3R - 349

GENERAL CORRESPONDENCE

YEAR(S):
1993 - 1984

BRUCE KING
GOVERNOR

State of New Mexico
ENVIRONMENT DEPARTMENT

OIL CONSERVATION DIVISION
'93 NOV 5 AM 9 20

JUDITH M. ESPINOSA
SECRETARY

RON CURRY
DEPUTY SECRETARY

November 4, 1993

Paul Buckner
Fanning, Harper & Martinson
8117 Preston Road
Dallas, Texas 75225

Re: Request for Information

Dear Mr. Buckner:

I am in receipt of your October 8, 1993 letter requesting information on the El Paso Natural Gas Company Prewitt Refinery. We have searched the files of the Surface Water Quality Bureau and do not have a file on the subject facility. We are referring your letter to Mr. Benito Garcia, Bureau Chief of the New Mexico Environment Department's (NMED) Hazardous & Radioactive Materials Bureau for review and separate response as appropriate. You may also wish to contact Mr. Roger Anderson of the New Mexico Oil Conservation Division (OCD) at (505) 827-5812. The OCD is the State agency with jurisdiction in water quality protection matters for facilities such as the subject refinery.

In reviewing your letter I note that you have posed many very specific questions. I would like to advise you that often the NMED does not have the staff resources to answer such requests. The NMED does make its public records available for inspection, on appointment, to anyone interested.

If you have any questions, please contact Glenn Saums of my staff at (505) 827-2827.

Sincerely,

Jim Piatt

Jim Piatt
Chief
Surface Water Quality Bureau

cc: (w/copy of letter)
Benito Garcia, Chief, NMED-HRWB
Roger Anderson, OCD
Tom Duker, NMED Public Records Officer

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FANNING, HARPER & MARTINSON

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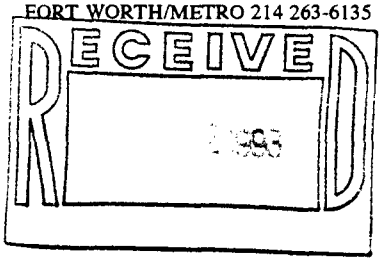
FORT WORTH/METRO 214 263-6135

214 369-1300

FAX: 214 987-9649



October 8, 1993

Mr. David Vackar
New Mexico Environmental Dept.
Environmental Protection Division
P. O. Box 26110
Santa Fe, NM 87502

Mr. Jim Piatt
New Mexico Environmental Dept.
Surface Water Control Bureau
P. O. Box 26110
Santa Fe, NM 87502

RE: Insured: El Paso Natural Gas Company
Policy Numbers and Terms:
S16-10212 - 8-1-70 to 8-1-71
S16-08512 - 8-1-69 to 8-1-70
S16-12158 - 8-1-71 to 8-1-72
Claim/Site: EPA/Prewitt Refinery, New Mexico
Date of Loss: 1956-1966
Our File No. 16556\6255

Dear Gentlemen:

Per a conversation my legal assistant had with an employee in Mr. Piatt's office, it is my understanding that a request for information and documents related to a particular site in New Mexico, can be made on either the Environmental Protection Division or the Surface Water Quality Bureau, and it will be circulated throughout the entire New Mexico Environment Department.

If this is not accurate, please contact me immediately so that I may make further requests on the other divisions and bureaus of the New Mexico Environment Department.

Please provide the undersigned with specific information regarding the involvement of El Paso Natural Gas Company (hereinafter "EPNG") at the Prewitt Refinery site (hereinafter "site") in or near Prewitt, New Mexico, including, but not limited to, information and documents related to:

A. Activities conducted by EPNG or the activities of any entity acting at the direction of or for EPNG at the site;

B. Dates of EPNG's activities(i.e. dumping, etc.) or the activities of any entity acting at the direction of or for EPNG at the site;

C. Types of materials manufactured, produced or generated by EPNG;

D. How those materials were transported to the site, and by whom;

E. How those materials were disposed of at the site;

F. The date that the contamination at the site was first discovered;

G. Any and all releases of hazardous materials from the site;

H. Information received by EPNG from any other entities involved regarding the site;

I. EPNG and Site policies regarding waste handling;

J. EPNG's method of conducting manufacturing operations;

K. Warnings given to EPNG's or site's employees, contractors and neighboring landowners of both EPNG's premises and the site;

L. Safety precautions given by EPNG regarding the handling of hazardous material;

M. Correspondence between EPNG and neighboring landowners and associations;

N. EPNG's inter- and intra-corporate correspondence concerning waste handling, manufacturing methods, safety records, etc.;

O. Information regarding remediation efforts at the site and EPNG's premises;

P. EPNG's corporate structure, and ownership and operation of the site and EPNG's premises;

Q. EPNG's practices to detect leaks and to avoid pollution;

R. EPNG's document retention, storage and destruction policies and practices;

S. Purchases and subscriptions to services utilized in the prevention, assessment or remediation of environmental contamination;

[redacted] ermits issued to EPNG for the handling and [redacted] aste (local, state or federal);

[redacted] contracts for environmental impairment [redacted] nance;

[redacted] veys of the site and EPNG's premises [redacted] federal);

[redacted] he site and EPNG's premises;

[redacted] agazine articles regarding the site; and

[redacted] mation regarding EPNG's involvement at or

[redacted] re may be search, copy and statutory fees [redacted]. Please contact the undersigned prior [redacted] on so that an estimate of costs and fees [redacted] promptly forward a check in payment of

[redacted] of the requested documents or portion [redacted] isclosure, please provide the specific [redacted] thholding is claimed and a brief [redacted] thholding.

[redacted] eiving your responses, and if you have [redacted] e nature of this request, please do not [redacted] ersigned at (214) 369-1300.

Very truly yours,

PAUL BUCKNER

Prewitt Refinery Superfund Site
Prewitt, New Mexico
December 21, 1992

Record of Decision Signed

Remedy Selected for Prewitt Site

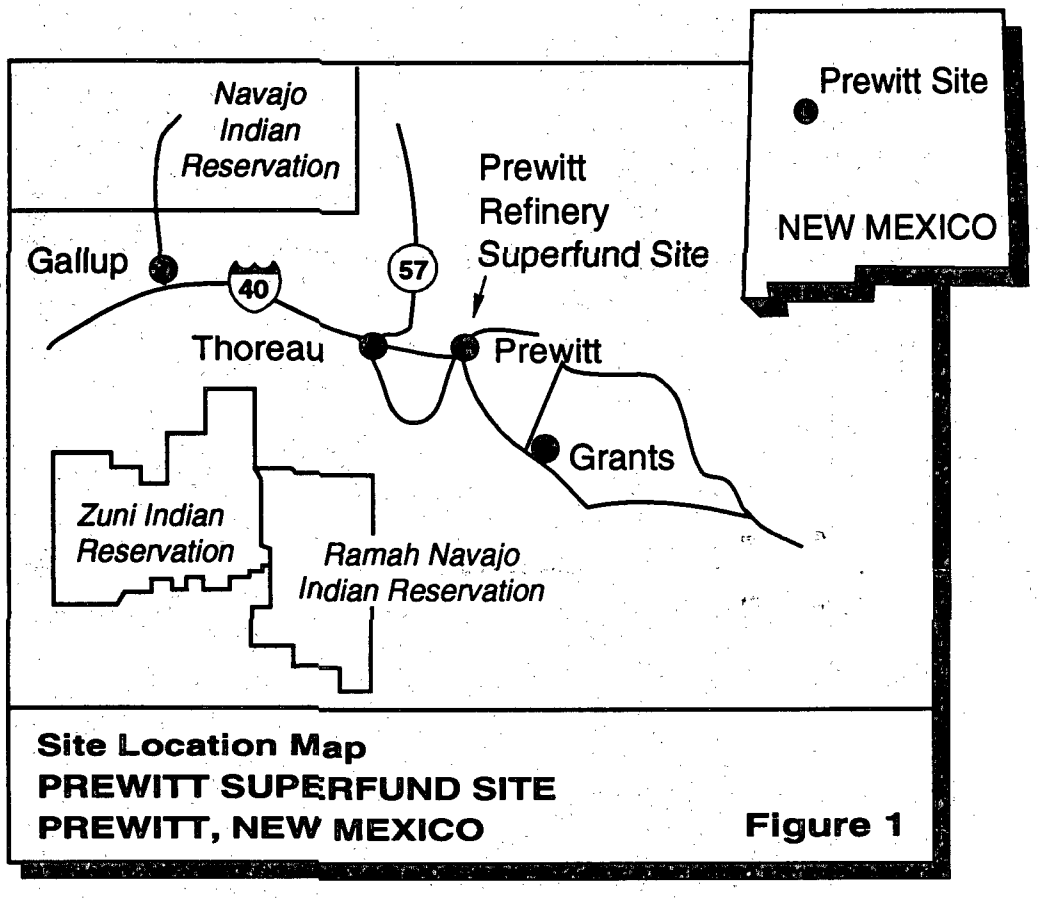
On September 30, 1992, Environmental Protection Agency Regional Administrator B. J. Wynne signed the Record of Decision (ROD) for the contamination at the Prewitt Refinery Superfund Site. The contamination of approximately 49 million gallons of ground water will be remedied by extracting, treating, and reinjecting the ground water. Approximately 43,000 gallons of Non Aqueous Phase Liquids (NAPL) will be extracted to prevent further contamination of the groundwater. Landfarming will be used to remedy the contamination of approximately 2675 cubic yards of hydrocarbon contaminated soil. Approximately 660 cubic yards of soil contaminated with lead, and at least 15 cubic yards of remaining asbestos contaminated material will be excavated and disposed of off site. Excavation and off-site disposal of approximately 83 cubic yards of contaminated material in the separator unit will remedy the contamination in that area of the site.

This action will reduce potential public health and environmental risks to an estimated 75 people living within a one mile radius of the site. The selected remedial action will limit exposure to those who may come into contact with contaminated soil and water.

EPA held an informal Open House on April 14, 1992 at the Prewitt Fire House in Prewitt, New Mexico, to inform the public that the site investigations were almost complete and that a proposed plan would soon be issued. EPA issued the proposed plan on July 23, 1992 stating that ground water extraction and treatment, NAPL soil vapor extraction, landfarming, and excavation and off-site disposal were the preferred remedies for the site. A public comment period began on July 18, 1992. During the public comment period, which was extended until September 18, 1992, members of the community were invited to comment on the Proposed Plan. A public meeting was held on July 29, 1992 to explain the preferred remedies and accept written and oral comments from the public. At the request of the Navajo Nation, another public meeting in English and Navajo was held on September 3, 1992. These comments and the EPA's responses to them are contained in the Responsiveness Summary, a copy of which is attached to the ROD. EPA considered these comments before selecting the final remedy for the site. A copy of the ROD is available in the site Information Repository locations listed on the back of this fact sheet.

The purpose of this fact sheet is to:

- Announce the signing of the Record of Decision for the Prewitt Site;
- Describe the methods that will be used to remediate the contamination at the Prewitt Site; and,
- Tell the public how to get more information about the Site.



Site Location Map
PREWITT SUPERFUND SITE
PREWITT, NEW MEXICO **Figure 1**

Site Background

The Prewitt Refinery is an abandoned crude oil refinery on approximately 70 acres located near the town of Prewitt in McKinley County, New Mexico. Much of the site property is currently owned by the Navajo Nation. The site is located in a rural area, with a cluster of six homes about one thousand feet east of the site.

The Prewitt Refinery was in operation from 1938 to 1957. Crude oil was delivered to storage tanks on the site. From there, the raw material was pumped to the distillation tower where various products were recovered from the crude oil. These products included gasoline, kerosene, diesel fuel, gas oil and a bottoms product. The gas oil and bottoms product were converted to gasoline and coke. These products were stored in tanks until they were removed from the site.

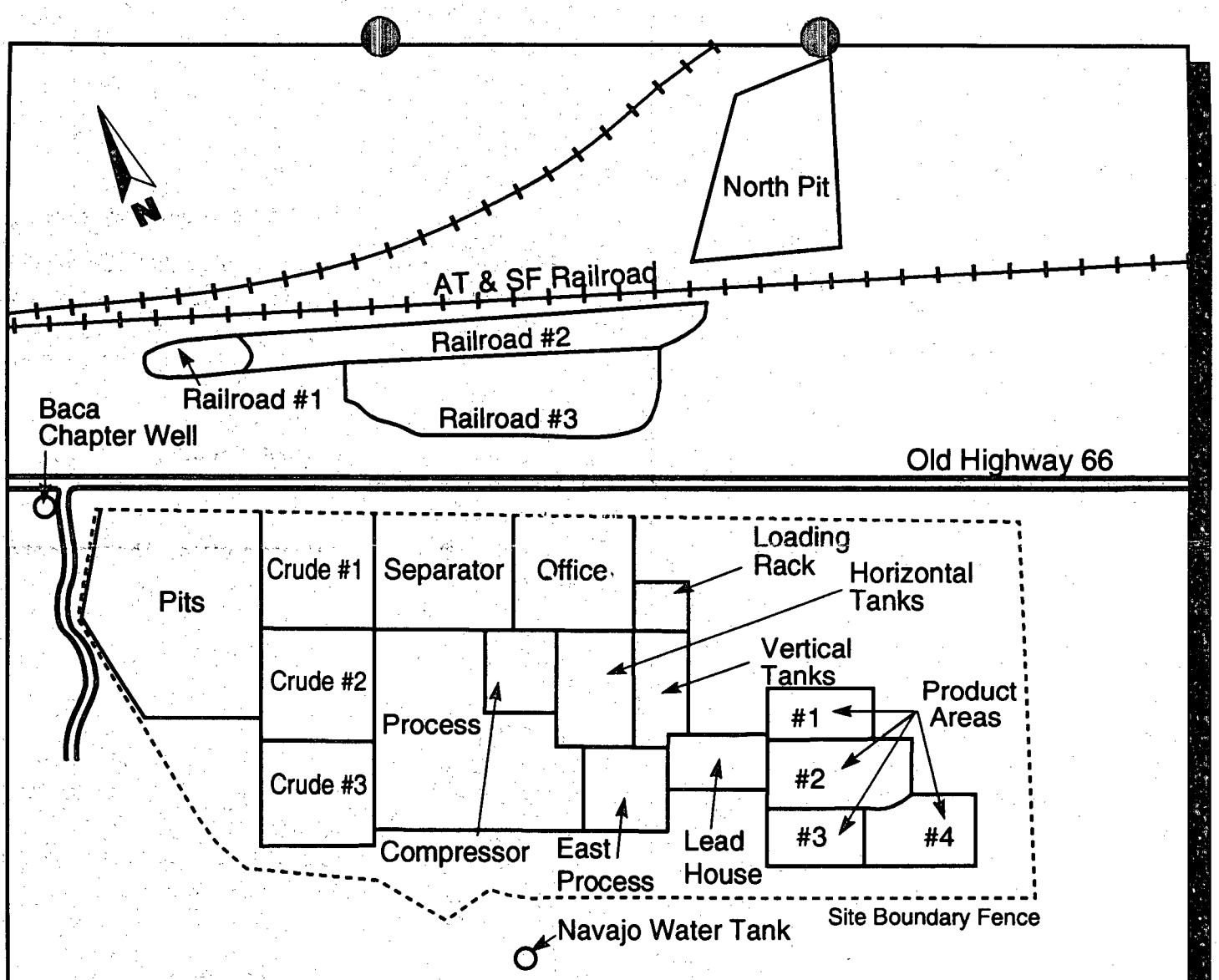
The refining of crude oil generates waste products. At Prewitt, wastes were generally disposed at or near the point of generation, and not in special waste management units. These wastes included leaded tank bottoms, slop tank contents, primary separator sludges, and secondary separator floats, all of which are listed as hazardous waste under the Resource Conservation and Recovery Act (RCRA). The waste materials spilled, dumped and spread in the refinery area mixed with the spills of petroleum products.

Wastewaters were routinely discharged into unlined, earthen ditches throughout the refinery area. In addition to accidental spills, these ditches are known to have carried off-specification petroleum products and hydrocarbon-laden wastewaters.

Many of these ditches flowed into the separator, which is a concrete tank divided into compartments. The waste in the separator was allowed to settle, so that the organics floated to the surface of the material in the tank. These organics were pumped off the water surface and returned to the process system. The water and heavier materials were drawn from the bottom of the separator, and discharged into an arroyo leading to the north edge of the site and into the North Pit.

An area located on the west side of the site was originally used as an emergency relief system. During the early years of operation, when a process unit had to shut down quickly, the contents of the unit were directed through underground pipes to the West Pits for containment. Later, tanks were installed in this area to receive the partially processed material and to make it easier to return the material to the crude oil refining process.

The former owners and operators of the refinery included Petroleum Products Refining Company and its successor Petroleum Products Refining and Producing Company; Malco Refineries; New Mexico Asphalt and Refining Company; and El Paso Natural Gas Products Company and its successor The El Paso Company (TEPCO). The site is now owned by the Atlantic Richfield Company (ARCO).



Remedial Investigation Map
PREWITT REFINERY SITE

Figure 2

Since the refinery was shut down, the refinery and its accompanying structures have been dismantled. Remnants include piping, pits, the separator, waste, and structural material, including foundations. The site is covered with scattered demolished structures and foundations and sparse desert foundation and exposed fill.

The site was called to EPA's attention by a citizen's complaint in 1980. The site was evaluated by the EPA in 1984, using the EPA's Hazard Ranking System. In June 1989, EPA issued an Administrative Order to both TEPCO and ARCO. The order required TEPCO and ARCO to fence the site and install and maintain an activated carbon filtration treatment system on five residential wells adjacent to the site. On August 30, 1990, the EPA added the Prewitt Refinery Site to the National Priorities List (NPL), making the site eligible for remedial activities under the Superfund program.

Contamination at the Site

On June 22, 1989, ARCO and TEPCO signed an Administrative Order on Consent with the EPA. This authorized the companies to begin a Remedial Investigation and Feasibility Study (RI/FS) at the site.

During the Remedial Investigation (RI), ground water and soils were sampled to determine the nature and extent of the contamination at the site. Based on the results of the RI, the following areas were found to be in need of remediation:

- **Ground water**
- **NAPL**
- **West Pits area, and hydrocarbon contaminated soils**
- **Lead contaminated soils**
- **Asbestos contaminated soils**

During the Feasibility Study (FS), various treatment alternatives were considered. The following paragraphs explain the contamination in each media, and the remedy selected to treat each media.

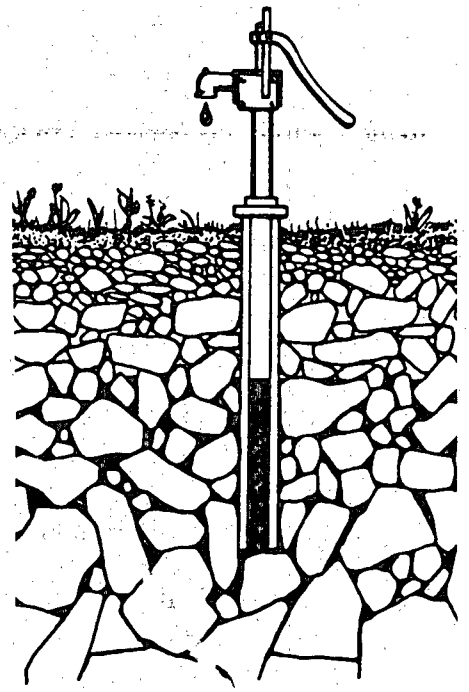
Ground Water

Ground water is the water found beneath the earth's surface. It fills the spaces between soil, sand, and gravel particles. When there is enough groundwater, it can be used as a drinking supply. Groundwater travels through aquifers, which are layers of gravel that can supply usable amounts of water to wells or springs.

The groundwater beneath the Prewitt site has been contaminated by past refinery practices. Wastes deposited on the surface of the soil have been washed by rainwater or moved through fractures in the bedrock to aquifers under the site. The groundwater is contaminated with levels of lead that exceed drinking water standards. The groundwater is also contaminated with benzene, toluene, ethylbenzene and xylene, also known as BTEX. Chlorinated hydrocarbons have also been detected at levels above drinking water standards, but the most recent sampling does not show high levels of chlorinated hydrocarbons.

Most of the contamination is found in the uppermost portion of the Sonsela Aquifer which underlies the site. Trace elements of contamination have also been found in the lower part of the Sonsela Aquifer, and in the San Adres/Glorieta Aquifer which lies under it.

Approximately 49 million gallons of contaminated groundwater will be extracted, treated, and reinjected. About twenty groundwater extraction wells will be installed. Water will be pumped up from the ground and treated until BTEX, lead and chlorinated hydrocarbon levels are within drinking water standards. The treated water will be pumped back into the ground by thirty-five injection wells.



Monitoring wells will be used to monitor the extent and concentration of the contamination. No water supply wells will be drilled in the contaminated areas until the water meets drinking water standards. Existing domestic wells will be fitted with water treatment units, and they will be sampled every three months to make sure the treatment units are effective.

NAPL

Non Aqueous Phase Liquids are non-water liquids, like oil, which do not mix with water. They can float on the surface of ground water, sink to the bottom of ground water, or adhere to soil, sand or gravel above or below an aquifer. The NAPL at the Prewitt site are concentrated in certain areas. The NAPL contains BTEX compounds. BTEX contamination in the groundwater is higher in areas that are near the NAPL areas.

BTEX are Volatile Organic Compounds (VOCs). This means that they evaporate quickly when they are exposed to air. Soil vapor extraction will be used to remedy the BTEX contamination in soil and water affected by the NAPL.

In the soil vapor extraction, a large pump will be used to vacuum up the air in the soil using thirty-eight wells. A thermal/catalytic oxidizer will be used to destroy the BTEX in the soil vapor, and the air will be released. Clean air will be pumped into the soil. Any groundwater produced will be piped to the air stripper for treatment, then injected.

West Pits Area and Hydrocarbon Contaminated Soils

Approximately 1175 cubic yards of pit material and 1500 cubic yards of hydrocarbon contaminated soil will be treated. The soil will be excavated and consolidated in an area where the soil is contaminated. Then the soil will be landfarmed. Landfarming is the controlled tilling, fertilizing and irrigating of land to maximize the natural biological breakdown of organic contaminants.

The landfarm will be built on the west side of the site. The hydrocarbon content of the soil will be carefully monitored, while the soil is mechanically worked to allow air to penetrate, and moisture and fertilizer added to provide near optimal conditions for contaminant breakdown. The landfarm will be carefully monitored to measure the breakdown of the contaminants, and to be sure that contaminants are not moving into the surrounding soil or groundwater. If the contaminants begin to migrate out of the landfarm area, a liner will be installed in the treatment area. Once landfarming treatment has been completed, a clean soil cover will be placed over the landfarm.

Lead Contaminated Soils

Soils contaminated with lead at a level above 500 parts per million (ppm) will be excavated and transported to a RCRA landfill for disposal. The soil will be treated prior to disposal if it exhibits a toxic characteristic. About 660 cubic yards of soil will be excavated. About 73 truck loads of soil will be taken off the site.

Asbestos Contaminated Soils

All asbestos-contaminated materials, including soil, will be excavated, placed in sealed containers, and transported to an EPA-approved landfill. About 15 cubic yards of material will be removed from at lease five locations on the site. During the removal, air monitoring will be performed in accordance with OSHA and NESHAP requirements.

Separator

The separator contains about 83 cubic yards of material that will be removed. Before the material is removed from the site, it will be analyzed to confirm levels of hazardous constituents. The waste will be loaded onto trucks and shipped to a RCRA landfill approved by the EPA. If it is necessary, the material will be treated before it is deposited in the landfill.

After the contents of the separator are removed, holes will be punched in the bottom of the separator to permit sampling of the soil beneath the structure. If the soil beneath the separator is contaminated, it will be remediated. If the soil is suitable for landfarming, it will be added to the soil being landfarmed. If it is contaminated with lead at a level above 500 ppm, or any constituents above the Toxicity Characteristic Leaching Procedure limits, it will be treated by an appropriate method, such as soil washing, off-site incineration, or another method. After the separator contents and all contaminated materials have been removed, the separator will be filled with non-contaminated soil.

EPA Responses to Public Comments

During the public comment period, EPA received written and oral comments from the public concerning the proposed plan for remediation of the contamination at the Prewitt site. EPA's responses to those comments are contained in the Responsiveness Summary, which is attached to the ROD. A copy of the ROD is available in the site Information Repository locations listed on the back of this fact sheet.

For More Information

If you have any questions about activities at the Prewitt Refinery site, please contact:

Monica Chapa Smith
Remedial Project Manager
U.S. EPA (6H-EO)
1445 Ross Avenue
Dallas, TX 75202-2733
(214) 655-6730
(800) 533-3508 (Toll Free)

Steve Wust
New Mexico Environmental Department
P. O. Box 26110
1190 Saint Francis Drive
Santa Fe, New Mexico 87502
(505) 827-0039

Diane Malone
Navajo Nation
Navajo Superfund Office
43 Crest Road
St. Michaels, Arizona 86511
(602) 871-7326

For more information about the public involvement process, please contact:

Olivia Rodriguez
Community Relations Coordinator
U. S. EPA (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-2240
(800) 533-3508 (Toll Free)

News Media Inquiries should be directed to Roger Meacham or Dave Bary, EPA Region 6 Press Officers, at (214) 655-2200.

Information Repositories

Information repositories contain laws, work plans, and other documents relevant to the investigation of and the remediation of Superfund sites. If you would like more information about the site, you may consult the Adminstrative Record File contained in the information repositories listed below:

Prewitt Fire House
P.O. Box 472
Prewitt, New Mexico 87045
(505) 876-4068

New Mexico Environmental Department
1190 St. Francis Drive
Santa Fe, New Mexico 87501
(505) 827-2633
Monday through Friday: 8:30 a.m. to 5:30 p.m.

Navajo Nation
Navajo Superfund Office
43 Crest Road
St. Michaels, Arizona 86511
(602) 871-6859

EPA Region 6 Library
12th Floor
1445 Ross Avenue
Dallas, TX 75202
(214) 655-6444 or
(800) 533-3508
Monday through Friday: 8:00 a.m. to 5:00 p.m.

U.S. Environmental Protection Agency
Region 6 (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733

David Boyer
NM Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504-2088

PROPOSED PLAN

SUMMARY FACT SHEET

Prewitt Refinery Superfund Site
Prewitt, New Mexico
July 23, 1992

EPA ANNOUNCES PROPOSED PLAN

This summary of the Proposed Plan of Action identifies the preferred option for addressing the contamination problems at the Prewitt Abandoned Refinery Site. In addition, this document includes summaries of other alternatives analyzed for the Site. EPA will select a final remedy for the Prewitt Refinery Site only after the public comment period has ended and the information submitted during this time has been reviewed and considered during the decision making process.

EPA issued the Proposed Plan on July 18, 1992 as part of its public participation responsibilities under Superfund law [Section 117(a) of the **Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)**]. This document summarizes information that can be found in greater detail in the Feasibility Study Report, the Proposed Plan of Action and other documents in the **Administrative Record** file for the Prewitt Refinery Site. (Words in **boldface** are defined in the Glossary.)

Alternatives presented in this summary and in the Proposed Plan are not numbered as they appear in the Feasibility Study Report; yet, they are the same alternatives and have been renumbered for clarity in preparing the Proposed Plan and this summary of the Proposed Plan. Also, it should be noted that, based on conclusions reached in the Feasibility Study and Feasibility Study Supplement, the alternatives presented in the Proposed Plan are the only alternatives now being considered.

EPA encourages the public to review the Administrative Record documents in order to gain a more comprehensive understanding of the Site and Superfund activities that have been conducted there. The Administrative Record file is available at the following information repository locations:

Prewitt Fire House
P.O. Box 472
Prewitt, New Mexico 87504

U.S. EPA, Region 6 Library
12th Floor, 1445 Ross Avenue
Dallas, Texas 75202
(214) 655-4444 or
(800) 533-3508

Navajo Nation
Navajo Superfund Office
43 Crest Road
St. Michaels, Arizona 86511

New Mexico Environment Department
1190 Saint Francis Drive
Santa Fe, New Mexico 87502

SITE BACKGROUND

The Prewitt Refinery is an abandoned crude oil refinery on approximately 70 acres located near the town of Prewitt in McKinley County, New Mexico (see Figure 1) The Site is located approximately 20 miles northwest of Grants, New Mexico. Old U.S. Highway 66 divides the Site into two tracts. In the northern part of the Site, north of the railroad track, lies an area which received waste. This area is known as the North Pit. Much of the Site property is currently owned by the Navajo Nation. The Site is located in a rural area, with a cluster of six homes about one thousand feet east of the Site.

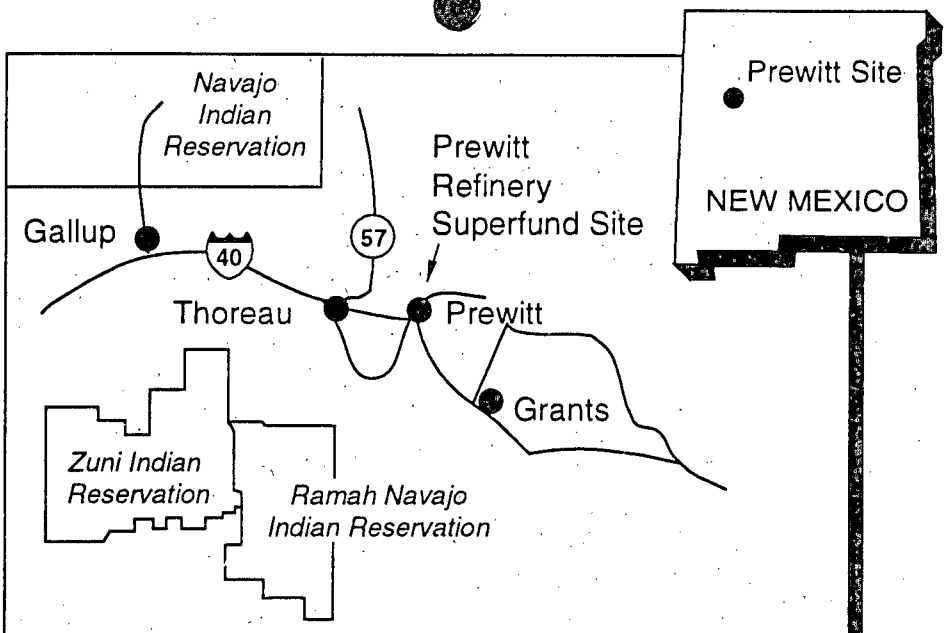
The Prewitt Refinery, a crude oil refinery, was in operation from 1938 to 1957. The main processing units at the refinery were a distillation plant, a thermal cracker, and a reformer. In July 1957, the refinery was shut down.

The purpose of this Proposed Plan summary is to:

- Identify the preferred alternatives for remedial action at the Site and explain the reasons for EPA's preference;
- Briefly describe the other remedial options considered in detail in the Feasibility Study and analyzed in the Proposed Plan;
- Solicit public review and comment on all the alternatives described in the Feasibility Study and in the Proposed Plan, and on information contained in the Administrative Record file; and
- Provide information on how the public can be involved in the remedy selection process.

Public Meeting

July 29, 1992
7:00 p.m.
Prewitt Fire House
Prewitt, New Mexico

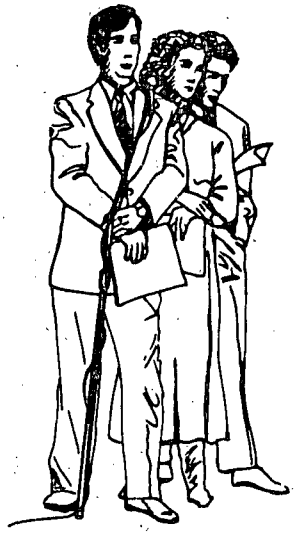


Site Location Map
PREWITT SUPERFUND SITE
PREWITT, NEW MEXICO **Figure 1**

Community Participation

Public Comments

The public is invited to comment on all of the remedial alternatives described in the Feasibility Study Report, the Proposed Plan and the Administrative Record file. The public comment period began on July 18, 1992 and ends on August 17, 1992. During the public comment period, written comments may be submitted to:



Mr. Donn Walters
Community Relations Coordinator
U.S. EPA, Region 6 (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733

Public Meeting

Additionally, oral comments on the above items will be accepted at a community public meeting scheduled for July 29, 1992, beginning at 7:00 p.m. at the Prewitt Fire House in Prewitt, New Mexico. Please make plans to attend. If special assistance is needed because of physical limitations or visual/hearing impairments, please call Mr. Donn Walters at (214) 655-2240 or (800) 533-3508.

EPA will respond to all comments in a document called a Responsiveness Summary. The Responsiveness Summary will be attached to the **Record of Decision (ROD)** and will be made available to the public at the information repositories. The Record of Decision will explain the final remedy selected to correct contamination problems at the Site. The final remedy could be different from the preferred alternative, depending upon new information or issues EPA may consider as a result of public comments.

The crude oil was delivered to storage tanks. From there, the raw material was pumped to the distillation tower where various products were recovered from the crude oil. The Site did not have a large number of waste management units. Wastes were generally disposed at or near the point of generation, and not in designated waste management units. Thus, waste materials known to have been spilled, dumped and spread in the refinery area have been intermixed with the spills of petroleum products also known to have occurred.

Wastewaters were routinely discharged into unlined, earthen ditches throughout the refinery area. In addition to accidental spills, these ditches are known to have carried off-specification petroleum products and hydrocarbon laden wastewaters. Deposits in these ditches during the operating history included **Resource Conservation and Recovery Act (RCRA)**- listed hazardous waste F037.

The separator, which many of these ditches flowed into, was a compartmentalized concrete tank. This provided reduced flow conditions which allowed the **organics** to float to the surface of the material in the tank. These organics were pumped off the water surface and returned to the process system. The water and heavier materials were drawn from the bottom of the separator, and discharged into an arroyo leading to the north edge of the Site and into the North Pit.

An area located on the west side of the Site was originally used as an emergency relief system. During the early years of operation, when a situation in the processing plant arose that required a process unit to shut down quickly, the contents of the unit were directed through underground pipes to bermed areas in the west side of the Site for containment. This emergency relief system was later modified to provide tanks in this area to receive the partially processed material, and to facilitate the return of the material to the crude oil refining process.

The former owners and operators of the Refinery included Petroleum Products Refining Company and successor,

Petroleum Products Refining and Producing Company; Malco Refineries; New Mexico Asphalt and Refining Company; and El Paso Natural Gas Products Company and successor, El Paso Products Company.

Since the Prewitt Refinery shut down, the refinery and accompanying structures were dismantled. Remnants include piping, pits, a separator, and other waste and structural material, including foundations. The surface at the Site is covered with scattered areas of demolished structures and foundations. The remaining area at the Site is covered with sparse desert vegetation and exposed fill.

The Site was called to EPA's attention by a citizen's complaint in 1980. In June 1989, EPA issued an **Administrative Order** to both The El Paso Company (TEPCO) and Atlantic Richfield Company (ARCO). The order required TEPCO and ARCO to fence the Site and to install and maintain an activated carbon filtration treatment system on five residential wells adjacent to the Site. These filters have been sampled and replaced on a monthly basis by TEPCO and ARCO. On August 30, 1990, the EPA added the Prewitt Refinery Site to the **National Priorities List (NPL)** making the Site eligible for remedial activities under the Superfund program.

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

The **Remedial Investigation** (RI) and **Feasibility Study** (FS) for the Site, were conducted pursuant to an Administrative Order on Consent, which EPA issued jointly to TEPCO and ARCO.

Remedial Investigation

The remedial investigation was conducted during 1990 and 1991 to determine the nature and extent of contamination at the Prewitt Site. The remedial investigation was conducted in two defined phases. Phase I was the initial sampling and analysis phase. The purpose of the Phase II activities was to resolve outstanding issues and fill data gaps remaining at the conclusion of Phase I. During the remedial investigation, contamination was detected in the surface soils and shallow **groundwater**. Figure 2 illustrates the way the Site was divided into different areas for the purpose of conducting the remedial investigation.

One of the activities that took place as part of the remedial investigation was the abandonment of existing wells. The wells were abandoned or modified to prevent them from being conduits of contamination to lower groundwater units.

Nature and Extent of Contamination

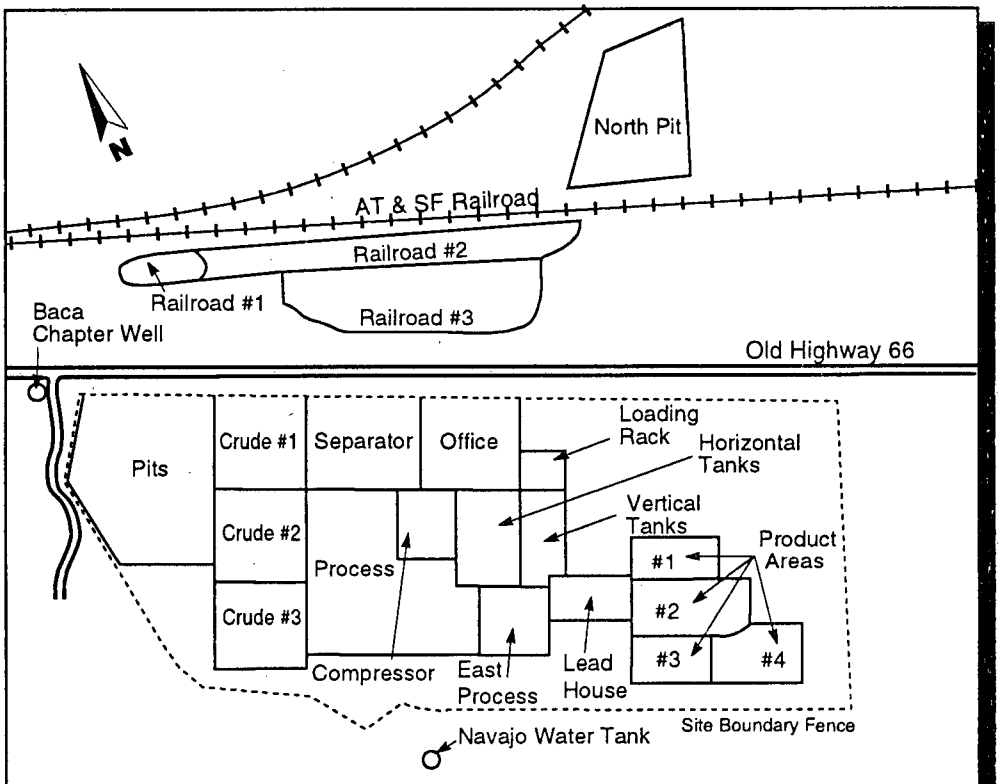
Groundwater—

The Site is situated above four significant water bearing zones. The uppermost zone is a perched **aquifer** of limited areal extent. Below this are the Sonsela and San Andres/Glorieta(SA/G) Aquifers which are separated by approximately 400 feet of **sediments**. The Sonsela Aquifer is composed of seven units in the Site area (areas A-G).

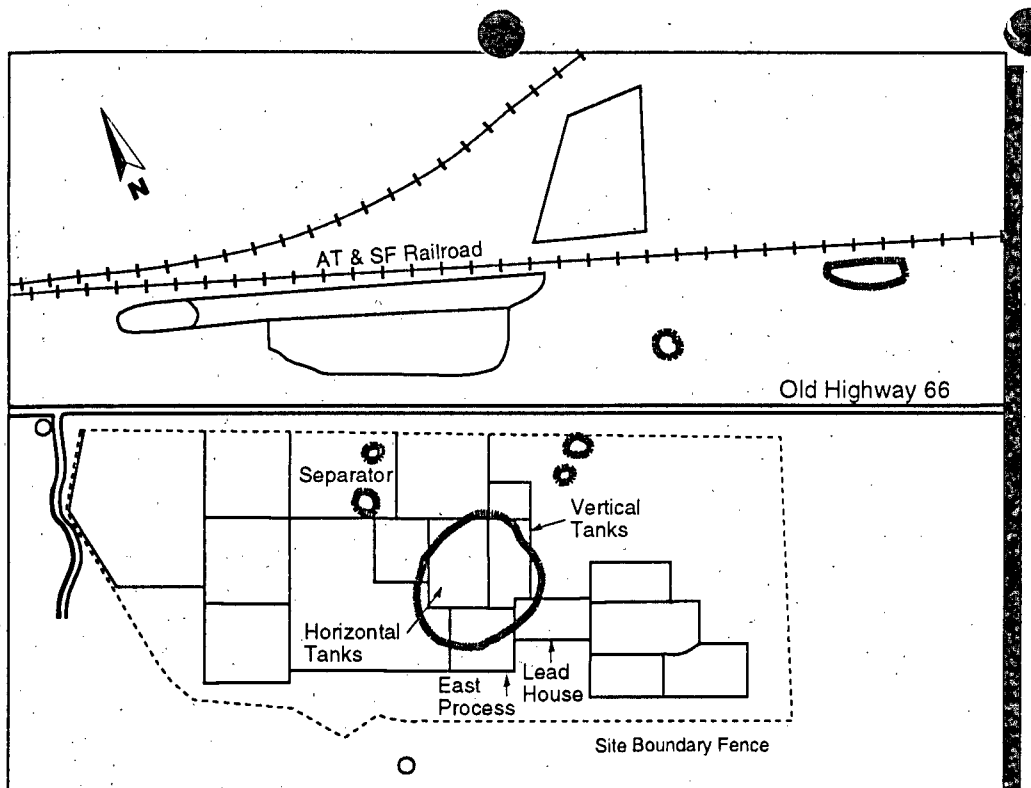
Shallow water underlying the Prewitt Refinery Site contains contaminants from past refinery related activities. Benzene, toluene, ethylbenzene and total xylenes (BTEX) have been transported into the groundwater. **Non-Aqueous Phase Liquid (NAPL)** has migrated downward from the surface under the influence of gravity through bedrock fracture systems. It appears that the dissolved phase BTEX contamination at the Site is highest in the areas where NAPL is present.

Groundwater contamination by organic compounds is generally confined to the uppermost portion of the Sonsela Aquifer. Trace concentrations of BTEX compounds have also been detected in the deeper Sonsela and San Andres/Glorieta Aquifer. The contamination in the San Andres/Glorieta Aquifer is related to transport of contaminants downward from the shallow Sonsela Aquifer through Site wells.

BTEX concentrations in the E unit of the Sonsela Aquifer range from 5 to 27,000 parts per billion (ppb). Low levels of BTEX (less than 80 ppb) occur in isolated areas in the C and D



Remedial Investigation Map
PREWITT REFINERY SITE **Figure 2**



NAPL (Non-Aqueous Phase Liquid)
PREWITT REFINERY SITE

= NAPL Areas

Figure 3

units with most detections less than 10 ppb. BTEX concentrations detected in the San Andres/Glorieta Aquifer range from 1 to 180 ppb. This contamination is localized and is due to leakage through Site wells.

Lead was detected in A-D units of the Sonsela Aquifer at a concentration range of 2.3-27.5 milligrams per liter (mg/L). In one groundwater monitoring well, 1,2-dichloroethane, a hazardous substance, was detected at concentrations in excess of the drinking water standard of 5 ppb during four consecutive sampling events. Recent sampling events have indicated that concentrations have dropped below detection limits in that well. 1,2-dichloroethane has not been detected in the other monitoring wells recently.

The chemicals identified in Site groundwater include antimony, benzene, beryllium, cadmium, 1,2 dichloroethane, ethylbenzene, lead, napthalene, tetrachloroethylene, toluene, trichloroethlylene, and total xylene.

NAPL—

Seven NAPL areas were identified at the Site during the sampling activities conducted as part of the remedial investigation (see Figure 3). It is estimated that 43,500 gallons of NAPL has accumulated in the E, F and G units of the Sonsela Aquifer and the upper confining bed. Staining noted during core logging indicates that bedrock fractures have been a significant transport mechanism for contaminants in the unsaturated zone.

West Pits Area—

The West Pits were found to have varying amounts of tarry Polynuclear Aromatic Hydrocarbons (PAH) materials mixed with soil. The lead concentrations in samples obtained from this area ranged from below 1 milligram/kilogram (mg/kg) to 177 mg/kg and trivalent chromium ranged from 4.0 mg/kg to 12.8 mg/kg. Total Petroleum Hydrocarbons (TPH) ranged from non-detectable levels to 24,000 mg/kg.

