
Pages: 137
Title: RECORD OF DECISION FOR NORTH RAILROAD AVENUE PLUME SUPERFUND SITE
Doc Type: RECORD OF DECISION (ROD)

	Name	Organization
Author:	N/A	U S EPA

	Name	Organization
Addressee:	N/A	PUBLIC

ADMINISTRATIVE RECORD INDEX

FINAL 09/26/2001

REMEDIAL

Site Name	NORTH RAILROAD AVE PLUME
Cerclis	NMD986670156
OUID	N/A
SSID	NORTH RAILROAD AVE PLUME (9N)
Action	REMEDIAL

Docid: 902448

Date: 01/01/2525

Pages: 4

Title: ENCLOSURE A INFORMATION REQUEST

Doc Type: QUESTIONNAIRE

	Name	Organization
Author:	N/A	N/A

	Name	Organization
Addressee:	N/A	N/A