Soil and Sediments—

For soils, the contaminants identified were lead, mercury, chromium, nickel, BTEXs and PAHs. Hydrocarbons were found in scattered localized concentrations at the Site. The highest concentrations occur in areas such as the West Pits, North Pit, separator, compressor, vertical tanks, along the railroad tracks, and process areas. The concentrations of PAHs generally diminish within two feet of the surface. A notable exception to this is in the vicinity of the separator, where PAH contamination extends to 18 feet.

Volatiles and semivolatiles are found only in limited areas in soils across the Site. Lead was the most prevalent metal contaminant and its distribution is limited. The highest lead concentrations were detected in the office, separator, vertical tanks, and Product #1 areas (see Figure 4). Most lead concentrations diminish to background levels below two feet.

Some contamination still exists in the sediments in the Site surface water drainage areas. Slightly elevated levels of TPH, metals, and semivolatiles were detected in a drainage north of the Site.

Risk Assessment

Using the data gathered during the remedial investigation, TEPCO and ARCO conducted a risk assessment. This was done to characterize the current and potential threats to human health and the environment that may be posed by contamination at the Site. That is, this part of the risk assessement was based on an assumption that people would live on the Site in residential housing (also known as a "residential scenario").

The risk assessment included an assessment of human health risks and of ecological impacts. The goal of the risk assessment was to characterize the current and potential threats to human health and the environment that may be posed by contaminants migrating to groundwater or surface water; releasing to air; leaching through soil; remaining in the soil and bioaccumulating in the food chain.

EPA has established criteria for interpreting both noncarcinogenic and carcinogenic risk estimates for Superfund Sites. For noncarcinogenic risks, a Health Index of less than 1.0 represents an exposure dose considered to be within acceptable risk limits for protection of human health. For carcinogenic risks, EPA has established a range of acceptable exposure levels that represent a lifetime incremental

excess cancer risk of 10^{-6} x10^{-4}. The incremental lifetime cancer risk represents the excess probability that an individual will develop cancer over a lifetime due to exposure to a contaminant. The background cancer risk in the United States is one in four, or 0.25. An incremental lifetime cancer risk of 1x10^{-6} indicates that an individual's chance of developing cancer in his or her lifetime is increased from 0.25 to 0.250001. Put another way, if one million people were exposed to Site contamination, in a situation in which the risk was 1x10^{-6}, one person would be expected to develop cancer due to site contaminants.

Risk Assessment Findings

The following discussion pertains to risks to human health resulting from actual and potential exposure to the Site.

Current Use—

Currently the Site is a dismantled refinery which is occasionally traversed by pedestrians and sheepherders. The total carcinogenic risk under the current use scenario for the Site was calculated to be 2x10^{-6}. This is within the EPA's range of acceptable exposure levels. The remedial action at the Site is intended to address likely exposure pathways (pathways) by which humans could be exposed to contaminants. The pathway that contributes most significantly to the total risk is ingestion of untreated private well water which has a risk of 3x10^{-6}. The estimated risk of 3 x10^{-6} is based on a more conservative exposure assumption. Under this more conservative exposure assumption, it is assumed that exposure to untreated groundwater will be for lifetime, with 70 years used as an average lifetime.

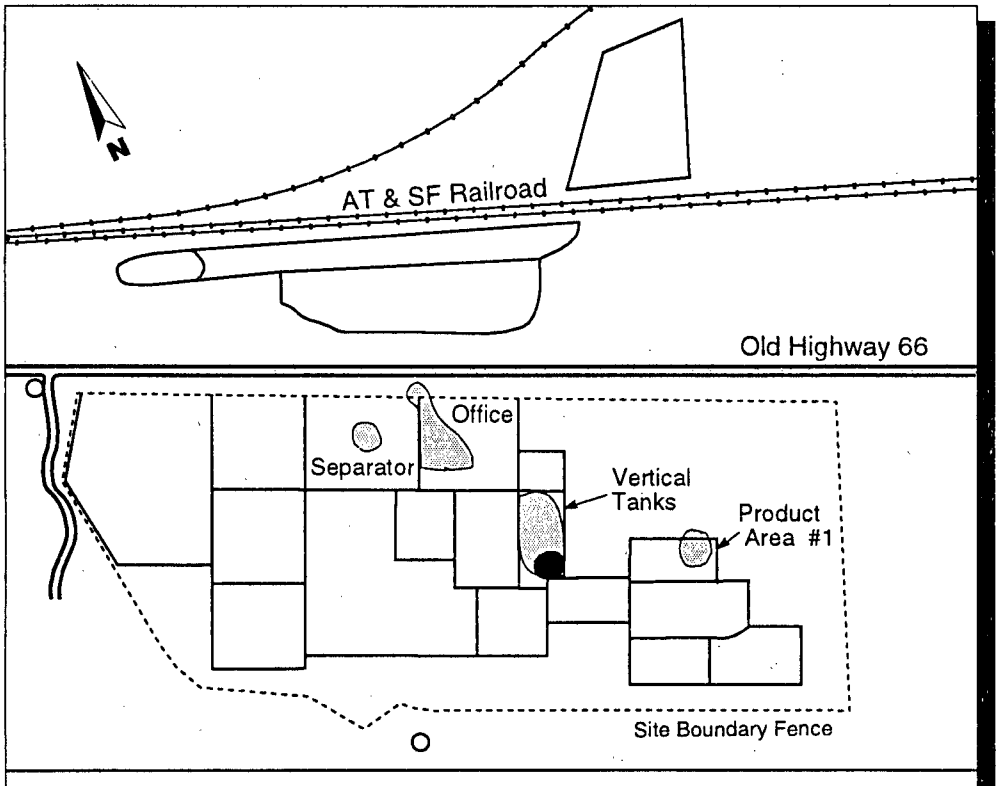
The total noncarcinogenic Health Index for the current use exposure pathway is 0.0003, three orders of magnitude below the EPA's acceptable Health Index value of 1.0. That is, if current use of the Site continued, then the noncarcinogenic Health Index would be 0.0003, well below EPA's acceptable Health Index value of 1.0. Dermal contact with soils from within and outside the refinery area is also a primary contributor to the noncarcinogenic Health Index. Toluene contributes most to the Health Index for untreated well water, while PAHs, including 2-methyl-napthalene and benzo(a)pyrene, are the contaminants which contribute the most to the noncarcinogenic risk posed by contaminants which may reach humans through soil pathways.

Future Residential Use—

Under the scenario in which the Site is used for residential housing in the future, the carcinogenic risks which an individual could be exposed to would be in the range of 10^{-6} to 10^{-3}, depending on the area in which the house is built.

Projected exposure to contaminants in the groundwater underlying the fenced area above the EF layer of the Sonsela Aquifer are greater than the acceptable exposure levels, but exposures to the ABCD-SA/G layer underlying the entire surface area of the Site, fenced and unfenced, are within the acceptable exposure levels utilizing the assumptions established by EPA in Risk Assessment Guidance for Superfund. Exposures to groundwater in all areas in the EF layer and in the area outside the fence above the ABCD-SA/G layer are greater than the acceptable exposure levels.

In the ABCD-SA/G layer, underlying the fenced area, a Health Index of less than one (0.003) is calculated for noncarcinogenic contaminants, based on projected future use of the groundwater if the area is used for residential purposes. For groundwater underlying the area outside of the fenced area, the Health Index under the same circumstances is 0.03. Projected future ingestion of groundwater from the EF layer underlying the fenced area results in a Health Index greater than 1.0 under the future residential scenario. Napthalene contributes most significantly to this estimate of risk. Projected future ingestion of groundwater from the EF layer underlying the area outside of the fence, results in a Health Index of 1.5 which exceeds the acceptable Health Index value of 1.0.



Lead Contamination
PREWITT REFINERY SITE

Figure 4

Projected future exposure to soils in the refinery area, which includes the soil within the fenced area as well as the hotspots, and projected future exposure to soils outside the fenced area, results in a Health Index of less than 1.0 under the residential scenario. PAHs are the contaminants that contribute most to this Health Index. It should be noted that the risk calculation performed did not include lead which is discussed below.

Lead occurs naturally in soils in many areas of the U.S. in what is termed "background" levels. Lead was detected above background levels in many areas of the Site. However, only seven sampling locations were found with lead concentrations above the EPA guidelines for residential cleanup. EPA considers lead soil concentrations in the 500 - 1,000 ppm range in a residential setting not to pose an unacceptable risk to human health. These seven samples, which are located in the office, separator, vertical tanks, and Product #1 areas (see Figure 4), have been used to define four areas that require remediation. Lead concentrations ranged from 3 to 129,000 mg/kg in soil samples throughout the Site. Most lead concentrations diminish to background concentrations below two feet.

Asbestos in soil has been observed at and near the ground surface in the central portion of the Site. An extensive asbestos abatement program was performed by ARCO and TEPCO in 1990. Approximately 800 cubic yards of asbestos-containing soils were removed from the Site. Only limited amounts of asbestos-contaminated materials remain in the Process and Compressor areas of the Site (see Figure 2).

The risk assessment reveals that the cancer risks associated with the exposure to surface soils at Prewitt are caused primarily by PAHs at or near the ground surface, particularly:

- Benzo(a)pyrene,
- Benzo(a)anthracene,
- Benzo(a)fluoranthene, and
- Benzo(k)fluoranthene.

The projected cancer risk under the future residential scenario posed by the PAHs in the soil in the area outside the fence, inclusive of the North Pit area and tarry areas along the railroad track, is estimated to be 3.6×10^{-3}.

A vaulted concrete structure and associated settling pit, known as the separator, used to separate oil and water is located in the northwest part of the Site. This separator contains petroleum sludges from refinery operations which are listed as hazardous waste number F037 under the Resource Conservation and Recovery Act (RCRA). RCRA Toxicity Characteristic Leaching Procedure (TCLP) analyses were performed on the waste samples collected from the separator and detected concentrations of 230 mg/L TCLP-benzene. This high concentration of benzene caused the sample to fail the TCLP test.

Overall, contaminants found at the Site and identified by the risk assessment represent constituents common to materials handled at petroleum refineries. Exceptions included asbestos and 1,2-dichloroethane. The chemicals were utilized in the risk evaluation based upon toxicity, frequency of detection, and concentration. The chemicals that represent the contaminants that contribute most significantly to human health risks at the Prewitt site are: 1) BTEX, lead and 1,2-dichloroethane for groundwater; and 2) lead, PAHs, and asbestos for soils. Other contaminants detected at the Site above background concentrations include chromium, beryllium, antimony, mercury, nickel, and cadmium. Each of these constituents were included in risk calculations, but it was determined that these other constituents do not contribute significantly to carcinogenic or noncarcinogenic risks at the concentrations detected at the Site.

Groundwater—

Groundwater is currently used for drinking water and agricultural purposes. This is not expected to change. The Sonsela's B unit is by far the most productive of the A through E units of the Sonsela, and would contribute a predominant portion of the groundwater drawn from existing and future wells. However, a well may draw water from any of the Sonsela units A through E or combinations thereof. Therefore, each of the A through E units contribute to the reasonable maximum exposure to an individual human drinking groundwater.

Presently, the San Andres/Glorieta Aquifer is not used as a water source in the vicinity of the Site. Given the availability of the shallower, palatable, non-staining B unit of the Sonsela Aquifer, the San Andres/Glorieta Aquifer is not currently used as a domestic or agricultural water supply, although, water from this unit is suitable for domestic and agricultural purposes and future use is possible.

For current uses, with access restricted by the fence, the total cancer risk calculated for the Site is 2×10^{-6} which is within EPA's acceptable exposure range. Of this cancer risk, 1×10^{-6} is based on consumption of untreated groundwater. The total Health Index calculated for the Site, 0.003, must be 3,000 times higher before the Site would present an unacceptable health risk for current uses. If the fence was removed to allow unrestricted access, the cancer risk would remain the same, yet the Health Index would be 0.0006.

Similarly, the cancer risk associated with sheepherding at the Site is 4×10^{-6}, with a corresponding Health Index of 0.002.

For future residential uses, projected exposure to on-site groundwater found in the EF units and hotspot soils resulted in a 2×10^{-3} cancer risk and an Health Index of 3.0. A qualitative review of risks associated with ingestion of produce grown in residential gardens at the Site indicated that risks are in the same range as those identified for residential ingestion and dermal contact with soils. The cancer risk to construction workers if residences are built at the Site is 7×10^{-8}, with a corresponding Health Index of 0.0006.

Under the future residential scenario, an evaluation was performed on the risks associated with inhalation exposure to contaminated wind-borne particulates at the Site. The resulting carcinogenic risk was calculated at below 10^{-7}, less

than the EPA 10^{-6} to 10^{-4} acceptable target risk range.

In summary, with the exception of future residential scenario, all of the present and future scenarios examined showed carcinogenic and noncarcinogenic risk below or at the low end of the EPA target risk range. Risks posed by a future residential exposure scenario exceed the EPA target risk range for both carcinogenic and noncarcinogenic risk.

Actual or threatened releases of hazardous substances from this site, is not addressed by the preferred alternative, or one of the other active measures considered. This present a current or potential threat to human health and the environment.

Impacts to the Environment—

The objective of the ecological assessment was to qualitatively assess potential impacts of contaminants on the surrounding natural environment. Wildlife in the Site area, including migrating species, were the receptors considered in this study. The most likely pathways by which wildlife could be exposed to contamination from the Site were incidental ingestion of contaminated soil and consumption of contaminated prey or plants. The risk assessement found that exposure levels associated with Site-related contaminants were not significantly impacting ecological receptors.

The region surrounding the Prewitt Site contains several major ecological community types, including cold desert and semidesert, northern temperate grassland, southern temperate grassland, and ecotone woodland and brushland communities. The Site itself lies in a transitional zone between a valley floor to the north and rocky uplands to the south. This transition in topography and substrata has resulted in vegetational transition from semidesert shrub grassland in the valley floor to pinyon-juniper woodland in the rocky uplands. The 40-acre fenced Site and adjacent off-site areas can be classified into three broad plant community types: loamy uplands, loamy overflows, and rocky uplands. No endangered plant species have been reported as occurring on or near the Prewitt Site.

Three federally-listed endangered species, peregrine falcon, bald eagle, and the black footed ferret, may occur in the region. Additionally, two bird species listed on the State of New Mexico's list of endangered species occur in McKinley County. They are the gray vireo and willow flycatcher. In addition to the federally- and state-listed species described above, the Navajo Fish and Wildlife Department has compiled a list of species of concern for the Navajo Nation. Of the species listed by the Navajo Fish and Wildlife Department, it is expected that only the following six bird species could potentially occur at the Site: Swainson's hawk, northern harrier, ferruginous hawk, short-eared owl, willow flycatcher, and the mountain plover. These species are classified in "Group 4" by the Navajo Fish and Wildlife Department, indicating that insufficient information is available to determine their particular ecological status.

Peregrine falcons would probably only occur at the Site as migrants or vagrants; bald eagles are not expected at the Site because of the absence of large trees for perches or roosts. It is also unlikely that ferrets would occur at the Site due to the absence of its primary prey, the prairie dog, as well as their general intolerance of human activity. The gray vireo may occur in the pinyon-juniper woodland south of the Site, but probably would not occur on-site due to the low density of junipers present. The willow flycatcher prefers riparian habitats, which are not present on or near the Site.

In summary, the risk assessment indicated that contamination existing in the surface soils and groundwater at the Site could pose health risks to persons at the Site if it is used for residential development. The overall risk at the Site is driven by relatively small "hotspots". These "hotspots" are small in areal extent, yet contain contaminant concentrations above health-based action levels. These areas are targeted for remediation. The significant hot spots include the waste pits and the area outside the fence (still inside the Site). The vertical tank and former office areas contain lead hotspots.

Feasibility Study

Utilizing the findings of the remedial investigation and the risk assessment, the feasibility study was initiated to develop and assess various remediation measures for the areas of contamination at the Site. The process involved in conducting the feasibility study and the detailed evaluations of the alternatives are presented in the Feasibility Study Report for the Prewitt Site which is part of the Administrative Record file. The remedial alternatives are health-risk based, and were determined by the future residential use of the Site.

One of the most important findings of the feasibility study was that removal or containment of BTEX constituents of the NAPL was necessary. This is the first step for groundwater remediation, so that the NAPL will pose no risk of continued groundwater contamination at the Site.

Scope and Role of Response Action

The studies undertaken at the Prewitt Refinery Site have identified the contaminated soils and groundwater as a threat to human health and the environment. The contaminated soils are of concern because of the potential threat for direct contact with the soils should residences be built on the property. The groundwater is contaminated primarily with benzene, ethylbenzene, toluene, and xylenes. Lead is detected above the drinking water standard in one area of the Site. Chlorinated hydrocarbons have also been detected at concentrations which exceed drinking water standards. The most recent sampling data do not show high concentrations of chlorinated hydrocarbons.

The remedial action objectives determined to be necessary for the Prewitt Refinery Site are:

- Removal or containment of NAPL to prevent further contamination to groundwater in the A-G units of the Sonsela Aquifer. Since NAPL impacts groundwater, remediation goals for subsurface areas contaminated with NAPL are as described below in the discussion of groundwater remediation goals.

- Prevent future exposure to the contaminated groundwater through the G, F, and E units and restore the G, F, and E units of the Sonsela Aquifer to their beneficial use, which is at this Site, as a drinking water aquifer.
- Excavation and treatment of wastes in the West Pits Area to prevent or reduce carcinogenic and noncarcinogenic risk to human health and the environment and to eliminate the physical hazard posed by the waste pits as they exist.
- Control or eliminate the exposure to contaminated soils. All soil containing lead shall be remediated until the lead concentration in the soil does not exceed the action level of 500 ppm. All soil containing asbestos shall be removed from the Site. All soil containing hydrocarbon shall be remediated such that Site risk to human health and the environment does not exceed the EPA's acceptable risk range of $1x10^{-6}$ to $1x10^{-4}$ due to PAHs. Soils and tarry substances throughout the Site that contain total carcinogenic PAHs in excess of a concentration of 3.0 ppm (approximately a $1x10^{-5}$ excess cancer risk) will be excavated, consolidated and treated by landfarming. Excavated areas will be backfilled with clean soil to further reduce exposure and risk from the excavated hot spots. The treatment goal for soils and wastes in the landfarm, upon completion of treatment, should be below a concentration of 10 ppm for total carcinogenic PAHs (approximately a $3x10^{-5}$ excess cancer risk). The landfarm will be closed and capped with a vegetative cover to prevent exposure to underlying soils, and further reduce cancer risks from exposure to soils.
- Eliminate risk and hazards associated with exposure to the separator unit and its contents. The separator and its contents shall be removed such that there is no future risk to human health and the environment.

Upon completion of remedy implementation, overall Site risk is expected to be below the acceptable risk level for noncarcinogens and approximately $1x10^{-6}$. The concentrations of carcinogenic PAHs in other soils throughout the Site, not designated as hydrocarbon contaminated soils, are generally less than detection limits (0.330 ppm). The treated soils in the landfarm, which will present an excess cancer risk between $1x10^{-5}$ and $1x10^{-4}$, will be covered with a vegetative cover upon completion of active biotreatment. Thus, the actual risk at the soil surface in the area of the landfarm will be $1x10^{-6}$.

REMEDIAL ALTERNATIVES

The groundwater beneath the abandoned refinery has petroleum hydrocarbon layers floating on it. This hydrocarbon layer consists of light NAPL. The layer is the result of contaminant migration from the surface. It contains high concentrations of BTEX constituents which are a component of petroleum products and refinery wastes.

Under current Superfund authority, groundwater contaminated with petroleum hydrocarbon product that is commingled with a CERCLA hazardous substance, pollutant or contaminant can be addressed.

Commom Elements of the Remedial Alternatives

- To reduce overall Site risk, off-site disposal of portions of the contamination is a component of all the remedial alternatives.
- Many of the alternatives require land use restrictions such that the land could not be used in the future as a residential area.
- All of the alternatives can be initiated within a one-year period.
- The "No Action" alternative for each of the media does not meet the remedial objectives identified for the Site.
- The Operations and Maintenance (O & M) cost for each alternative is an annual cost.

The Preferred Alternative

EPA's preferred alternative includes a combination of various alternatives which individually address select portions of the contamination, yet, collectively address all the areas of contamination present at the Site. The preferred alternative includes all of the following alternatives:

1 Alternative 1C, groundwater extraction/reinjection [as a component of the soil vapor extraction of the Non-Aqueous Phase Liquid (NAPL) (Alternative 2C)] as needed and, if technically feasible upon completion of the NAPL extraction activities.

2 Alternative 2C, soil vapor extraction of NAPL in the G, F, and E sandstones of the Sonsela Aquifer.

3 Alternative 3C, excavation and bioremediation/ landfarming of contaminated soils in the West Pits Area.

4 Alternative 4B, excavation, treatment (if necessary) and off-site disposal of lead contaminated soils.

5 Alternative 4C, off-site disposal of asbestos-contaminated soils.

6 Alternative 4E, excavation and bioremediation landfarming of hydrocarbon contaminated stained soils.

7 Alternative 5B, treatment and disposal of separator contents and dismantling of separator.

Groundwater Alternatives

Groundwater Alternative 1A—No Action

Time to Implement:	Not Applicable
Capital Cost:	$37,600
O & M Cost:	$17,800
Present Worth Cost:	$319,000

The No Action alternative involves no remedial actions. The No Action alternative includes the following:

- Installation of two monitoring wells completed in the B unit of the Sonsela Aquifer unless wells presently onsite are acceptable for this purpose;
- Quarterly monitoring of two monitoring wells and two private wells for BTEX; and
- Use of institutional controls to eliminate the installation of water supply wells in contaminated groundwater.

Since this alternative does not provide for the Sonsela Aquifer to be restored to its beneficial use, it is not favored by EPA.

Groundwater Alternative 1B—Restricted Use

Time to Implement:	1 year
Capital Cost:	$44,500
O & M Cost:	$40,800
Present Worth Cost:	$668,500

This alternative includes all the components of Alternative 1A. It also includes the installation of activated carbon water treatment units on existing domestic wells that exceed drinking water standards and quarterly sampling of domestic wells at the point of consumption to insure effectiveness of the carbon treatment units.

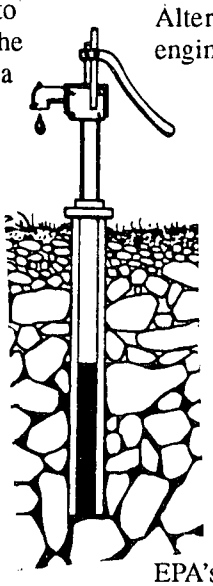
The carbon treatment units are considered an institutional control and do not provide for EPA's objective to restore the groundwater to beneficial use; therefore, this alternative is not favored by EPA.

Groundwater Alternative 1C—Extraction/Reinjection

EPA'S Preferred Alternative

Time to Implement:	1 year
Capital Cost:	$2,156,000
O & M Cost:	$367,200
Present Worth Cost:	$7,957,000

Groundwater Alternative 1C involves all the components of Alternative 1B: the installation of groundwater extraction wells; a groundwater treatment plant (air stripper); the installation of injection wells.



The use of an extraction and reinjection well system is commonly used to attempt to restore an aquifer. The system removes groundwater via extraction wells and then reinjects the treated groundwater into the aquifer. The reinjection wells may be located upgradient of the contaminant plume, around the perimeter of the contaminant plume, or interspersed with the extraction wells. This alternative will provide for restoration of the aquifer at a faster pace than the No Action or Restricted Use alternatives.

This alternative is implementable upon the removal of the NAPL which is the groundwater contamination source. The efficiency of the remediation system to achieve the remediation goals for groundwater will be assessed throughout the implementation process. The extraction system may require modification through the remediation period due to potential variations in groundwater flow and extraction efficiency.

This alternative, implemented simultaneously with Alternative 2C, is favored by EPA.

Groundwater Alternative 1D—Vapor Extraction

Time to Implement:	5-7 years
Capital Cost:	$2,214,500
O & M Cost:	$411,700
Present Worth Cost:	$8,718,900

This alternative involves all the components of Alternative 1B. It also includes installation of vapor extraction wells for the groundwater remediation of the E unit and installation of rotary blowers.

This alternative remediates only contaminants that can be transported to the vapor phase and not the actual groundwater and thus is not favored by EPA.

NAPL Alternatives

NAPL Alternative 2A—No Action

Time to Implement:	Not Applicable
Cost:	$0

NAPL Alternative 2A is the No Action Alternative. No monitoring, engineering, construction or treatment is included for the removal of the source of groundwater contamination. Natural bioremediation and attenuation are relied upon under this alternative to eliminate the source of contamination over an unknown period of time. Exposure to NAPL is controlled through the use of institutional controls.

This alternative does not provide for the reduction of toxicity, mobility and volume via treatment. In addition this alternative does not meet the EPA's objective of restoration of the groundwater to beneficial use. This alternative is not favored by EPA.

NAPL Alternative 2B—Extraction

Time to Implement:	1 year
Capital Cost:	$743,900
O & M Cost:	$238,900
Present Worth Cost:	$1,785,000

This alternative involves all the components of Alternative 2A. It also includes installation of NAPL extraction wells in the E, F and G units; groundwater extraction, as necessary; groundwater treatment, as necessary; and disposal of NAPL to a commercial recycler.

This alternative does not provide for restoration of the aquifer to beneficial use as a result of the remediation. This alternative is not favored by EPA.

NAPL Alternative 2C—Vapor Extraction

EPA's Preferred Alternative

Time to Implement:	7 years
Capital Cost:	$1,429,672
O & M Cost:	$430,444
Present Worth Cost:	$4,185,576

This alternative involves continued use of home treatment units. It includes the

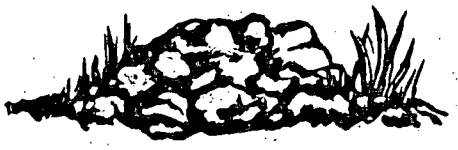
installation of vapor extraction wells; the installation of combination air injection/air sparging wells; the installation of a vapor treatment system; and the installation of combination Soil Vapor Extraction and groundwater pumping wells. Further, it implements long term air and groundwater monitoring, surface discharge, and on-site catalytic oxidation.

NAPL Alternative 2C involves the use of soil vapor recovery for removal of the NAPL as a source of groundwater contamination. A negative pressure is imposed on the soil through a series of well points, sweeping the contaminated zone with air, and allowing the Volatile Organic Compound (VOCs) contaminants to be carried up to the surface where they are removed from the gas stream. The VOC-laden gas stream is contacted with carbon to absorb the VOCs from the gas. The extracted soil vapor will be piped to an on-site treatment area. Air emissions in the treatment area will be controlled and in compliance with all applicable regulations.

This alternative includes groundwater remediation measures that will be applied upon completion of the NAPL extraction phase of the remedy.

This alternative provides for the remedial objectives pertaining to both NAPL and groundwater to be met. This alternative is favored by EPA.

West Pits Alternatives



West Pits Area Alternative 3A—No Action

Time to Implement:	Not Applicable
Cost:	$0

The No Action alternative would not involve any remedial actions. The Site would remain as it exists at the present time. Since this alternative does not meet the remedial objectives set for this area, it is not favored by EPA.

West Pits Area Alternative 3B—Native Soil Cap

Time To Implement:	1 year
Capital Cost:	$27,300
O & M Cost:	$0
Present Worth Cost:	$27,300

This alternative involves use restriction for residential areas, placement of a soil cap and revegetation:

This alternative is not favored by EPA due to the question of permanence of the cap in a residential setting. Due to the arid conditions at the Site, it is not known if the grass for the vegetative cover will grow. Thus, erosion of the cover may occur.

West Pits Area Alternative 3C—Excavation/Landfarming

EPA's Preferred Alternative

Time to Implement:	1 year
Capital Cost:	$862,300
O & M Cost:	$150,100
Present Worth Cost:	$1,142,400

This alternative includes excavation, landfarming and monitoring. Landfarming, or land treatment, involves tillage, fertilization and irrigation of the contaminated soil in a controlled treatment area to maximize biological degradation of the contaminants. Landfarming has been used effectively throughout the country on contaminated soils similar to those found at the Prewitt Site. The process relies on aerobic digestion, generally by naturally occurring microorganisms, under conditions designed to maximize aerobic biological activity. Removal by volatilization and photodegradation may also occur. The soil containing hydrocarbons would be consolidated in a central location within an area of contamination and would be landfarmed.

The landfarm would be constructed in the western end of the Site and would consist of runon-runoff protection, near flat treatment area, irrigation system, and a nutrient addition system. Treatment would consist of mechanically working the material to allow air to penetrate, and providing moisture and nutrients at near optimal conditions during allowable weather. Monitoring of the soil PAH content would be performed to measure degradation until the remedial action objectives/goals are met.

It is expected that within two years from implementation, the risk posed by the waste pits will be reduced such that residential use of the property can occur. This alternative is expected to meet all **applicable or relevant and appropriate requirements (ARARs)** regarding landfarming. Since treatment will occur within the area of concern, the movement of waste will not constitute placement; thus, federal Land Disposal Restrictions are not ARARs. This alternative is favored by EPA.

West Pits Area Alternative 3D—Thin Spreading

Time to Implement:	1 year
Capital Cost:	$113,700
O & M Cost:	$22,200
Present Worth Cost:	$134,800

West Pits Area Alternative 3D involves excavating the pits to the bottom of the tarry material and stockpiling that material. The excavated pit material would then be spread over an area of approximately five acres. The material would be mechanically worked to generate a maximum of surface area, allowing for an increase in biodegradation. The excavations would then be backfilled and the Site leveled after treatment is completed.

Thin spreading is a form of landfarming, but may not be able to meet the RCRA requirement to maximize biodegradation or to ensure degradation of contaminants in the treatment zone prior to transport into groundwater. EPA does not favor this alternative at this time.

West Pits Area Alternative 3E—Stabilization

Time to Implement:	1 year
Capital Cost:	$83,400
O & M Cost:	$0
Present Worth Cost:	$83,400

This alternative includes stabilization of pits, placement of soil cover, and vegetation, as well as use restrictions for a residential area.

Stabilization is a means of minimizing the risks associated with the hazardous

waste by limiting the solubility and mobility of contaminants, thus minimizing their potential for leaching into the groundwater and preventing ingestion or direct contact.

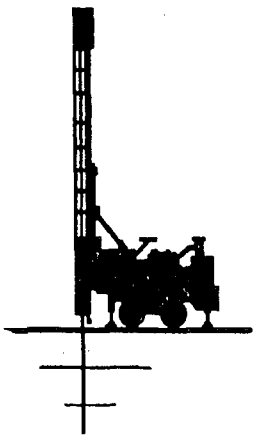
Although this alternative meets the remedial objectives set for the West Pits Area, land use restrictions would prevent the property from being used for residential purposes. This alternative is not favored by EPA.

Surface Soil Alternatives

Surface Soils Alternative 4A—No Action

Time to Implement: Not Applicable
Cost: $0

The No Action alternative would not involve any remedial actions. The Site would remain as it exists at the present time. The No Action alternative does not provide for means to eliminate or control exposure to contaminated soils, nor does it provide for treatment. Consequently, this alternative is not favored by EPA.



Surface Soils Alternative 4B—Lead Contamination: Excavation, Off-Site Disposal

EPA's Preferred Alternative

Time to Implement:	1 year
Capital Cost:	$1,605,000
O & M Cost:	$0
Present Worth Cost:	$1,605,000

Lead Alternative 4B involves the excavation of soil containing lead at concentrations above the 500 ppm action level. The soil will be chemically stabilized onsite if required by Federal standards prior to transporting the material to a RCRA landfill for disposal. This alternative meets the remedial action objectives for lead-contaminated soil, provides for treatment as necessary and eliminates the potential for human health and the environment to be exposed to lead. This alternative is favored by EPA.

Surface Soil Alternative 4C—Asbestos Contamination: Excavation, Off-Site Disposal

EPA's Preferred Alternative

Time to Implement:	1 year
Capital Cost:	$9,300*
O & M Cost:	$0
Present Worth Cost:	$9,300*

* This cost is based on the removal of only excavating approximately 15 cubic yards. The cost may be higher due to the requirement to remove all asbestos-contaminated soil and material.

Asbestos Alternative 4C involves the excavation of soil containing asbestos and any additional asbestos containing materials present at the Site. Asbestos containing materials will be excavated, placed in sealed containers, transported to and disposed of in an approved landfill. During the removal activities, air monitoring will be performed in accordance with Occupational Safety and Health Administration (OSHA) and National Emissions Standards For Hazardous Air Pollutants (NESHAP) requirements. This method of asbestos abatement is an acceptable practice. Since this alternative will eliminate the possibility of exposure to asbestos containing material, this alternative is favored by EPA.

Surface Soil Alternative 4D—Hydrocarbon Contamination: Excavation, Off-Site Disposal

Time to Implement:	1 year
Capital Cost:	$681,300
O & M Cost:	$0
Present Worth Cost:	$681,300

Hydrocarbon Alternative 4D involves the selective excavation of major surface deposits of hydrocarbon material. The quantity of this material is estimated to be 1,500 cubic yards, approximately 58 truckloads. This material would be loaded into trucks and transported to the nearest acceptable landfill for disposal. The excavations would then be backfilled. Remedial investigation data indicates that some of the PAH concentrations in hydrocarbon-contaminated soils exceed levels permissible for land disposal of refinery-related hazardous wastes. Thus, offsite land disposal which constitutes placement without treatment would not meet ARARs. This alternative is not favored by the EPA.

Surface Soil Alternative 4E—Hydrocarbon Contamination: Excavation, Landfarming

EPA's Preferred Alternative

Time to Implement:	1 year
Capital Cost:	$875,600*
O & M Cost:	$150,100
Present Worth Cost:	$1,286,300

* The cost incurred for this alternative will be lower than presented in the Proposed Plan and in the Feasibility Study report. This is due to the fact that many of these costs have already been taken into account in Alternative 3C.

Alternative 4E involves the excavation and consolidation of the major hydrocarbon occurrences in a prepared landfarm site. The landfarm would be the same as the one constructed for Alternative 3C. This is acceptable since the contamination is in one area of concern; thus, placement would not be occurring and Land Disposal Restrictions would not be ARARs. This alternative meets the remedial action objective for residential use by providing risk levels that are within the EPA's acceptable risk range. Risk is expected to be reduced to levels acceptable for residential use within two years after the start of landfarming. This alternative is preferred by EPA.

Surface Soil Alternative 4F—Hydrocarbon Contamination: Thin Spreading

Time to Implement:	1 year
Capital Cost:	$134,900
O & M Cost:	$22,200
Present Worth Cost:	$156,000

This alternative involves the excavation of major surface deposits of hydrocarbon material, and transporting the material to the west end of the Site, inside the fenced area. The areas excavated would then be backfilled. The excavated material (approximately 1,500 cubic yards) would be spread over an area of approximately 5 acres. The area would then be mechanically tilled to create a maximum surface area to enhance the degradation of the hydrocarbons by exposing the material to ultraviolet rays, and oxygen for increased biological activity.

For the reasons explained in the discussion of Alternative 3D, this alternative is not favored by EPA at this time.

Separator Alternatives

Separator Alternative 5A— No Action

Time to Implement:	less than 1 year
Capital Cost:	$3,700
O & M Cost:	$200
Present Worth Cost:	$7,200

The No Action alternative would consist of installing a fence around the separator. Warning signs would be affixed to the fence to prevent unauthorized access.

This alternative is not favored by EPA because it does not meet the remedial objectives established for the separator and its contents.

Separator Alternative 5B— Excavation, Off-Site Treatment

EPA's Preferred Alternative

Time to Implement:	1 year
Capital Cost:	$116,000
O & M Cost:	$0
Present Worth Cost:	$116,000

Alternative 5B involves the excavation of the separator contents by pumping or mechanical excavation, loadings into trucks, and hauling the contents to an approved RCRA landfill. The waste shipped off-site will be treated at the disposal site as required. The separator contains approximately 83 cubic yards of material that will require approximately four trucks. After the separator contents are removed, holes will be broken into the bottom to permit drainage and the sampling of soil below the separator. If leakage of the separator contents is found, additional remediation of contaminated soils will be performed through landfarming provided the leachability of contaminants does not interfere with compliance of landfarming ARARs. If leachability of contaminants from soils taken from under the separator does interfer with landfarming ARARs, the soil will be treated through other methods such as, but not limited to, stabilization, off-site incineration, or soil washing. After all separator contents have been removed, the separator will be backfilled. This alternative is favored by EPA.

EVALUATION OF REMEDIAL ALTERNATIVES

EPA's preferred alternative for remediating the groundwater at the Prewitt Refinery Site is a combination of Alternatives 1C Groundwater Extraction/Reinjection and 2C NAPL Vapor Extraction. The goal of the remedial action is to remove the NAPL as a continuing source of contamination to groundwater, and to the maximum extent practicable, to return all units of the Sonsela Aquifer to their beneficial use. Based on information obtained during the remedial investigation, supplemental sampling, and analysis of all remedial alternatives, EPA believes that the preferred remedy will achieve this goal.

Groundwater contamination may be especially persistent in the immediate vicinity of the NAPL where concentrations are relatively high. The ability to achieve cleanup levels at all points throughout the area of attainment, or plume, cannot be determined until the extraction system has been implemented, modified as necessary, and plume response monitored over time. If the selected remedy cannot meet the specified remediation levels, the contingency measures described in this section may replace the selected groundwater remedy and remediation levels for these portions of the plume. Such contingency measures will, at a minimum, prevent further migration of the plume and include a combination of containment technologies and institutional controls. These contingency measures are considered to protect human health and the environment, and are technically practicable under the corresponding circumstances.

The preferred alternative includes groundwater extraction for an estimated period in excess of 30 years, during which time the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any, or all, of the following:

- Discontinuing pumping at individual wells where cleanup goals have been attained.
- Alternating pumping among the various wells to eliminate stagnation points.
- Pulse pumping to allow aquifer equilibration, and to encourage adsorbed contaminants to partition into groundwater.
- Installing additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

EPA's preferred remedy to address the soil and separator contamination consists of a combination of alternatives. The preferred remedy does not leave waste in place to pose a risk to human health and the environment.

The preferred remedy for the entire Site is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site.

Remedy Selection Criteria Analysis

Based on current information, the preferred Alternatives 1C, 2C, 3C, 4B, 4C, 4E and 5B appear to provide the best balance between the alternatives with respect to the nine criteria that EPA uses to evaluate alternatives (see Selecting a Remedy, page 23).

West Pits Area, Surface Soils, and Separator Alternatives

Criterion 1— Overall Protection of Human Health and the Environment

The No Action alternative for all the West Pits Area, the surface soils and the separator does not provide protection of human health and the environment.

Therefore, it will not be discussed further in the criteria analysis.

West Pits Area Alternatives

Alternative 3C provides for the reduction of risks posed by the waste pits and its contents to an acceptable level through the use of landfarming. This alternative is protective of human health and the environment. It is expected that the West Pits and landfarm areas will be able to be used for residential purposes upon completion of the landfarming and landfarm closure. Monitoring programs will be established to ensure that contaminants are not leaching into the groundwater; thus providing protection of the groundwater. Of the alternatives discussed, this alternative provides the highest degree of protectiveness to human health and the environment by reducing exposure to remediation goal levels.

Human health and the environment will be protected by Alternative 3B through the elimination of the physical hazard and isolation of the wastes in the pits as they now exist. The cap would eliminate the potential for storm water collection in the depressions. For the residential scenario, restrictions would be required to prevent construction of housing in the West Pits Area to ensure the integrity of the cap. It will reduce exposure to remediation goals.

Alternative 3D may be protective of human health and the environment by utilizing the natural degradation of the pit contents. Natural degradation may eventually result in a reduction of risk to levels that would be acceptable for residential use. Alternative 3D may reduce exposures to where levels of contaminants meet the remediation goals; however, thin spreading may not be able to meet the federal environmental requirements to maximize biodegradation. Moreover, thin spreading may not be able to meet Federal requirements to ensure degradation of contaminants in the treatment zone prior to transport into groundwater; therefore, it may not be protective of human health and the environment.

Alternative 3E will be protective of the public health by removing the physical hazards now associated with the West Pits Area. It will be protective of the environment through the chemical stabilization of hydrocarbons near the soil surface. Under the residential scenario, restrictions would be required to prevent the construction of housing in the West Pits Area to prevent disturbance of the compacted material. Alternative 3E may reduce exposure to within remediation goal levels.

Surface Soils Alternatives

The risk associated with lead will be reduced with Alternative 4B by removing the soil containing lead above the action level of 500 ppm. Risks due to potential exposure to inhalation of asbestos would be eliminated by Alternative 4C. Both of these alternatives provide the highest degree of protection to human health and the environment for soil contaminated with lead and asbestos.

As with Alternative 3C, Alternative 4E (both are landfarming alternatives) provides the highest degree of protection to human health and the environment of any of the alternatives discussed. Alternative 4E reduces exposures to contaminants to remediation goals. Alternative 4D is protective of human health and the environment by removing most of the hydrocarbon material from the Site, thereby reducing levels of exposure to meet remediation goals. Alternative 4F may eventually, through natural degradation, reduce exposures to contaminants to remediation goal levels. However, Alternative 4F will have the same limitations as those presented for 3D.

Separator Alternatives

Through Alternative 5B, the potential risks due to contact and ingestion of the separator sludge would be eliminated due to the removal of the sludge. This alternative is protective of human health and the environment.

Criterion 2— Compliance with ARARs

The Navajo Superfund Office has indicated that Tribal ARARs do not exist. Consequently, Navajo ARARs are not discussed.

New Mexico is authorized under RCRA to operate its hazardous waste management program in lieu of the federal RCRA programs. When federal RCRA requirements are cited in the description of ARARs (which follows), the intention is also to reference the corresponding New Mexico regulation, if the New Mexico regulations are applicable.

West Pits Area

There are no chemical- or location-specific ARARs that apply to the West Pits Area. The treatment taking place is in-situ (i.e, in-place) within one area of contamination, thus, placement will not be occurring and Land Disposal Restrictions will not be applicable, relevant or appropriate. RCRA (40 CFR 264.270) Subpart M is considered an action-specific requirement for the thin spreading and landfarming alternatives. Compliance with the requirements set forth in RCRA (40 CFR 264.270) Subpart M will help ensure that contaminants do not migrate beyond the treatment zone in concentrations above risk-based levels.

Landfarming, when implemented properly, will meet the action-specific ARARs of RCRA and is demonstrated to result in significant reduction of toxic organic compounds such as PAHs. The effectiveness of thin spreading to ensure treatment of contaminants within the treatment zone, as required by RCRA, is less certain. Thin spreading does not include unsaturated zone monitoring to detect contaminant leachate. Thus, thin spreading, as presented in the feasibility study, will not comply with RCRA requirements.

RCRA closure requirements for landfarming are action-specific ARARs for the landfarming and thin spreading alternatives, and are expected to be met.

Surface Soils

The remedial action goal for the lead contaminated soil is 500 ppm. The presence of the lead in the soil may result in designation of the excavated soil as exhibiting the characteristic of lead toxicity under RCRA. Consequently, the soil will be treated onsite to satisfy the Land Disposal Restrictions which set cleanup standards for certain wastes prior to land disposal in a RCRA-permitted landfill. There are no location-specific

ARARs for the lead excavation alternative. The 500 - 1000 ppm action level is a range set by EPA. The exact action level is selected based on site-specific factors. Some of the soils containing high lead may also contain either F037 or F052 RCRA hazardous wastes. Review of data in the remedial investigation indicates that contaminants other than lead in the high lead-soils are below levels that can be land disposed pursuant to the Land Disposal Restrictions. In the event that soils that must be removed due to high lead content also contain high concentrations of organic constituents in excess of the Land Disposal Restricition limits, treatment via landfarming will need to take place prior to off-site disposal of the soils.

Under federal regulations if asbestos is found improperly disposed of, it must all be removed down to background levels. All asbestos-contaminated material which is removed will be sent to an approved landfill. There are no location-specific ARARs for the asbestos removal alternative.

There are no chemical-specific ARARs which address hydrocarbons in soil. RCRA treatment, storage, disposal and transportation regulations and Land Disposal Restrictions are considered ARARs for Alternative 4D.

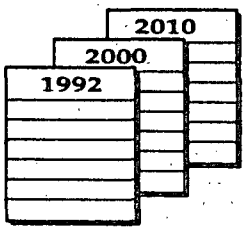
There are no chemical-specific ARARs for the remedial alternatives discussed for surface soils containing hydrocarbons. There are no location-specific ARARs for Alternative 4E and 4F. Landfarming RCRA requirements inclusive of closure requirements are considered action-specific ARARs for 4E and 4F. Since treatment will be occurring within the area of concern, placement will not be occurring; therefore, Land Disposal Restrictions are not considered ARARs for 4E and 4F.

Separator

With Alternative 5B , there are no chemical-specific ARARs which address the separator residues remaining in the unit. Land Disposal Restrictions are action-specific ARARs that apply to this alternative. When the residues are removed for disposal, they will be manifested as a RCRA hazardous waste, if it exhibits the toxicity characteristic for lead, and will be treated prior to disposal at an approved disposal facility. There are no location-specific ARARs for the separator residue removal alternative.

Criterion 3— Long-Term Effectiveness and Permanence

West Pits Area



Alternative 3B is only as permanent as the cap itself. Provided the cap is effective, this alternative would meet the remedial action objective for the residential scenario by controlling or eliminating exposure from PAHs.

Alternative 3C will treat the hydrocarbon contained in the pits through biodegradation. Bench scale testing has shown that landfarming can be effective in treating hydrocarbons. This alternative provides for risk levels to be reduced such that residential use of the area can occur.

Alternative 3D may meet the remedial goals established for the West Pits Area. The physical hazard from PAHs will be eliminated. However, there is less certainty that thin spreading will reduce the health risk, and contaminant migration to groundwater can occur. The long-term effectiveness of this alternative is uncertain. Thin spreading waste which exceeds EPA's acceptable risk range will increase short-term risks due to increasing the areal extent and probability for exposure, and may also increase long-term risks if contaminants are very slowly degraded.

Alternative 3E will meet the remedial goals established for the West Pits Area. This alternative reduces the magnitude of residual risk to meet the remedial action objective for the residential scenario by controlling or eliminating exposure to PAHs. The physical hazards posed by the West Pits will also be permanently eliminated from the Site. Past experience at other sites has shown stabilization to be an adequate and reliable treatment for PAHs. This alternative is effective in the long term.

Surface Soils

Alternative 4A does not reduce the magnitude of residual risk to meet remedial action objectives for lead-, asbestos-or hydrocarbon-contaminated-soils. Since it would not control or eliminate exposure to contaminated soils, it would not maintain adequate or reliable protection of human health and the environment over time. Under this alternative there would remain a residual risk of significant magnitude. Therefore, it is neither permanent nor effective in the long term.

Alternative 4B will reduce the magnitude of residual risk to meet the remedial objective to control or eliminate exposure to lead-contaminated soils. Since soil containing lead in concentrations above the action level will be removed from the Site, the action will maintain adequate and reliable protection for human health and the environment over time. Under this alternative, no significant residual risk will remain once cleanup goals have been met. This alternative will be effective in the long term, and permanent.

Alternative 4C will meet the remedial action objective to control or eliminate the exposure to asbestos-contaminated soil. No risk to human health and the environment is expected to remain once the remedial action is complete and the asbestos containing material is disposed of in an approved landfill. Such removal has been proven to be a reliable and effective remediation of asbestos-contaminated soil. The problem will be permanently solved so that controls will not be required. This alternative is effective in the long term.

Alternative 4D reduces the magnitude of residual risk to meet the remedial action objective for the residential scenario. This alternative provides long-term effectiveness and permanence by excavating the contaminated soils and disposing of them off-site and backfilling the area with clean soils from the local area.

Alternative 4E will treat the hydrocarbon contained in the soils through biodegradation. Bench scale

testing has shown that landfarming can be effective and reliable in treating hydrocarbons. This alternative provides for risk levels to be permanently reduced for the long term such that residential use of the area can occur.

Alternative 4F may reduce the magnitude of residual risk of exposure to hydrocarbons in separator sludge to meet the remedial action objectives. However, 4F may not be adequate or reliable because there is less certainty that thin spreading will reduce the magnitude of residual risk due to contaminant migration to groundwater which may occur. The long-term effectiveness of this alternative is uncertain. Thin spreading waste which exceeds EPA's acceptable risk range will increase short-term risks due to increasing the areal extent and probability for exposure, and may also increase long-term risks due to possible migration of contaminants to groundwater.

Separator

The No Action Alternative (5A), does not meet the remedial action objective to eliminate the risk and hazards associated with exposure to the separator unit. It is not effective in the long term.

Alternative 5B is reliable, effective and permanent. After completion of remediation, all separator contents will have been removed. This alternative will substantially eliminate all residual risk of exposure to separator contents; therefore, this alternative is permanent and effective in the long term.

Criterion 4— Reduction of Toxicity, Mobility, and Volume Through Treatment

West Pits Area

Alternative 3C provides for the reduction in toxicity and mobility of contaminants through irreversible biodegradation. The quantity of residual contamination will be up to 99% less than before treatment, though it will be spread over a larger area. It is expected that the risk posed by the waste will be reduced to acceptable residential use levels within two years.

The native soil cap in Alternative 3B does not meet this criterion because it does not provide for the reduction in toxicity, mobility and/or volume of contaminants through treatment.

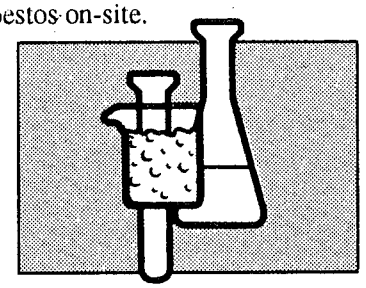
Alternative 3D will enhance the natural degradation of the refinery wastes now contained in the pits. Toxicity and volume should be reduced over time. However, the reduction in toxicity is uncertain. Moreover, mobility may not be reduced do to the possibility that contaminants may migrate into the groundwater undetected.

Alternative 3E will reduce toxicity and mobility through treatment. The volume occupied by the contaminants will increase due to mixing with ash. However, the total mass of contaminants will remain the same. A stabilized mass will be produced.

Surface Soils

Alternative 4B reduces toxicity, mobility and volume at the Site by removing the lead in the soil to 500 ppm and providing for off-site treatment to take place as necessary prior to disposal. Ultimate placement in a secure off-site landfill will be reduce mobility.

Alternative 4C does not meet this criterion since treatment is not taking place. Off-site disposal reduces the toxicity, mobility and volume of the asbestos on-site.



Removal and off-site disposal of the soil containing asbestos above the action level is not considered treatment. Thus, it does not meet this criterion. Mobility will be reduced by the off-site disposal unit. If off-site treatment is needed prior to disposal, toxicity would be reduced. However, volume may not be reduced.

Alternative 4E provides for the reduction in toxicity, mobility and volume of contaminants through biodegradation. It is expected that the risk posed by the waste will be reduced to acceptable use residential levels within two years.

Alternative 4F will increase the surface area which the refinery wastes occupy, thereby enhancing the natural degradation. This should result in a reduction of toxicity and volume over time. However, the reduction in toxicity is uncertain. Moreover, mobility may not be reduced due to the possibility that contaminants may migrate into the groundwater undetected.

Separator

No reductions in contaminant toxicity, mobility or volume would be achieved by the No Action Alternative (5A) since treatment is not taking place.

Alternative 5B does not reduce volume of the separator contaminants. However, toxicity and mobility will be reduced by treatment. This alternative provides for off-site disposal of the separator contents. The contents will be treated prior to off-site disposal.

Criterion 5— Short-Term Effectiveness

West Pits

Alternative 3B can be completed relatively quickly once workers have been mobilized. There are risks associated with the construction of the cap, but these are normal for this type of work and can be mitigated through the implementation of a safety program. Risk to the community and the environment during construction are low. Alternative 3B is effective in the short term.

For both Alternatives 3C and 3D there will be short-term hazards to construction personnel. These hazards are common to any excavation operation and may be mitigated through safety precautions. Alternative 3C is expected to reach remedial action goals within two years of implementation. It is unknown how long it will take for Alternative 3D to reach the remedial action goals. Thin spreading waste which exceeds EPA's acceptable risk range, will increase short-term risks due

to increasing the areal extent. Probability for exposure to the contaminated wastes and long-term risks may also be increased. These risks can be controlled by limiting access until sufficient degradation of contaminants is complete.

With Alternative 3E there will be short-term hazards to remediation personnel and local residents from airborne particulates during the mixing of lime and the recontouring. These hazards can be mitigated through the use of personal protective equipment by remediation workers and the use of dust-suppression water. Work would not be allowed during windy days that would carry particulates past the Site boundaries. This alternative is implementable within one year.

Surface Soils

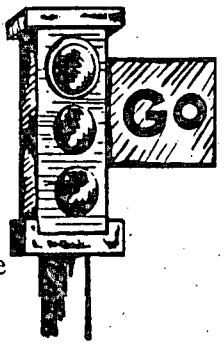
Short-term risks to the public from Alternative 4B are associated with the ingestion of airborne particles generated during excavation, loading, and transporting. Safety measures such as dust-suppression sprays and tarping of the trucks would be implemented to prevent exposing the public to contaminants. Operating during periods of high wind would not be allowed. Traffic control in the vicinity of the Site and the use of qualified, experienced haulage contractors would minimize the risk from the trucks. For workers, the risks are greater because of directly handling the soil. An appropriate health and safety program will be developed and enforced to mitigate these risks. The backfilling of excavations to above original grade will minimize any environmental impact on the arid, flat terrain. Access to the area is good and no new roads or other disturbances are required. Alternative 4B is effective in the short term. Protection is expected to be achieved within a year.

In implementing Alternative 4C, the removal and handling of the asbestos containing material will be conducted in accordance with federal regulations, which ensure the protection of workers, environment and the public. The time until protection will be achieved is estimated to be less than one year upon mobilization of workers and equipment. This alternative is effective in the short term.

Risks to workers and the community through Alternative 4D will be ingestion of airborne particles generated during excavation, loading and transporting. Safety measures such as dust-suppression sprays and tarping of trucks will be implemented to prevent exposing the remediation personnel and the public to the hydrocarbons. Protection is expected to be achieved within a year.

Through Alternatives 4E and 4F, there will be short-term hazards to construction personnel. These are the hazards common to any excavation operation and may be mitigated through safety precautions. Both alternatives are effective in the short-term.

Alternative 4E is expected to reach remedial action goals within two years of implementation. It is unknown how long it will take for Alternative 4F to reach the remedial action goals. The short-term risks to the community and the environment may be increase with Alternative 4F by increasing the areal extent of the West Pit contents, and therefore the exposure possibilities. These risks are lessened with techniques used in 4E. Exposure possibilities can be controlled by restricting access until sufficient degradation is completed. Risks to the community will be minimized by conducting air monitoring during implementation to ensure risk due to inhalation are within EPA's acceptable risk range.



Separator

There should be no risk to the public during removal of the separator sludge. There are risks for workers exposed to the sludge during removal, but these can be mitigated through the implementation of an effective health and safety program. A risk to the community and workers is present during transportation of the material from the Site to the landfill. Protection is expected within one year. Thus, Alternative 5B is effective in the short term.

Criterion 6—Implementability

West Pits

Alternatives 3B, 3C, 3D and 3E are all implementable within a one-year period. Adequate work force and equipment, as well as chemicals, are available in the area. Native soil for the cap is available on-site or nearby.

Surface Soils

All surface soils alternatives are implementable in a one-year period. The excavation, transport and disposal of contaminated soils is common practice. The excavations are shallow and of small areal extent so that common equipment can be utilized. Clean, native soil for backfill, if needed, should be available either on-site or locally.

Asbestos Alternative 4C is easily implemented within a one-year period, as the technologies are common practice and proven reliable. The alternative provides a permanent solution to the problem. The action will require coordination with the State of New Mexico.

Alternatives 4D, 4E and 4F are implementable within a one-year period. The work force and equipment required are readily available in the area.

Separator

The technologies proposed for Alternative 5B are proven reliable and have become common practice. Equipment and personnel should be readily available. This alternative is implementable within a one-year period.

Criterion 7—Cost

West Pits

The Preferred Alternative, 3C, is the most expensive for remediation of the west pits, at an estimated $1,142,400. The least expensive alternative is Alternative 3A at $0.

Surface Soils

The least expensive surface soil remedial alternative considered is the No Action Alternative, 4A, at $0. The cost of the preferred soil remedial

alternative, which is the combination of Alternatives 4B, 4C, and 4E, will be approximately $2,900,600.

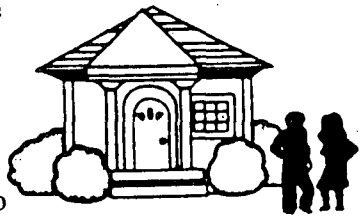
Separator

The least expensive alternative for remediation of the separator is the No Action Alternative (5A) at a present value of $7,200. The preferred alternative (5B) is also the most expensive at $116,000.

Criterion 8— State Acceptance

The State of New Mexico through the New Mexico Environment Department has reviewed and commented on the Remedial Investigation and Feasibility Study Reports. The State has also commented on the draft Proposed Plan. The State comments have been incorporated. While the State, through its comments, indicated general agreement with the Proposed Plan, the State reserves the right to provide comments after the start of the public the comment period.

The Navajo Nation through the Navajo Superfund Office has reviewed and commented on the draft Remedial Investigation and Feasibility Study Reports. While the Navajo Nation has indicated general agreement with the Proposed Plan, the Navajo Nation reserves the right to provide comments after the start of public comment period.



Criterion 9— Community Acceptance

Community acceptance of the preferred alternative will be addressed in the ROD to be prepared after receipt of public comments on this Proposed Plan, the Remedial Investigation and Feasibility Study Reports and the Administrative Record.

Groundwater and NAPL Alternatives

Criterion 1— Overall Protection of Human Health and the Environment

The No Action Alternatives, 1A and 2A, do not provide overall protection of human health and the environment; therefore, they will not be discussed further in the criteria analysis.

Home treatment units provide effective removal of the groundwater contaminants, though they do not address the source of contamination. They eliminate the health risk to the public from ingestion and inhalation of the contaminants, provided they are properly monitored and filters are replaced and/or regenerated. Institutional controls are used to insure that no new domestic wells will be installed in the contaminated portions of the Sonsela Aquifer. Thus, Alternatives 1B, 1C and 1D are protective of human health and the environment. The time required for the aquifer to reach drinking water standards throughout is unknown utilizing Alternative 1B.

Alternative 2B achieves the remedial action objective of reducing or eliminating the source of groundwater contamination. Extraction of the NAPL and institutional controls make this alternative protective of human health and the environment.

Alternative 2C involves the removal and destruction of volatile organics in NAPL and groundwater and is expected to achieve groundwater drinking water standards in a reasonable time frame. During implementation of the remedy, home treatment units eliminate the health risk to the public from ingestion and inhalation of contaminants. Use restrictions insure that no new domestic wells will be installed in the contaminated portion of the Sonsela Aquifer. This alternative is protective of human health and the environment.

Criterion 2— Compliance with ARARs

The Navajo Superfund Office has indicated that Tribal ARARs do not exist. Consequently, Navajo ARARs are not discussed.

New Mexico is authorized under RCRA to operate its hazardous waste management program in lieu of the federal RCRA programs. When federal RCRA requirements are cited in the description of ARARs which follows, the intention is also to reference the corresponding New Mexico regulation (if the New Mexico regulations are applicable).

Under the Restricted Use Alternative 1B, chemical-specific ARARs, including drinking water standards, will almost certainly not be attained within any reasonable time period in the Sonsela Aquifer units. Home treatment units will attain ARARs at the point of exposure to domestic groundwater. There are no action- or location-specific ARARs for the Restricted Use Alternative 1B.

Due to the heterogeneous nature of the Sonsela sandstone it is questionable whether chemical-specific ARARs, including drinking water standards, will be attained throughout the aquifer in a reasonable period of time, utilizing Alternatives 1C and 1D. Based on the common practice of assuming operating plant life to be 30 years, this time frame has been selected as a reasonable period in which to obtain the goals.

For Alternatives 2B and 2C the New Mexico State Engineer's Office Rules and Regulations, Article 1-17 are considered action-specific ARARs. Under Alternatives 1C, 1D and 2B, the aqueous discharge from the air stripper will be required to attain the New Mexico Water Quality Control Commission Regulations. Thus, metal contaminant concentrations must meet these standards, or additional treatment may be required.

The action-specific requirements applicable to discharges onto the ground surface that apply to the groundwater and NAPL alternatives are found in New Mexico Water Quality Control Commission Regulations. They include, but are not limited to:

Benzene	10 µg/L*
Ethylbenzene	750 µg/L
Toluene	750 µg/L
Xylenes	620 µg/L
Napthalene	30 µg/L
Lead	15 µg/L

*micrograms per liter

There are no location specific ARARs for the groundwater Alternatives 1C and 1D.

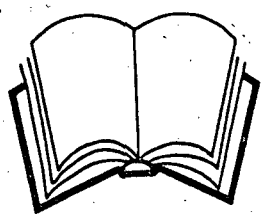
With Alternative 2C, compliance with chemical-specific ARARs, including drinking water standards for groundwater, is expected to be attainable in 15 to 80 years. Action-specific ARARs

will be met. The NAPL extraction part of this alternative will result in a substantial reduction, if not elimination, of NAPL as a source of groundwater contamination. It will also substantially reduce the high BTEX concentrations in groundwater in the vicinity of the E Sandstone NAPL plume.

Emissions from the vapor extraction and air stripper units will meet action-specific requirements of New Mexico Air Quality Control regulations.

Criterion 3– Long-Term Effectiveness and Permanence

Home treatment units in Alternative 1B will provide long-term effectiveness if maintained and serviced properly. The use of these units would be required until natural biodegradation and attenuation reduce contaminant levels to below action levels. The time required for this to occur is unknown. The remediation rate for natural degradation and attenuation is difficult to predict at the Prewitt Site as long as NAPL is present. However, it is almost certain that natural degradation and attenuation will not reduce the magnitude or residual risk within any reasonable period of time. Four home treatment units have been installed on the existing local wells at the present time. Institutional controls will insure that no new domestic wells are installed in the contaminated portions of the aquifer.



The long-term effectiveness of Alternative 1C is uncertain. In similar pump and treat remediations at other sites, after target levels were initially achieved, the aquifer contaminants "rebounded" to above target levels. However, when appropriately designed, this system will control the migration of contaminants which will certainly reduce the magnitude of residual risk to those who utilize the aquifer in question.

The long-term effectiveness of Alternative 1D is uncertain. Insufficient data is available to determine whether vapor extraction systems exhibit a "rebound" effect similar to pump and treat systems. Experience at other sites, such as the Tysons Superfund Site in King of Prussia, Pennsylvania, has shown that ultimate removal of volatile contaminants from fractured rock is difficult, if not impossible, to complete. Additionally, the low permeability of the fractured formation at the Prewitt Refinery Site suggests that vapor extraction will not reach sufficient water surface area to obtain drinking water standards. Consequently, it appears that residual risk would remain high under 1D.

Remedial action objectives are achieved at the completion of Alternative 2B. Although it is uncertain how long it will take for the remediation to be completed using this alternative and how successful this alternative will be. Provided that the alternative is successful in reducing or eliminating the NAPL as a source of groundwater contamination, this alternative is both permanent and effective in the long term.

The NAPL remediation alternative consists of a combination of Alternative 2C and Alternative 1C. This combination will be a reliable and effective method for reducing the volume of BTEX in vapor, adsorbed on soil and rock and in a liquid phase from the E, F, and G sandstone units. From the pilot test results, it is believed that the remedial action goals for the NAPL will be met within five years. Alternative 2C results in a substantial reduction, if not elimination, of NAPL as a source of groundwater contamination and also substantially reduces the level of contamination in groundwater where concentrations are highest. Further air sparging and extraction of groundwater through Alternative 1C, where these remediation approaches can be effective, combined with natural restoration where they cannot, will result in attainment of groundwater drinking water standards, eliminating residual risk (subject to the qualification expressed in the discussion of the implementability of Alternative 1C which follows). Thus, this alternative will provide both long-term effectiveness and permanence.

Criterion 4— Reduction of Toxicity, Mobility, and Volume Through Treatment

Alternative 1B will not reduce the toxicity, mobility or volume of the contaminants in the groundwater. This alternative does treat the groundwater at point of exposure by removing the contaminants into the carbon treaters. The aquifer may ultimately be remediated by natural attenuation and contaminant degradation at some unknown time in the future.

Alternative 1C will reduce the volume, toxicity, and mobility of the contaminants. Toxicity of groundwater is irreversibly reduced by the slow removal of BTEX from the groundwater and through treatment of the groundwater prior to reinjection. Mobility of contaminants is reduced by the altering of the groundwater gradient within the well field. Ultimately volume and toxicity of the BTEX will be irreversibly reduced by recycling of the BTEX as a fuel when it is burned.

Alternative 1D removes the contaminants thus reducing their toxicity and mobility.

Alternative 2B provides for the removal of NAPL; thus, the toxicity of the groundwater is reduced by elimination of the contamination. Mobility and volume of contamination in the affected groundwater is reduced. Since extracted NAPL will be sent to a recycling firm, treatment will be taking place. Also, the groundwater which is extracted along with the NAPL will be treated prior to discharge.

Based on the pilot test results Alternative 2C effectively removes the NAPL which acts as a source of contamination to the groundwater. Toxicity, mobility and volume reduction are achieved through vapor extraction and treatment of the BTEX fraction within the NAPL which are of concern for toxicity and mobility in vapor and groundwater. Volume reduction will occur not only as a result of the reduction of the BTEX fraction within the NAPL via soil vapor extraction, but also from vapor extraction of a considerable portion of other volatile and semivolatile constituents in NAPL. The NAPL volume will also be reduced by vacuum-enhanced liquid NAPL

extraction. The toxicity, mobility and volume of BTEX compounds in groundwater are also reduced by pump and treat, and air sparging, through the implementation of Alternative 1C, within the portion of the E sandstone in the vicinity of the NAPL source which exhibits the highest concentrations of BTEX.

Criterion 5— Short-Term Effectiveness

Home treatment units and institutional controls in Alternative 1B are effective in short-term protection of human health.

Under Alternative 1C, the use of institutional controls and home treatment units will protect human health during the remediation period. Risks associated with installation of the system are minimal. Workers wil not be directly exposed to the contaminants except for the short period of well completion. Alternative 1C is effective in the short term. Risk to the environment will be minimal since ground water will be treated and reinjected.

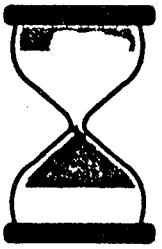
Alternative 1D provides for the use of institutional controls. Home treatment units will protect human health during the remediation period. Risks associated with installation of the system are minimal. Workers will not be directly exposed to contamination except for the short period of well completion. Risks to the environment are expected to be minimal.

Risk to workers with Alternative 2B is minimal. This alternative is effective in the short term. Risks to workers associated with installation ad operation of the system will be minimized by compliance with federal health and safety regulations. Risk to the community and the environment during implementation of this alternative is minimal. Air emissions would comply with regulatory standards.

The use of institutional controls, home treatment units and compliance with action-specific ARARs will protect human health and the environment during the remediation period involved with Alternative 2C. Risks to workers associated with installation and operation of the system will be minimized by compliance with federal health and safety regulations.

Criterion 6— Implementability

Alternative 1B is implementable. The units are available and service of the units is available in the area. Institutional controls exist in the form of New Mexico regulations which prohibit installation of water supply wells in known areas of contamination.



Under Alternative 1C, mechanical installation of the system is standard practice and can be easily accomplished within one year. However, recent studies of pump-and-treat applications, the presence of NAPL at the Prewitt Site, and the modeling performed all illustrate the difficulty that pump-and-treat alternatives will have in achieving µg/L concentrations within thirty years at the Prewitt Site. The efficiency of the remediation stystem to achieve the remediation goals for groundwater will be assessed throughout the implementation process. The extraction system may require modification through the remediation period due to potential variations in groundwater flow and extraction efficiency. Alternative 1C is implementable as a component of Alternative 2C. Upon removal of the NAPL, Alternative 1C is implementable for remediation of the groundwater. As a consequence of NAPL removal, additional insight will be gained on the time frame needed for this alternative to achieve the groundwater remediation goal.

The design and installation of vapor extraction systems, sush as is required for Alternative 1D, has become common practice. Experienced contractors are available to conduct the necessary pre-design testing, design and installation of the system. The equipment required for installation is readily available. Regulatory approvals and permits should not be a problem. However, the following technical uncertainties cast doubt on its ability to achieve drinking water standards:

- The tightness of the fractured rock formation suggests that vapor recovery will not reach sufficient water surface area to obtain drinking water standards.
- Compressed air released below the saturated surface may cause difficulties by plugging wells and rock fractures, which would magnify the problems of remediation.
- The percentage of fractures intersected by wells.

Alternative 1D is an innovative technology for remediating groundwater in a fractured aquifer. This alternative is not implementable until the groundwater contamination source, NAPL, is removed. The time to reach the goal is not known at this time. As a consequence of NAPL removal, additional insight will be gained on the time frame needed for this alternative to achieve the goal.

The technologies proposed for Alternative 2B are implementable. Equipment and workers to implement the alternative are available. Recyclers are available in the area to provide a disposal source for the recovered NAPL. Some uncertainty exists as to the length of time required to remove the NAPL.

As far as the implementability of Alternative 2C is concerned, home treatment units have already been implemented. Pilot test results have demonstrated that NAPL extraction, groundwater pump and treat, air injection, and air sparging features of the combination alternative are implementable. Mobilization, installation and start up should be able to be accomplished within a year.

Criterion 7—Cost

The least expensive alternative considered for groundwater remediation is the 1A, No Action Alternative, at $319,500. The preferred alternative, 1C, costs $7,957,000. The most expensive alternative is Alternative 1D at $8,718,900.

There are no costs associated with No Action Alternative for NAPL. The most expensive NAPL alternative considered is Alternative 2C, the preferred alternative $4,185,576.

Criterion 8—State Acceptance

The State of New Mexico, through the New Mexico Environment Department, has reviewed and commented on the Remedial Investigation and Feasibility Study Reports. The State has also commented on the draft Proposed Plan. The State comments have been incorporated. While the State, through its comments indicated general agreement with the Proposed Plan, the State reserves the right to provide comments after the start of public comment period.

The Navajo Nation, through the Navajo Superfund Office, has reviewed and commented on the draft Remedial Investigation and Feasibility Study Reports. While the Navajo Nation has indicated general agreement with the Proposed Plan, the Navajo Nation reserves the right to provide comments after the start of public comment period.

Criterion 9—Community Acceptance

Community acceptance of the preferred alternative will be addressed in the ROD to be prepared after receipt of public comments on this Proposed Plan and the Remedial Investigation and Feasibility Study Reports.

GLOSSARY

Administrative Order - A legal and enforceable agreement between EPA and potentially responsible parties (PRPs) under which the PRPs agree to perform or pay for activities at a Superfund site.

Administrative Record - A collection of documents that form the basis for the selection of a response action.

Aquifer - A layer of permeable rock, sand, or gravel below the ground's surface that can supply usable quantities of groundwater to wells and springs. An aquifer can be a source of drinking water.

Applicable, Relevant and Appropriate Requirements (ARARs) - The federal and State statutory and regulatory requirements that a selected remedy must meet.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) - This law authorizes the federal government to respond directly to releases (or threatened releases) of hazardous substances which may be a danger to public health, welfare, or the environment. U.S. EPA is responsible for managing the Superfund program.

Feasibility Study - A study that identifies and evaluates alternatives for addressing site contamination at a Superfund site.

Groundwater - Water found beneath the Earth's surface that fills pores between soil, sand, and gravel particles to the point of saturation. When it occurs in a sufficient quantity, groundwater can be used as a water supply.

Inorganics - Chemical remedial substances of mineral origin, not of basically carbon structure.

Non-Aqueous Phase Liquid (NAPL) - Non-aqueous phase liquid that consists of contamination in groundwater that does not mix with the groundwater. Oil is a NAPL because it does not mix with water.

National Priorities List - U.S. EPA's list of the top priority hazardous waste sites in the United States that are eligible for investigation and remediation under Superfund.

Organics - Compounds which contain carbon.

Present Net Worth - The amount of money necessary to secure the promise of future payment, or series of payments, at an assumed interest rate. For example the total cost of purchasing a car after the car loan has been paid off is the net present worth of the car.

Resource Conservation and Recovery Act (RCRA)- The Federal law that regulates the treatment, storage and disposal of hazardous wastes.

Remedial Investigation - An investigation to determine the nature and extent of contamination at a Superfund site and the problems that the contamination causes. The investigation is performed prior to a Feasibility Study, which identifies and analyzes cleanup alternatives for the Site.

Record of Decision (ROD) - A legal document signed by the EPA Regional Administrator that describes the final clean up action or remedy selected for a site, the basis for EPA's choice of that remedy, public comment on alternative remedies, EPA's responses to comments, and the cost of the remedy.

Sediment - Solid material that settles to the bottom of a liquid. For example, sediments are found on lake bottoms and in stream beds.

PUBLIC COMMENT PERIOD

The 30-day public comment period runs from July 18, 1992 through August 17, 1992. You may send written comment to:

Mr. Donn Walters
Community Relations Coordinator
U.S. EPA Region 6 (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733

After the public comment period is concluded, EPA will review and consider the submitted comments when making its final decision on the Site. The final actions chosen for the Prewitt Refinery Site may, therefore, be different than the preferred alternative identified in this summary of the Proposed Plan.

EPA will respond to comments in document called a Responsiveness Summary. The Responsiveness Summary will be available to the public as part of the Record of Decision (ROD) for the Site. You are encouraged to review the Proposed Plan, Feasibility Study Report, and other documents related to the Site, which are available in the Site information repositories.

Cut on Dashed Line

Fold on dashed lines, Staple, Stamp, and

Name _____

Address _____

City _____

State _____ **Zip** _____

PLACE STAMP

Mr. Donn Walters
Community Relations Coordinator
U.S. Environmental Protection Agency
Region 6 (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the proposed remedy for the Prewitt Refinery Site is important to EPA. Comments provided by the public are valuable in helping EPA select a final remedy for the site.

You may use the space below to write your comments, then fold and mail. Comments must be post marked by August 17, 1992, unless the EPA grants an extension to the public comment period.

Additional comments on a separate piece of paper may be included.

Name _____

Address _____

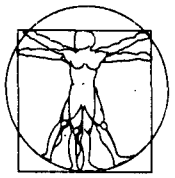
City _____

State _____ **Zip** _____

SELECTING A REMEDY

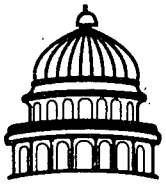
U.S. EPA uses nine criteria, or standards, to evaluate alternatives for addressing a hazardous waste site. The remedy ultimately selected for a site provides the best balance of trade-offs among alterntives with respect to the evaluation criteria, and ought to be implemented at the site. The nine criteria are as follows:

1. Overall Protection of Public Health and the Environment



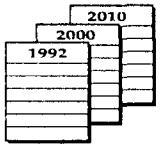
This criterion addresses the way in which a potential remedy would reduce, eliminate, or control the risks posed by the site to human health and the environment. The methods used to achieve an adequate level of protection may be through engineering controls, treatment techniques, or other controls such as restrictions on the future use of the site. Total elimination of risk is often impossible to achieve. However, a remedy must minimize risk to assure that human health and the environment would be protected.

2. Compliance with ARARs



Compliance with ARARs, or "applicable or relevant and appropriate laws and regulations," assures that a selected remedy will meet all related Federal, State and local requirements. The requirements may specify maximum concentrations of chemicals that can remain at a site; design or performance requirements for treatment technologies; and restrictions that may limit potential remedial activities at a site because of its location.

3. Long-Term Effectiveness or Permanence



This criterion addresses the ability of a potential option to reliably protect human health and the environment over time, after the cleanup goals have been accomplished.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants

This criterion assesses how effectively a proposed remedy will address the contamination problem. Factors considered include the nature of the treatment process; the amount of hazardous materials that will be destroyed by the treatment process; how effectively the process reduces the toxicity, mobility, or volume of waste; and the type and quantity of contamination that will remain after treatment.

5. Short-Term Effectiveness

This criterion addresses short-term risks to the workers and the community and the time factor.

Cleanup technologies often require several years for implementation. A potential remedy is evaluated for the length of time required for implementation and the potential impact on human health and the environment during the remedial action.

6. Implementability

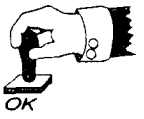
Implementability addresses the ease with which a potential remedy can be put in place. Factors such as technical feasibility and availability of materials and services are considered.

7. Cost

Costs (including capital costs required for design and construction, and projected long-term maintenance costs) are considered and compared to the benefit that will result from implementing the remedy.

8. State Acceptance

The state has an opportunity to review the Feasibility Study and Proposed Plan and offer comments to U.S. EPA. A State may agree with, oppose, or have no comment on the U.S. EPA preferred alternative.



9. Community Acceptance

During the public comment period, interested persons or organizations may comment on the alternatives. U.S. EPA considers these comments in making its final remedy selection. The comments are addressed in a document called a Responsiveness Summary, which is part of the Record of Decision.

FINAL REMEDY

FOR MORE INFORMATION

If you have questions about activities at the Prewitt Refinery site, please contact:

Monica Chapa Smith
Remedial Project Manager
U.S. EPA (6H-EO)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-6730
(800) 533-3508 (Toll Free)

Steve Wust
New Mexico Environmental Department
P.O. Box 26110
1190 Saint Francis Drive
Santa Fe, New Mexico 87502
(505) 827-0039

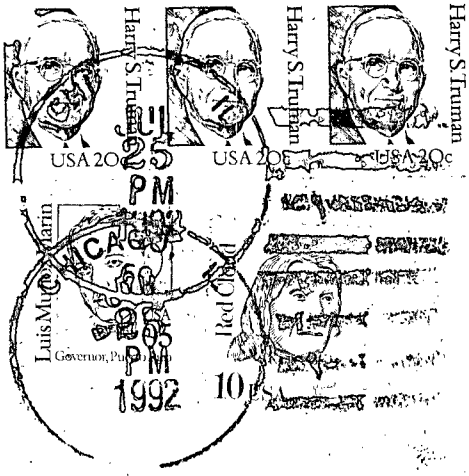
Diane Malone
Navajo Nation
Navajo Superfund Office
43 Crest Road
St. Michaels, Arizona 86511
(602) 871-7326

For more information about the public involvement process, please contact:

Donn Walters
Community Relations Coordinator
U.S. EPA (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-2240
(800) 533-3508 (Toll Free)

NEWS MEDIA
Inquiries should be directed to Roger Meacham or Dave Bary, EPA Region 6 Press Officers, at (214) 655-2200.

U.S. Environmental Protection Agency
Region 6 (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733



David Boyer
NM Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504-2088

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An Update on Activities at
the Prewitt Refinery Site
Prewitt, New Mexico
July 10, 1991

Superfund Fact Sheet

Remedial Investigation Activities Completed at the Prewitt Refinery Site

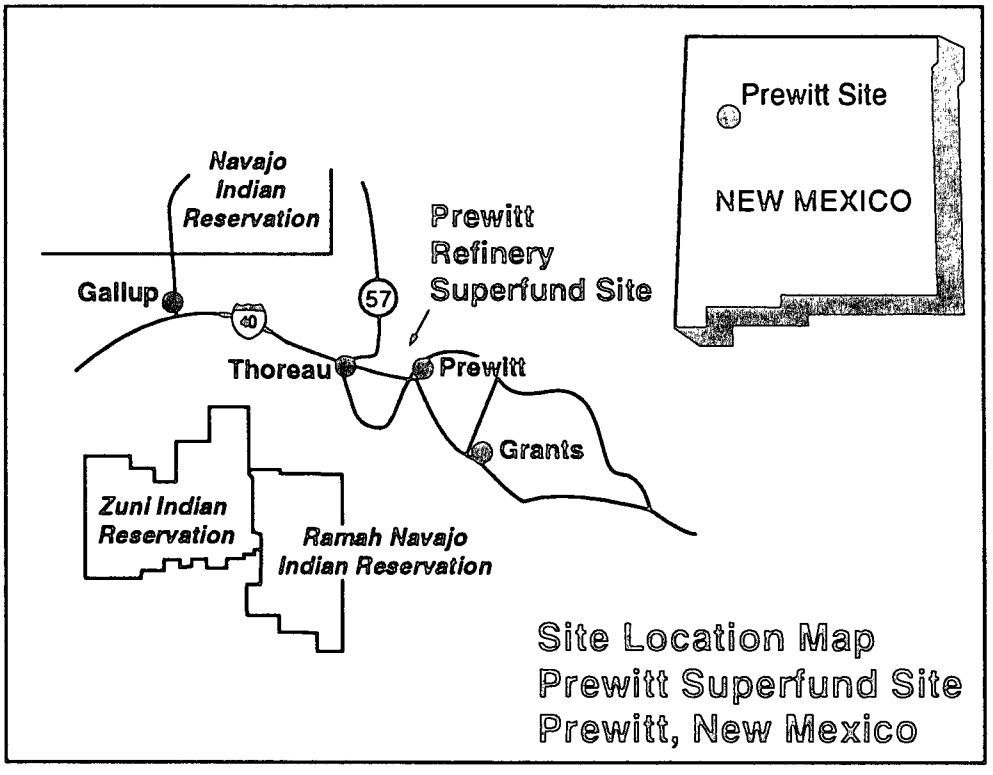
Introduction

The Prewitt Refinery Site is located in McKinley County west of Prewitt on U.S. Highway 66 (see Site Map). The abandoned oil refinery operated for 15 to 20 years beginning in 1940 and under several owners and operators. The Navajo Nation has owned the property since 1966.

Tests conducted in 1986 detected **benzene, xylenes, lead** and **chromium** in sediments collected on site to a depth of 17 feet (words in **bold** are defined in the Glossary). Further ground water investigation in 1987 indicated contamination of ground water north of the site and a floating layer of waste.

This Fact Sheet Has Information About...

- The major activities involved in phase I and II of the Remedial Investigation (RI).
- Summary of RI Findings.
- Upcoming Superfund activities related to the Site.
- The Technical Assistance Grant (TAG) Program.
- Opportunities for public involvement.



Site Location Map
Prewitt Superfund Site
Prewitt, New Mexico

The site was formally added to the National Priorities List (NPL) of hazardous waste sites in August 1990. Under the terms of an Administrative Order on Consent (AOC), The El Paso Company (TEPCO) and the Atlantic Richfield Company (ARCO) have conducted activities to reduce immediate hazards posed by the site by constructing a security fence and treating well water to remove the hydrocarbon contamination. Under the terms of a separate AOC, TEPCO and ARCO are responsible for conducting the phased remedial investigation and feasibility study (RI/FS) of the Prewitt Refinery Site. The purpose of the RI/FS is to determine the nature and extent of contamination at the site and to evaluate alternatives for cleaning up the site. MK-Environmental Services, TEPCO and ARCO's contractor for the RI/FS have completed both Phase I and II of the RI. This fact sheet lists the major activities involved in both phases.

Remedial Investigation Phase I and Phase II Major Activities

Phase I Activities

Phase I of the RI was completed in June 1990. Phase I activities included:

Water Well Inventory

An inventory of ground-water wells within a three-mile radius of the site was completed by researching existing files and literature and conducting a door-to-door survey. A notice was written and mailed to known well owners and residents, and a standard survey form was utilized in interviews during the survey. Well files were created from research and survey data, results were tabulated, and wells were identified on a map.

Geological Reconnaissance

A field investigation was conducted on and in the vicinity of the site by a geologist familiar with contaminated sites and local geology. The investigation consisted of measuring, describing, and photographing geological features. From the field investigation and aerial photos, a surface geological map was drawn, cross-sections were constructed, and a report was generated.

Ecological Survey

A field investigation of the site was conducted with respect to the plants and animals native to the area, and any existing or potential natural resource damage. From this investigation and other research an ecological survey was generated.

Sediment Sampling

In order to assess possible off-site transport of contaminants, a sediment sampling plan was developed, approved, and executed. Drainage channels were located and sampled both upgradient (to provide background information) and downgradient of the site. A total of 16 sediment samples were obtained from eight locations.

Fault Definition

In order to determine the presence and orientation of faulting in subsurface rock at the site, a seismic program was instituted. Data along four seismic lines were acquired and incorporated into the structural geological interpretation.

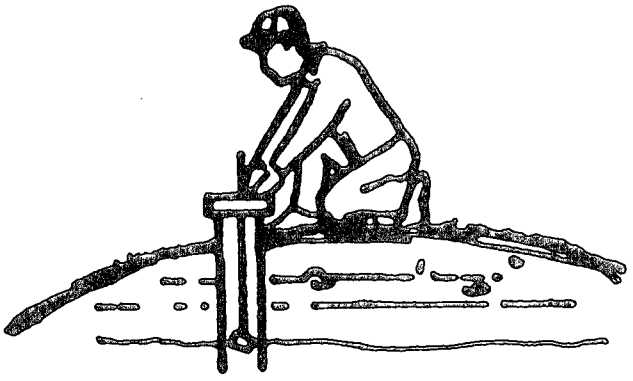
Definition of Floating Non-Aqueous Phase Liquids

To determine usefulness of soil gas analysis in identifying the presence of non-aqueous phase liquids (**NAPLs**) in the subsurface and near the site, two methods were tested. The first was an active method involving withdrawal of soil gas from five or more feet below the surface with a metal probe, and transferring that sample to an on site lab for rapid analysis. The second was a passive method involving an adsorption device placed eighteen inches below the surface for varying periods of time up to 96 hours; the device was removed, sealed, and shipped to an off-site lab for analysis. After analyzing the results of the two methods it was determined that neither was effective and no further soil gas effort was made during Phase I of the remedial investigation.

Hydrologic Testing of Water-Bearing Units

Two pumping tests and ten slug tests were executed in aquifer zones underlying the site vicinity to provide data to predict contaminant migration. Ground water flow patterns were determined.

Ground Water Sampling



Ground water monitoring wells were sampled and analyzed for the presence of:

- **Volatile and semivolatile organic compounds;**
- Dissolved metals; and
- Cyanide.

Location and Evaluation of On Site Wells

A number of wells are located in the vicinity of the refinery property. A review of previous investigations and site history, conversations with knowledgeable individuals, and site visits were used to located these wells. The wells were cleaned out and geophysical logs were then run in those wells, and fluid samples were taken.

Treatability Studies

Samples of waste material on the site were gathered and tested to determine if treatment of the waste by a remediation technique known as landfarming is feasible.

On-Going Monitoring

Monthly ground water sampling includes all monitoring wells, wells containing NAPL detectors and several existing site water-supply wells. About 60 wells are sampled at each sampling event. Originally the monitoring was quarterly then increased to monthly. The PRP's, with EPA's approval, changed quarterly monitoring to a monthly schedule to obtain more data and define the full extent of the plume.

Ground water samples have been analyzed for the presence of volatile and semi-volatile organic compounds, metals, minerals, and naturally occurring chloride, fluoride, bicarbonate, carbonate, sulfate, calcium, magnesium, sodium, potassium and iron. The existing site water-supply well samples were analyzed for volatile organic compounds.

Phase II Activities

The Phase II field activities were performed during the period from August, 1990 through December, 1990. Based on the Phase I results, several activities were conducted in Phase II of the RI. The activities for Phase II included:

Non-Aqueous Phase Liquids (NAPLs) Investigation

The Phase II NAPLs investigation was conducted to improve definition of the boundaries, chemical composition, and factors governing flow of NAPLs in the aquifer. The data was used to guide the design, construction and operation of the NAPL extraction pilot program (see "NAPL Extraction Pilot Program" on page 4).

During Phase II, a total of 29 NAPL wells were drilled. NAPL measuring devices were installed in 12 of these wells. The material collected from the wells was evaluated to determine its characteristics and samples were analyzed for the presence of contaminants. Tests were performed on several NAPL measuring devices to evaluate the rate at which NAPL could be recovered.

Soil Investigation

Additional soil sampling and analyses were performed to achieve the following objectives:

- determine the boundaries of lead and chromium contamination;
- determine the boundaries of hydrocarbon contamination as indicated by total petroleum hydrocarbon;
- determine the location and boundaries of tar in the Railroad areas;
- determine the fraction of organic carbon (FOC) of the unsaturated soil on the site to evaluate soil leachability; and
- determine characteristics of waste in the pits, separator and tar areas.

A total of 93 shallow soil, deep soil, and waste samples were obtained from 42 locations. Soil samples were analyzed for organic and inorganic compounds, minerals, heavy metals, petroleum products, volatile organic compounds (VOC), semi-volatile organic compounds (SVOC), pesticides and **Polychloramated Biphenials (PCBs)**. Waste samples were analyzed to determine if the wastes contained contaminants regulated by **Resource Conservation and Recovery Act (RCRA)** were present at the site. Additional analysis was conducted to determine levels of naturally occurring lead and chromium.

Ground Water Investigation

The purpose of this task was to further define the extent of ground water contamination, assess vertical migration of contaminants from the upper sandstone aquifers and further refine the horizontal migration rates.

Eleven monitoring wells were installed during Phase II. The wells were installed and sampled using the procedures defined during Phase I and the ongoing monthly monitoring program.

NAPL Extraction Pilot Program

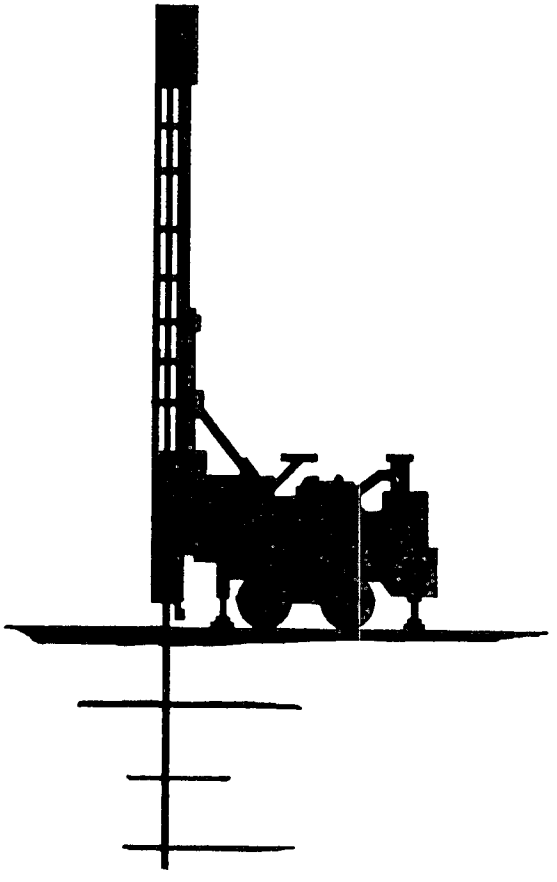
The objective of the NAPLs extraction pilot program was to generate data required by the Feasibility Study (FS), in particular:

- the factors governing the NAPL extraction rate;
- the response of the ground water table to NAPL extraction; and
- the ability to remove pure NAPL without also removing ground water.

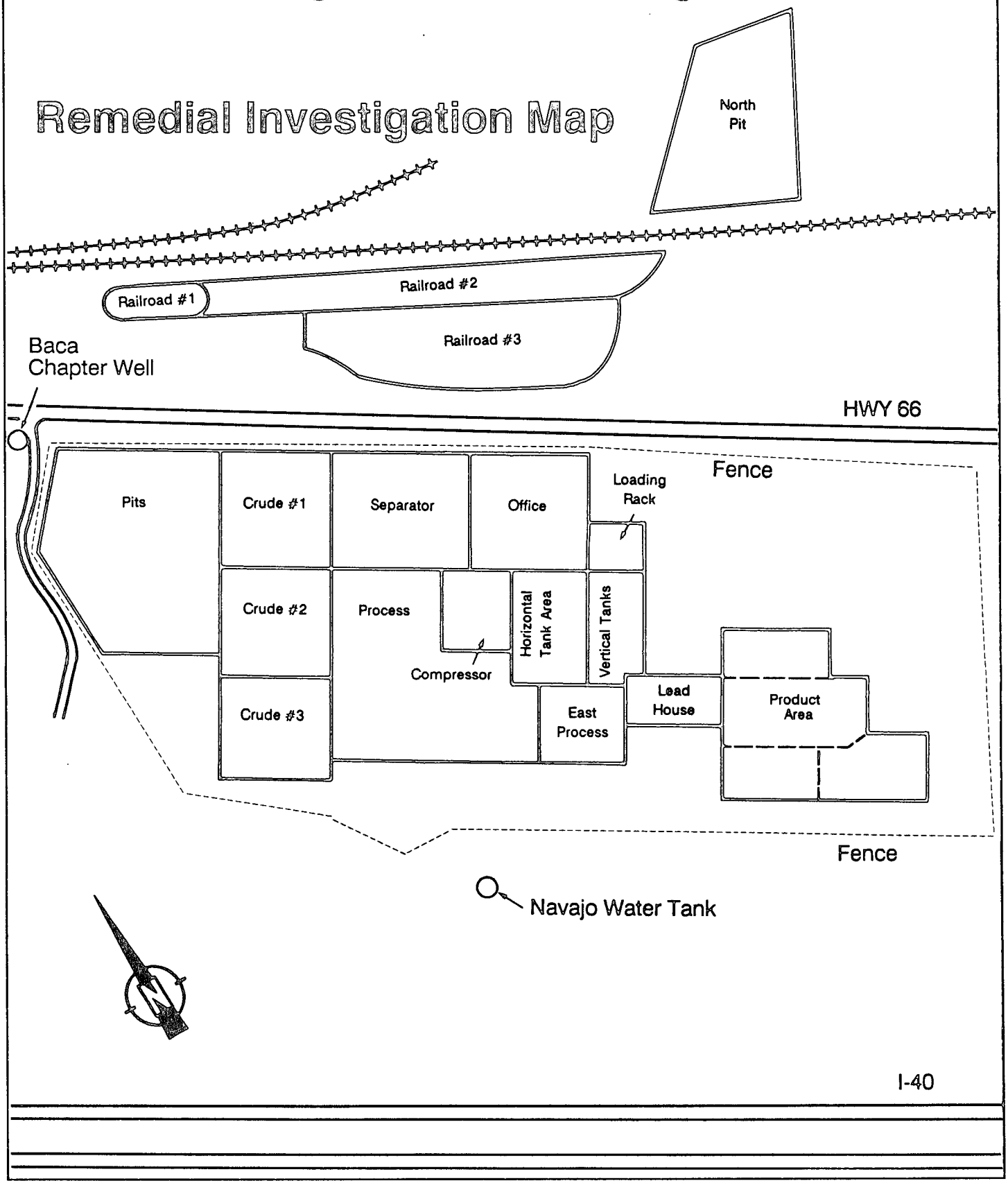
A NAPL extraction well was drilled and a NAPL extraction system was installed on the well. The results of the NAPL Extraction Pilot Program will be presented in the Feasibility Study which will be available upon completion in early 1992 at the repositories listed on page 8.

Asbestos Removal

A total of 1,005 tons of asbestos containing material was removed from the site. The transport and disposal of the material was conducted in accordance with all applicable federal and/or state rules and regulations. Information regarding this work is presented in the Feasibility Study.



Remedial Investigation Map



Summary of RI Findings

Following the completion of the RI, a comprehensive Draft RI report was submitted for EPA review in April 1991. This report combined the findings of both phases of the RI. These findings were used to identify and evaluate the possible alternatives for cleaning up the site. The Draft Feasibility Study Report which discussed the various alternatives was submitted for EPA review in May 1991. A final RI/FS report is due to EPA by January 1992.

Benzene, **toluene**, **ethylbenzene**, and xylenes have dissolved into ground water from the Non-Aqueous Phase Liquids (NAPLs). NAPLs moved downward from the surface under the influence of gravity through bedrock fracture systems.

Seven NAPL area have been identified. The NAPL occurrences have been documented to be small, discrete areas within the fenced area and north of Highway 66.

The majority of organic contaminants in the soil are limited to isolated locations in the Separator, Pits, Crude #1, Crude #2, Compressor, Product, and Vertical Tank areas (see Remedial Investigation Map). In general, organic contamination diminishes with depth. Lead contamination occurs in a number of isolated locations with limited downward distribution, generally diminishing to background concentration levels below two feet.

Hydrocarbon wastes were identified in four pits, a separator, a railroad tar area and small, scattered, localized concentrations in the refinery and process storage areas.

Contamination in soil and the occurrence of NAPLs in the refinery site are primarily the result of surface spills; however, data indicate that unsaturated soils are not presently affecting ground water at the majority of the site.

GLOSSARY

Benzene - A petroleum by-product used in detergents, as a gasoline additive, and other products. It can be toxic by ingestion, inhalation or absorption and it is a known cause of cancer.

Chromium - Used to protect against corrosion and to help paint adhere to metal. Some forms of chromium may cause skin diseases, and may possibly cause cancer.

Ethylbenzene - A volatile organic compound used as a solvent. it can be toxic by ingestion, inhalation, or skin absorption.

Lead - A metal which can be toxic by ingestion or inhalation of contaminated dust or fumes. It accumulates in the body, and can build up to dangerous levels over long periods of time.

Non-Aqueous Phase Liquids (NAPLs) - Liquids that do not mix with water.

Polychlorinated Bipherials (PCBs)- A group of toxic, persistent chemicals used in transformers and capacitors for insulating purposes and in gas pipeline systems as a lubricant. Further sale or new use was banned by law in 1979

Resource Conservation and Recovery Act (RCRA) - The Federal law that regulates the treatment, storage and disposal of hazardous wastes.

Semi-Volatile Organic Compounds (SVOCs) - A group of chemical substances which evaporate in air at a slower rate than volatile organic compounds. Many are suspected or known to cause cancer or other illnesses.

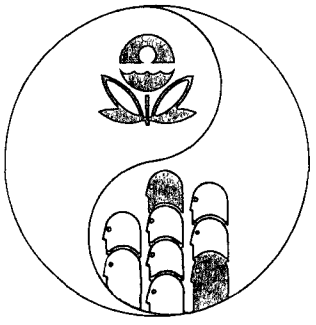
Toluene - Used as a solvent for paints and coatings, and as a component of automobile and aviation fuels. It can be toxic by ingestion, inhalation or skin absorption.

Volatile Organic Compounds (VOCs) - A group of organic chemicals that have a tendency to evaporate when exposed to air. When present in drinking water, VOCs may pose a potential threat to human health.

Xylenes - A volatile organic chemical used as a solvent and as an ingredient in lacquers, inks, enamels and rubber cement. It may be toxic by inhalation or ingestion.

The Next Step

Once the FS report has been finalized, a 30-day public comment period and public meeting will be held. During this 30 days, the public will be given the opportunity to comment on the proposed plan. The proposed plan will briefly describe the remedial alternatives analyzed by EPA, will identify the preferred remedy, and will summarize the information relied upon to select the preferred alternative. EPA will select a final remedy for the Prewitt Refinery site only after the public comment period has ended and the information submitted during this time has been reviewed and considered during the decision-making process.



Grant Available

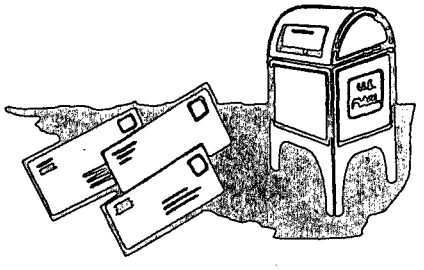
U.S. EPA's Technical Assistance Grant (TAG) program enables a group of interested citizens to obtain assistance in interpreting documents and activities conducted at the Superfund site. The grant provides up to $50,000 to a community group wishing to hire consultants to interpret sampling results, reports, and other documents. Twenty percent of the requested funding amount must be matched by the group. Municipalities or other government agencies are not eligible to receive TAGs. The process for obtaining a TAG takes time, so if you are interested, please contact:

Tom Oliver
U.S. Environmental Protection Agency
Region 6 (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733
Phone: (214) 655-2240 or 1-800-533-3508.

Mailing List

If you did not receive this fact sheet in the mail, then you are not on our mailing list. If you wish to be placed on the Prewitt Superfund Site mailing list, please complete this form, detach and mail to:

Alan Lee
Community Relations Coordinator
U.S. EPA (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733



NAME_____

DAYTIME PHONE NO (___) _____

ADDRESS_____

CITY_____

STATE _____ ZIP _____

AFFILIATION _____

For More Information

Information repositories have been established to provide interested persons the opportunity to read all of the documents and materials EPA has used to date to evaluate the Prewitt Refinery site. Additional information about the site and the Superfund program is available during regular business hours at the EPA office in Dallas and the following information repositories.

Prewitt Fire House
P.O. Box 472
Prewitt, New Mexico 87045

New Mexico Environment Department
1190 Saint Francis Drive
Santa Fe, NM 87501
Monday through Friday - 8:30 a.m. to 5:30 p.m.
Saturday & Sunday - Closed

If you have further questions, please call or write to:

Monica Chapa
Remedial Project Manager
U.S. EPA (6H-EO)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-6730

Alan Lee
Community Relations Coordinator
U.S. EPA (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-2240
1-800-533-3508

News media
Inquiries should be directed to Roger Meacham or Dave Bary, EPA Region 6 Press Officers, at (214) 655-2200

U.S. Environmental Protection Agency
Region 6 (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733

David Boyer
NM Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504-2088

OIL CONSERVATION DIVISION
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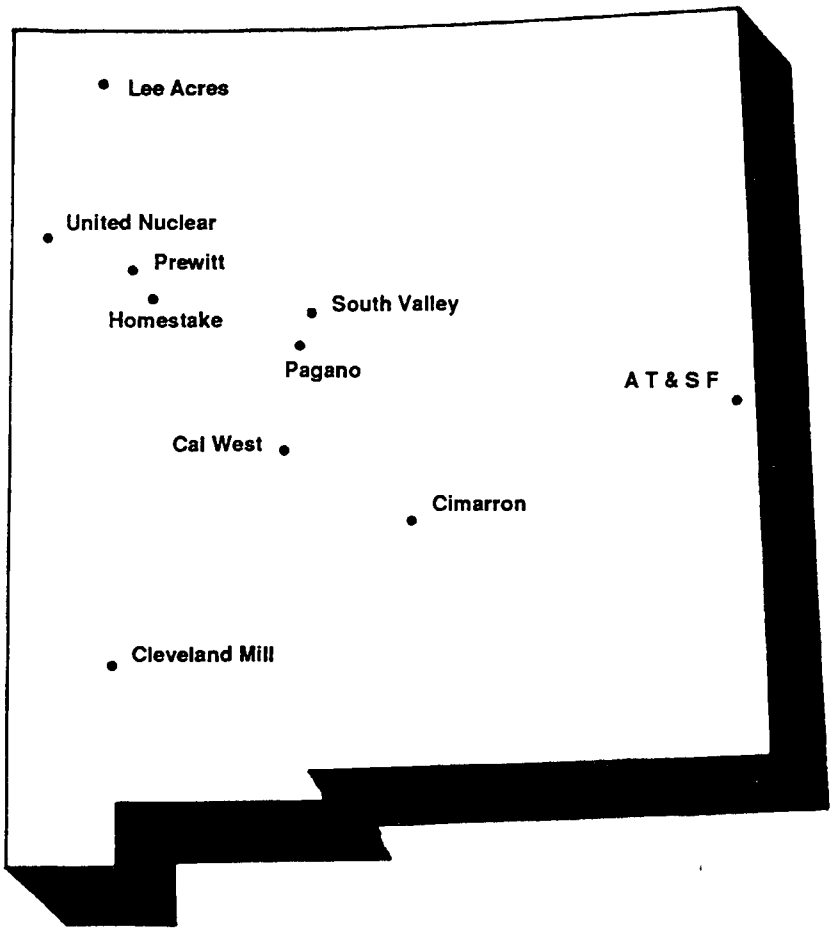
United States
Environmental Protection Agency
Region 6

July 1991

Quarterly Status Report of *Superfund* Sites in New Mexico



SUPERFUND is the common term for the *Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA)* as amended in 1986, the federal law that provides remedies for abandoned hazardous waste sites. The Environmental Protection Agency (EPA) administers and enforces CERCLA in New Mexico cooperation with the New Mexico Environment Department (NMED). The State of New Mexico currently has ten sites on the EPA's *National Priorities List (NPL)*. This report includes a brief description of the current status of these sites. Terms in *italics* are defined in the glossary on pages 8 - 11, for your convenience.

Atchison, Topeka, and Santa Fe

Also Known As: AT&SF Site; Clovis Site

Location: Curry County; South of the AT&SF Railway Switching Yard in Clovis

National Priorities Listing History: Proposed Date: 10/23/81; Final Date: 9/8/83

Current Project Phase: *Remedial Design/Remedial Action (RD/RA)*

Contact: Susan Webster, EPA, (214) 655-6730

Information Available at: Clovis-Carver Library

The ATSF railroad yard has been in use since the early 1900s. Waste water from various ATSF operations contaminated Santa Fe Lake and threatens an underlying *aquifer.*

ATSF, the *potentially responsible party (PRP)* for this site, conducted the *remedial investigation/ feasibility study* for Santa Fe Lake under an *Administrative Order on Consent.* In 1988, EPA selected a remedy for Santa Fe Lake which includes evaporating the lake water, excavating the *sediments,* and moving them to an onsite *biodegradation* treatment area. The remedy also includes *in-situ* soil treatment and removal of soils to an onsite treatment area.

Once the treatment is complete, the treatment area will be *capped* and vegetated. No treatment is planned for *ground water,* although monitoring will continue to ensure that the remedy is effective. Design of the first phase is complete, and construction began in September 1989. Construction of the dike around the lake is complete and most of the lake water has evaporated. Phase II construction documents are being reviewed by EPA and in-situ bioremediation of soils will begin in July 1991.

A citizens' group interested in obtaining a grant from EPA to hire a technical advisor should call 1-800-533-3508.

Cal-West Metals

Location: Socorro County; 1/2 mile north of Lemitar

National Priorities Listing History: Proposed Date: 6/24/88; Final Date: 3/31/89

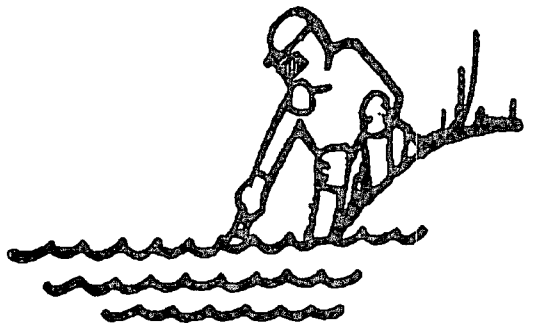
Current Project Phase: *Remedial Investigation/ Feasibility Study (RI/FS)*

Contact: Carlos A. Sanchez, EPA, (214) 655-6710

This 44-acre site is adjacent to Interstate 25 about 7 miles north of Socorro, in Lemitar. The site was used on an intermittent basis as a battery recycling and smelter facility from 1979 to 1981. During 1982-84, research and development was conducted on various aspects of raw materials recovery. During an inspection in 1985, about 300 drums of lead oxide and sulfuric acid, piles of battery pieces, and an *evaporation pond* remained onsite. The drums have since been removed. Lead was detected in an onsite monitoring well, onsite soils, and surface soils downwind of the site. Piles of lead-contaminated battery pieces and *sediments* remain onsite.

A *remedial investigation* was initiated by EPA in August 1990. Data from Phase I sampling has been evaluated. A Phase II remedial investigation is planned for the summer of 1991. The Phase II site investigation will be conducted to fully characterize the site and perform the *risk assessment.* Additionally, site materials will be collected during Phase II sampling period to begin treatability studies to determine the best way to treat the lead contaminated materials.

A citizens' grant for a Technical Advisor is now available; call 1-800-533-3508.



Cimarron Mining

Location: Lincoln County; Carrizozo

National Priorities Listing History: Proposed Date: 6/24/88; Final Date: 10/4/89

Current Project Phase: *Remedial Design (RD)*

Contact: Paul Sieminski, EPA, (214) 655-6710

Information Available at: Carrizozo City Hall

During 1979-82, the site was used as a precious metals recovery mill using a mixture of cyanide salt solution and metal stripper. In June 1982, the company was sent a notice of violation by the New Mexico Environment Department (NMED) for discharging cyanide solutions into an unlined discharge pit. In July 1982, the company closed operations and in July 1983, the company filed for bankruptcy.

An extensive study of this site, called a *remedial investigation*, began in August 1989 and was completed in June of 1990. During the remedial investigation at Cimarron, another nearby milling location was discovered, known as Sierra Blanca. This location was further investigated in late 1990 as a separate *operable unit* or phase. The data are complete and various potential remedies are being explored.

The results of the Cimarron remedial investigation and EPA's *Record of Decision (ROD)*, documenting selection of the site remedy, indicated that the shallow *ground water* is contaminated with cyanide as a result of improper storage of cyanide solutions in the unlined discharge pit and cinder block trenches during the mill's operation.

In September 1990, EPA selected a remedy for the shallow ground water which includes pumping the ground water to the surface and discharging to the local publically owned treatment works (POTW) for treatment. The cyanide levels would be reduced through natural degradation processes within the treatment plant, which includes aeration, photodecomposition, and effluent chlorination.

The water discharged from the site in addition to treatment plant effluent and sludges will be monitored to ensure no adverse impacts to the POTW treatment processes. The *remedial design* phase for the Cimarron site is underway.

Any citizens' group interested in obtaining a grant from EPA to hire a technical advisor should call 1-800-533-3508.

Cleveland Mill

Location: Grant County; 5 miles northeast of Silver City

National Priorities Listing History: Proposed Date: 6/24/88; Final Date: 3/31/89

Current Project Phase: Pre-*Remedial Investigation*

Contact: Randy Merker, NMED, (505) 827-2911; or Ann Schober, EPA, (214) 655-6710

This site is an abandoned lead, zinc, and copper mill covering 5 to 10 acres located about 5 miles northeast of Silver City. An estimated 12,000 cubic yards of tailings containing lead, silver, zinc, copper, and arsenic are piled onsite. Tests indicate that the nearby Little Walnut Creek is receiving acid drainage containing these metals.

An extensive study of the nature and extent of the contamination, called a *remedial investigation* and *feasibility study (RI/FS)*, will be conducted by the New Mexico Environment Department (NMED), with EPA oversight. The RI/FS will begin this spring. Preliminary site characterization using a field portable x-ray fluorescence (FPXRF) survey was conducted last summer. The site screening report generated from the survey was submitted to EPA in November 1990. Information obtained from the FPXRF survey will be used to streamline the RI/FS.

A citizens' assistance grant is now available. For more information, call 1-800-533-3508.

Homestake Mining

Also Known As: United Nuclear Homestake Partners; UNC/Homestake

Location: Valencia County; Route 53 north of Milan and Grants

National Priorities Listing History: Proposed Date: 10/23/81; Final Date: 9/8/83

Current Project Phase: *Remedial Action (RA)*

Contact: Ricky McCoy, EPA, (214) 655-6730

Information Available at: NMSU Campus Library in Grants

This site is an inactive uranium mill where seepage from two mill-tailings ponds have contaminated a shallow *aquifer* under the site. Approximately 22 million tons of tailings cover an estimated 245 acres, piled up to 100 feet high.

The site was added to the *National Priorities List* primarily due to off-site contamination of residential wells in neighboring subdivisions. Homestake Mining Company (HMC) provided a water supply system to area residents in 1985, under the terms of a *Consent Decree*. HMC also implemented an aquifer restoration program at the site aimed at flushing tailings-contaminated *ground water* in off-site areas and containing the ground water plume onsite. The New Mexico Environment Department (NMED) has required maintenance and modifications of the aquifer restoration program through a formal Groundwater Discharge Plan since 1985.

NMED also performed a 2-year outdoor monitoring program which included continuous indoor monitoring of a limited number of homes located near the mill. Subsequent to this, HMC agreed to further investigate the presence and sources of radon in the subdivisions near the mill. An extensive, long-term investigation to determine the extent of indoor and outdoor radon concentrations in area subdivisions is complete. The report indicated that the principal cause of elevated indoor radon concentration (above 4 picocuries per liter of air) in eight residences is related to local soil sources of radon. Therefore, EPA decided that no further action is needed on the radon portion.

In 1986, the Nuclear Regulatory Commission (NRC) assumed licensing authority for uranium mills in New Mexico. NRC required Homestake to submit a reclamation plan for the tailings embankment at the site in accordance with NRC regulations. NRC has also required Homestake to continue ground water restoration efforts at the site.

For information regarding a technical assistance grant, call 1-800-533-3508.

Lee Acres

Location: San Juan County; Farmington

National Priorities Listing History: Proposed Date: 6/24/88; Final Date: 8/30/90

Current Project Phase: Pre-*Remedial Investigation/Feasibility Study (RI/FS)*

Contact: Monica Chapa, EPA, (214) 655-6730

This site covers 60 acres of public land east of Farmington. The Lee Acres residential subdivision and the Giant Industries refinery are nearby. The Bureau of Land Management (BLM) leased the property to San Juan County which operated a *landfill* onsite from 1962 to 1986.

The landfill consists of an undetermined number of buried solid waste trenches and four unlined waste *lagoons*. At least three of the lagoons received a complex mixture of liquid wastes including water produced from oil and gas fields, waste oils, spent acids, and chlorinated solvents. Sampling conducted by the NMED in 1985 revealed chlorinated *volatile organic compounds* in lagoon contents and in a residential well located downgradient at the north end of the Lee Acres subdivision.

BLM was required to perform a preliminary investigation under a Compliance Agreement between NMED and BLM, which was signed in August 1987. BLM conducted the preliminary investigation between September 1987 and March 1989, which included the installation and sampling of 19 monitoring wells.

In early 1987, BLM arranged an alternate drinking water supply for affected residents near the landfill. BLM has conducted additional field investigations since September 1988. Later this year, EPA, NMED, and BLM will meet to define the requirements for the *remedial investigation/ feasibility study.*

A citizens' group interested in obtaining a grant to hire a technical advisor should call 1-800-533-3508.

Pagano Salvage

Also Known As: Waste Electric Transformer #4

Location: Valencia County; 1 mile southeast of Los Lunas

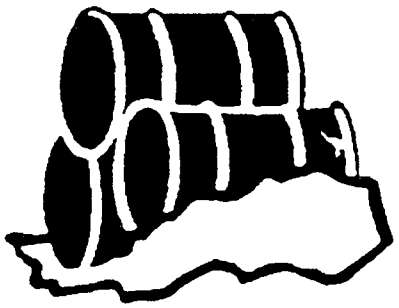
National Priorities Listing History: Proposed Date: 6/24/88; Final Date: 10/4/89

Current Project Phase: No further action planned.

Contact: Carlos Sanchez, EPA, (214) 655-6710

Information Available at: Los Lunas Public Library

This one-acre site is located at 102 Edeal Road near the east bank of the Rio Grande. The metal salvage operations included *PCB*-contaminated oil from electric transformers and capacitors. Drums containing this oil were removed from the site by the Department of Energy. Aroclor 1254 and Aroclor 1260 were detected, as well as pesticides DDT and DDE. *Ground water* in the area is shallow and surface water near the site is used to irrigate food and forage crops.



Sampling in 1988 indicated that PCB levels in the surface soil were greater than allowable. PCBs were also found in the nearby Peralta Riverside Drain/Otero Drain and in some fish tissue. In order to protect human health and the environment, approximately 5,100 cubic yards of contaminated soil and debris were excavated and moved to a permitted facility. EPA reviewed the sampling data and determined that further studies were not needed. Additionally, based on EPA's removal action, EPA has determined that further action is not required and a *Record of Decision (ROD)*, recommending no further action, was signed on September 27, 1990.

Operation and Maintenance ground water sampling was performed in January 1991 as stated in the ROD.

Prewitt

Also Known As: Petroleum Products Refinery; Prewitt Tar Pits

Location: McKinley County; West of Prewitt on U.S. Highway 66

National Priorities Listing History: Proposed Date: 6/24/88; Final Date: August 1990

Current Project Phase: *Remedial Investigation/ Feasibility Study (RI/FS)*

Contact: Monica Chapa, EPA, (214) 655-6730

Information Available at: Prewitt Fire House

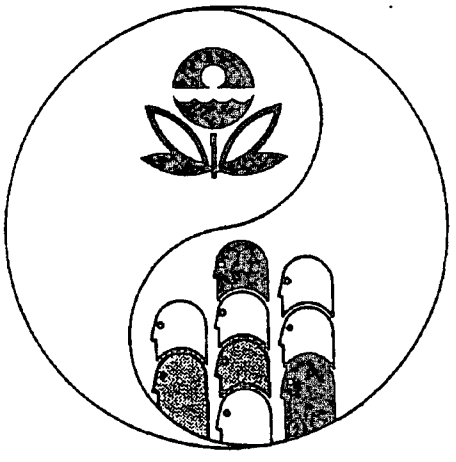
The abandoned oil refinery operation occupies 75 acres west of Prewitt on U.S. Highway 66. The site contains the ruins of the refinery including waste pits, an oil/water separator, tank bases and other equipment rubble, two major spill areas, and the remains of a pump lift station. Site operations began in the early 1940s and continued for 15-20 years under several owners and operators. The Navajo Nation has owned the property since 1966.

Tests conducted in 1986 detected benzene, xylenes, lead, and chromium in *sediments* collected on site to a depth of 17 feet. Further investigation in 1987 indicated contamination of *ground water* north of the site and a floating layer of *non-aqueous phase liquids (NAPL).*

Under agreements with EPA, former owners of the refinery, Atlantic Richfield Company (ARCO) and the El Paso Company (TEPCO) have conducted activities to reduce the immediate hazards posed by the site by constructing a security fence and treating well water to remove the *hydrocarbon* contamination. Water treatment for five homes has been completed.

ARCO and TEPCO are under an agreement with EPA to perform a phased *Remedial Investigation and Feasibility Study (RI/FS).* Phase I of the RI has been completed. ARCO and TEPCO submitted a draft Remedial Investigation Report detailing the results of the sampling and site characterization activities performed, including Phase II data. The *potentially responsible parties* have conducted a Risk and Endangerment Assessment of the site. A draft report on this has been submitted and is being updated to incorporate comments from oversight organizations. The draft Remedial Investigation was submitted for EPA review and comment on April 15, 1991. Feasibility Study Reports were submitted in May 1991 to EPA.

Any citizens' group interested in obtaining a grant from EPA to hire a technical advisor should call 1-800-533-3508.



South Valley

Also Known As: South Valley PCB Tank Site

Location: Bernalillo County; Albuquerque

National Priorities Listing History: Proposed Date: 7/23/82; Final Date: 9/8/83

Current Project Phase: *Remedial Design/ Remedial Action (RD/RA)*

Contact: Tim Underwood, EPA, (214) 655-6730

Information Available at: Albuquerque Public Library

Contaminants from a number of industrial sources contributed to localized *ground water* contamination in the vicinity of the SJ-6 municipal drinking water well. SJ-6 is located on Woodward Road east of Broadway.

The one-square mile area around SJ-6 was designated as the top Superfund priority in New Mexico. Two area municipal wells were closed, including SJ-6. Closing the SJ-6 well caused a decrease in Albuquerque's available water supply for fire protection and other purposes. As a result, EPA installed a new well (Burton #4) at another location.

The *remedial investigations and feasibility studies* were conducted in phases by EPA and the *potentially responsible parties (PRPs).* All of the studies are now complete. Actions planned for the area include: pumping and treating contaminated ground water, plugging abandoned wells to stop downward migration, treating contaminated soil by vacuum extraction, and long-term monitoring.

Start up of the Edmunds Street property ground water remediation system began in September 1990. Prior to system startup, an extensive pilot program was conducted confirming proper system operation in accordance with design specifications and compliance with federal, state and local cleanup standards.

Expansion of the monitoring well system is continuing and design work on cleanup of the remaining portions of the South Valley site is now underway.

The Superfund Project of the San Jose Community Awareness Council has been awarded the citizens' grant for the South Valley site. If you would like to participate in the activities of this group, please contact Jesus Lucero at (505) 242-3658.

United Nuclear

Also Known As: UNC Mining and Milling; Church Rock Mill

Location: McKinley County; Church Rock, 17 miles northeast of Gallup

National Priorities Listing History: Proposed Date: 10/23/81; Final Date: 9/8/83

Current Project Phase: *Remedial Action (RA)*

Contact: Ricky McCoy, EPA, (214) 655-6730

Information Available at: Gallup Public Library

This inactive uranium mill is located near the southern border of the Navajo reservation. The mill operated from 1977 to 1982. In 1979, a break in a tailings pond dam released 93 million gallons of mill tailings fluid into the Rio Puerco. Seepage from the tailings *impoundment* contaminated the Upper Gallup and alluvial *aquifers* in the vicinity of the impoundment. EPA conducted an RI/FS investigation of *ground water* contamination at the site from 1984 to 1988.

Analyses of samples collected from nearby private drinking water wells indicated that the drinking water in the wells meets health-related primary drinking water standards. In 1988, EPA decided to pump and treat the contaminated ground water from the Upper Gallup and alluvial aquifers.

A *register/pond evaporation* system was installed as well as a series of Upper Gallup pumping wells and alluvial pumping wells. Due to the slow movement of water through the aquifers, this remedial action is expected to take many years to complete.

In a separate action, UNC submitted a Reclamation Plan to the Nuclear Regulatory Commission (NRC) as required by their Source Material License. The Reclamation Plan includes installation of a *cap* over the site, mill decommissioning, control of surface water runoff, and removal and evaporation of contaminated ground water.

The roles and responsibilities of EPA and NRC for remedial action are formally defined in a 1988 *Memorandum of Understanding*. UNC submitted its first annual review report of ground water remediation in December 1989. EPA, NRC, NMED, and Navajo Superfund have reviewed the report and submitted comments to UNC.

UNC submitted a proposal to modify seepage collection in Zone 1 of the Upper Gallup aquifer and add an additional monitoring well to further identify remediation in Zone 3. An enhanced evaporation system to increase evaporation efficiency was constructed. EPA and NRC approved this proposal in August 1990. NRC incorporated these modifications by amending UNC's Source Material License. Modifications were completed in November 1990. UNC has submitted its second annual review report of ground water remediation in 1990. EPA, NRC, NMED, and Navajo Superfund are currently discussing various system modifications necessary to enhance remediation of the site.

Any citizens' group interested in obtaining a grant from EPA to hire a technical advisor should call 1-800-533-3508.

Additional Information

A guide to EPA hotlines, clearinghouses, libraries, and dockets is available from the Office of Public Affairs at (202) 382-[illegible]50. Please refer to publication number EPA 007-89. For more information about Superfund sites or activities outside our Region, contact EPA's toll-free number, 1-800-424-9346. The number for the hearing impaired is 1-800-553-7672 or 475-9652 in the Washington, D.C. area.

If you need additional information on the Superfund sites in New Mexico, please call or write to:

Donn R. Walters
Community Relations Coordinator
U.S. EPA (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-2240
or

1-800-533-3508

Site Security
If you observe vandalism or trespassing at any of the Superfund sites, please contact your local Police/Sheriff's Department, who will contact EPA. Your assistance in alerting us to problems such as this is greatly appreciated.

Special Note
Please help us by letting us know of any corrections needed in your address, or of any changes if you move and wish to continue receiving these reports. Return the old label to us so future issues can reach you without delay.

Questions from the media should be directed to:

Roger Meacham or Dave Bary
EPA Region 6 Press Officers
(214) 655-2200

Glossary

This glossary defines terms often used in Superfund publications. The definitions may have other meanings when used in a context other than hazardous waste management.

Administrative Order On Consent (AOC): A legal and enforceable agreement between EPA and the parties potentially responsible for site contamination. Under the terms of the Order, the *potentially responsible parties (PRPs)* agree to perform or pay for site studies or cleanups. It also describes the oversight rules, responsibilities and enforcement options that the government may exercise in the event of non-compliance by potentially responsible parties. This Order is signed by PRPs and the government; it does not require approval by a judge.

Administrative Record: The collection of documents which forms the basis for the selection of a response action at a Superfund site. EPA is required to establish an administrative record for every Superfund site and make a copy available at or near the site. Often, it is the local library near a Superfund site that keeps the administrative record on file for public reference.

Alluvial Aquifers: Adjacent minor aquifers that interrelate with a main aquifer.

Aquifer: An underground layer of rock, sand, or gravel capable of storing water within cracks and pore spaces, or between grains. When water contained within an aquifer is of sufficient quantity and quality, it can be tapped and used for drinking or other purposes. The water contained in the aquifer is called ground water.

Artesian (Well): A well made by drilling into the earth until water is reached which, from internal pressure, flows up like a fountain.

Biodegradation: An innovative technology that uses micro-organisms to degrade contaminants.

Cap: A layer of material, such as clay or a synthetic material, used to prevent rainwater from penetrating and spreading contaminated materials. The surface of the cap is generally mounded or sloped so water will drain off.

Cells: In solid waste disposal, holes where waste is dumped, compacted, and covered with layers of dirt on a daily basis.

Chlorinated Hydrocarbons: These include a class of persistent, broad-spectrum insecticides that linger in the environment and accumulate in the food chain. Among them are DDT, aldrin, dieldrin, heptachlor, chlordane, lindane, endrin, mirex, hexachloride, and toxaphene. Other examples include TCE, used as an industrial solvent.

Community Relations Plan (CRP): The formal plan of action used by EPA to inform and educate the public affected by a Superfund site. This plan addresses all the avenues of communication to be used in a community, such as public open houses, fact sheets, workshops, and notices. It contains a list of interested citizens, citizens' groups, local *repositories,* Federal, State, and local officials. The CRP is a *CERCLA requirement meant to address a community's* needs and concerns. A copy of the Plan is part of the file with the *Administrative Record* in the local *repository.*

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA): The federal law that provides remedies for abandoned hazardous waste sites. CERCLA is commonly known as Superfund.

Consent Decree: A legal document, approved and issued by a judge, formalizing an agreement between EPA and the parties potentially responsible for site contamination. The decree describes cleanup actions that the *potentially responsible parties* are required to perform and/or the costs incurred by the government that the parties will reimburse, as well as the roles, responsibilities, and enforcement options that the government may exercise in the event of non-compliance by potentially responsible parties. If a settlement between EPA and a potentially responsible party includes cleanup actions, it must be in the form of a consent decree. A consent decree is subject to a public comment period.

Dewater: To remove water from wastes, soils, or chemicals.

Evaporation Pond: A containment area where liquids are allowed to evaporate. In some cases, a spraying mechanism is used to speed evaporation.

Expedited Response Action (ERA): A prompt, short-term removal to protect public health and the environment, authorized by *CERCLA.*

Feasibility Study (FS): 1. Analysis of the practicability of a proposal; e.g., a description and analysis of the potential cleanup alternatives for a site on the National Priorities List. The feasibility study usually recommends selection of a cost-effective alternative. It usually starts as soon as the *remedial investigation* is underway; together, they are commonly referred to as the "RI/FS." 2. In research, a small-scale investigation of a problem to ascertain whether or not a proposed research approach is likely to provide useful data.

Ground Water: The supply of fresh water found beneath the earth's surface (usually in aquifers) which is often used for supplying wells and springs.

Heavy Metals: Metallic elements with high atomic weights, e.g., mercury, chromium, cadmium, arsenic, and lead. They can damage living things at low concentrations and tend to accumulate in the food chain.

Hydrocarbons: Chemical compounds that consist entirely of carbon and hydrogen such as petroleum, natural gas and coal.

Impoundment: A body of water or sludge confined by a dam, dike, floodgate, or other barrier.

In-situ biodegradation: Treatment of soil in place to encourage contaminants to break down. It involves aerating the soil and adding nutrients to promote growth of micro-organisms.

Inorganic Chemicals/Compounds: Chemical substances of mineral origin, not of basically carbon structure. These include metals such as lead and cadmium.

Lagoon: A shallow pond where sunlight, bacterial action, and oxygen work to purify wastewater. Lagoons are typically used for the storage of wastewaters, sludges, liquid wastes, or spent nuclear fuel.

Landfarm: To apply waste to land and/or incorporate waste into the surface soil, such as fertilizer or soil conditioner. This practice is commonly used for disposal of composted wastes.

Long-term Remedial Phase: Distinct, often incremental, steps that are taken to solve site pollution problems. Depending on the complexity, site cleanup activities can be separated into a number of these phases.

Memorandum of Understanding (MOU): An interagency agreement defining which agency has a responsibility.

Migration: The movement of oil, gas, contaminants, water, or other liquids through porous and permeable rock.

National Priorities List (NPL): EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. A site must be on the NPL to receive money from the Superfund Trust Fund for remedial action. The list is based primarily on the score a site receives from the Hazard Ranking System. EPA is required to update the NPL at least once a year.

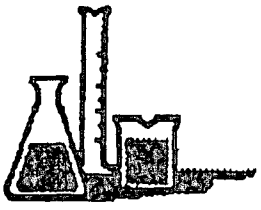
Non-Aqueous Phase Liquids: Liquids that do not mix with water.

Operable Unit: Term for each of a number of separate activities undertaken as part of a Superfund site cleanup. A typical operable unit would be removing drums and tanks from the surface of a site.

Operation and Maintenance: 1. Activities conducted at a site after a Superfund site action is completed to ensure that the action is effective and operating properly. 2. Actions taken after construction to ensure that facilities constructed to treat waste water will be properly operated, maintained, and managed to achieve efficiency levels and prescribed effluent limitations in an optimum manner.

Organic Chemicals/Compounds: Animal or plant-produced substances containing mainly carbon, hydrogen, and oxygen, such as benzene and toluene.

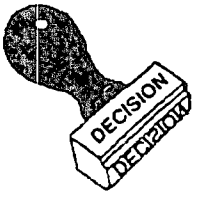
Petrochemicals: Chemical substances produced from petroleum in refinery operations and as fuel oil residues. These include fluoranthene, chrysene, mineral spirits, and refined oils. Petrochemicals are the bases from which volatile organic compounds (VOCs), plastics, and many pesticides are made. These chemical substances are often toxic to humans and the environment.



Polychlorinated Biphenyls (PCBs): A group of toxic chemicals used for a variety of purposes including electrical applications, carbonless copy paper, adhesives, hydraulic fluids, microscope emersion oils, and caulking compounds. PCBs are also produced in certain combustion processes. PCBs are extremely persistent in the environment because they are very stable, non-reactive, and highly heat resistant. Chronic exposure to PCBs is believed to cause liver damage. It is also known to bioaccumulate in fatty tissues. PCB use and sale was banned in 1979 with the passage of the Toxic Substances Control Act.

Potentially Responsible Parties (PRPs): Parties, including owners, who may have contributed to the contamination at a Superfund site and may be liable for costs of response actions. Parties are considered PRPs until they admit liability or a court makes a determination of liability. This means that PRPs may sign a *consent decree* or *administrative order on consent* to participate in site cleanup activity without admitting liability.

Record of Decision (ROD): A public document that explains which cleanup alternative(s) will be used at Superfund sites where the Trust Fund pays for the cleanup. The Record of Decision is based on information and technical analyses generated during the *remedial investigation/ feasibility study* and consideration of public comments and community concerns.



Remedial Action (RA): The actual construction or implementation phase of a Superfund site cleanup that follows remedial design.

Remedial Design (RD): An engineering phase that follows the *remedial investigation/feasibility study* and includes development of engineering drawings and specifications for a site cleanup.

Remedial Investigation (RI): An in-depth study designed to gather the data necessary to determine the nature and extent of contamination at a Superfund site; establish criteria for cleaning up the site; identify preliminary alternatives for remedial actions; and support the technical and cost analyses of the alternatives. The remedial investigation is usually done with the *feasibility*

study. Together they are usually referred to as the "RI/FS."

Remedial Project Manager (RPM): The EPA or state official responsible for overseeing remedial action at a site.

Remedial Response: A long-term action that stops or substantially reduces a release or threatened release of hazardous substances that is serious, but does not pose an immediate threat to public health and/or the environment.

Removal Action: Short-term immediate actions taken to address releases of hazardous substances that require expedited response.

Repository: A facility where official Superfund documents are kept for public reference. Each Superfund site has at least one repository, usually the local library or other public facility.

Risk Assessment: The qualitative and quantitative evaluation performed in an effort to define the risk posed to human health and/or the environment by the presence or potential presence and/or use of specific pollutants.

Runoff: The discharge of water over land into surface water. It can carry pollutants from the air and land into receiving waters.

Sediment: The layer of soil, sand and minerals at the bottom of surface water, such as streams, lakes, and rivers that absorb contaminants.

Sludge: Semi-solid residues from industrial or water treatment processes that may be contaminated with hazardous materials.

Stabilization: The process of changing an active substance into inert, harmless material, or physical activities at a site that act to limit the further spread of contamination without actual reduction of toxicity.

Unilateral Administrative Order (UAO): A legally binding document issued by EPA directing the parties potentially responsible to perform site cleanups or studies (generally, EPA does not issue unilateral orders for site studies).

Volatile Organic Compounds (VOCs): VOCs are made as secondary *petrochemicals.* They include light alcohols, acetone, trichloroethylene, perchloroethylene, dichloroethylene, benzene, vinyl chloride, toluene, and methylene chloride. These potentially toxic chemicals are used as solvents, degreasers, paints, thinners, and fuels. Because of their volatile nature, they readily evaporate into the air, increasing the potential exposure to humans. Due to their low water solubility, environmental persistence, and widespread industrial use, they are commonly found in soil and ground water.

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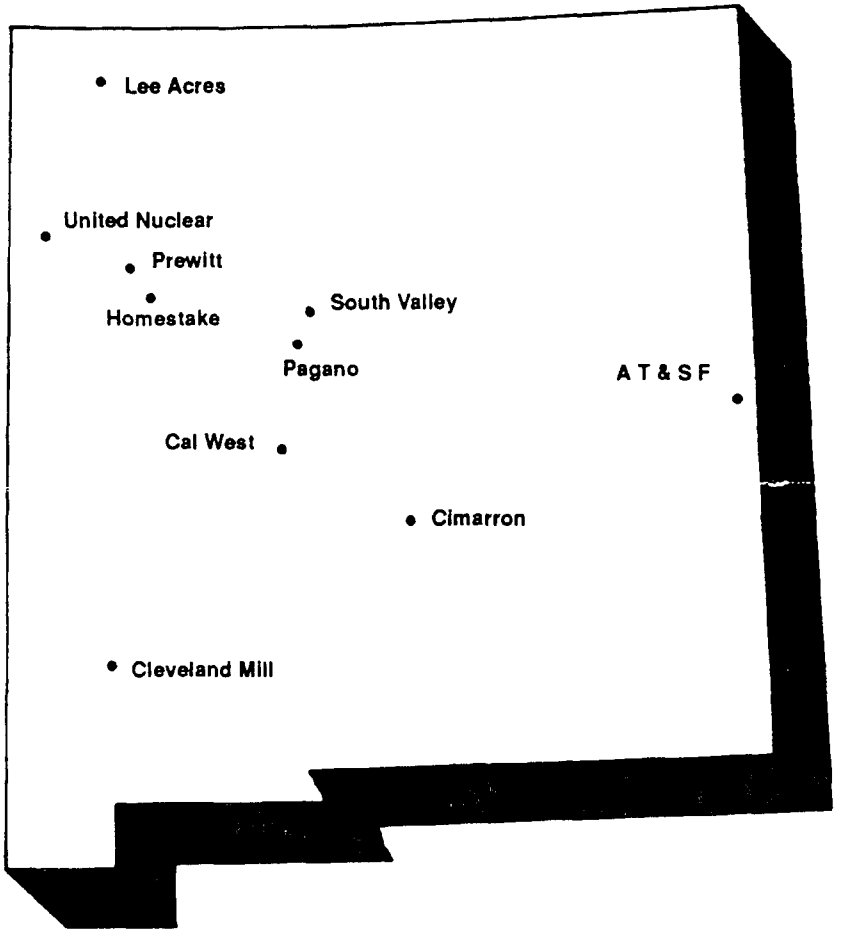
October 25, 1990

Quarterly Status Report of Superfund Sites



INTRODUCTION

Superfund is the common term for the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended in 1986, the federal law that provides remedies for abandoned hazardous waste sites. The U.S. Environmental Protection Agency administers and enforces CERCLA in New Mexico in consultation with the New Mexico Environmental Improvement Division. The State of New Mexico currently has ten sites (proposed or final) on EPA's National Priorities List of hazardous waste sites. This report includes a brief description and current status of these sites.

SITE STATUS

Atchison, Topeka, and Santa Fe (ATSF) in Clovis, Curry County: The ATSF railroad yard has been in use since the early 1900s. Waste water from various ATSF operations contaminated Santa Fe Lake and threatens an underlying aquifer. The site was added to the National Priorities List in 1983. ATSF, the potentially responsible party for this site, conducted the remedial investigation/ feasibility study for Santa Fe Lake under an Administrative Order on Consent.

In 1988, EPA selected a remedy for Santa Fe Lake which includes evaporating the lake water, digging up the sediments, and moving them to a biodegradation treatment area. The remedy also includes bringing lake residue to the treatment area and bioremediation of soil under the lake sediments. Once the treatment is complete, the treatment area will be capped and vegetated. No additional treatment is planned for ground water, although monitoring will continue to ensure that this remedy is effective. Design of the first phase is complete and construction began in September 1989. Construction of the dike around the lake is completed and most of the lake water has evaporated.

Questions regarding this site should be directed to Susan Webster at (214) 655-6730. Information is available at the Clovis-Carver Library. A citizens' group interested in obtaining a grant from EPA to hire a technical advisor should call (214) 655-2240 or 1-800-533-3508.

Cal-West Metals in Lemitar, Socorro County: This 44-acre site is adjacent to Interstate 25 about 6 miles north of Socorro, in Lemitar. The site was used on an intermittent basis as a battery recycling and smelter facility from 1979 to 1981. During 1982-84, research and development was conducted on various aspects of raw materials recovery. Since 1985, the company has been reworking the waste piles from the battery recycling operation to recover lead. During an inspection in 1985, about 300 drums of lead oxide and sulfuric acid, piles of battery pieces, and an evaporation pond remained onsite. Lead was detected in an onsite monitoring well and surface soils downwind of the site. The drums and battery pieces have since been removed.

The site was proposed for addition to the National Priorities List in 1988 and was formally designated as a Superfund site in 1989. An in-house remedial investigation began in August 1990.

A citizens' grant is now available; call Al Lee, (EPA) at (214) 655-2240 or 1-800-533-3508.

Questions on this site should be directed to Carlos A. Sanchez at (214) 655-6710.

Cimarron Mining & Milling in Carrizozo, Lincoln County: During 1979-82, the site was used as a precious metal recovery mill using a mixture of cyanide salt solution and metal stripper. In June 1982, the company was sent a notice of violation by the New Mexico Environmental Improvement Division (NMEID) for discharging cyanide solutions into an unlined discharge pit. In July 1982, the company closed operations and in July 1983, the company filed for bankruptcy.

The site was proposed for addition to the National Priorities List in 1988. An extensive study of this site, called a remedial investigation, began in August 1989 and was completed in June of 1990. During the remedial investigation at Cimarron, another nearby milling location was discovered, known as Sierra Blanca. This location is being further investigated as a separate "operable unit" or phase. The results of the Cimarron remedial investigation and EPA's Record of Decision, documenting selection of the site remedy, indicated the shallow ground water is contaminated with cyanide as a result of improper storage of cyanide

solutions in the unlined discharge pit and cinder block trenches during the mill's operation. In September 1990, EPA selected a remedy for the shallow ground water which includes pumping the ground water to the surface and discharging to the local publically owned treatment works (POTW) for treatment. The cyanide would be reduced through natural degradation processes within the treatment plant which includes aeration, photodecomposition in addition to effluent chlorination. The water discharged from the site in addition to treatment plant effluent and sludges will be monitored to ensure no adverse impacts to the POTW treatment processes. The Remedial Design phase for the Cimarron site will begin in the spring of 1991.

Technical questions about the site should be directed to Paul Sieminski at (214) 655-6710. Information is available at the Carrizozo City Hall. Any citizens' group interested in obtaining a grant from EPA to hire a technical advisor should call (214) 655-2240 or 1-800-533-3508.

Cleveland Mill, near Silver City, Grant County: This site is an abandoned lead, zinc, and copper mill covering 5 to 10 acres located about 5 miles northeast of Silver City. An estimated 12,000 cubic yards of tailings containing lead, silver, zinc, copper, and arsenic are piled onsite. Tests indicate that the nearby Little Walnut Creek is receiving acid drainage containing these metals.

This mining site was proposed for the National Priorities List in 1988 and formally designated as a Superfund site in March 1989. An extensive study of the nature and extent of the contamination, called a remedial investigation and feasibility study (RI/FS), will be conducted by the New Mexico Environmental Improvement Division (NMEID), with EPA oversight. The RI/FS will begin this fall. Preliminary site characterization using a field portable x-ray fluorescence (FPXRF) survey was conducted this summer. The site screening report generated from the survey is due to be submitted to EPA in October. Information obtained from the FPXRF survey will be used to streamline the RI/FS.

A citizens' assistance grant is now available. For more information, contact Al Lee at EPA, (214) 655-2240 or 1-800-533-3508. Questions regarding the site should be directed to Randy Merker at (505) 827-2862 or Ann Schober at (214) 655-6710.

Homestake Mining Company (HMC) near Milan, Cibola County: This site is an active uranium mill where seepage from two mill-tailings ponds have contaminated a shallow aquifer under the site. Approximately 22 million tons of tailings cover an estimated 245 acres, piled up to 100 feet high.

The site was added to the National Priorities List in 1983 primarily due to offsite contamination of residential wells in neighboring subdivisions. HMC provided a water supply system to area residents in 1985, under the terms of a Consent Decree. HMC also implemented an aquifer restoration program at the site aimed at flushing tailings-contaminated ground water in off-site areas and containing the ground water plume onsite. The New Mexico Environmental Improvement Division (NMEID) has required maintenance and modifications of the aquifer restoration program through a formal Groundwater Discharge Plan since 1985.

NMEID also performed a 2-year outdoor monitoring program which included continuous indoor monitoring of a limited number of homes located near the mill. Subsequent to this, HMC agreed to further investigate the presence and sources of radon in the subdivisions near the mill. An extensive, long-term inves-

tigation to determine the extent of indoor and outdoor radon concentrations in area subdivisions is complete. The report indicated that the principal cause of elevated indoor radon concentration (above 4 pico curies per liter of air) in eight residences is related to local soil sources of radon. Therefore, EPA decided that no further action is needed on the radon portion.

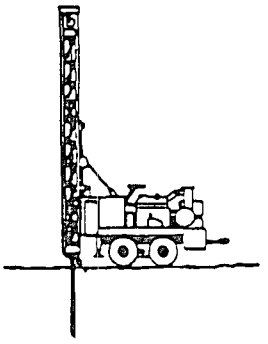
In 1986, the Nuclear Regulatory Commission (NRC) assumed licensing authority for uranium mills in New Mexico. NRC required Homestake to submit a reclamation plan for the tailings embankment at the site in accordance with NRC regulations. NRC has also required Homestake to continue ground water restoration efforts at the site.

Questions or comments should be directed to Ricky McCoy at (214) 655-6730. Information is available at the NMSU Campus Library in Grants.

For information regarding a technical assistance grant, call Al Lee at EPA, (214) 655-2240 or 1-800-533-3508.

Lee Acres Landfill near Farmington, San Juan County: This site covers 20 acres of public land east of Farmington. The Lee Acres residential subdivision and the Giant Industries refinery are nearby. The Bureau of Land Management (BLM) leased the property to San Juan County which operated the landfill from 1962 to 1986. The landfill consists of an undetermined number of buried solid waste trenches and four unlined waste lagoons. At least three of the lagoons received a complex mixture of liquid wastes including water produced from oil and gas fields, waste oils, spent acids, and chlorinated solvents.

Sampling conducted by the NMEID in 1985 revealed chlorinated volatile organic compounds in lagoon contents and in a residential well located downgradient at the north end of the Lee Acres subdivision.



BLM was required to perform a preliminary investigation under an order between NMEID and BLM signed in August 1987. BLM performed the preliminary investigation between September 1987 and September 1988 which included the installation and sampling of 19 monitoring wells.

In early 1987, BLM arranged an alternate drinking water supply for affected residents near the landfill. BLM has conducted additional field investigations since September 1988.

The site was added to the Superfund National Priorities List in August 1990. Later this year, EPA, NMEID, and BLM will meet to define the requirements for the remedial investigation/feasibility study.

Questions regarding this site should be directed to Monica Chapa at (214) 655-6730. A citizens' group interested in obtaining a grant to hire a technical advisor should call Al Lee (EPA) at (214) 655-2240 or 1-800-533-3508.

Pagano Salvage in Los Lunas, Valencia County: This one-acre site is located at 102 Edeal Road near the east bank of the Rio Grande. The metal salvage operations included PCB-contaminated oil from electric transformers and capacitors. Drums containing oil were removed from the site by the Department of Energy. Aroclor 1254 and Aroclor 1260 were detected, as well as pesticides DDT and DDE. Ground water in the area is shallow and surface water near the site is used to irrigate food and forage crops.

The site was proposed for the National Priorities List in 1988 and added in October 1989. Sampling in September and October 1988 indicated that PCB

levels in the surface soil were greater than allowable. PCBs were also found in the nearby Peralta Riverside Drain/Otero Drain and in some fish tissue. In order to protect human health and the environment, approximately 5,100 cubic yards of contaminated soil and debris were excavated and moved to a permitted facility. EPA reviewed the sampling data and determined that further studies were not needed. Additionally, based on EPA's removal action, EPA has determined that further action is not required and a Record of Decision, recommending no further action, was signed on September 27, 1990.

Questions should be directed to Carlos Sanchez at (214) 655-6710.

Prewitt Refinery in Prewitt, McKinley County: The abandoned oil refinery operation occupies 75 acres west of Prewitt on U.S. Highway 66. The site contains the ruins of the refinery including waste pits, an oil/water separator, tank bases and other equipment rubble, two major spill areas, and the remains of a pump lift station. Site operations began in the early 1940s and continued for 15-20 years under several owners and operators. The Navajo Nation has owned the property since 1966.

Tests conducted in 1986 detected benzene, xylenes, lead, and chromium in sediments collected on site to a depth of 17 feet. Further investigation in 1987 indicated contamination of ground water north of the site and a floating layer of waste.

The site was included on the National Priorities List in August 1990 under Final Rule #9. Under agreements with EPA, former owners of the refinery, Atlantic Richfield Company (ARCO) and the El Paso Company (TEPCO) have conducted activities to reduce the immediate hazards posed by the site by constructing a security fence and treating well water to remove the hydrocarbon contamination. Water treatment for five homes has been completed.

ARCO and TEPCO are under an agreement with EPA to perform a phased Remedial Investigation and Feasibility Study (RI/FS). Phase I of the RI has been completed. ARCO and TEPCO submitted an Interim Data Summary (IDS) detailing the results of the sampling and site characterization activities performed. The IDS and Phase II of the RI Proposal were submitted to EPA in late June 1990. Phase II RI work began in August 1990.

Questions should be directed to Monica Chapa at (214) 655-6730. Any citizens' group interested in obtaining a grant from EPA to hire a technical advisor should call Al Lee (EPA) at (214) 655-2240 or 1-800-533-3508.

South Valley in Albuquerque, Bernalillo County: Contaminants from a number of industrial sources contributed to localized ground water contamination in the vicinity of the SJ-6 municipal drinking water well. SJ-6 is located on Woodward Road east of Broadway.

The one-square mile area around SJ-6 was designated as the top Superfund priority in New Mexico and was added to the National Priorities List in 1982. Two area municipal wells were closed, including SJ-6. Closing the SJ-6 well caused a decrease in Albuquerque's available water supply for fire protection and other purposes. As a result, EPA installed a new well (Burton #4) at another location.

The remedial investigations and feasibility studies were conducted in phases by EPA and the potentially responsible parties (PRPs). All of the studies are now complete. Actions planned for the area include: pumping and treating contam-

inated ground water, plugging abandoned wells to stop downward migration, treating contaminated soil by vacuum extraction, and long-term monitoring.

Pilot testing of the ground water cleanup system on the Edmunds Street property is underway. Design work on cleanup of the remaining portions of the South Valley site is now underway.

Questions on the site should be directed to Tim Underwood at (214) 655-6730. The Superfund Project of the San Jose Community Awareness Council has been awarded the citizens' grant for the South Valley site. If you would like to participate in the activities of this group, please contact Jesus Lucero at (505) 242-3658.

United Nuclear Corporation (UNC), in Church Rock, McKinley County: This inactive uranium mill is located near the southern border of the Navajo reservation. The mill operated from 1977 to 1982. In 1979, a break in a tailings pond dam released 93 million gallons of mill tailings fluid into the Rio Puerco. Seepage from the tailings impoundment contaminated the Upper Gallup and alluvial aquifers in the vicinity of the impoundment. The site was added to the National Priorities List in 1982. EPA conducted an RI/FS investigation of ground water contamination at the site from 1984 to 1988.

Analyses of samples collected from nearby private drinking water wells indicated that the drinking water in the wells meets health-related primary drinking water standards. Levels of several aesthetic parameters such as sulfate, iron, and manganese are naturally high, however. In 1988, EPA decided to pump and treat the contaminated ground water from the Upper Gallup and alluvial aquifers.

A mister/pond evaporation system was installed as well as a series of Upper Gallup pumping wells and alluvial pumping wells. Due to the slow movement of water through the aquifers, this remedial action is expected to take many years to complete.

In a separate action, UNC submitted a Reclamation Plan to the Nuclear Regulatory Commission (NRC) as required by their Source Material License. The Reclamation Plan includes installation of a cap over the site, mill decommissioning, control of surface water runoff, and removal and evaporation of contaminated ground water.

The roles and responsibilities of EPA and NRC for remedial action are formally defined in a 1988 Memorandum of Understanding. UNC submitted their first annual review report of ground water remediation in December 1989. EPA, NRC, and NMEID have reviewed the report and submitted comments to UNC.

UNC submitted a proposal to modify seepage collection in Zone 1 of the Upper Gallup aquifer and add an additional monitoring well to further identify remediation in Zone 3. An enhanced, evaporation system to increase evaporation efficiency will also be constructed. EPA and NRC approved this proposal in August 1990. NRC incorporated these modifications by amending UNC's Source Material License. Modifications began in September 1990.

Questions regarding EPA's portion of the site should be directed to Ricky McCoy at (214) 655-6730. Any citizens' group interested in obtaining a grant from EPA to hire a technical advisor should call (214) 655-2240.

Additional Information

Questions from the media should be directed to Roger Meacham, EPA Region 6 Press Officer, at (214) 655-2200.

A guide to EPA hotlines, clearinghouses, libraries, and dockets is available from

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For more information about Superfund sites or activities outside our Region, contact EPA's toll-free number 1-800-424-9346. The number for the hearing impaired is 1-800-553-7672 or 475-9652 in the Washington, D.C. area.

The EPA publication *CERCLA: Getting into the Act - Contracting and Subcontracting Opportunities in the Current Superfund Program*, lists Superfund contracts and provides contact points, addresses, and telephone numbers for firms with Superfund contracts. To obtain a free copy of the brochure, call (202) 382-2080 or (202) 557-7777. Please refer to EPA publication number 540/G-89-003a.

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Community Relations Coordinator
U.S. EPA (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-2240
or
1-800-533-3508

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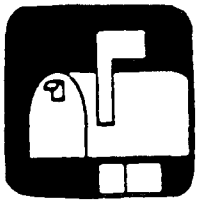

Name _____

Affiliation _____

Street _____

City, State, and ZIP _____

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U.S. Environmental Protection Agency
Superfund (6H-MC)
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Dallas, Texas 75202

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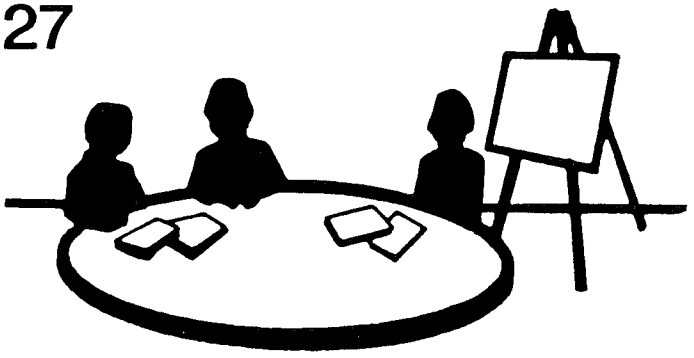
Protection Agency
EPA-335

David Boyer
NM Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504-2088

You are invited
to a

Prewitt Refinery Superfund Site Open House

Thursday, September 27
5:00 to 7:30 p.m.
at the
Prewitt Fire House
Prewitt, New Mexico



You are invited to learn more about the Prewitt Refinery site and the Superfund process at this Open House. U.S. Environmental Protection Agency (EPA) and New Mexico Environmental Improvement Division representatives will be available to answer questions and explain current site activities. This is not a formal public meeting. You will have the opportunity to talk directly with EPA and NMEID representatives in an informal setting. We welcome your participation.

Please make plans to stop by!

U.S. Environmental Protection Agency
Region 6 (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733

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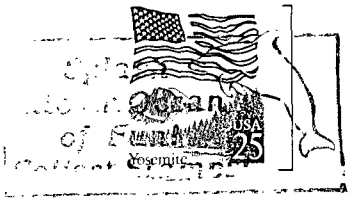

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NM Oil Conservation Division
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Santa Fe,NM 87504-2088

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PREWITT SITE UPDATE

An EPA Update on Activities at the Prewitt Refinery Superfund Site
September 1990

PREWITT REFINERY PLACED ON THE NATIONAL PRIORITIES LIST

Under the provisions of the federal **Superfund** program, the U.S. Environmental Protection Agency (EPA) has formally added the Prewitt Refinery site to the National Priorities List (NPL). After a review of the public comments, the site was added to the NPL making it eligible for Federal action. The NPL is a national roster of uncontrolled or abandoned hazardous waste sites eligible for investigation and remediation under the Superfund program.

Under agreements with EPA, two of the former owners of the refinery, Atlantic Richfield Company (ARCO) and the EL Paso Company (TEPCO) have conducted activities to reduce the immediate hazards posed by the site by constructing a security fence and treating well water to remove the hydrocarbon contaminants. Water treatment for five homes has been completed. In July 1989, ARCO and TEPCO entered into an agreement with EPA to perform a phase Remedial Investigation and Feasibility Study. Phase I of the RI was completed in June 1990. ARCO and TEPCO submitted an Interim Data Summary detailing the results of the sampling and site characterization activities performed. Based on the results in the Interim Data Summary, ARCO and TEPCO submitted a Phase II Work Plan which was approved in September 1990.

The Phase II field activities are under way. Some of the Phase II activities include additional ground water investigations, soil investigations, endangerment assessment, and Non-Aqueous Phase Liquids (NAPL) investigations.

THIS FACT SHEET WILL TELL YOU ABOUT . . .

- The addition of the Prewitt site to the National Priorities List.
- The next step in the Superfund process.
- Site background.
- How to find out more about the site.
- Citizen Involvement Opportunity.

THE NEXT STEP

The Feasibility Study is scheduled to begin in November 1990. A final RI/FS report is due to EPA in January 1992. Upon completion of the FS, a 30-day **public comment period** is held. After the public comment period a specific long-term action will be selected. A **record of decision (ROD)** is prepared to document the decision made, provide a summary of comments received during the comment period, and provide EPA's responses to those comments. Once the ROD is issued, the remedial design and remedial action are implemented.

The time required to complete each of these steps is different for every site. In general, an RI/FS takes between eighteen months and two years. Designing a long-term remedial action, if the FS indicates that longterm action is needed, may take an additional six months. The final long-term action typically takes one to two years, although treatment of contaminated ground water, if needed, may take decades. If the site poses an imminent threat to public health or the environment at any time during this process, EPA will immediatly intervene with a response action.

PREWITT OPEN HOUSE
Thursday, September 27, 1990 5:00 -7:30 pm

How you can get involved and learn more about the Prewitt Site and Superfund Process.

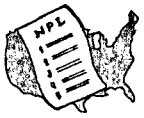
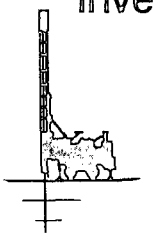
The *Superfund* Process

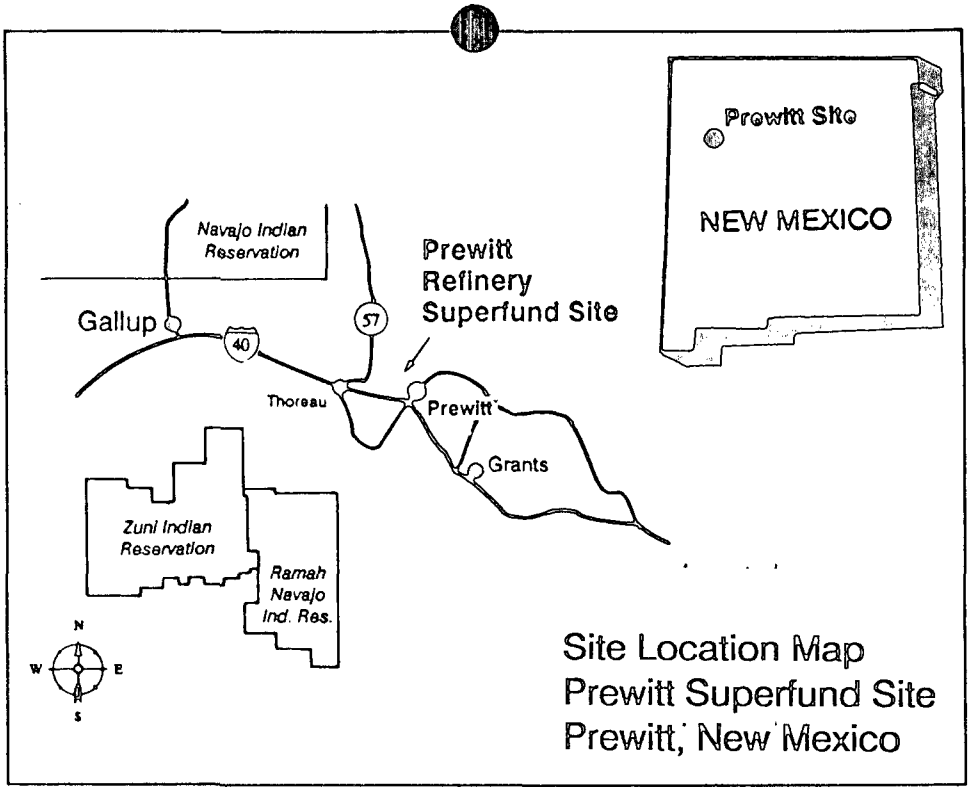
The Superfund program was enacted by Congress in December 1980. The law established a program to investigate and initiate actions against actual and potential releases of hazardous chemicals and other substances at sites throughout the United States. In 1986, Congress reauthorized Superfund and increased the size of the fund from $1.6 billion to $8.5 billion. EPA administers the Superfund program in cooperation with individual states.

The Superfund process can differ for each site. There are usually six phases which begin when a site is identified and conclude with a final remedy.

EPA monitors the site throughout the process. *If at any time contamination becomes an immediate threat to public health or the environment, EPA may conduct an emergency action,* known as a removal action.

EPA attempts to identify parties who may be legally responsible for site contamination. Once identified, these parties are asked to participate in the investigation and remedial process. If they do not agree to participate, EPA may seek their participation through legal means.

Identification 	Before most people understood how certain wastes might threaten public health and the environment, hazardous wastes were often disposed of at locations where they could either enter the ground, water, or air. Now these sites are being brought to the attention of EPA by private citizens, and local and state agencies.
Assessment 	A preliminary inspection of the site is conducted by EPA or a state agency. The site is assessed for the presence of hazardous chemicals and other substances and their potential impact on public health or the environment.
NPL Placement 	If EPA finds that a site poses a serious actual or potential threat to the community, the site is placed on the National Priorities List (NPL), a roster of the nations worst hazardous waste sites. The NPL currently includes more than 1,100 sites nationwide.
Investigation 	EPA conducts a two-part investigation of all NPL sites. The first part, a remedial investigation, identifies contamination and site-related threats to the environment and public health. The second part of the investigation, a feasibility study, evaluates various approaches to addressing site conditions.
Preferred Remedy 	EPA selects a preferred remedy for the site from among the alternatives presented in the feasibility study. After EPA recommends its choice, the public, and state and local officials are given an opportunity to comment on it. After it considers the comments, EPA selects the final remedy for the site.
Final Remedy 	Following the selection of a final remedy, EPA designs and implements the chose remedy. EPA negotiates with parties responsible for contamination of the site to design, implement and pay for the final remedy. If an agreement cannot be reached, EPA proceeds with the final remedy. EPA may, through legal action, later recover costs from the responsible parties.



Site Location Map
Prewitt Superfund Site
Prewitt, New Mexico

SITE BACKGROUND

The Prewitt Refinery is an abandoned oil refinery operation which occupies 70 acres west of the city of Prewitt on U.S. Highway 66. The site contains the ruins of the refinery, including waste pits, an oil/water separator, tank bases and other equipment rubble, two major spill areas and the remains of a pump lift station. Site operations began in the early 1940s and continued until 1957 under several owners and operators. The Navajo Nation has owned the property since 1966.

Tests conducted in 1986 detected benzene, xylenes, lead, and chromium in sediments collected on site to a depth of 17 feet. Further investigation in 1987 indicated contamination of ground water north of the site and a floating layer of hydrocarbon waste.

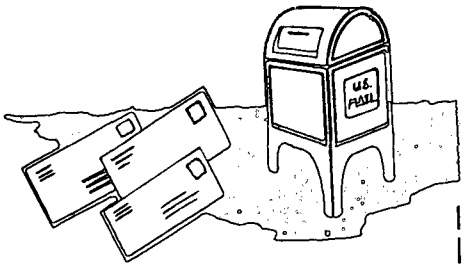
TECHNICAL ASSISTANCE GRANT

U.S. EPA's Technical Assistance Grant (TAG) program enables a group of interested citizens to obtain assistance in interpreting documents and activities conducted at the Superfund site. The grant provides up to $50,000 to a community group wishing to hire consultants to interpret sampling results, reports, and other documents. Twenty percent of the requested funding amount must be matched by the group. Municipalities or other government agencies are not eligible to receive TAGs. The process for obtaining a TAG takes time, so if you are interested, please contact:

Mr. Al Lee
U.S. Environmental Protection Agency
Region 6 (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733

Phone: (214) 655-2240
-or-
1-800-533-3508

MAILING LIST



If you did not receive this fact sheet in the mail, then you are not on our mailing list. If you wish to be placed on the Prewitt Superfund Site mailing list, please complete this form, detach and mail to:

Donn Walters
Community Relations Coordinator
U.S. EPA (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733

NAME _____

DAYTIME PHONE NO: (___) _____

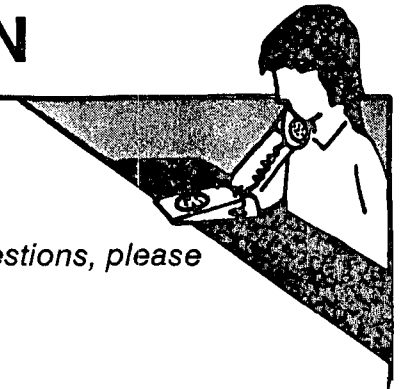
ADDRESS _____

CITY _____

STATE _____ ZIP _____

AFFILIATION _____

FOR MORE INFORMATION



Information repositories have been established to provide interested persons the opportunity to read all of the documents and materials EPA has used to date to evaluate the Prewitt Refinery site. Additional information about the site and the Superfund program is available during regular business hours at the EPA office in Dallas and the following information repositories.

Prewitt Fire House
P.O. Box 472
Prewitt, New Mexico 87045

New Mexico Environmental
Improvement Division
1190 Saint Francis Drive
Santa Fe, NM 87501
Monday through Friday - 8:30 a.m. to 5:30 p.m.
Saturday & Sunday - Closed

If you have further questions, please call or write to:

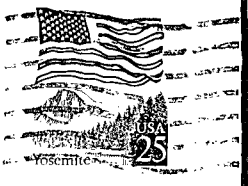
Monica Chapa
Remedial Project Manager
U.S. EPA (6H-EO)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-6730

Donn Walters
Community Relations Coordinator
U.S. EPA (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-2240

Inquiries may also be directed to the EPA Toll Free Number at 1-800-533-3508. Questions from the media should be directed to:

Roger Meacham
Press Officer
U.S. EPA (6X)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-2200

U.S. Environmental Protection Agency
Region 6 (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733



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NM Oil Conservation Division
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Two N.M. sites added to Superfund list

The Associated Press

WASHINGTON — The U.S. Environmental Protection Agency on Tuesday added 106 hazardous waste sites, including two in New Mexico, to its national priority cleanup list.

The EPA said an abandoned refinery site near Prewitt and the Lee Acres landfill near Farmington were tagged onto the list, which now has 1,187 sites nationally.

Placement on the list makes non-federal sites eligible for cleanup aid under the federal Superfund law.

The Lee Acres site is considered a federal site because it is on U.S. Bureau of Land Management land.

The 75-acre refinery site, just east of Prewitt on U.S. 66, was operated by several different owners for 25 years beginning in the early 1940s, the EPA said.

Owners and operators included Petroleum Products Refining Co., Petroleum Products Refining and Producing Co., Malco Refineries, New Mexico Asphalt and Refining Co., Malco Asphalt and Refining Co. and El Paso Natural Gas Products Co., the EPA said.

The Navajo Nation has owned the property since December 1966, the agency said.

El Paso Natural Gas Products dumped crude refinery wastes at the site and Petroleum Products Refinery and Producing deposited hazardous wastes there, the agency said.

In December 1982, the New Mexico Environmental Improvement Division detected benzene, a cancer-causing organic chemical, in a nearby private well, the EPA said.

Wells within three miles of the site provide ground water to livestock and an estimated 1,600 people, the agency said.

The Lee Acres landfill, which covers 40 acres southeast of Farmington, was shut down in the mid-1980s.

The landfill consists of solid waste trenches and unlined waste lagoons, the EPA said.

At least three lagoons might have received waste oil, acids, chlorinated organic solvents and septic tank wastes, the EID said.

In 1985, the EID detected chlorinated organic compounds as well as benzene in a lagoon and in a residential well at the north end of the Lee Acres subdivision, the EPA said.

An estimated 400 people use ground water within three miles of the site for drinking water, the EPA said.

The BLM ordered the landfill closed and contracted for fencing when the county abandoned the landfill, the EPA said.

In November 1986, the BLM arranged for alternative drinking water supplies for Lee Acres residents using ground water, the EPA said.

STATE OF NEW MEXICO

OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal | Time 1:45 PM | Date 8/12/85

Originating Party	Other Parties
David Boyer OCD	John Eichelmann, EPNG (988-9804)

Subject: Prewitt Refinery Site

Discussion: I contacted John to get an update on EPNG attempts to gain access to site for remedial work. ① Tribe didn't respond to EPNG January 9, 1985, letter requesting access ② EPA was to write Tribe in March-April (at EPNG request) to help them to gain access*; later, for whatever reason, EPA did not send letter ③ EPNG wants to perform remedial action to clean up surface and plug wells. Tribe wants full scale monitoring and ground-water clean up if necessary. EPNG says can work on the latter - plug open holes now - possibly would agree to few monitor wells now.

* Probably involvement would be through various Superfund avenues.

Conclusions or Agreements: ARCO folks involved here all retired - EPNG to brief replacements within several months. John says that if OCD writing a letter to Navajos would help EPNG gain access to site, they would favor us proceeding to write such a letter.

Distribution: Prewitt Refinery File
Dick Stamets

Signed: D. H. Boyer

Dick - This may have some eventual effect on the Prewitt case

Dave

THE GROUNDWATER NEWSLETTER

• *Exploration* • *Development*
• *Management* • *Recharge* • *Pollution*
• *Underground Waste Disposal*

Published by Water Information Center, Inc.
a subsidiary company of Geraghty & Miller, Inc.
Groundwater Consultants.

A twice-a-month report on groundwater

FRED TROISE, Editor
JANET L. STERLING, Asst. Editor

Vol. 14, No. 2 January 31, 1985

WASHINGTON UPDATE

After months of debate, EPA and the Department of Justice have issued an interim policy on private party cleanup settlements under Superfund. Under the policy, approved by acting EPA head Lee M. Thomas, the government will drop its self-imposed requirement that responsible parties offer at least 80 percent of cleanup costs to negotiate a settlement and replace it with a more flexible position. Now, the agency will negotiate only if the initial offer constitutes a "substantial portion" of the costs of cleanup. No specific numerical threshold for initiating negotiations has been established. The agency felt that the old policy was self-defeating and that voluntary cleanups--negotiated private party actions--are essential to an effective and successful program.

El Paso
Natural Gas Company

P. O. BOX 1492
EL PASO, TEXAS 79978

PHONE: 915-541-2600

January 9, 1985

Mr. Richard Stamets
Director
New Mexico Oil Conservation Division
Land Office Building
Post Office Box 2088
Santa Fe, New Mexico 87501

Re: **Prewitt Refinery Site**
McKinley County, New Mexico

Dear Mr. Stamets:

For your information, I am enclosing a copy of our latest request to The Navajo Nation for permission to enter the Prewitt Refinery site. Also enclosed is a chronology of our efforts during the past year to obtain permission from the Navajo's to enter the refinery site and commence the proposed remedial work.

As we have in the past, we will keep you informed of our efforts regarding the Prewitt site.

Very truly yours,

H Reiquam

Howard E. Reiquam
Director, Environmental Affairs

Enclosures

El Paso
Natural Gas Company

P. O. BOX 1492
EL PASO, TEXAS 79978
PHONE 915-541-2600

January 9, 1985

Mr. Harold Tso, Executive Director
Division of Resources
The Navajo Nation
Post Office Box 308
Window Rock, Arizona 86515

Re: Prewitt, New Mexico Refinery Site

Dear Mr. Tso:

The Navajo Nation on December 6, 1966 purchased approximately one hundred and eighty-three (183) acres of land, which included the Prewitt New Mexico Refinery site, from El Paso Products Company, a wholly owned subsidiary of El Paso Natural Gas Company. As you know, on March 5, 1984 Atlantic Richfield Company/El Paso Natural Gas Company met with Ms. Louise Linkin and Mr. James Benally and discussed our proposed plan to eliminate suspected sources of groundwater contamination at the abandoned Prewitt, New Mexico Refinery site. After this visit we met with Ms. Arlene Luther and Mr. James Benally and toured the refinery site and discussed the proposed plan for remedial work. As a result of this meeting El Paso agreed to amend the initial plan to include reseeding of disturbed areas.

This letter shall reaffirm Arco's/El Paso's willingness to do the reclamation work recommended in the proposal that we have submitted. This proposal was prepared by John W. Shomaker - Consulting Geologist, and titled "Proposed Remedial Work Prewitt Refinery Site, McKinley County, New Mexico" and dated February, 1984. A copy of the proposal is attached.

The proposal includes specific requirements for surface reclamation and specific requirements for plugging the abandoned refinery wells. Briefly stated, the proposal for surface reclamation requires the following work:

1. Petroleum residues will be excavated, spread uniformly and disced into the soil. As stated in our letter dated June 8, 1984, to Ms. Arlene Luther, disposal of hydrocarbon waste by this method, i.e. land-spreading, has been accepted by the United States Environmental Protection Agency, the Texas Department of Water Resources and, in addition, has been practiced for over six years by El Paso Products Company near Odessa, Texas.

2. All berms and dikes will be broken down and the dirt will be used to fill any depressions to ensure positive drainage away from former ponds.

3. Where soil depth permits, those areas disturbed during reclamation activities will be reseeded with native range grasses.

The proposal for plugging the abandoned refinery wells would require the following work:

1. Each well will be cleaned out to total depth if possible.

2. After the well has been cleaned, it will be pumped and a water sample taken from the producing aquifer.

3. An attempt will be made to pull the casing and fill the hole with cement. If the attempt is not successful, the casing will be perforated and filled with cement.

4. A detailed report of abandonment will be filed with the New Mexico State Engineer's Office.

After we receive permission from The Navajo Nation to enter the refinery site, we would commence the reclamation work within thirty (30) days. The reclamation work would be completed as soon as reasonable after commencement.

As you undoubtedly know one of the neighboring domestic wells has been found to contain traces of hydrocarbons that may have originated from the refinery. Although the refinery was shutdown in July, 1957, there is a possibility that the current condition of the refinery site, i.e. unplugged abandoned water wells and former pond sites containing hydrocarbon waste, may be contributing to contamination of the groundwater.

As a previous owner of the refinery site ARCO/El Paso wish to complete the proposed reclamation work as soon as possible. As a private property owner in Prewitt, New Mexico we are sure The Navajo Nation also recognizes its duty to take necessary action to prevent the contamination of groundwater - a contamination that could be characterized by the New Mexico courts as a public nuisance.

Ms. Louise Linkin has said we would be given access to the refinery site to complete the reclamation work provided we would agree to develop and implement a groundwater monitoring plan. At this time our first priority must be, and we believe the first priority of The Navajo Nation should be, reclamation of the site to prevent the possible contamination of groundwater near the refinery site. Plugging of the abandoned wells as proposed includes collecting and analyzing water samples. These analytical results will provide new information regarding

possible contamination of the aquifer under the refinery site. When this data is available we will give you the data and meet with you or your designated representatives to discuss the data and to discuss whether any further groundwater monitoring activities would be justified.

Because this proposal has been under consideration for almost one year, we would appreciate very much your written authorization for ARCO/El Paso to enter the refinery site by February 1, 1985.

Very truly yours,

H Reiquam

Howard E. Reiquam
Director - Environmental Affairs

cc: U.S. Environmental Protection Agency
Region VI, Dallas, Texas
New Mexico Oil Conservation Division
New Mexico Environmental Improvement Division
Senator - W. S. (Smitty) Eoff

bcc: C. A. (Cab) Baldwin - ARCO
Dave Larson
Bill Lorang
Clovis McArthur
John McFall

Prewitt Refinery Site Remedial Work

Chronology

January 1984	El Paso/Arco designated engineers to work on site reclamation.
January 16, 1984	Engineers met to formulate plans.
February 1, 1984	El Paso/Arco visited site with J. W. Shomaker for onsite evaluation.
February 13, 1984	Shomaker submitted plan to El Paso/Arco.
February 15, 1984	EP/Arco met to consider plan.
March 2, 1984	Met w/NMOCD to explain plan.
March 2, 1984	Met w/NMEID to explain plan.
March 5, 1984	Met w/Navajo EPA to explain plan.
March 6, 1984	Letter to Navajos sent requesting permission (to Benally; cc: Linkin).
March 6, 1984	Letter to Navajos sent requesting permission (to Linkin; cc: Benally).
March 8, 1984	Sent copy of plan to NM State Engineer requesting approval of well plugging techniques proposed.
March 14, 1984	Site visit with Navajos (J. Benally, land dept; Arlene Luther, Navajo EPA).
March 24, 1984	Plan revised with two addenda (reseeding & State Engr. requested well plugging method).
March 28, 1984	Letter to Navajos (Tso) from El Paso providing amended plan and requesting permission.
March 30, 1984	Telecon w/Tso requesting that he expedite his review.
April 4, 1984	Letter to El Paso from Tso acknowledging receipt of plan, delegation of approval to Linkin, and request of review by Zaman, Navajo Department of Water Resources.
April 6, 1984	Telecon w/Louise Linkin; she indicated plan approval by 4/18/84.
April 12, 1984	Telecon w/Tso; told him of receipt of Zaman's comments and our concerns. He said he understood.

April 13, 1984	Letter written to Tso from Zaman relative to Zaman's review of plan - suggested monitor wells.
April 13, 1984	Telecon w/Linkin; she said letter of permission would be mailed today.
April 24, 1984	Letter written to El Paso from Boyer (EID) relative to Boyer's review of plan - suggested delineation of plume, etc.
May 14, 1984	Application to appropriate water prepared for Barnes.
May 22, 1984	Drilling of Barnes' well began.
May 31, 1984	Letter to Boyer from El Paso responding to Boyer's concerns.
June 4, 1984	Barnes well completed.
June 8, 1984	Letter to Arlene Luther from El Paso, transmitting responses to Boyer, analysis of sludges, EPA land spreading techniques.
June 11, 1984	Memo to NMEID from Boyer: Reply to El Paso responses of May 31.
June 13, 1984	Telecon to Arlene Luther/J. Benally; they indicated that permission letter is being drafted for chairman's signature.
June 20, 1984	Telecon to Damon (of Tso's office); he indicated that permission letter probably enroute; will check & call back.
July 17, 1984	Meeting w/EID to update the agency regarding well completion and analytical reports.
August 9, 1984	Meeting w/Navajos to update them regarding well completion and to reiterate plan/request for permission to enter site. Responded that permission be granted only if monitoring program is developed.
September 27, 1984	Telecon w/Louise Linkin; she said that she would provide a letter of permission which would be contingent upon the development of a monitoring plan.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
525 Camino de los Marquez
Santa Fe, New Mexico
87501

TONEY ANAYA
GOVERNOR

December 13, 1984

Denise Fort, Director
NM Environmental Improvement Division
P. O. Box 968
Santa Fe, New Mexico 87504-0968

Dear Ms. Fort:

Your letter of December 4, 1984, regarding the Prewitt, New Mexico, abandoned oil refinery site, and the accompanying site file have been received by me and referred to the Oil Conservation Division (OCD) for their review. Technical and legal staff from both OCD and your division have already held preliminary discussions of the issues involved.

The refinery had several owners before being closed in 1957 and dismantled in 1964. In 1965 land ownership was transferred to the Navajo Tribe and tribal members living in the area. Therefore, identification of potential legal mechanisms to effect clean-up is made more complex by the length of time since the pollution occurred and the number of parties involved. The OCD expects to continue to work with the EID and all other parties concerned to arrive at an acceptable strategy which will address the surface and subsurface contamination problems at the site.

Yours truly,

PAUL BIDERMAN
Secretary

PB/DB/dp

cc: Arlene Luther, Navajo Tribe
Paul Sieminski, EPA
Laure Van Heijenoort, EID
Legal Services Bureau

Independent

DEC 8 1984

New Mexico Press Clipping Bureau

Benzene levels in Prewitt well set record

By David Carlson
Eastern Bureau

PREWITT — The highest level of benzene ever reported in groundwater in the United States was detected in a home water well at Prewitt, according to an Albuquerque-based environmental group.

A domestic water well that is less than one-quarter mile from an abandoned oil refinery here contains "extraordinarily high levels of benzene," according to a report published this week by Southwest Research and Information Center (SRIC), a non-profit environmental-information group based in Albuquerque.

Two other New Mexico wells, one near Bloomfield and another near Hobbs, also contain levels of benzene higher than available data indicates has ever been reported anywhere in the nation, the report says.

The Prewitt well, when tested in 1982 and '83, contained 1,200 parts-per-billion of the petroleum byproduct benzene — 120 times more than is allowed under state and federal drinking water standards — according to SRIC researcher Chris Shuey.

"The highest concentration of benzene reported in groundwater in the U.S. prior to 1982 was 300 parts-per-billion in New Jersey," Shuey said Friday. The most recent figures he could find in his research were from July, 1982, he added.

Shuey's report also details numerous other incidents of groundwater pollution related to oil and gas development in New Mexico. Pollution is most serious near Hobbs, in the southeast portion of the state, and near Farmington in the northwest, the report says.

The report is critical of the New Mexico Oil Conservation Division, which Shuey contended has not done enough to prevent the pollution. OCD officials were not immediately available for comment.

The researcher's report, entitled "Oil and Water Still Don't Mix," appears in a just-released edition of "The Workbook," a quarterly publication of SRIC.

The polluted Prewitt water well is owned by Mabon Barnes, who, ironically, worked for more than 30 years at the now-abandonded oil refinery across U.S. 66 from his home in this tiny town 15 miles west of Grants. Barnes is suffering from leukemia, a disease "commonly" caused by exposure to benzene, Shuey said.

The Prewitt refinery, as previously reported in the *Independent* is believed by state officials to be the source of the contamination in Barnes' well.

The refinery was operated by a succession of corporate owners from the mid-1940s until 1967, when it was leveled by then-owners El Paso Natural Gas Co. and Atlantic-Richfield Corp. (ARCO). The site was later sold to the Navajo Tribe which still owns it.

Shuey was mildly critical in his report of the state epidemiologist for concluding there was not enough evidence to suggest Barnes' disease was caused by the contaminated water he drank and bathed in for at least 20 years.

He says federal studies have concluded exposure to much smaller amounts of benzene than Barnes is believed to have ingested causes increased risk of leukemia, a form of cancer.

"Despite the knowledge that benzene causes leukemia in people who breathe it in minute quantities over long periods of time," Shuey says in the report, "the state epidemiologist concluded in 1983 that there was not enough information to directly link Barnes' cancer with his exposure to carcinogens on the job or in his water at home."

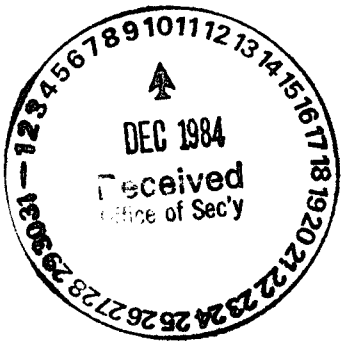
State officials sought clean-up of the Prewitt site earlier this year through the U.S. Environmental Protection Agency's Superfund program. The site was denied a place on the list, however, because the law creating the fund excludes petroleum-related pollution, the EPA said.

HEALTH ENVIRONMENT department

TONEY ANAYA
GOVERNOR

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
Denise Fort, Director
P.O. Box 968, Santa Fe, NM 87504-0968

December 4, 1984



Paul Biderman, Secretary
Energy and Minerals Department
400 Camino de Los Marquez
Santa Fe, NM 87504

Dear Secretary Biderman:

Environmental Improvement Division staff have, in conjunction with the Navajo Tribe and the Environmental Protection Agency, demonstrated that significant pollution and associated health hazards exist at an abandoned oil refinery site near Prewitt, New Mexico. The site was recommended for inclusion on the National Priorities List (NPL) and for subsequent clean-up under Superfund. EPA's Washington, D.C. headquarters has disallowed inclusion of the site on NPL.

The contamination at the site currently affects well water and poses a serious threat to health. We fear the continuing degradation of ground water quality through migration of the pollutants. Your attorney, Jeff Taylor, has indicated that OCD, rather than EID, probably has jurisdiction over this matter. I would appreciate your Department taking the lead in continuing investigation of the Prewitt site and identifying potential mechanisms to effect a cleanup of the contaminated soil and ground water. My staff will be available for assistance in matters such as defining the area's geohydrology and determining the efficacy of specific pollution abatement technologies.

I enclose a copy of the file which EID has kept on the Prewitt site. If you have any questions, please contact me or Richard Perkins of my staff (984-0020, ext. 270). I hope that continued cooperation between our two departments will result in an increasingly safe and clean environment.

Yours truly,

Denise Fort

Denise Fort
Director

DF/RJP/ps

cc: Arlene Luther, Navajo Tribe
Paul Sieminski, EPA
Laure van Heijenoort, EID

Enc.

Note to File — 1/11/84

Larry Sharp
PO Box 312
Prewitt NM 87045

works at Giant Refining (Ciniza)
722-3833 x 280
lived about 300' from Barnes

Is upset over groundwater quality + loss of value of his home — has abandoned it.

Might be willing to testify at legislature in support of state superfund

El Paso Natural Gas Company

MEMORANDUM

TO: H. Reiquam

DATE: September 24, 1984

FROM: W. F. Lorang

PLACE: Environmental Affairs

Subject: Review of Prewitt Refinery Site Closure

El Paso purchased the Prewitt Refinery from Malco in 1956 (Malco since purchased by ARCO, owned the refinery from 1952 to 1956). El Paso shut the refinery down in 1957 and it was dismantled in 1964. The site was sold to the Navajo tribe.

A complaint by Mabon Barnes, an adjacent resident, prompted sampling of his domestic water supply and other wells in the area by the NMEID in 1979. The water sampled was shown to contain small amounts of benzene.

Mr. Barnes attributed the benzene in his water to the operation of the Prewitt refinery; he contacted Arco/El Paso alleging adverse health effects due to ingestion of the water. In a settlement agreement (January '84) Arco/El Paso agreed to pay a cash amount to Mr. Barnes and 1) to drill a new well to a deeper aquifer which would produce enough water of acceptable quality; 2) to replace plumbing necessary to deliver acceptable quality water; and 3) replace the top soil in his garden area.

In consideration of possible liability with respect to Barnes, his five neighbors and other area inhabitants, it was decided by Arco/El Paso to properly close the refinery site, plug all existing abandoned refinery water wells and to replace the neighboring domestic wells.

Arco/El Paso contacted J. W. Shomaker, Albuquerque consultant geologist, to prepare a plan of remedial action to properly close the site, replace water supplies and to plug existing wells. Mr. Shomaker prepared such a plan which was acceptable to Arco/El Paso. The total estimated cost of the planned work was $249,800 (as of 3/24/84).

The plan was reviewed with regulatory agencies in New Mexico and with the Navajo tribe. Minor amendments to the plan were made to comply with requests of the N. M. State Engineer's office and with the Navajo tribe. Samples of soil, water and sludge were taken from the site at the request of NMEID. A request was made to the Navajos to enter their land in order to perform the site closure and to plug the abandoned wells.

August 13, 1984

Mr. Steve D. Phillips
Environmental Protection Agency
Inter First Two
1201 Elm Street
Dallas, Texas 75270

RE: Proposed Remedial Work
Prewitt Refinery

Dear Mr. Phillips:

We have recently been contacted by representatives of El Paso Natural Gas Co. and ARCO regarding the remedial action plan proposed by John Shomaken in February, 1984. It is my understanding that you have received a copy of this report previously.

We understand that such activity would not have any legal impact on the pending "Super Fund" designation. We also recognize that this plan does not address the groundwater pollution that may already exist. However, both our technicians and those from El Paso agree that the proposal could help prevent further pollution, which would seem to be worthwhile. We do want to make sure that there is some coordination here between all relevant agencies. To that end we request your views on the proposed plan and appropriate timing for its implementation, if it is an acceptable means of preventing further degradation to the resource.

Thank you for your views.

Sincerely,

John A. MacKinnon
Attorney
Navajo Nation Department of Justice
P.O. Drawer 2010
Window Rock, Arizona 86515

xc: Robert M. Lowry
New Mexico EID
Box 968
Santa Fe, New Mexico 87504

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 0930	Date Jun 29, 1984
Originating Party	Other Parties	
Lowy returning call	Karen Solari - EPA (Emergency Response) - 214-767-9798	

Subject: Pruitt Refinery

Discussion:

Barnes Well - are they still using bottled water
— I don't know

Mention 7 wells plugged on property

Mr. Barnes has died

Are there children

Asking about immediate removal action

I mentioned fences

Conclusions or Agreements

~~Should~~

Emergency response evaluate for immediate emergency action
— Karen does not see need for immediate removal
— Let go through usual chain of action
Lowy agrees — Perkins concurs

Distribution

Signed RM Lowy

ENVIRONMENT Department

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87504-0968
(505) 984-0020
STEVEN ASHER, Director

TONEY ANAYA
GOVERNOR

ROBERT McNEILL
SECRETARY

ROBERT L. LOVATO, M.A.P.A.
DEPUTY SECRETARY

JOSEPH F. JOHNSON
DEPUTY SECRETARY

June 14, 1984

Steve Romanov
U.S. EPA - Region VI
InterFirst Two Bldg.
1201 Elm Street,
Dallas, Texas 75270

Dear Mr. Romanov:

As you requested, I have prepared a narrative describing my techniques and methods for calculating the volume of sludge in the Prewitt Tar Pits (NM 00281). The narrative includes a rationale for estimating thickness and pit-specific volume calculations. After reappraising my calculations, I noted a mistake that adds approximately 10 cubic yards to the original estimate. Please review my presentation and call me by June 22 if you have any questions or revisions.

Yours truly,

Robert M. Lowy
Project Manager
N.M. RRA 3012 Program

RL/ps

PREWITT HAZARDOUS RANKING SCORE -- SLUDGE VOLUME CALCULATIONS

INTRODUCTION

The Prewitt site is an abandoned crude-oil refinery that includes three areas containing a hazardous petroleum residue or sludgy tar. The topography of the area is undular and marked by pits and raised hummocks or mounds. In higher areas, the sludge is dry and forms a hard crust over the surface. Fluids accumulate in the lower portions of the area where they keep the tar soft and viscous.

The variation in sludge consistency and the uneven topography necessitate the use of both direct and indirect methods of obtaining an estimate of sludge thickness in the pits. Initially, the areal extent of the pits was determined by a cloth-tape survey. Next, the thickness of sludge crust was measured directly with the tape. Finally, the thickness of soft, tar-sludge was estimated by pushing a wooden dowel into the material and measuring the thickness penetrated. A two-man team surveyed the area and located sampling points on the surveyed base-map.

FIELD METHODS

The tape survey consisted of measurements of the widths of the three pits at four regularly-spaced, sectional lines, measurements of the breadths of the pits at their greatest extent, and construction of a site-map that graphically depicted the measured dimensions. The site-map was used as a base for plotting the sampling locations. Since the site-map was a free-hand sketch, the site-plan may not be exactly reproducible. If necessary, the boundaries of the pits and position of the pit-berms can be checked against aerial photography to assess the precision of the survey.

The thickness of sludge crust was directly measured by one of three methods. The sludge layer at the edges of the pits was exposed by erosion of the adjacent sediment. Likewise, the crowns of the hummocks have been breached by erosion, thus exposing the vertical thickness of upturned sludge-crust. Sludge layers at these points could be measured directly with the cloth tape. In flatter areas and on the flanks of the hummocks, the sludge was penetrated and upturned with a shovel and the thickness measured with a tape.

Access to the deep depressions was hampered by the presence of the soft tar and contaminated fluid. The method for determining sludge/tar thickness in the depressions consisted of positioning 10 foot sections of planking across the tar surface and then advancing along the planks taking thickness measurements with wooden dowels which had been previously graduated into tenths of feet. The dowel would be pushed into the tar until appreciable resistance was encountered. The survey team assumed that the resistance was indicative of the consolidated sediment underlying the tar. The depth of fluid above the tar was subtracted from the observed measurement and the result recorded as total sludge/tar thickness at the sampling location. One traverse per deep pit was performed in this manner.

SLUDGE VOLUME CALCULATIONS

Sludge volume was calculated using an isogram and planimeter technique. First, contour lines were drawn connecting sample locations with equal sludge thicknesses. Then, a planimeter was used to determine the surface area of each concentric ring between contour lines. The planimetry was performed from innermost to outermost ring. In this manner, the smaller area could easily be subtracted from the larger for an accurate determination of the area of each concentric ring. Unless otherwise noted, the average thickness between adjacent contours was multiplied by the ring's surface area to calculate sludge volume per ring. Finally, the sum of the incremental sludge volumes was calculated to determine the total sludge volume of each pit.

Two potential sources of significant error could be identified in this investigation; both potential errors are related to the calculation of tar volumes in the thickest tar accumulations. Due to safety concerns, only one traverse was made along the radius of each deep depression. Although depth measurements at the edges of the depressions were used to determine the contour configurations, there was little real control over the distribution of depth in areas of the pools that were not traversed. Also, the assumption that "appreciable resistance" was indicative of underlying sediment could not be verified. The shovel technique used on the flanks of the hummocks was also suspect, to a lesser extent. Since the shovel mixed the sludge into the underlying sediment, the exact depth to the contact between sludge and sediment could not always be determined and thus, an approximate value was used.

EPA has indicated that the sludge-volume calculations seem to be inconsistent in that average thickness within rings are sometimes supplanted by a lesser thickness value. EID would like to point out that when the lesser value is used, the calculated sludge volume will be biased towards a conservative estimate and thus, the total sludge in the pits may, in fact, be greater than the submitted results. Although use of the higher values may be more indicative of the actual amount of sludge that needs to be removed, this subject would have to be addressed more precisely at the FEASIBILITY STUDY part of a Superfund action. Thus, EID has chosen to use the conservative estimate which still gives an HRS score high enough for Prewitt to be included on the National Priorities List.

EID would like to discuss the rationale behind the assignment of thickness values in greater detail. Thickness determination of thin crust or homogenous tar accumulations is fairly straight-forward, thus, the average value was used in these situations. However, when one is balanced precariously on a thin piece of plank over a pool of deep tar (and sinking fast), one tends to measure depths rather quickly and, understandably, with lower precision than can be applied in the thin, crusty areas. Visual estimates of tar accumulation beyond the end of the planking were also used in some circumstances. Similarly, areas of thick, hard crust could not be penetrated and upturned at the exact point where sludge contacted sediment. Therefore, unavoidable field imprecision was balanced by using a conservative thickness estimate in the office calculations.

WEST PIT CALCULATIONS

Sludge-volume calculations at the West Pit (fig. 1) were complex due to the topography of the area and the limited access to the large pool in the northern-most part of the pit. To facilitate the calculations, the West Pit was separated into

north and south zones. The two zones were separated by an elevated ridge overlain by a thin layer of sludge-crust. North of the ridge, the pit was characterized by thick accumulations of tar and fluids in two distinct pools. Several drums and tanks had been discarded in the smaller of the pools. South of the transition, the sludge was dry and hard and consistently thin except for a thick accumulation at a hummock at the southern-most end. Sludge volumes were calculated for both the north and south portions and the results combined for a total volume estimate,

The large tar pool in the north zone was very extensive; the center of the the pool could only be approached from the northeast edge. The deepest accessible part of the pool measured 1.0 feet of tar/sludge acumulation. However, the field team estimated that the tar thickness exceeds 1.5 feet at the very center of the pool, which could not be reached without dangerous consequences. The smaller pool is steep-walled and almost completely filled with tar and fluid. The deepest recorded point in this pool exceeds 1.7 feet. The drums observed in the pool appear to be submerged to a depth of about 2.0 feet. Depths in the north zone of the West Pit were all determined by graduated dowel or direct measurement at the pit edge.

The south zone of the West Pit is primarily composed of dry crust less than 0.3 feet thick. Sludge crust in the transition area was usually 0.2 feet, although a 0.1 foot measurement was also obtained in this area. Sludge thickness of the hummock ranged as high as 0.6 feet. Sludge thickness in the south zone was determined by shovel penetration and direct measurement. Direct measurement of the pit edge was also possible in this zone.

WEST PIT -- NORTH ZONE

In the deepest part of the tar pool, depth is at least 1.5 feet or greater. Average values were used from the 0.8 contour to the pool center. It was felt that this would be a conservative estimate of the tar thickness through this region of the pool. From the 0.6 to 0.8 contour, conservative values, corresponding to the lowest contour values, were used to compensate for the lack of representative depth-control sampling points. Average values were used for the remainder of the north zone including the small pool, where depths may exceed 2.0 feet.

WEST PIT -- SOUTH ZONE

An average value of 0.3 feet was used to calculate the thickness of the sludge crust in the flat areas of this zone and 0.2 feet was used for the transition zone. Conservative values, corresponding to the lowest contour values, were used to calculate thicknesses between contours in the hummock area. The conservative values were used to compensate for the imprecision involved in fixing the contact between sludge and sediment.

FAR WEST PIT

Sludge-volume calculations required the use of both the shovel penetration and dowel techniques. The majority of the Far West Pit (fig. 2) is composed of thin sludge crust ranging from 0.1-0.2 feet in thickness. The extreme northern portion of the pit is a deep tar/fluid pool that was accessed by use of wooden planks. Thickness of the tar in this pool consistantly ranged from 0.7-1.0 feet except in the

center which has at least 1.5 feet of tar accumulation. The average value was used for the thin-crust and pool-center portions of the pit. A conservative estimate of 0.8 feet was used for the remainder of the pool.

EAST PIT

The East Pit (fig. 3) is a square, bermed, and fenced area where sludge thickness increased progressively toward the middle. This pit was particularly difficult to measure due to the thick tar and deep fluid accumulation in the pit, and the large overall dimensions of the area. It was not possible to reach the center of the pool, thus, no estimates of tar thickness for the center could be justified. Average values were used for the majority of the pit; since there was no way to judge the maximum depth of tar in the center, a conservative estimate of 3.0 feet was applied to the middle area within the 3.0 contour.

CORRECTIONS TO ORIGINAL CALCULATIONS

In the original ranking package, the West Pit figure contained calculations for a 0.1 foot depth-interval. In reviewing the document, EID recognized that a 0.1 foot interval does not exist; however, the corresponding area measurement is the same as that of the small pool. Moreover, there are no calculations shown for the small pool. Therefore, EID apparantly made an error in the decimal place location; the 0.1 foot interval should be replaced by a 1.0 foot interval to calculate sludge volume in the small pool.

Note also that the dial reading indicated as 0.042 for the drafted 400 sq. ft. reference box is in error. The larger reference box represents 1600 sq. ft. and has a dial reading of 0.225; hence, calculations for the pit should be based on 400 sq. ft. being equal to a .056 dial reading (i.e. 0.225 ÷ 4 = 0.056). The .042 dial reading indicated must have been an early notation which was not changed in the final version. This is substantiated by the fact that 0.056 was used in the original calculations, as shown in figure 4.

SUMMARY OF CALCULATIONS

LOCATION	THICKNESS VALUE	AREA (sq. ft.)	VOLUME (cu. ft.)	TOTALS (cu. ft.)
West Pit -- North Zone				
Large pool and fringe	1.20	85.71	102.85	
	0.90	571.43	514.29	
	0.70	692.86	485.00	
	0.60	892.86	535.72	
	0.40	1692.86	677.14	
Small pool	1.00	278.57	278.57	
				2593.57
West Pit -- South Zone				
Hummock	0.60	192.86	115.72	
	0.50	485.71	242.86	
	0.40	1257.14	502.86	
Fringe	0.30	2464.29	739.29	
				1740.73
COMBINED TOTAL FOR THE WEST PIT				4334.30 cu. ft. (160.53 cu. yd.)
Far West Pit				
Large pool	1.25	101.82	127.28	
	0.80	1221.82	977.46	
Fringe	0.15	6516.37	977.46	
COMBINED TOTAL FOR FAR WEST PIT				2082.20 cu. ft. (77.12 cu ft.)
East Pit				
	3.00	421.43	1264.29	
	2.50	357.14	892.85	
	1.50	571.43	857.15	
	0.85	592.86	503.93	
	0.30	1071.43	321.43	
COMBINED TOTAL FOR EAST PIT				3839.65 cu. ft. (142.21 cu. ft.)
COMBINED TOTAL FOR ALL PITS				10256.15 cu. ft. (379.86 cu. yd.)

HEALTH ENVIRONMENT department

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87504-0968
(505) 984-0020
Steven Asher, Director

TONEY ANAYA
GOVERNOR
Joseph Goldberg
SECRETARY
Ted Guambana
DEPUTY SECRETARY
JOSEPH F. JOHNSON
DEPUTY SECRETARY

MEMORANDUM

TO: Anthony Drypolcher, Bureau Chief, Ground Water/Hazardous Waste Bureau

THRU: Maxine S. Goad, Program Manager, Ground Water Section MSG

FROM: David Boyer, Ground Water Hydrologist, Ground Water Section DJB

SUBJ: Prewitt Refinery Site, follow-up to my technical comments of April 24, 1984, on John Shomaker's report entitled "Proposed Remedial Work, Prewitt Refinery Site, McKinley County, New Mexico."

DATE: June 11, 1984

On June 1, 1984, El Paso Natural Gas (EPNG) Company provided a response (dated May 31, 1984, and attached herein) to my technical comments. I have reviewed their response and provide specific comments below.

Dr. Howard Reiquam, Director of EPNG's Environmental Affairs Department, discussed the report briefly, and said they were moving ahead to replace the Barnes well and wished to begin surface reclamation if they could obtain access from the Navajo Tribe. I told him that there was potential "Superfund" action, that I was not aware of details, and that he should contact yourself or Richard Perkins to set up a meeting on the Superfund issues. He referred me to page 2 of the response which states that no "significant concentrations of heavy metals or hazardous hydrocarbon compunds" were found in several analyses performed at the site. These results were provided to EPNG in John Shomaker's letter dated May 7, 1984 (attached). I told Reiquam that I understood EPA analyses detected the presence of pesticides in the pits, and also that the nearness of the Baca Chapter well contributed to Superfund concerns. Again, I referred further inquiries to you and Perkins.

Below are my specific comments on the points raised in their May 31, 1984 letter. Numbering of comments follows that in my April 24, 1984 letter.

1. As stated in my April 24, 1984 technical comments, the EID only suspects contamination in the "west" well. However, I mentioned that the 1968 New Mexico State Engineer Technical Report #35 reports gasoline contamination in the "east" well, approximately 260 feet east of the "west" well. Also, the distance from the Navajo Tribe's Baca Chapter well to the main

refinery process area is shown as 1,000 to 1,200 feet in figure 3 of EPNG's report. Unless the scale of their figures is incorrect, the distance is not the 2,250 feet given in EPNG's May 31 letter. In any event the Baca Chapter well is completed in the same aquifer zones as suspected of being contaminated, and it should be periodically monitored for contamination.

2. Sampling and analysis of the existing wells will assist in delineating the extent of contamination. A listing in their report of the wells suspected of being contaminated would provide clarity in their discussion of the problem.

4. EID sampled the "New Railroad" well four times from May 17 through June 8, 1983. All four analyses, done at SLD, detected benzene contamination at levels from 0.047 to 0.116 mg/1 (WQCC standard 0.01 mg/1) plus a pentene hydrocarbon compound. Why EPNG's contract laboratory (Spectrix Corp. in Houston) did not detect any contamination of that well is unknown.

5. EPNG did not respond to my comment on what plan of action they would follow if the well was so filled with debris or collapsed that it could not be plugged with cement in a conventional manner.

7. The locks on the wells are the property of EID and should be returned when the well caps are removed for plugging. The caps and locks were installed to provide sampling access (where possible) and prevent additional debris from being put down the wells. They have no other use and can be removed at the time of plugging.

8. El Paso/ARCO state that analyses of the fluids and sludges in the pits show they are at concentrations that are non-hazardous. However, in their May 7, 1984 letter, EPNG reports analyzing only five samples and only one of those was aqueous. Although a sample of "floating scum" was taken from the fenced tar pit (sample #20784-3-3), no sampling of the fluid phase from this pit was taken and analyzed for dissolved constituents. In addition, I am not yet experienced enough in the specifics of organic analysis to say whether the methodology used was appropriate or to interpret the gas chromatography results. I suggest that one of our other staff persons, or SLD, assist in this interpretation.

DB:egr

cc: Richard Perkins, Hazardous Waste Section

El Paso
Natural Gas Company

P. O. BOX 1492
EL PASO, TEXAS 79978
PHONE: 915-541-2600

May 31, 1984

RECEIVED

JUN 1 1984

GROUND WATER/HAZARDOUS WASTE
BUREAU

Mr. David G. Boyer
State of New Mexico
Environmental Improvement Division
P. O. Box 968
Santa Fe, New Mexico 87504-968

Re: Report dated February, 1984 and titled "Proposed Remedial Work, Prewitt Refinery Site, McKinley County, New Mexico

Long comments in margin rmc 6/1/84

Dear Mr. Boyer:

Your letter dated April 24, 1984 to Mr. John F. Eichelmann, Jr. has been forwarded to me. El Paso and ARCO have considered all of your comments and our response follows.

We agree with your opinion that there are two remedial work objectives of primary importance, i.e., it is necessary to provide a safe domestic water supply for those wells now contaminated by hydrocarbons, and it is important to prevent current and/or future movement of any contaminants into and between aquifers through wells open to the surface and perforated in two or more aquifers or water-bearing zones within a single formation.

A replacement drinking water well for the Barnes' residence is being drilled at this time. The other property owners in the immediate vicinity of the Barnes' well have been contacted and presented with a proposal to provide them with new drinking water wells. As discussed in the above-referenced report at pages 3-6, each of the refinery wells will be plugged with cement to positively prevent any future movement of contaminants into and between aquifers, provided surface access can be obtained from the Navajo Tribe.

Although the report did not discuss our concern regarding characterizing the fluids and residual contents of the pits, such a characterization is considered a prerequisite to land-spreading these materials. Samples were collected from the API separator, fenced tar pit and other waste material on February 5, 1984. These samples were analyzed by Albuchemist, Inc. of Albuquerque, New Mexico. Albuchemist's analytical results show that the samples do not contain significant concentrations of heavy metals or hazardous hydrocarbon compounds. We will be happy to provide you with a copy of these analytical results if you desire. These analyses confirm our expectation that the materials are hydrocarbons capable of biodegradation. As you know, land-spreading is a common and widely accepted technique for enhancing biodegradation.

Our response to some of your specific comments follows:

1. "The continued use of the former refinery "Trap" well as a public supply well for the Baca Navajo Indian Chapter should be addressed."

   There are a number of reasons why we believe this well is unlikely to become contaminated.

   First the geologic conditions of the area preclude contamination of the well from the surface because of the forty (40) feet of shale (referenced in your letter) between the surface and the first water sand. Also, the plan for remedial work provides for re-grading the refinery site such that ponding areas are removed, thus preventing the possible hydraulic gradient required to move surface contaminants through the soil.

   how did aquifer get contam.? by access thru annulus!

   Second, the evidence of contamination of the aquifer is more remote than is suggested in your letter. As you recall, EID's sampling of the

"West" well on or about May 17-19, 1983 was duplicated at our request by Mr. John W. Shomaker. The samples collected by Mr. Shomaker were analyzed by Spectrix Corporation, Houston, Texas. Analyses of the sample from the "West" well showed that no benzene, toluene or any other hazardous hydrocarbons were present. The "suspicion" by EID that the well is contaminated is apparently based upon the detection of a "hydrocarbon odor" when the well was sampled. The detection of such an odor from a well that had been abandoned and inactive for approximately thirty (30) years should surprise no one. However, to say that such an odor is evidence of contamination of the aquifer is unfounded.

Third, subsurface geologic conditions preclude the contamination of the well from intra aquifer contamination. The Baca Chapter is - strong off-gradient to the suspected - weak direction of groundwater movement. The well is also approximately 2,250 feet from the refinery process area and off-gradient to the suspected direction of groundwater movement. Therefore, we believe the possibility of the Baca Chapter well becoming contaminated is remote.

2. "The specific refinery wells which are contaminated . . . should be listed . . . ."

Because some of the wells are plugged and are not presently capable of being sampled, this request would be impossible to fulfill. Sampling of the groundwater is an essential part of this proposed remedial program. We're not concerned about individual wells per se because they are to be plugged. The real objectives are to stop the use of the contaminated zone by replacement wells and to prevent

the contamination of a good aquifer by plugging the communicative wells.

3. "Water levels . . . should be determined . . . ."

put a gauging station onsite

Water levels will be determined to the extent reasonably possible.

4. "EID sampling detected contamination in the 790 foot-deep 'New Railroad' well which is completed in both the Middle Chinle and the San Andres-Glorieta aquifers. . . . If the vertical gradient is downwards, the contamination at the 'New Railroad' well could be migrating into the San Andres-Glorieta aquifer."

Samples from the "New Railroad" well obtained by Mr. John Shomaker on May 17, 1983 were analyzed by Spectrix Corporation, Houston, Texas. Spectrix's analysis showed no detectable concentrations of hazardous hydrocarbon compounds. Although the sample had a strong hydrocarbon odor, such an odor from a long abandoned well should not be surprising. Nonetheless, we plan to sample each new drinking water well completed into the San Andres-Glorieta aquifer to assure ourselves that the wells produce uncontaminated water.

6. "Subsequent to clean out and prior to plugging, water samples at the old refinery wells are proposed to be sampled for volatile organic constituents. . . . EID requests an opportunity to be on site during the sampling to collect a split sample for analysis."

We will be pleased to notify EID in advance of the clean out and plugging operation so EID may collect samples for analysis.

7. ". . . four wells having caps and locks . . . two . . . north of the highway also . . . ."

Wells need not be "unlocked"; with your permission the cap will be removed by the driller, the casing pulled and scrapped.

8. ". . . without chemical characterization of fluids and sludges remaining in the pits . . . ."

El Paso/ARCO has obtained samples of liquids/sludges remaining; analyses show typical hydrocarbons--definitely biodegradeable. Analyses are available upon request.

We believe the preceding discussion fully addresses your major concerns as stated in your April 24 letter. We would be happy to meet with you to discuss any concerns that may remain.

Very truly yours,

Howard Reiquam, Ph.D.
Director
Environmental Affairs Department

THE NAVAJO NATION

WINDOW ROCK, NAVAJO NATION, ARIZONA 86515

PETERSON ZAH
CHAIRMAN, NAVAJO TRIBAL COUNCIL

EDWARD T. BEGAY
VICE CHAIRMAN, NAVAJO TRIBAL COUNCIL

AGENDA

New Mexico Environmental Improvement Divison
Santa Fe, New Mexico

May 10, 1984
10:00 AM

1. Introduction

2. Concerns regarding Environmental Assessment for Proposed Remedial Work of the Old Prewitt Refinery Site, Prewitt, New Mexico, by El Paso Natural Gas Company and Arco Oil and Gas Company

   Arlene Luther. Environmental Specialist
   Environmental Protection Administration
   The Navajo Tribe

   Harold W. Tso, Executive Director
   Division of Resources
   The Navajo Tribe

   David Boyer, Ground Water Hydrologist
   Ground Water Section
   New Mexico Environmental Improvement Division

3. Navajo Tribal Land Status for the Old Prewitt Refinery Site

   Alfred Dehiya, Director
   Navajo Land Development
   The Navajo Tribe

4. Evaluation Criteria for Superfund eligibility status and joint agreements to coordinate remedial activities

   Paul Sieminski, Project Officer
   Policy and Design Section
   U.S. Environmental Protection Agency
   Region VI

5. Other Business

6. Adjournment

~~[illegible]~~

Bruce & Wayne

re 10 am Navajo / Bennett meeting:

Agenda

1. Presentation by Navajos on land ownership history and status
2. Discussion of closure plan deficiencies by Roger (highlights)
3. Proposed future use of site by Navajos
4. Coordination in development of remedial action plan
5. Other possible CERCLA sites on tribal land

Prewitt Meeting
May 10, 1984
Navajo Tribe / EID / EPA

MAXINE [redacted] S. GOAD	EID	Santa Fe
PAUL SIEMINSKI	EPA, DALLAS	(214) 767-9762
SAM NOTT	"	767-9709
Robert Lowy	NM EID	(505) 984-0020
Dave Boyer	"	"
Bruce Gallaher	"	"
Richard Perkins	"	"
Dick Young	NMEID-Legal	"
Harold W. Bo	Navajo Tribe	602/871-6593, 6594
ARLENE LUTHER	NAVAJO TRIBE	602/871-6534-6536
STEVEN ASHE	EID	
Anthony Drypolcher	EID	
Alfred Dehiya	Navajo (Late)	

Prewitt Meeting

Alfred Dehiga - late
Herold Tso
Arlene Luther
Dick Young

N

Bruce Gallaher
Robert Lang
Paul Siemieriski
Sam Nott
Dave Boyer
Max Good.
Tony Drypolcher
Rich Perkins
Steve Asher

Arlene – not satisfied w/ plan
- no analytical data of exist wells
- ~~tars~~
- no hydrology ; recharge area
- no empty pits
- no erosion / runoff control
- concrete slabs ; buried pipes (What was understanding when Nav. got land ?)
- no concern for future utilization of area
- Nav. hydrologist – BIA ? who ?
- no extent, eval of Legarding situation – did not give ~~details~~ approval to EPNG plan.

POP FIG – Revenue sharing report
Chapter development

★ EPNG wants to re-negotiate right-of-ways for pipelines
- Love leverage to use for Prewitt reclamation

Bruce – overview of ranking.
CONTAMINATED AQUIFER
PITS – materials, volumes

Paul - No funds 'til ~~August~~ Oct 1 - (fiscal year 1985)
~~prior~~ remedial actions won't affect score

SAM - budget / RAMP
- Remedial Investigation & Feasibility Study (RIFS)
  estab budget for ~~an~~ remedial ~~study~~ action 4mo → 2yr
- Remedy selection process
  Public Comments
- Final decision / Remedy
  Notify Responsible Parties - Navajo's among responsible parties
- Offer parties chance to fix-up
- Design remedy designs & construct.

NAVAJOS CONTRIBUTE 10% OF COST

- may be able to initiate ~~Emergency~~ Immediate Remedial ~~Action~~ Measure (IRM)
  or Immediate Removal Activities

DICK - Can Tribe be the leading party.
PAUL - State can negotiate w/ tribe for matching responsibilities

Harold - questions of LEAD, ~~MUCH MUCH~~ WHAT PORTION WOULD NAV. BE RESPONS. FOR,
TONY - Navajo will have to decide what route to take.
HAROLD - what about if clean superficially and leave GW for Superfund
SAM - take that up at RIFS stage
ARLENE - ~~the~~ we want immediate - remove for material, monitor wells, cover pits.
DICK - if you can get agreement with EPNG to do all this ?

AL — (Land Status)

1950's — Uranium boom / EP refinery

1965 — Tribe passed resolution to acquire prop (236 acres) @ $25 per acre
got surface rights / not mineral rights — ~~Kerr~~ Santa Fe Mineral Corp.

BACA chapter about 3/4 mi to the west

DAVE — all talk, so far, about Navajos land — what about off-site lands — if Navajos arrange a deal, what about off-site citizens; this is a State concern.

DAVE Fence pits

Plug wells to prevent further contam.

Off-site wells

ME — analyses of BACA Community well

AL — Baca would like to initiate development.

OTHER SITES (2) — omitted from "UMTRA"

Cameron Ariz near Flagstaff } Uranium processing
West of Grants — Smith Lake }
— either concentrator or mills

CAMERON — ores on surface

SMITH LAKE — shut down mid 1960's

Blackjack Mine

3-4 mi on Hwy — north of I-40

STATE OF NEW MEXICO
ENVIRONMENT

MEMORANDUM OF ~~MEETING OR CONVERSATION~~
To Prewitt File

N/A ☐ Telephone ☐ Personal | Time | Date 4/30/84

Originating Party	Other Parties
Dave Boyer	

Subject: Notes on Prewitt Refinery Situation

Discussion: The letter to John Eichelman Jr (El Paso Co) dated 4/24/84 and relating to John Shomaker's ~~proposed~~ remedial work at the abandoned Refinery site was reviewed and commented on by Robert Lowry and Bruce Gallaher. Their comments were incorporated into the letter. A copy of the letter was sent on 4/30 to Release Letters of the Navajo Env. Prot. Comm PO Box 308, Window Rock AZ 86515

Conclusions or Agreements:

A meeting between EID, EPA and the Navajo Tribe will be held Thursday May 10 at 10AM in EID conf. room to discuss the Prewitt issue. EPA rep. will be Paul Saminski.

Distribution: Prewitt File.

Signed: Dave Boyer

HEALTH ENVIRONMENT department

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
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STEVEN ASHER, Director

TONEY ANAYA
GOVERNOR

Joseph Goldberg
SECRETARY

Ted Guambana
DEPUTY SECRETARY

JOSEPH F. JOHNSON
DEPUTY SECRETARY

April 24, 1984

Mr. John F. Eichelmann, Jr.
The El Paso Company
320 Galisteo, Suite 2
Santa Fe, NM 87501

RE: Comments on Report dated February, 1984 and titled "Proposed Remedial Work, Prewitt Refinery Site, McKinley County, New Mexico."

Dear Mr. Eichelmann:

The above report prepared by John W. Shomaker, Consulting Geologist, for El Paso Natural Gas Company and ARCO Oil and Gas Company (received March 2, 1984) has been reviewed by me with input from other EID staff members. The review primarily concentrates on the aspects of remedial work proposed in the report which are related to ground water contamination; additional information is needed on the specific nature and composition of the surface materials before other than general comments can be offered on the proposed surface reclamation.

The existence of ground water contamination at the old refinery site (previously owned and operated by both Malco (now ARCO) and El Paso Natural Gas Products Co.) was first documented by Cooper and John in the 1968 New Mexico State Engineer Technical Report 35: Geology and Ground-Water Occurrence in Southeastern McKinley County, New Mexico. In this report two wells, the "East" and "Gas" wells, were found to have gasoline on top of the water. Subsequent investigation by EID in 1983 found four other wells that were suspected of hydrocarbon contamination. The "Barnes" well (previously used for a drinking supply) and the "New Railroad" well (abandoned refinery supply well) had up to 1,300 parts per billion (ppb) and 116 ppb of benzene respectively in bailed samples taken in the spring of 1983. Additional tap water samples from the Barnes well contained between 85 and 405 ppb of benzene in four samples taken between December, 1982 and June, 1983. In two other wells, the "Lamance" well (used for domestic supply) and the "West" well (abandoned refinery supply well), hydrocarbon odors were detected during sampling but concentration levels were below detection when analyzed by the New Mexico Scientific Laboratory Division (SLD). All results of the EID sampling and SLD analyses are on file with the Ground Water and Hazardous Waste Bureau.

In my opinion, there are two remedial work objectives of primary importance. First, it is necessary to provide a safe domestic water supply for those wells now contaminated or likely to be contaminated by the hydrocarbon pollution plume. Second, it is vitally important to prevent current and/or future movement of contaminants into and between aquifers through wells open to the surface, and perforated in two or more aquifers or water bearing zones within a single formation. Surface reclamation, while important to protect the health and safety of persons and animals that may come in contact with hydrocarbon fluids and other residues remaining in the pits and separators, is in my opinion not as urgent as water supply replacement and protection of uncontaminated ground water. Stratigraphic evidence from the geologic log of the "New Railroad" well indicates the presence of at least 40 feet of shale between the surface and the first water sand (4 feet thick) which lies at a depth of about 81 feet. Even with the addition of precipitation (approximately 12 inches per year), the continued presence of fluids in several pits and concrete boxes after more than 25 years of disuse indicates low seepage rates, probably due both to natural conditions (low permeability shales and surface caliche), and sludge and tar residues in unlined pits.

Except as noted in the specific comments presented below, I find that the remedial actions proposed to provide an alternate domestic water supply to homes northeast of the site, and to protect ground water in other aquifers from future movement of contamination between aquifers, are generally adequate. However, the report does not address possible future contamination at the Baca Navajo Indian chapter well (formerly refinery "Trap" well - see comment 1), nor does it address any future actions to delineate the extent and potential for movement of the existing contaminant plume. Also, I believe that the proposed surface reclamation plan is severely deficient because fluid and residual contents of the pits and concrete boxes have not been adequately characterized as to composition or degree of hazard that would be posed by land-spreading the material over a larger surface area. Since additional and potentially hazardous non-refinery-generated materials may have been deposited in the pits over the past quarter-century, land-spreading and mixing before characterization may aggravate the problem with respect to enlarging and making more complex any future clean-up under the auspices of the "Superfund" program. Since immediate action is needed to prevent further human and animal (e.g. sheep, dogs, etc.) contact with the pits, El Paso and ARCO should consider securely fencing the entire area, or at least the pits containing viscous fluids, while a decision is made (in cooperation with affected federal, state and Indian entities) on the preferred method of surface reclamation. However, unresolved surface reclamation issues should not impede nor delay the initiation of measures to mitigate ground water contamination.

Specific Comments

1. The continued use of the former refinery "Trap" well (Shomaker, Figure 1; C & J, 13.11.18.221) as a public water supply well for the Baca Navajo Indian chapter should be addressed. This well is located only 300 feet from several of the pits still containing fluids. This 201 foot-deep well is also located about 1,200 feet from the "West" well which is

completed at the same depth and suspected by EID of being contaminated. No contamination was detected in the Baca chapter well in 1983 EID sampling, and the well is off-gradient to the suspected direction (northeast) of ground water movement. However, the potential for future contamination remains if heavy use causes the pumping cone of depression to intersect the contaminant plume. Unless and until that well is replaced or deepened both state and Indian health agencies should be aware of the potential for contamination and periodically monitor water for organic materials.

2. The specific refinery wells which are contaminated or suspected of being contaminated should be listed in Table 1 of Shomaker's report.

3. Water levels in the Chinle and the deeper San Andres-Glorieta aquifers should be determined whenever possible during drilling of the replacement domestic wells and prior to sampling of the refinery wells. Water level measurements will help in determining the potential for vertical migration of aquifer fluids between the Middle Chinle water-bearing sands and San Andres-Glorieta aquifer.

4. EID sampling detected contamination in the 790 foot-deep "New Railroad" well which is completed in both the Middle Chinle and the San Andres-Glorieta aquifers. The other two deep wells were blocked by debris but the "Old Railroad" well is also known to be completed in both formations. If the vertical gradient is downwards, the contamination at the "New Railroad" well could be migrating into the San Andres-Glorieta aquifer. Since the replacement wells to be completed in the San Andres-Glorieta are close to both "Railroad" wells, they should also be sampled upon completion and again periodically if a downward vertical gradient between aquifers exists.

5. Regarding the refinery wells to be plugged, no plan of action is presented if debris (e.g. concrete, steel pipe sections) in the well cannot be removed, or if the casing has collapsed.

6. Subsequent to clean out and prior to plugging, water samples at the old refinery wells are proposed to be sampled for volatile organic constituents. The EID suggests that EPA method 624, utilizing a gas chromatograph mass spectrometer, be employed to determine and quantify contaminants on EPA's list of priority pollutants. Common non-priority pollutants (e.g. EDB, xylenes and simple ketones) also will be quantified using this method. EID requests an opportunity to be on site during the sampling to collect and split samples for analyses.

7. In addition to the four wells having caps and locks that were shown south of the highway in Figure 3, the two "Railroad" wells north of the highway also have caps and locks. Keys are available at the EID Milan field office and the EID Ground Water Section in Santa Fe ("Abandoned Prewitt Refinery" file).

8. General comments on the proposed surface reclamation were summarized earlier. I believe it is important to stress that without chemical characterization of the fluids and sludges remaining in the pits, the proposed mixing of materials with clean soil, and land-spreading may be counterproductive. This would be especially true if more extensive clean-up, including possible removal of materials, is later necessary under future "Superfund" mitigation requirements.

Sincerely,

David G. Boyer by MSR

David G. Boyer
Ground Water Hydrologist
Ground Water Section

DGB:egr

cc: Richard Perkins, Surveillance Section
Peter Pache, Hazardous Waste Section
Richard Mitzelfelt, EID District I, Manager
Ray Madson, EID Field Office, Grants
Joe Ramey, OCD, Santa Fe

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April 16, 1984

Paul Sieminski
Policy and Design Section
U.S. Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Sieminski:

Enclosed please find a package of material pertaining to the abandoned oil refinery site near Prewitt, New Mexico. Presented is a preliminary assessment by the New Mexico Environmental Improvement Division (EID) and a Hazardous Ranking System score for eligibility for the National Priorities List.

Included are:

1. Hazardous Ranking System Worksheets;

2. Documentation records;

3. Form 2070-13 (prepared by the Ecology and Environment, Inc. FIT team); and

4. Narrative site summary (prepared by the Ecology and Environment, Inc. FIT team).

EID prefers, at least at this point, that EPA assume lead status in any potential response actions at the Prewitt site. Further sites will be submitted as the RCRA 3012 survey continues. New Mexico may wish to assume lead status for future response actions.

If you have any questions or comments, please contact me (505) 984-0020, ext. 281, or Richard Perkins (same number, ext. 270).

Yours truly,

Anthony Drypolcher
Acting Bureau Chief, Superfund Coordinator
Ground Water/Hazardous Waste Bureau

AD/RJP/ps

cc: Steven Asher

Facility name: Abandoned Refinery (AKA Prewitt Tar Pits) NM00281

Location: Prewitt, New Mexico

EPA Region: G

Person(s) in charge of the facility: Site Operator: None, Inactive.

Realty Owner: Navajo Indian Trive

Name of Reviewer: Bruce Gallaher/Robert Lowy Date: April 16, 1984

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

The site is an abandoned refinery located about 1/4 miles west of the Prewitt New Mexico Post Office. The site is bounded by U.S. Route 66 and Interstate 40. The refinery has been inactive for 15-20 years. Wastes at the refinery were placed into pits and an API separator drained directly into the ground. It was reported that a drinking water well at results from prior sampling inspections indicated the presence of benzene and light hydrocarbons in a domestic drinking water well northeast of the site. Numerous pesticides and organics were detected in samples collected from around the site.

Scores: S_M =44.3 (S_{gw} =76.5 S_{sw} = 0 S_a = 0)

S_{FE} =Not evaluated

S_{DC} =Not evaluated

FIGURE 1
HRS COVER SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score			----	15	
3 Containment	0 1 2 3	1	----	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1		18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 (7) 8	1		8	
Total Waste Characteristics Score			25	26	
5 Targets					3.5
Ground Water Use	0 1 2 (3)	3		9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 (30) 32 35 40	1		40	
Total Targets Score			39	49	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5			43,875	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} = 76.53			

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1		3	
1-yr. 24-hr. Rainfall	0 1 2 3	1		3	
Distance to Nearest Surface Water	0 1 2 3	2		6	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score			10	15	
3 Containment	0 1 2 3	1	2	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1		18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 (7) 8	1		8	
this should be 7					
Total Waste Characteristics Score			25	26	
5 Targets					4.5
Surface Water Use	(0) 1 2 3	3		9	
Distance to a Sensitive Environment	(0) 1 2 3	2		6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1		40	
Total Targets Score			0	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			0	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} =	0		

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
[1] Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line [1] is 0, the S_a = 0. Enter on line [5]. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
[3] Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
[4] Multiply [1] x [2] x [3]			0	35,100	
[5] Divide line [4] by 35,100 and multiply by 100		S_a =	0		

FIGURE 9
AIR ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	76.53	5856.84
Surface Water Route Score (S_{sw})	0	0
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		5856.84
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		76.53
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		44.24

FIGURE 10
WORKSHEET FOR COMPUTING S_M

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Containment	1 3	1		3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score				20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Total Targets Score				24	
4 Multiply 1 x 2 x 3				1,440	
5 Divide line 4 by 1,440 and multiply by 100			S_{FE} = Not evaluated		

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

Direct Contact Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
[1] Observed Incident	0 45	1		45	8.1
If line [1] is 45, proceed to line [4] If line [1] is 0, proceed to line [2]					
[2] Accessibility	0 1 2 3	1		3	8.2
[3] Containment	0 15	1		15	8.3
[4] Waste Characteristics Toxicity	0 1 2 3	5		15	8.4
[5] Targets					8.5
Population Within a 1-Mile Radius	0 1 2 3 4 5	4		20	
Distance to a Critical Habitat	0 1 2 3	4		12	
Total Targets Score				32	
[6] If line [1] is 45, multiply [1] x [4] x [5] If line [1] is 0, multiply [2] x [3] x [4] x [5]				21,600	
[7] Divide line [6] by 21,600 and multiply by 100			S_{DC} = Not evaluated		

FIGURE 12
DIRECT CONTACT WORK SHEET

June 28, 1982

DOCUMENTATION RECORDS FOR HAZARD RANKING SYSTEM

INSTRUCTIONS: The purpose of these records is to provide a convenient way to prepare an auditable record of the data and documentation used to apply the Hazard Ranking System to a given facility. As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference that will make the document used for a given data point easier to find. Include the location of the document and consider appending a copy of the relevant page(s) for ease in review.

FACILITY NAME: Abandoned Refinery (AKA Prewitt Tar Pits) NM1228

LOCATION: Prewitt, New Mexico

GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum):

Benzene
Toluene
Xylene
Ethylbenzene

Rationale for attributing the contaminants to the facility:

All of these constituents are components in gasoline which was a product of the refinery operation, located 0.4 miles west of affected well. Closest alternative potential sources of contaminants are service stations in Prewitt located about 1 mile NW of affected well. Wells situated between refinery and Prewitt are not contaminated.

* * *

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifers(s) of concern:

Sonsela Sandstone bed of Triassic Chinle Formation, comprised of alternating shales and sandstones.

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

Average of 200 feet.

Depth from the ground surface to the lowest point of waste disposal/ storage:

3 feet

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

12 inches mean annual

Mean annual lake or seasonal evaporation (list months for seasonal):

41 inches mean annual lake evaporation

Net precipitation (subtract the above figures):

-29 inches (deficit)

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Consolidated Sands and Silts; poorly developed soil cover. Sandstone moderately fractured.

Permeability associated with soil type:

10^{-5} cm/sec. (estimate)

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

Sludges, liquids and oily wastes.

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Surface impoundment
Non-engineered earthen berms. Pits are unlined. No runoff diversion structures.

Method with highest score:

Unsound run-on diversion structure; no liner.

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Aldrin (0.32 ppm)
Endrin Aldehyde (0.42 ppm)
DDT (0.3 ppm)
Pyrene (120 ppm)
Phenanthrene (180 ppm)

Compound with highest score:

Aldrin

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

1294 cubic yards

Basis of estimating and/or computing waste quantity:

Area dimension determined by tape measurement.
Depth determined by probing with wooden dowel.
Volume computed as area product of area and weighted depth

* * *

5 TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

Drinking Water

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Baca Chapter Well.
Legal description NW 1/4 of NE 1/4 of NE 1/4 of Section 18, T13N, R11W.

Distance to above well or building:

200 feet west of hazardous substances.

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

Baca Chapter Well - 1526 people
6 Private Wells within SW 1/4 of NE 1/4 of NW 1/4 Section 17, T13N, R11W. - 23 peopl

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

0

Total population served by ground water within a 3-mile radius:

1549 people

SURFACE WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

No analyses performed

Rationale for attributing the contaminants to the facility:

N/A

* * *

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

< 3%

Name/description of nearest downslope surface water:

Mitchell Draw

Average slope of terrain between facility and above-cited surface water body in percent:

< 3%

Is the facility located either totally or partially in surface water?

No

Is the facility completely surrounded by areas of higher elevation?

No

1-Year 24-Hour Rainfall in Inches

1.25

Distance to Nearest Downslope Surface Water

900 feet

Physical State of Waste

Sludges and Liquid

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Surface impoundment

Method with highest score:

Unsound run-on diversion structure

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Same as in Ground Water Route

Compound with highest score:

Same as in Ground Water Route

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Same as in Ground Water Route

Basis of estimating and/or computing waste quantity:

Same as in Ground Water Route

* * *

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

No known use

Is there tidal influence?

N/A

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

None present

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

None present

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

None present

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

0

Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

0

Total population served:

0

Name/description of nearest of above water bodies:

N/A

Distance to above-cited intakes, measured in stream miles.

N/A

AIR ROUTE

1 OBSERVED RELEASE

Contaminants detected:
No analyses performed

Date and location of detection of contaminants

Methods used to detect the contaminants:

Rationale for attributing the contaminants to the site:

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Most incompatible pair of compounds:

Toxicity

Most toxic compound:

Hazardous Waste Quantity

Total quantity of hazardous waste:

Basis of estimating and/or computing waste quantity:

* * *

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi 0 to 1 mi 0 to 1/2 mi 0 to 1/4 mi

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Distance to critical habitat of an endangered species, if 1 mile or less:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

Prewitt SIF

Sludge Volume Calcs.

PITS

TOTAL AREA = 20,204 ft^2 = .46 acre

TOTAL SLUDGE VOLUME = 10,004 ft^3 = 1111 yd^3 = .24ac-ft

AVERAGE THICKNESS = .50 ft

SEPARATOR DISCHARGE

Total Area = 1650 ft^2

Thickness = 1 ft

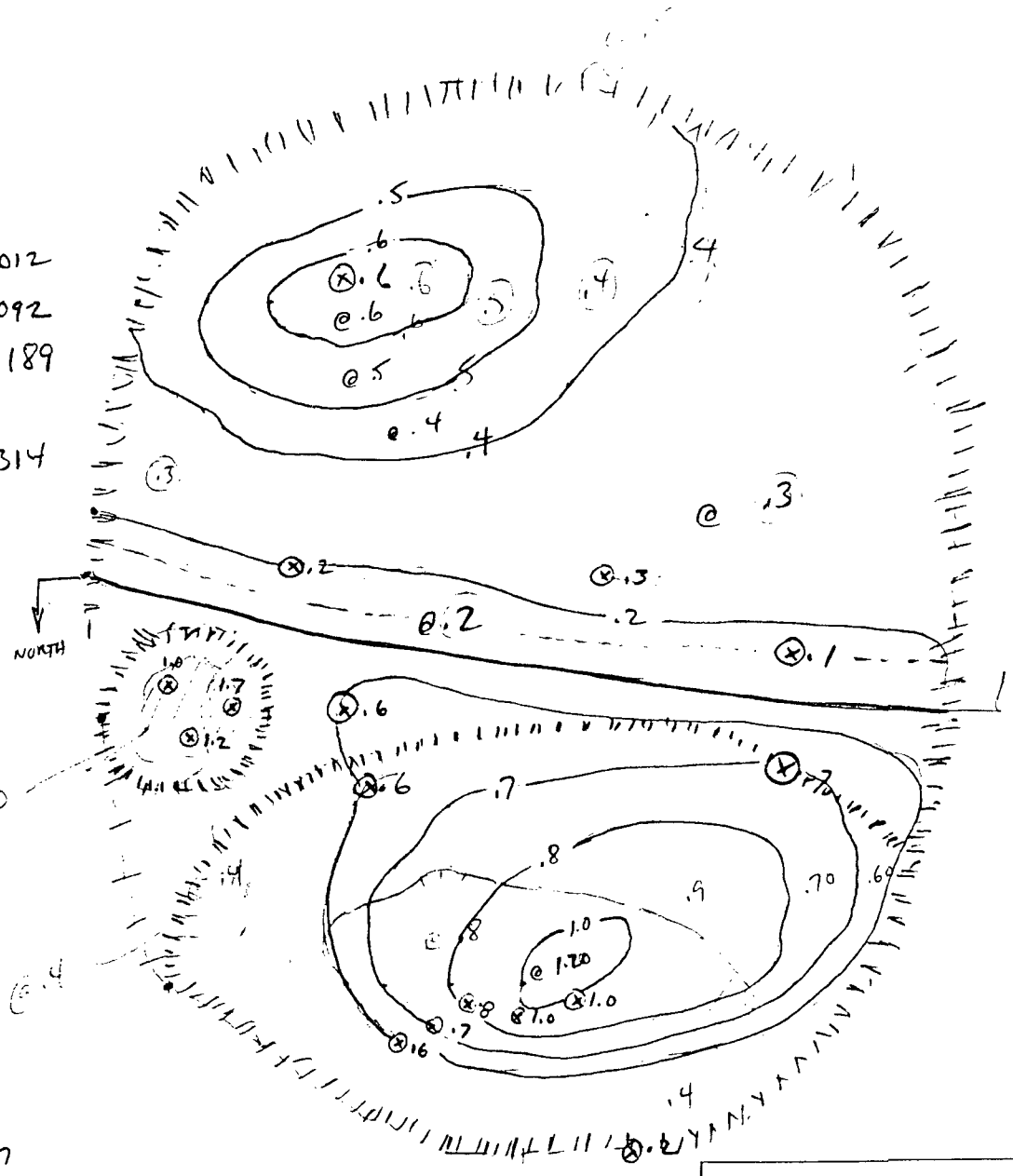
Total Sludge Volume = 1650 ft^3 = 183.33 yd^3

10,004 = 370.5 yd^3

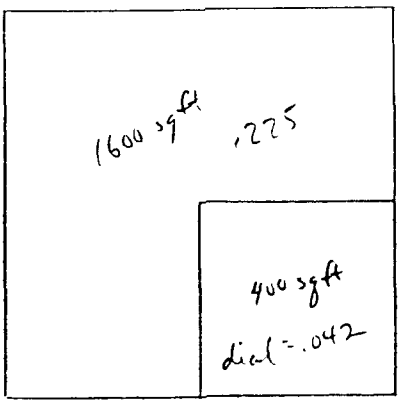
4/4/84

NORTH PORTION

1.20 1.012
.9 .092 − .012
.80 .189 − .092
.60 .314 − .189
.5
.4 .551 − .314
.3
.2
.1 1.039



.6 .027
.5 .095 − .027
.4 .271 − .095
.3 .345
.2 1.098
.1



Berm

— thickness contours

sand / liquid

20ft

20ft

- WEST PIT

Salmoiraghi Planimeter

400 sq ft = .056 dial (go around twice and ÷ 2)

1600 sq ft = .225 dial

CONTOURED THICKNESS	DIAL	SQ FT	VOL SQFT × THICK
1.20	.012	85.71	102.85
.9	.080	571.43	514.29
.8	—		
.7	.097	692.86	485 -
.6	.152	1085.72	651.43
.5	.068	485.71	242.86
.4	.413	2950.00	1180.00
.3	.345	2464.29	739.29
.2	.098	700.00	140.00
.1	.039	278.57	27.86

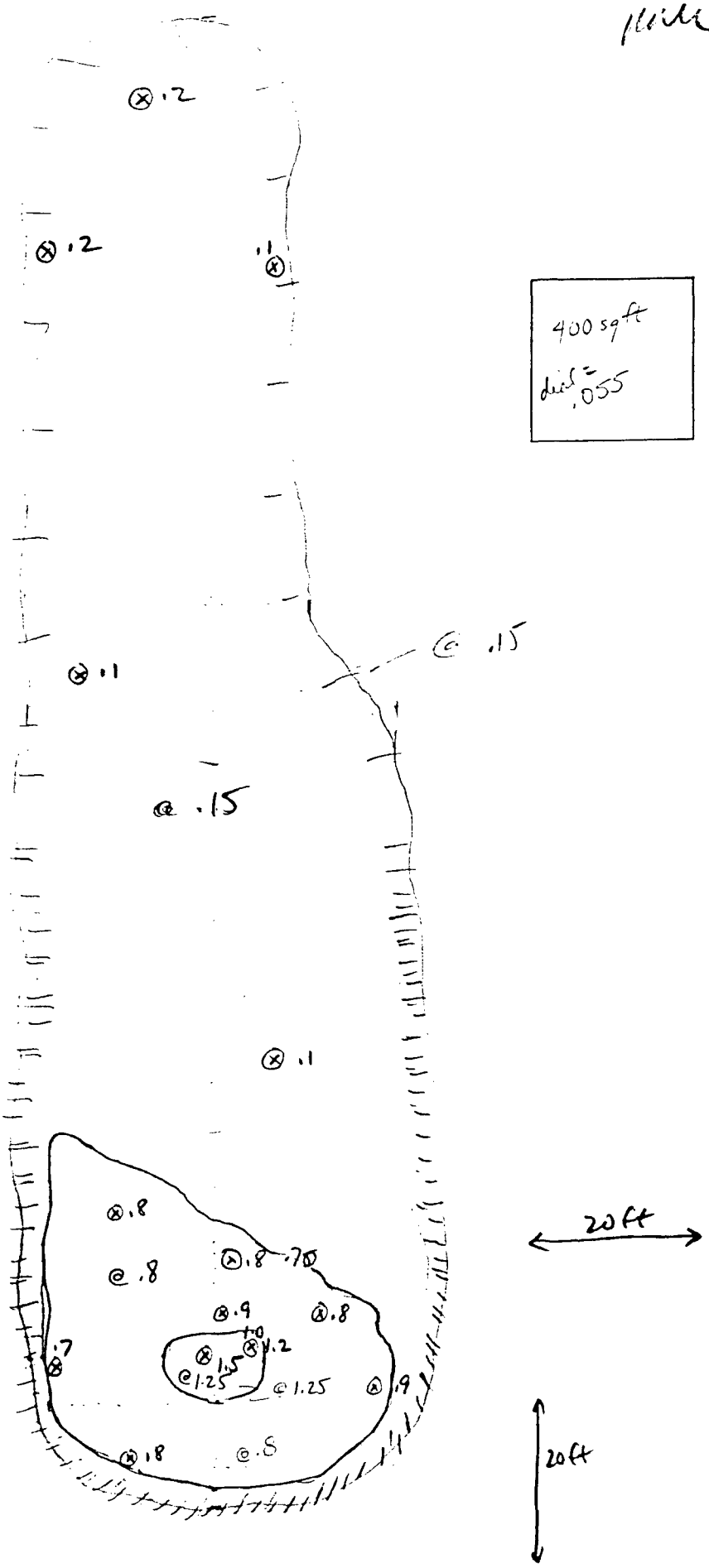
4083.58 cu ft.

151.24 cu yd

pit is approx 9350 sq ft

or one layer of sludge is .44 ft = 5.2 in

F[redacted] West Pit – NW-most pit



1.25 | .014

.8 | .182 − .014

.15 | .078 − .182

//// Berm

—— contour thickness

Salmoiraghi Pleasant

400 sq ft = .055 (go around twice ... ÷2)

CONT. THICK	DIAL	SQ FT	VOL / SQ FT * THICK
1.25	.014	101.82	127.28
.8	.168	1221.82	977.46
.15	.896	6516.37	977.46

2052.20 sq ft

231.36 sq yd

pit is 7840 sq ft

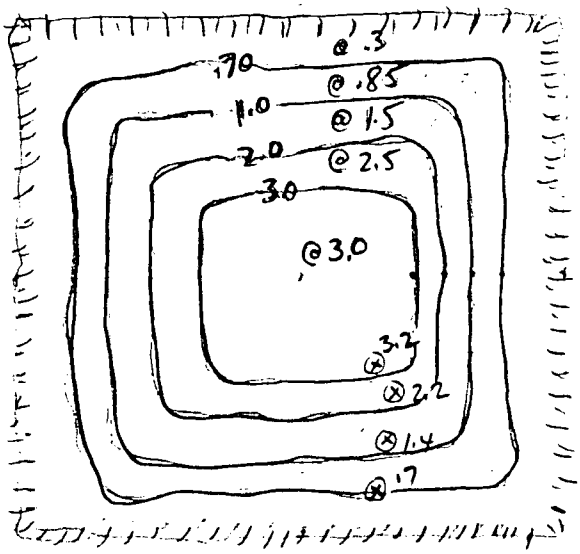
ave thick is .27 ft

= 3.2 in

EAST PIT

4/4/[illegible]

KML



3.0 .059
2.5 .109 - .059
1.5 .189 - .109
.85 .272 - .189
.30 .922 - .272

400 sq ft
disk .056

//// Berm
— thick. contour
/// water / liquid

↑ 20ft ↓

⟵ 20ft ⟶

Cell 4

Sediment Pollution Control

400 sq ft = .03 ac (twice around)

CONT THICK	DIAL	SQ FT	VOL / SQFT = THICK
3.0	.059	421.43	1264.29
2.5	.050	357.14	892.85
1.5	.080	571.43	857.15
.85	.053	592.86	503.93
.30	.150	1071.43	321.43
			3839.65 cu ft
			426.63 cu yd

AREA = 3014.29

AVE THICK = 1.27 ft
= 15.24 in

SUMMARIZE

	AREA (ft²)	VOL (ft³)	AVE THICK (ft)
WEST PIT	9350	4083	.44
FAR WEST PIT	7840	2082	.27
EAST PIT	3014	3839	1.27
TOTALS	20,204	10,004	.50 ft

= .46 ac

VOL SLUDGE = .24 ac-ft

Separator Discharge Area

Rectangular area 30' x 55' with sludge thicknesses averaging 1 ft thick.

TOTAL VOLUME = ~~183~~ 61.11 cu yd = 1650 ft^3

(Other Info)

DATE: December 15, 1982

RECEIVED

DEC 30 1982

EID; WATER POLLUTION CONTROL

TO: File

FROM: Tim Reed, Environmentalist TR

SUBJECT: Possible Groundwater Pollution

On December 14, 1982 a water sample was obtained from the private well at the home of Mabon Barnes, for testing of potential pollution from petroleum. On arriving at the Barnes residence, a glass of water was taken from the kitchen tap. The water had the definite odor of gasoline. A sample was then taken from the outside tap which is not filtered or otherwise treated. In questioning Mr. Barnes about the possible source of such contamination it was determined that a refinery had been in operation across the highway from his home, from 1939 to 1959. Mr. Barnes had been an employee there until its closing in 1959. I requested a tour of the abandoned site.

During the tour Mr. Barnes stated that some of the storage tanks, which had contained regular and ethyl-lead gasolines, were known to have leaked their contents. He showed me the sites where these leaking tanks once stood. One such site was entirely barren, in a perfect circle. No vegetation had grown in this spot since the refinery was dismantled around 1962. He recalled a situation where an employee neglected his operation of the mixing apparatus, allowing 2000-3000 gallons of gasoline to overflow almost every day for a period of 3-4 months. (A conservative estimate gives a figure of 144,000 gallons; 2000gals.X6 daysX12 weeks).

The "transfer pit" had cracks in its concrete foundation. At the end of the day, the 3" to 4" of gasoline in this pit would be left to leak out overnight.

Two of the water wells at the refinery were decommissioned due to pollution from gasoline. When asked for more detail on this Mr. Barnes said the chemist used a sedimentation method for testing the well water and he recalled a figure of 58% gasoline content in the water. "We couldn't use it because it was explosive".

The Barnes residence is approximately .4 of a mile from the position of the storage tank site, to the Northeast. Surface topography indicates that a hydrologic flow is to the Northeast. The use of water in mining activity could also possibly pull a plume of contamination toward the well used by the Barnes family.

Their well is 175 feet deep with the pump set at about 167 feet. The well is 20 years old. Approximately 18 months ago the pump was pulled. A black sludge had covered the inlet except for one hole, ½ inch in diameter. An odor similar to sewage or rotten eggs was prevalent. This could be indicative of sulfur bacteria. It was suggestd that a periodic dosage of chlorine bleach be continued.

MEMO TO FILE RE: POSSIBLE GROUNDWATER POLLUTION

Mr. Barnes developed chronic leukemia about 10 years ago. Mrs. Barnes suffers from dermatological disease at times. Due to these ailments, it would seem imperative that a good quality supply of water be available so as not to compound health problems. Bottled water was suggested and if fixed income will provide, the suggestion may be taken.

The results of the water analyses at SLD are not available as of December 15, 1982.

jq

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 1430	Date APR 13 1984
Originating Party	Other Parties	
Lewy - EID	DIANE YAZZI 602-871-4941	

Subject: Population using BACA WELL
STATE ENG. # 13.11.18.221

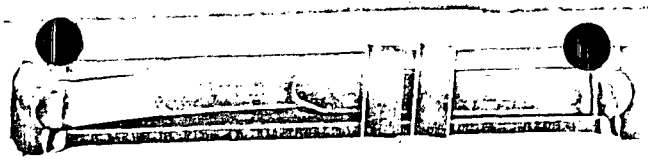
Discussion: Talked to DIANE YAZZI @ Navajo Nation
ENV. Protection Commission
Explained need to determine no. of people using Baca Well
She used Navajo Nation Overall Economic Development Plan
prepared by Division of Economic Development; Nav. Tribe
(1983-1984)
In report, ate figures from BIA 1982 Enrollment Figures.
Diane explained that populations from both Prewitt and
Baca Chapters use well for domestic consumption

Conclusions or Agreements

Population using well is 1526

Distribution
Include w/ Prewitt HRS pkg.
to EPA - Region VI. / Dallas

Signed P M Lewy



Blue Ashur

STATE OF NEW MEXICO

OFFICE OF THE GOVERNOR

SANTA FE

87503

TONEY ANAYA
GOVERNOR

November 14, 1983

RN 1012

Honorable W.S. Eoff
State Senator
2000 McDevitt
Gallup, NM 87301

Dear Senator Eoff:

In response to your recent request for information on the Prewitt hydrocarbon contamination incident, the following facts were obtained from staff members at the Health and Environment Department's Environmental Improvement Division (EID).

In response to a citizen request in December, 1982, the EID sampled domestic wells in the vicinity of an abandoned gasoline refinery near Prewitt for hydrocarbon contamination. The well of Mr. Mabon Barnes located northeast and directly adjacent to the site was found to be contaminated with benzene (a constituent of gasoline) in excess of the New Mexico human health ground water standard of 0.01 mg/l. Repeat samplings through the summer of 1983 showed levels of benzene ranging from 0.085 to 1.30 mg/l. Additionally, other hydrocarbon contaminants (toluene, xylene, ethylbenzene) were detected in this well though not at levels detected for benzene. Other private domestic wells adjacent and directly to the east of the Barnes residence were similarly sampled but no detectable hydrocarbon contamination was observed. Members of the Barnes residence were informed that their well water exceeded the benzene standard and currently they are hauling water for all domestic uses, including drinking. The other families continue to use their individual wells.

The site of the abandoned refinery, which was previously owned by El Paso Products Company and MALCO Refinery (now ARCO), was sold in 1966 to the Navajo Tribe and tribal members in the area. A former refinery water well on-site immediately to the west of the processing buildings and tanks is now used by the Baca Navajo Chapter for community supplies. This well was sampled this summer (1983) in cooperation with the Indian Health Service, and no hydrocarbon contamination has been detected to date. However, several other unplugged, uncapped former water supply wells exist on site and the EID was able to obtain water samples from two wells not filled with debris. These wells (closer to the Barnes residence than to the Baca Navajo Chapter well) had concentrations of benzene ranging from 0.047 to 0.116 mg/l. Resampling will be conducted at the refinery site and at the domestic wells later this fall.

The exact mechanism allowing aquifer contamination by benzene and related hydrocarbons remains to be determined. Several unlined pits, and below-grade concrete structures remain at the site and still contain oil, tars and other

hydrocarbon materials, even though the refinery ceased operation in the mid-1950's. A more likely source of the ground water contamination is leakage from spills and surface discharges during operation down the outside casing of those water supply wells located in the center of the facility.

The operation of the facility (and likely the contamination) occurred prior to adoption of the Water Quality Control Commission Ground Water Regulations in 1977. These regulations address ground water protection at both new and active existing facilities. Abandoned facilities and clean-up of pollution which occurred before the various laws and regulations were in effect present difficult technical and regulatory problems. Within the past month, the EID has begun an EPA-funded assessment of sites for possible future inclusion on EPA's "Superfund" clean-up list. The Prewitt refinery site is one of several sites state-wide targeted for intensive study, including the possible drilling in six to eight months of monitoring wells to delineate the extent, size, movement, and concentration of the contaminant plume. No money is available under this study for clean-up of ground water contamination, but results of the assessment will be used in determining possible inclusion and ranking of the Prewitt site on EPA's "Superfund" list. Addition of the site to the "Superfund" list would make EPA resources available for cleanup under the Federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980. Additionally, it is EID's understanding that litigation is pending between the former refinery owner(s) and Mr. Barnes regarding mitigation of possible health effects and loss of property due to former refinery activities. The EID is unaware of the present status of this litigation.

If you have any further questions please feel free to contact me or Steven Asher, Director of the Environmental Improvement Division at your convenience.

Sincerely,

Robert McNeill
Chief of Staff
Office of the Governor

RN:SA:jba

cc: Steven Asher, EID Director

Well data on Baca Chaves Well #.

TECHNICAL REPORT 35

New Mexico State Engineer
Santa Fe, New Mexico

Geology and Ground-Water Occurrence in Southeastern McKinley County, New Mexico

By
James B. Cooper & Edward C. John

United States Geological Survey

1968

REPRINTED 1978

TABLE 1 (continued)

RECORDS OF WELLS IN SOUTHEASTERN MCKINLEY COUNTY, N. MEX.

Location	Owner or name	Driller	Year completed	Altitude	Depth of well (feet)	Water level: Depth below surface (feet)	Water level: Date of measurement	Principal water-bearing unit: Character of material	Principal water-bearing unit: Stratigraphic unit	Diameter of casing (inches)	Type of pump	Type of power	Use of water	Remarks
13, 8,22,121	James W. McAvoy	Coffee	-	6,835	330	198.5	10-16-62	Sandstone	Jmw	5	S	E	Pg	Water supply for trailer court, use of 9000 gpd reported 10-17-62.
22,212	P.O. and Carlos Sandoval	O. Carter	1955	6,830	95	87.5	12-18-57	Sand	Qal	5	C	W	S	Ca.
24,221	Rabor Marquez	-	-	6,910	80	56.5	12- 6-57	do.	Qal	5	C	W	S	-
24,221a	Calumet Necia Inc.	-	1955	6,910	80	56.8	12- 6-57	do.	Qal	8	C	E	I,D	Exploratory drill hole.
29,341	Beatvaco Min. Dev.	-	-	6,755	190 M	dry	10-30-57	Limestone	Jl	5	N	N	U	Well reported to have gone dry when "Faith" mine was deepened.
29,343	Mount Taylor Corp.	C. C. Smith	1958	6,760	455	228	-	Sandstone	Pe (?)	5	S	E	U	-
13,10, 8,211	U.S. Bureau of Indian Affairs	C. M. Carroll	1936	7,000	357	330.7	10-29-57	do.	Pw	7	C	W	S	BIA well 168-38; L.
11,242	Adrian Berryhill	Prewitt Drlg Co.	1962	7,210	805	732	-	do.	Jmw	6	C	W	S	-
33,443	Duane Berryhill	do.	1956	6,720	110	38.7	10-16-62	do.	Pc	6	C	W	S	L.
13,11, 6,313	Elkins Ranch, Inc.	-	-	6,795	74 M	38.9	9- 5-62	do.	Pc	7	N	N	U	Drilled for sand-pit operations, supply inadequate.
6,424	do.	Tom Elkins	-	6,785	100	45.3	6-23-48	do.	Pc	6	C	W	U	-
6,424a	do.	O. Carter	-	6,785	352	50	-	do.	Pc	6	S	E	S	Water not used for drinking, reported bad taste.
7,344	Justin La Font	O. Carter	-	6,810	-	-	-	do.	Pc	-	S	E	D	Ca.
7,431	Elkins Ranch, Inc.	Prewitt Drlg Co.	1958	6,810	220	52.4	8- 3-61	do.	Pc	7	S	E	U	L.
7,433	Justin La Font	-	-	6,820	147	-	-	do.	Pc	5	C	N	U	Ca.
8,212	Elkins Ranch, Inc.	-	-	6,785	100	37.0	6-23-48	do.	Pc	6	C	W	S	Ca.
17,113	El Paso Natural Gas Co.	Bledsoe	-	6,805	200	79.6	8- 2-61	do.	Pc	5	N	N	U	Gasoline on top of water, Prewitt refinery.
17,113a	do.	do.	1916	6,805	240	79.9	8- 2-61	do.	Pc	6	N	N	U	Ca; Prewitt refinery, "Bluewater" well
17,114	do.	-	1953	6,795	790	67.0	8- 2-61	do.	Pc, Pmm	6	N	N	U	Prewitt refinery, "New" railroad well
17,114a	do.	Bledsoe	-	6,795	200	59.4	8- 2-61	do.	Pc	6	N	N	U	Ca; gasoline on top of water, Prewitt refinery "Gas" well 3.
17,123	do.	do.	1940	6,795	774	145	-	do.	Pc, Pmm	6	C	N	U	Prewitt refinery, "Old" railroad well.
17,133	do.	-	-	6,820	-	111.2	8- 2-61	do	Pc	6	N	N	U	Prewitt refinery, "House" well.
17,141	do.	Hubbell Bros.	1951	6,810	196	75.2	8- 2-61	do.	Pc	7	N	N	U	Prewitt refinery.
17,411	Zuni Mt. Trading Post	Masters	-	6,805	180	84.8	9-18-62	do.	Pc	6	S	E	D	Ca.
17,442	F. M. Hubbell and Lawrence Elkins	F. M. Hubbell	1955	6,825	208	115	-	do.	Pc	7	J	F	D	-
17,442a	F. M. Hubbell	do.	1960	6,825	150	100	-	do.	Pc	8	S	E	D	-
18,122	El Paso Natural Gas Co.	-	-	6,825	187 M	82.3	9- 5-62	do.	Pc	7	N	N	U	Prewitt refinery.
18,122a	Yolton Tietjen	Berryhill		6,810	200	86.8	9- 5-62	do.	Pc	6	C	E	D	-
18,221	El Paso Natural Gas Co.	Hubbell bros.	1954	6,805	201	73.5	8- 2-61	do.	Pc	7	N	N	U	Prewitt refinery.
18,223	do.	do.	1952	6,815	803	-	-	Limestone and sandstone	Pmm, Pg	8	C	E	I	Prewitt refinery, "Shop" well yield 11 gpm; L.
18,224	do.	Bledsoe		6,805	200	87.6	8- 2-61	Sandstone	Pc	6	N	N	U	Ca, Prewitt refinery, "West" well.
18,444	Roy Naverre	Hubbell bros.	19	6,930	540	381.0	10-24-62	do.	Pc	8	C	W	S	L.
33,324	Elkins Ranch, Inc.	do.	-	6,780	800	303.8	8- 3-61	do.	Pc	7	C	W	S	Basalt to 80 ft, water in red sand near 800 ft.
27,314	do.	Hubbell bros.	19--	6,720	204	125.9	8- 3-61	do.	Pc	7	C	W	S	L.
34,133	Henry Andrews	do.		6,710	-	181.9	9-19-62	do.	Pc	6	J	E	D	Water pumped to house and tried a post
13,12, 3,142	Elkins Ranch, Inc.	-	-	6,855	-	49.2	8- 4-61	do.	Pc	6	C	W	U	-
1,343	U.S. Bureau of Indian Affairs	-	-	6,940	24 M	18.7	6- 3-59	do.	Pc	48	J	I	D,S	Dug well, reported to have run out years
8,121	C. Williams	-	-	7,005	124	51		do.	Pc	6	C	W	D	-

Malco Refineries, Inc.

P. O. BOX 660
ROSWELL, NEW MEXICO

SMK 21

July 6th, 1954

13.11.17.113

Mr. Clyde S. Conover
District Engineer - GW
Ground Water Branch U.S.G.S.
P. O. Box 443
Albuquerque, New Mexico

RE: Prewitt Refinery Water Wells
McKinley County, New Mexico

Dear Mr. Conover:

Enclosed you will find a sketch map showing the water well locations at Prewitt Refinery together with pumping tests in July this year plus three well logs and tests prior to clean out.

I am sorry there has been such a delay in getting this data to you but I was under the impression that it had been sent to you when we first started working on the wells.

It is my opinion that the Shop well and the Santa Fe R. R. wells have penetrated the San Andres limestone and part of the Glorieta sandstone and that the San Andres limestone is definitely present in the Prewitt area. I measured 50 feet of San Andres at several places in Bluewater Canyon to the south and that is about the thickness of the lime at Prewitt. Depth and thickness of beds all fit the relative position of the San Andres at Bluewater Canyon and Prewitt.

We plan to deepen the Shop well through the Glorieta sandstone at this date to increase the water. Moving south will not make depth much shallower. If your organization has any suggestions, we would certainly appreciate hearing of them.

Very truly yours,

MALCO REFINERIES, INC.

Phil D. Helmig

Phil D. Helmig
Chief Geologist

/sa

PREWITT REFINERY

WATER WELL TESTS PRIOR TO CLEAN OUT

WELL	HR TEST	GALS HR° /Test	GALS WTR. /Min.Aver.	GALS WTR. /24 hours	TYPE PUMP	SIZE CSG.	T.D.	REMARKS
East Well Sec. 17 SW NW T13N-R11W	0	0	0	0	None	5½"	185'	Well was not on Production, Thought to be dry
Blue Str. Well SW NE Sec. 17-13N-R11W	13½	6968.8	8.6	12,424.8	Peerless Hilift 2 H.P. 10660 Sq. Type	5½"	199'	Well is purping good drinking wtr. (Larger Pump?)
Deep Wtr. Well NE NW Sec. 17-13N R11W	¼	1500	20	28,800	2-3/4" plunger type 2" rod 3/4" tubing	5½" 0/4" liner	774"	Pump set @425' 10' working bbl Jack O.S.C. 5-H.P. Motor Gen. 10 H.P. 3 Ph. 220/14 volts.
Gas Well NW NW Sec. 17 T13N-R11W	3½	176	8.4	12,096	Peerless Jet pump 2" 1½"	5½"	200'	Well loss gasoline seepage.
East Well NE NE Sec.18 T13N-R11W	¼	90	6	8,640	Peerless Hilift Squeeze Type 2 H.P.	5½"	195'	Pump is pumping off - Air
Trap Well NW NE Sec.18 T13N-R11W	¼	35	5.7	8,208	Peerless Hi/Lift Sq. Type 2 H.P. 10508J	5½"	205'	Pump @ 140' Well not pumping full capacity. Clean out - Put in jet pump
TOTAL			48.7	69,769				

PEERLESS SQUEEZE TYPE PUMP Maximum Capacity
10 to 13 gal./min.
JET TYPE PUMPS w/2" and 1½" tubing capacity
25 gal/min in upper stage.

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal | Time 1430 | Date APR 13 1984

Originating Party	Other Parties
Lowy - EID	DIANE YAZZI
	602-871-4941

Subject: Population using BACA WELL
STATE ENG. # 13.11.18.221

Discussion: Talked to DIANE YAZZI @ Navajo Nation Env. Protection Commission
Explained need to determine no. of people using Baca Well
She used Navajo Nation Overall Economic Development Plan prepared by Division of Economic Development; Nav. Tribe (1983-1984)
In report, ate figures from BIA 1982 Enrollment Figures.
Diane explained that populations from both Prewitt and Baca Chapters use well for domestic consumption

Conclusions or Agreements

Population using well is 1526

Distribution
Include w/ Prewitt HRS pkg.
to EPA - Region VI. / Dallas

Signed P M Lowy

Info on Barnes well from FIT report

ECOLOGY AND ENVIRONMENT, INC.

REGION VI

MEMORANDUM

PRELIMINARY REPORT
This does not constitute
final opinion of EPA

TO: Dave Peters, Chief
Hazardous Waste Section

FROM: David Anderson, FIT-Chemist

THRU: K. B. Malone, Jr.-RPM

DATE: February 7, 1984

SUBJ: Sampling at Abandoned Refinery, Prewitt, New Mexico (NM 1228)
TDD R-6-8305-27

Sampling at the abandoned refinery, Prewitt, N.M. was conducted by a five member FIT on August 31, 1983. Water samples were collected from nine residential and other private wells located around the site (see photos on sheets #1,2,3,11,13, and 14 and attached "Residential Well Sampling Information), one area of stained soil (sheet 8, photo #4), two of the three waste pits present (photos on sheets 4-7) and two samples from the separator and its discharge (sheet 9, photo #7 and photos on sheet 10). Other areas of soil contamination were noted on site (sheet 8, photo #5 and sheet 9, photo #6) as were areas on and near the ATSF right of way, across the highway from the site, (sheets 15 and 16). Sampling stations are indicated on the attached map as are the approximate locations of wells formerly used at the site for process water.

All of the wells sampled were probably completed in an aquifer 180-200 ft. in depth. A shallow aquifer is thought to be present at a depth of 40-50 ft. This is the approximate depth at which water was first encountered when the Sharp well was drilled, as recollected by Mr. Sharp. The site wells north of US 66 are thought to be at a depth of greater than 700 ft. This information was provided by Mr. Barnes, who formerly worked at the site. Groundwater flow is thought to be to the NE, influenced by mining that has been conducted in that direction. Based on this information, the KOA and Bacca wells (stations 08 and 09) are believed to be upgradient wells.

The Barnes well (station 01) was the only well sample in which organics were detected. Benzene was detected at 0.072 ppm in this sample. Benzene had also been detected at a concentration of 0.185 ppm in a sample from this well collected by the state in December, 1982. Eight other organics were also detected in the sample (See attached Organic Analysis Summary). These contaminants consisted of light hydrocarbons, C-5 to C-7. The only metal that appeared to be elevated in the well samples was the iron detected in the Barnes and Polk wells (stations 01 and 04). Conductivity and pH data for the well samples is included in Table 1.

RESIDENTIAL WELL SAMPLING INFORMATION

1. Name, address and phone number of resident (include county and zip code)

   Marvin Barnes
   Box 24
   Prewitt, NM 87045 McKinley

2. Date well was dug 1963

3. Depth of well 187 drilled ≈170 current

4. Depth to static water Unknown

5. Is the well cased? Yes X No

   If so, to what depth? To bottom

   What type of casing is used? 7 inch steel

6. Is well screened? Yes No X

7. How much is the well pumped? (Only for residential use or for use in watering livestock?) Not currently in use, formerly residential.

8. Any other pertinent information? Previous sample December 1982. 185 ppb benzene

8210-31

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT

REGION	SITE NUMBER (To be assigned by HQ)
6	NM 1228

GENERAL INSTRUCTIONS: Complete Sections I and III through XV of this form as completely as possible. Then use the information on this form to develop a Tentative Disposition (Section II). File this form in its entirety in the regional Hazardous Waste Log File. Be sure to include all appropriate Supplemental Reports in the file. Submit a copy of the forms to: U.S. Environmental Protection Agency; Site Tracking System: Hazardous Waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME: Abandoned Refinery (AKA Prewitt Tar Pits)

B. STREET (or other identifier): Old U.S. 66 ½ mile west west of Prewitt Post Office.

C. CITY: Prewitt

D. STATE: NM

E. ZIP CODE: 87045

F. COUNTY NAME: McKinley

G. SITE OPERATOR INFORMATION

1. NAME: None, Inactive. (see attachment A for previous operators)

2. TELEPHONE NUMBER:

3. STREET:

4. CITY:

5. STATE:

6. ZIP CODE:

H. REALTY OWNER INFORMATION (if different from operator of site)

1. NAME: Navajo Tribe of Indian

2. TELEPHONE NUMBER:

3. CITY: Prewitt

4. STATE: NM

5. ZIP CODE: 87045

I. SITE DESCRIPTION: See attachment A

J. TYPE OF OWNERSHIP

[X] 1. FEDERAL [ ] 2. STATE [ ] 3. COUNTY [ ] 4. MUNICIPAL [ ] 5. PRIVATE

II. TENTATIVE DISPOSITION (complete this section last)

A. ESTIMATE DATE OF TENTATIVE DISPOSITION (mo., day, & yr.):

B. APPARENT SERIOUSNESS OF PROBLEM

[X] 1. HIGH [ ] 2. MEDIUM [ ] 3. LOW [ ] 4. NONE

C. PREPARER INFORMATION

1. NAME: David Anderson (David Anderson)

2. TELEPHONE NUMBER: 214-742-4521

3. DATE (mo., day, & yr.): Jan 21, 1983

III. INSPECTION INFORMATION

A. PRINCIPAL INSPECTOR INFORMATION

1. NAME: David Anderson

2. TITLE: FIT Chemist

3. ORGANIZATION: Ecology and Environment, Inc. 1509 Main St. Dallas, TX 75201

4. TELEPHONE NO. (area code & no.): 214-742-4521

B. INSPECTION PARTICIPANTS

1. NAME	2. ORGANIZATION	3. TELEPHONE NO.
James Trusley	Ecology and Environment, Inc.	214-742-4521
Timothy Reed	Environmentalist (505) 287-8845 NMEID 708 Uranium Av Milan, N.M. 87020	505-287-8845

C. SITE REPRESENTATIVES INTERVIEWED (corporate officials, workers, residents)

1. NAME	2. TITLE & TELEPHONE NO.	3. ADDRESS
T.C. Lassen	Environmental Engineer 213-267-5454	The Atchison, Topeka, and Santa Fe Railway Co. One Santa Fe Plaza 5200 E. Sheila St. Los Angeles, CA 90040

PRELIMINARY REPORT: This does not constitute final opinion of EPA.

PRELIMINARY REPORT

E-16-83 DATE

RESIDENTIAL WELL SAMPLING INFORMATION

1. Name, address and phone number of resident (include county and zip code)

   Mabon Barnes

   Prewitt, New Mexico 87045

   McKinley

2. Date well was dug approximately 1960

3. Depth of well 175 ft.

4. Depth to static water Unknown

5. Is the well cased? Yes_____ No_____ Unknown

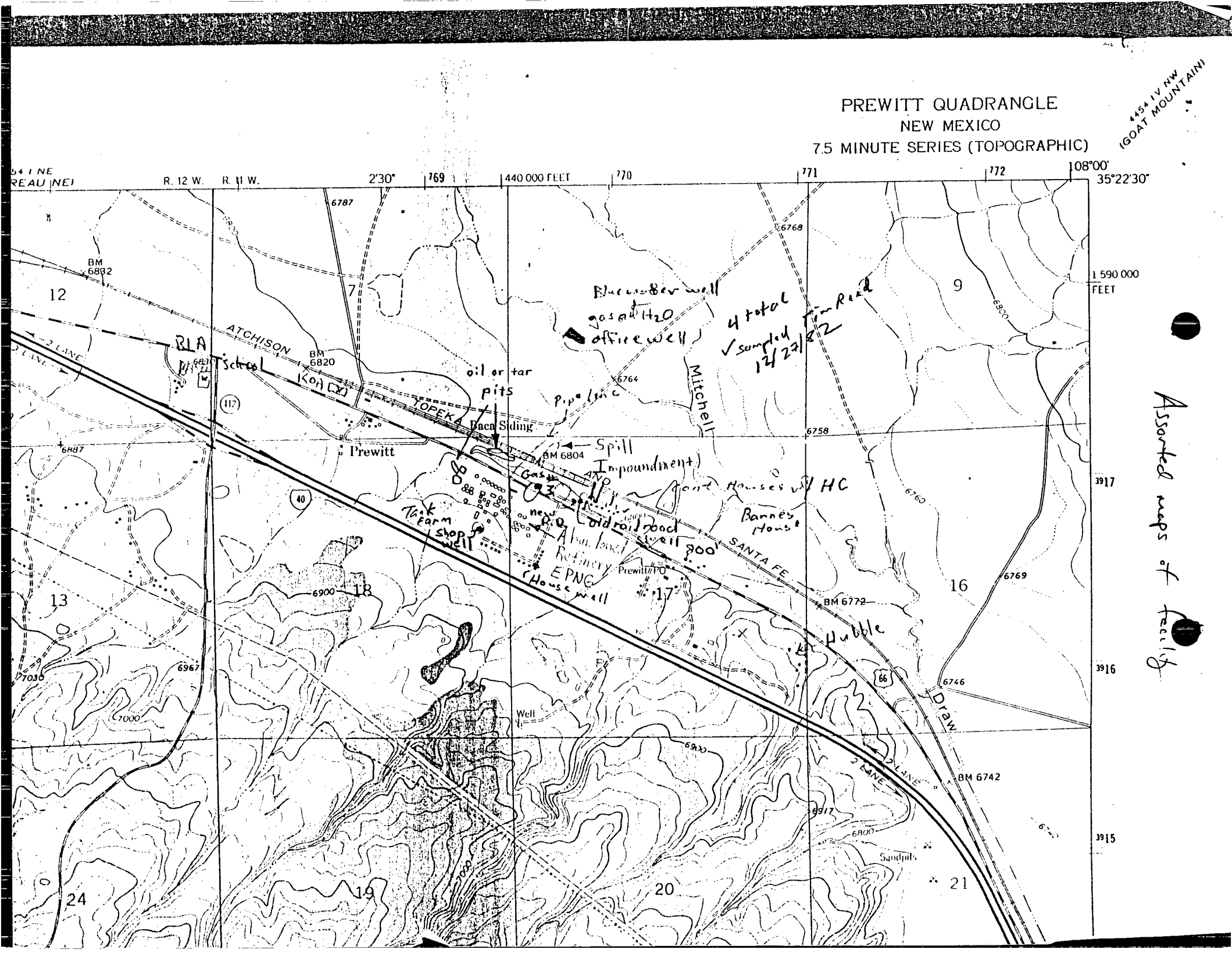
   If so, to what depth? Unknown

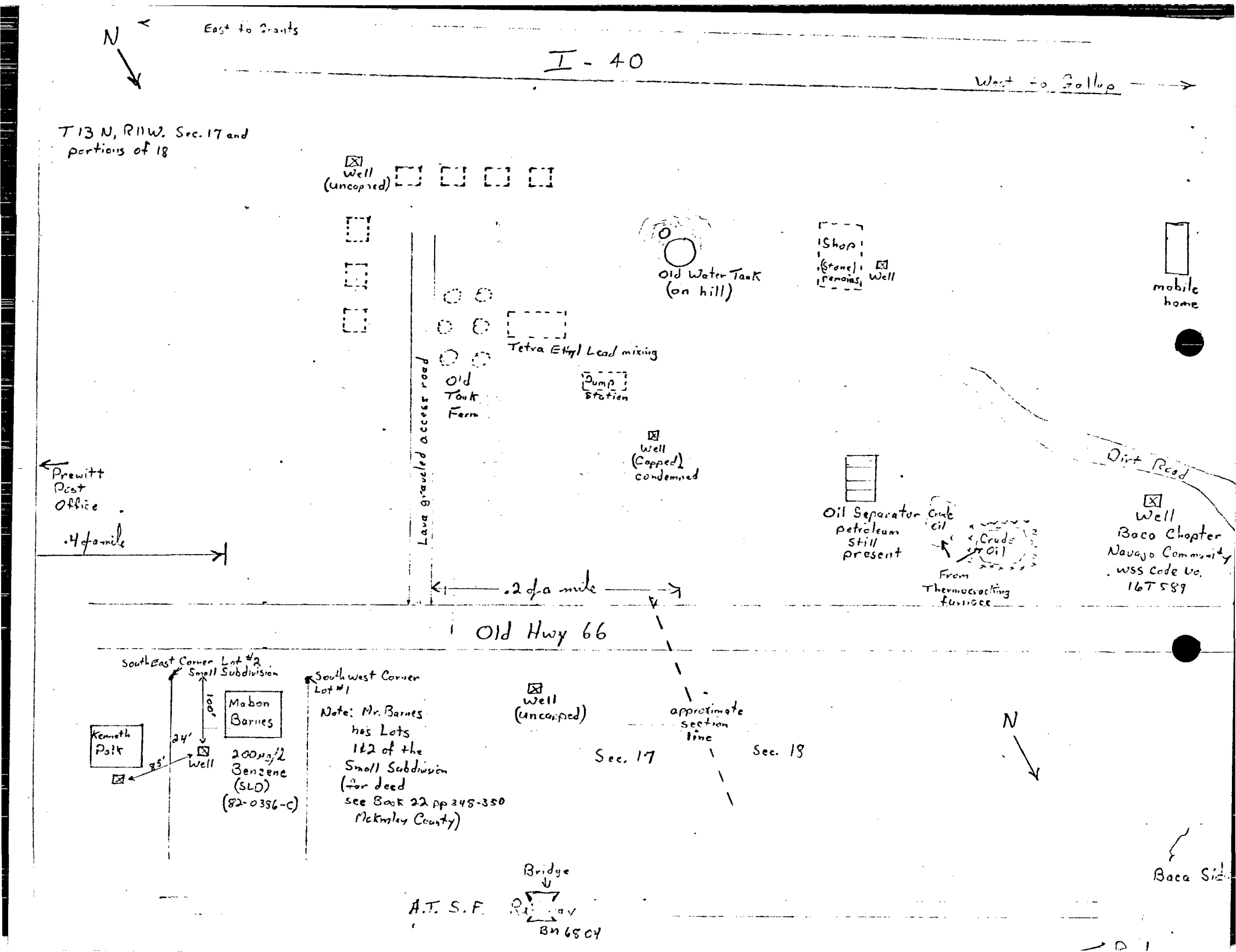
   What type of casing is used? Unknown

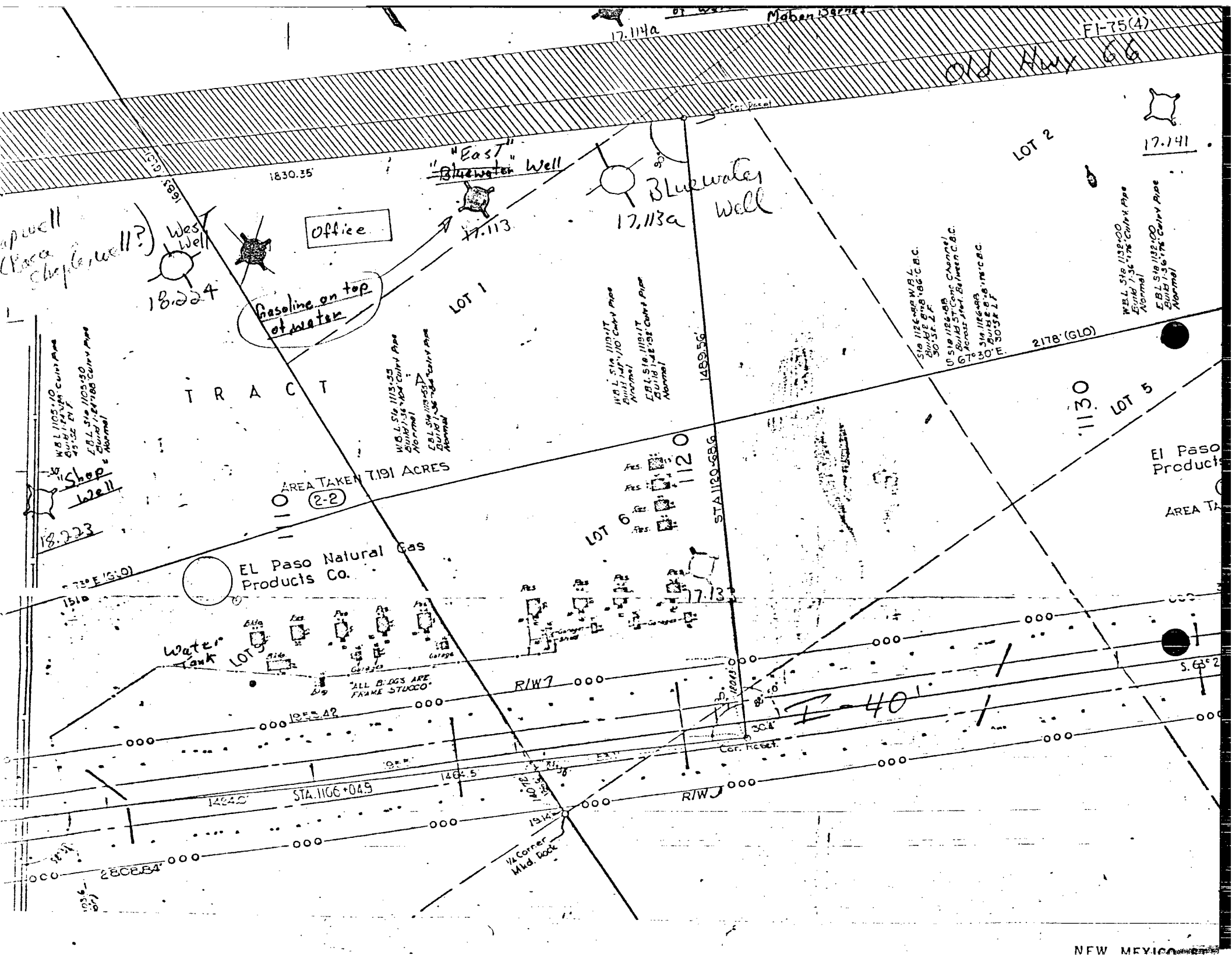
6. Is well screened? Yes_____ No_____ Unknown

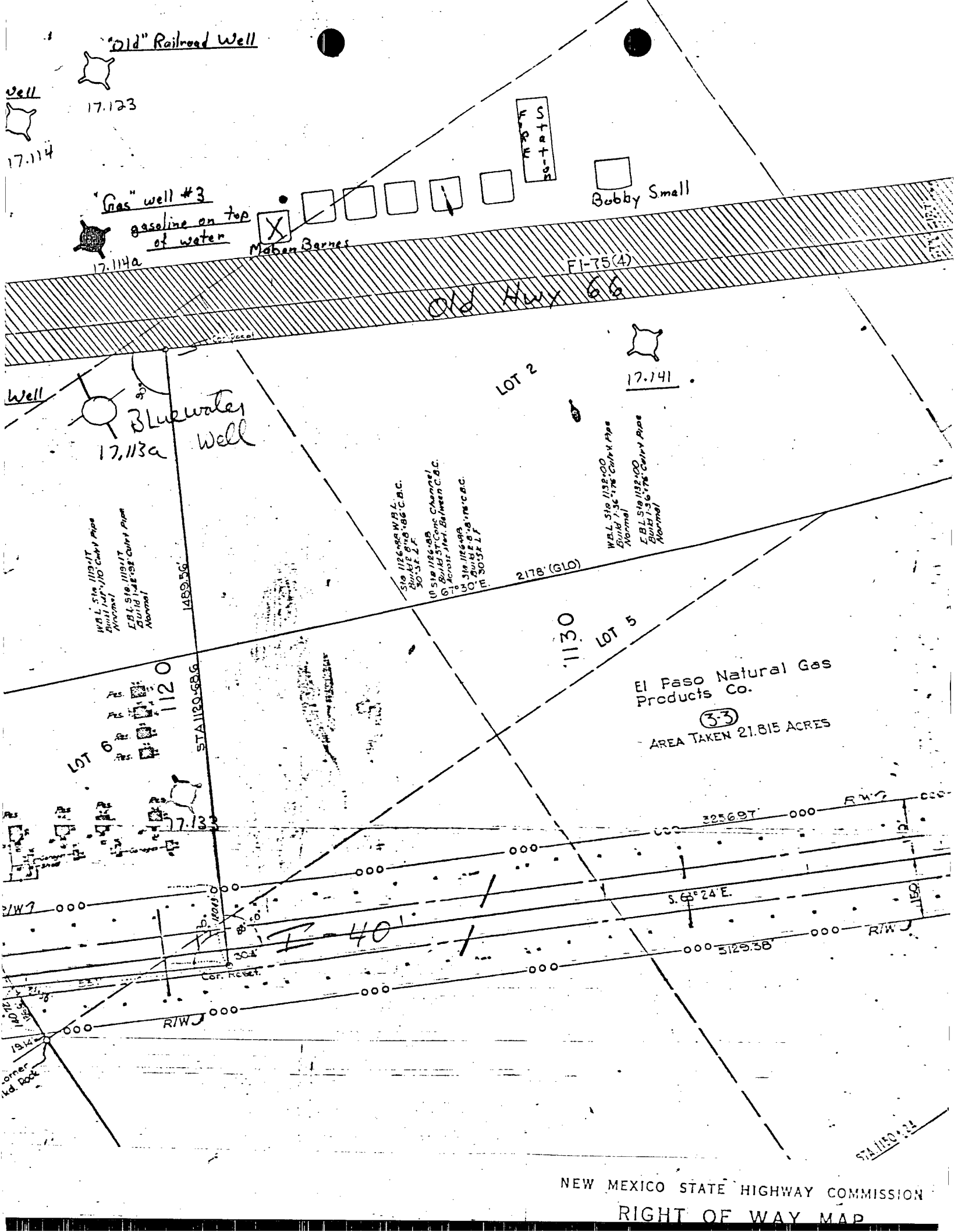
7. How much is the well pumped? (Only for residential use or for use in watering livestock?) residential use only

8. Any other pertinent information? State of New Mexico sampled this well and found 185 ppb benzene. The state has recommend that use of the well be discontinued. Other near by wells are being sampled by the state.


PREWITT QUADRANGLE
NEW MEXICO
7.5 MINUTE SERIES (TOPOGRAPHIC)
454 I V NW
(GOAT MOUNTAIN)
R. 12 W.
R. 11 W.
2'30"
769
440 000 FEET
770
771
772
108°00'
35°22'30"
1 590 000 FEET
3917
3916
3915
BM 6832
BM 6820
ATCHISON
TOPEKA
SANTA FE
Prewitt
Spill
Impoundment
Gas
Tank
Farm
shop
well
Old railroad
well 900'
Prewitt P.O.
EPNG
House well
Barnes House
Draw
Well
Sandpits
BM 6804
BM 6772
BM 6742
Blue water well
gas and H2O
office well
4 total
✓sampled 12/27/82
oil or tar
pits
Pipeline
Mitchell
Assorted maps of facility

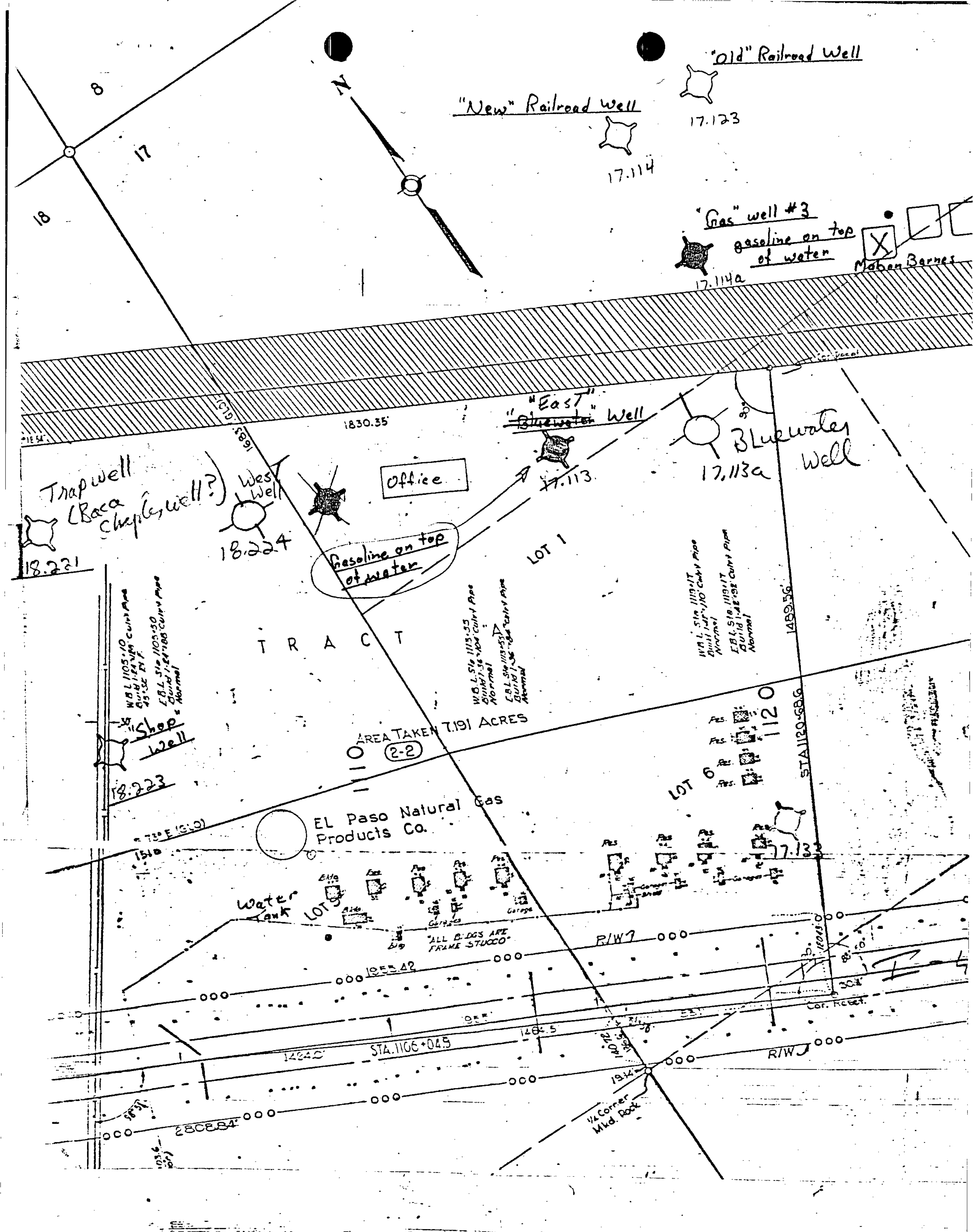

N
East to Grants
I - 40
West to Gallup
T 13 N, R 11 W. Sec. 17 and portions of 18
Well (uncapped)
Old Water Tank (on hill)
Shop (Stone) Remains
Well
mobile home
Tetra Ethyl Lead mixing
Old Tank Farm
Pump Station
Lava graveled access road
Well (Capped) condemned
Prewitt Post Office
.4 of a mile
Oil Separator petroleum still present
Crude oil
Crude Oil
From Thermocracking furnace
Dirt Road
Well Baco Chapter Navajo Community WSS Code No. 16T589
.2 of a mile
Old Hwy 66
South East Corner Lot #2 Small Subdivision
100'
24'
35'
Well
Kenneth Polk
Mabon Barnes
200 mg/l Benzene (SLD) (82-0356-C)
South west Corner Lot #1
Note: Mr. Barnes has Lots 1 & 2 of the Small Subdivision (for deed see Book 22 pp 348-350 McKinley County)
Well (uncapped)
approximate section line
Sec. 17
Sec. 18
N
Bridge
A.T.S.F. Railway
Bn 6804
Baca Side


Old Hwy 66
FI-75(4)
17.114a
Maben Siphon
Cor. Reset
"East" "Bluewater" Well
Bluewater Well
17.113a
17.113
17.141
LOT 2
LOT 1
Office
West Well
18.224
Gasoline on top of water
1830.35'
TRACT A
AREA TAKEN 7.191 ACRES
2-2
LOT 6
LOT 5
1130
1120
STA 1120+86
1489.56'
2178' (GLO)
El Paso Natural Gas Products Co.
Shop well
18.223
Water tank
LOT 9
"ALL BLDGS ARE FRAME STUCCO"
Garage
Bldg
Res.
R/W 7
R/W J
E-40'
Cor. Reset
STA. 1106+04.9
1424.0'
146.5
1914'
1/4 Corner Mkd. Rock
S. 68° 2
NEW MEXICO



NEW MEXICO STATE HIGHWAY COMMISSION

RIGHT OF WAY MAP


"Old" Railroad Well
17.123
"New" Railroad Well
17.114
N
8
17
18
"Gas" well #3
gasoline on top of water
17.114a
Moban Barnes
"East" "Bluewater" Well
17.113
Bluewater Well
17.113a
1830.35
Office
Trap well (Baca Chapel well?)
18.221
West Well
18.224
Gasoline on top of water
LOT 1
TRACT "A"
"Shop" Well
18.223
AREA TAKEN 7.191 ACRES
(2-2)
1110
1120
LOT 6
STA.1120+68.6
1489.56
EL Paso Natural Gas Products Co.
17.132
Water Tank
LOT 3
"ALL BLDGS ARE FRAME STUCCO"
R/W
1853.42
STA. 1106+049
R/W
280884
1/4 Corner Mkd. Rock
Cor. Reset

ECOLOGY AND ENVIRONMENT, INC.

REGION VI

MEMORANDUM

TO: Dave Peters, Chief
Hazardous Waste Section

PRELIMINARY REPORT
This does not constitute
final opinion of EPA.

FROM: David Anderson, FIT-Chemist

THRU: K. H. Malone, Jr.-RPM

DATE: February 7, 1984

SUBJ: Sampling at Abandoned Refinery, Prewitt, New Mexico (NM 1228)
TDD R-6-8305-27

Sampling at the abandoned refinery, Prewitt, N.M. was conducted by a five member FIT on August 31, 1983. Water samples were collected from nine residential and other private wells located around the site (see photos on sheets #1,2,3,11,13, and 14 and attached "Residential Well Sampling Information), one area of stained soil (sheet 8, photo #4), two of the three waste pits present (photos on sheets 4-7) and two samples from the separator and its discharge (sheet 9, photo #7 and photos on sheet 10). Other areas of soil contamination were noted on site (sheet 8, photo #5 and sheet 9, photo #6) as were areas on and near the ATSF right of way, across the highway from the site, (sheets 15 and 16). Sampling stations are indicated on the attached map as are the approximate locations of wells formerly used at the site for process water.

All of the wells sampled were probably completed in an aquifer 180-200 ft. in depth. A shallow aquifer is thought to be present at a depth of 40-50 ft. This is the approximate depth at which water was first encountered when the Sharp well was drilled, as recollected by Mr. Sharp. The site wells north of US 66 are thought to be at a depth of greater than 700 ft. This information was provided by Mr. Barnes, who formerly worked at the site. Groundwater flow is thought to be to the NE, influenced by mining that has been conducted in that direction. Based on this information, the KOA and Bacca wells (stations 08 and 09) are believed to be upgradient wells.

The Barnes well (station 01) was the only well sample in which organics were detected. Benzene was detected at 0.072 ppm in this sample. Benzene had also been detected at a concentration of 0.185 ppm in a sample from this well collected by the state in December, 1982. Eight other organics were also detected in the sample (See attached Organic Analysis Summary). These contaminants consisted of light hydrocarbons, C-5 to C-7. The only metal that appeared to be elevated in the well samples was the iron detected in the Barnes and Polk wells (stations 01 and 04). Conductivity and pH data for the well samples is included in Table 1.

The sample of contaminated soil (station 12) contained numerous pesticides and other organics. Pesticides found included aldrin (0.32 ppm), dieldrin (0.06 ppm), DDT (0.3 ppm), DDD (0.12 ppm), alpha-endosulfan (0.12 ppm), endrin (0.09 ppm), endrin aldehyde (0.42 ppm), heptachlor and heptachlor epoxide (0.08 ppm) and alpha, gamma and delta BHC (0.23 ppm). The other organics detected consisted of hydrocarbons and unknowns, possibly weathered hydrocarbons. The lab failed to quantify these tentatively identified compounds.

Results of the analyses of waste samples collected from stations 10,11,13 and 14 consisted primarily of higher molecular weight hydrocarbons, C-20 or greater. Concentrations of the hydrocarbons ranged from 132 to 4870 ppm in these samples. Polynuclear aromatics and pesticides were also detected in the samples. Only station 13 showed significant metals. Following is a summary of elevated levels of contamination detected in each sample.

Station 10 - Total hydrocarbons - 3,540 ppm
unknowns - 3,030 ppm
phenanthrene - 80 ppm
pyrene - 120 ppm

Station 11 - Total hydrocarbons - 3154 ppm
(soil)

Station 11 - Total hydrocarbons - 20,442 ppm
(liquid) phenanthrene - 180 ppm
endrin - 0.23 ppm
heptachlor epoxide - 0.15 ppm

Station 13 - Total hydrocarbons - 9,930 ppm
phenanthrene - 18 ppm
pyrene - 110 ppm
heptachlor epoxide - 0.38 ppm
benzo (b or k) fluoranthene - 52 ppm
chrysene - 36 ppm
chromium - 656 ppm
copper - 49 ppm
manganese - 705 ppm
zinc - 109 ppm
arsenic - 23.5 ppm
lead - 262 ppm

Station 14 - Total hydrocarbons - 21,770 ppm

Following is a proposed groundwater monitoring plan designed to determine the presence and extent of groundwater contamination which may have resulted from operations at the abandoned refinery. Based upon data obtained during a previous sampling mission a contaminant source is present and there are indications of possible groundwater contamination.

The site is an abandoned refinery located about 1/4 mile west of the Prewitt, New Mexico Post Office. The site is bounded by U.S. Route 66 and Interstate 40 (see attached site location map). The refinery has been inactive for 15-20 years. Wastes at the refinery were placed into pits and an API separator drained directly into the ground. It was reported that a drinking water well at the refinery had to be abandoned due to gasoline contamination. Analytical results from a prior sampling inspection indicated the presence of benzene and light hydrocarbons in a domestic drinking water well northeast of the site. Numerous pesticides and organics were detected in samples collected from around the site.

General Geologic Information

Based upon available reports and data collected during the previous inspections, the surface deposits at the site are alluvial sands and gravels. These alluvial deposits are generally thin, 5-10 feet thick. Underlying the surface deposits is the Upper Trecissic Windgate Sandstone member of the Glen Canyon Group. At this location the Windgate, which consist of predominantly red and tan medium grain sandstone, is about 75 feet thick. Beneath the Windgate is the Chinle Formation which consists predominantly of red shale and interbedded sandstone.

Three aquifer zones have been identified beneath the site. The first occurs at a depth of about 50-75 feet. It was in this zone that the on-site gasoline contaminated well was thought to be completed. The second aquifer zone occurs at a depth of about 175-200 feet. It is in this zone that the domestic wells immediately northeast of the site are completed. The sample from the domestic well closest to the site and completed in this zone, had a benzene concentration of 0.072 ppm and a total concentration of eight other light hydrocarbon compounds of 0.321 ppm. A third aquifer has been reported at a depth of about 700 feet.

Groundwater flow beneath the site appears to follow the surface water patterns to the northeast. Thus the domestic wells are downgradient from the site. This general information will be verified by the drilling program if initiated.

Monitor Well Program

In order to assess the presence and extent of contamination which may be emanating from the site, it is recommended that monitor wells be installed to depths such that the quality of both the first and second aquifers can be monitored. Based upon the available data the first aquifer at the site was contaminated at least with gasoline; and based upon the analytical results contamination of the second aquifer may or may not exist. The fact that only one of the domestic wells indicated contamination could be an indicator of its presence at the edge of a contaminant plume, or it could indicate leakage within that single well along or through the well casing. Only by installing wells of known construction quality can water quality of the second aquifer zone be evaluated and necessary corrective action defined.

A site sketch is attached and indicates the approximate locations of proposed monitor well installation.

Locations were selected to provide data on the first and second aquifers upgradient from the site (location 1), immediately beneath the site (locations 2,3) and downgradient of the waste disposal areas (locations 4,5,6).

It is recommended that monitor wells be constructed and completed in both the first (50-75 feet) aquifer and second (175-200 feet) aquifer zones. At each of the six locations a well should be drilled so that screens can be set in the first aquifer zone. At locations 1,2,5 and 6, a second well should be constructed so as to be completed in the second aquifer zone. These deeper wells should utilize a double casing system with a surface casing being set through the first aquifer to assure that no cross connection exists via the well between the aquifer zones. The monitoring of both aquifers will permit an evaluation of the hydrologic interconnection between the two zones. The shallower wells would be designated 1,2,3,...etc. with the deeper wells designated as 1A, 2A,...etc.

It is anticipated that a depth of 75 feet will be required for the shallower wells and a depth of 200 feet necessary for the deeper wells. Table 2 provides the anticipated well completion depths, screen intervals, and outer casing depth of the deeper wells. Also attached is a projected cost estimate for installation of the monitor wells.

TABLE 1

Station No.	Location	Conductivity (ppm)	pH
01	Barnes residence	450	7.05
02	Polk residence	440	6.9
03	LaMance residence	425	6.95
04	Wilcox residence	395	6.9
05	Sharp residence	630	6.85
06	Small residence	450	7.2
07	Smith Trading Post	550	6.9
08	KOA Campground	350	6.95
09	Bacca Council	450	6.75

TABLE 2

Well No.	Anticipated Depth (ft)	Anticipated Screen Interval (ft)	Anticipated Outer Casing depth (ft)
1	75	60-75	
1A	200	180-200	100
2	75	60-75	
2A	200	180-200	100
3	75	60-75	
4	75	60-75	
5	75	60-75	
5A	200	180-200	100
6	75	60-75	
6A	200	180-200	100

Well materials will be 4 inch schedule 80 PVC with the outer casing of the deeper wells being 10 inch Schedule 80 PVC.

Precise depths and screen intervals would be determined in the field based upon samples collected during drilling.

Monitor Well Projected Cost Estimate
Abandoned Refinery
Prewitt, New Mexico

Mobilization/Demobilization		$2,000.00
Drilling/Sampling		$27,500.00
Monitor Well Installation Material & Labor		$23,000.00
Waste Disposal Incl: Decon time Waste pickup Ultimate Disposal		$5,000.00
	Total	$57,500.00

This is only an estimate of drilling and installation costs based upon similar types of drilling projects. Bids have been known to vary dramatically from projected estimates. Above total does not include services for sample analysis.

RESIDENTIAL WELL SAMPLING INFORMATION

1. Name, address and phone number of resident (include county and zip code)

   Ron Smith - Smith's Trading Post
   Box 290
   Prewitt, NM 87045 McKinley
   (505) 876-2792

2. Date well was dug Unknown

3. Depth of well Unknown

4. Depth to static water Unknown

5. Is the well cased? Yes_____ No_____ Unknown

   If so, to what depth? _____

   What type of casing is used? Unknown

6. Is well screened? Yes_____ No_____ Unknown

7. How much is the well pumped? (Only for residential use or for use in watering livestock?) Restaurant and residence.

8. Any other pertinent information? _____

RESIDENTIAL WELL SAMPLING INFORMATION

1. Name, address and phone number of resident (include county and zip code)

   Charles T. LaMance
   Box 52
   Prewitt, NM 87045 McKinley
   (505) 876-2773

2. Date well was dug 1961, deepened in 1964.

3. Depth of well 180 ft.

4. Depth to static water Unknown

5. Is the well cased? Yes X No

   If so, to what depth? Bottom

   What type of casing is used? Steel

6. Is well screened? Yes X No

7. How much is the well pumped? (Only for residential use or for use in watering livestock?) Residential

8. Any other pertinent information? 18 gpm yield

RESIDENTIAL WELL SAMPLING INFORMATION

1. Name, address and phone number of resident (include county and zip code)

KOA Kampground Richard Hallock, Mgr.
P.O. Box 10
Prewitt, NM 87045 McKinley
(505) 876-2662

2. Date well was dug ≈1968

3. Depth of well ≈200 ft.

4. Depth to static water Unknown

5. Is the well cased? Yes X No

If so, to what depth? Unknown

What type of casing is used? Steel

6. Is well screened? Yes X No

7. How much is the well pumped? (Only for residential use or for use in watering livestock?)

Daily, 5-600 gallons

8. Any other pertinent information?

RESIDENTIAL WELL SAMPLING INFORMATION

1. Name, address and phone number of resident (include county and zip code)

   Bacca Council

   Prewitt, NM 87045 McKinley

2. Date well was dug Unknown

3. Depth of well Unknown

4. Depth to static water Unknown

5. Is the well cased? Yes_____ No_____ Unknown

   If so, to what depth? _____

   What type of casing is used? Unknown

6. Is well screened? Yes_____ No_____ Unknown

7. How much is the well pumped? (Only for residential use or for use in watering livestock?) Community usage of well for residents.

8. Any other pertinent information? _____

RESIDENTIAL WELL SAMPLING INFORMATION

1. Name, address and phone number of resident (include county and zip code)

   Robert E. Small

   Box 472

   Prewitt, NM 87045 McKinley

   (505) 876-2702

2. Date well was dug 1950

3. Depth of well 190 ft.

4. Depth to static water _____

5. Is the well cased? Yes y No _____

   If so, to what depth? Bottom

   What type of casing is used? PVC

6. Is well screened? Yes _____ No _____ Unknown

7. How much is the well pumped? (Only for residential use or for use in watering livestock?) Residential and agriculture

8. Any other pertinent information? _____

RESIDENTIAL WELL SAMPLING INFORMATION

1. Name, address and phone number of resident (include county and zip code)

   Wilford O. Wilcox
   Box 43
   Prewitt, NM 87045 McKinley

2. Date well was dug 1961

3. Depth of well 196 ft.

4. Depth to static water 64 ft. when dry

5. Is the well cased? Yes X No

   If so, to what depth? To bottom

   What type of casing is used? PVC

6. Is well screened? Yes X No gravel

7. How much is the well pumped? (Only for residential use or for use in watering livestock?) Residential

8. Any other pertinent information? 20 gpm yield

RESIDENTIAL WELL SAMPLING INFORMATION

1. Name, address and phone number of resident (include county and zip code)

   Marvin Barnes

   Box 24

   Prewitt, NM 87045 McKinley

2. Date well was dug 1963

3. Depth of well 187 drilled ≈170 current

4. Depth to static water Unknown

5. Is the well cased? Yes X No

   If so, to what depth? To bottom

   What type of casing is used? 7 inch steel

6. Is well screened? Yes No X

7. How much is the well pumped? (Only for residential use or for use in watering livestock?) Not currently in use, formerly residential.

8. Any other pertinent information? Previous sample December 1982. 185 ppb benzene

TABLE I. INORGANIC ANALYSIS SUMMARY

CASE NUMBER: 2009

SITE NAME/CODE: Abandoned Refinery

NM 1228

CONCENTRATIONS (ppm) High Concentration

	PARAMETER	EPA Sample Numbers										Ambient Background 1.	
		F 5094	F 5095	F 5096	F 5099	F 5097	F 5098	F 5100				Western U.S. 2.	Eastern U.S. 2.
Task 1	Matrix Type	Soil	Soil	liq	liq	soil	liq	liq				Soil	Soil
	Aluminum	20,626	20,205	745	170	22,148	199	166				54,000	33,000
	Chromium	16	15	7.7		656	12					38	36
	Barium	198	187			211						560	500
	Beryllium		2									0.6	0.6
	Cobalt											8	7
	Copper					49						21	14
	Iron	7325	7195	3.5		10,657	219					20,000	15,000
	Nickel	20	17	27		16.2						16	13
	Manganese	132	154	21		705						390	290
	Zinc	28	27	11		109	8.6					51	36
	Boron	58	55	44		50						22	32
	Vanadium											66	46
	Silver	6.4										-	-
Task 2	Arsenic					23.5						6.1	5.4
	Antimony											150	-
	Selenium											0.25	0.39
	Thallium											-	-
	Mercury											0.055	0.096
	Tin											10	10
	Cadmium											1	1
Task 3	Lead	18	13	3.2	5.3	262	45					18	14
	Ammonia											-	-
	Cyanide											-	-
	Sulfide											-	-
	Station No.	10	11	11	11	13	14	14					
	Sample Station Location	West Waste pit	East Waste pit solids	East Waste pit-liquid	East Waste pit aqueous	Discharge from SEPARATOR	Oil from separator	Aqueous phase from separator					

1. Ambient background concentrations apply only to soil matrix samples. Values obtained from "Geochemistry of Some Rocks, Soils, Plant and Vegetables in the Contermious United States" Geological Survey Professional Paper

2. Reference for East/West Division is the 97° W longitudinal line which bisects Region VI.

C - Concentration corrected for lab blank concentration

TABLE I. INORGANIC ANALYSIS SUMMARY

CASE NUMBER: 2009 SAS 6035

SITE NAME/CODE: Abandoned Refinery

NM 1228

CONCENTRATIONS (ppm)

	PARAMETER	EPA Sample Numbers										Ambient Background 1.	
		MF 0135	MF 136	MF 137	MF 138	MF 139	MF 140	MF 141	MF 142	MF 143	MF 144	Western U.S. 2.	Eastern U.S. 2.
	Matrix Type	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Soil	Soil
Task 1	Aluminum	0.288	0.208		0.2		0.208	0.204	0.23	0.21		54,000	33,000
	Chromium											38	36
	Barium											560	500
	Beryllium											0.6	0.6
	Cobalt											8	7
	Copper											21	14
	Iron	3.53	0.972	0.246	2.24	0.054	0.754	0.242	0.129	0.078		20,000	15,000
	Nickel											16	13
	Manganese	0.124	0.107	0.086	0.118	0.112	0.072	0.018	0.032			390	290
	Zinc	0.189	0.43	0.178	0.484	0.171	0.136	0.162	0.172	0.22		51	36
	Boron	0.22	0.184	0.209	0.176	0.212	0.199	0.187	0.184	0.202		22	32
	Vanadium											66	46
	Silver											-	-
Task 2	Arsenic											6.1	5.4
	Antimony											150	-
	Selenium	0.028	0.0059	0.026	0.014	0.012	0.012	0.0095	0.0047	0.0054		0.25	0.39
	Thallium											-	-
	Mercury											0.055	0.096
	Tin					0.034						10	10
	Cadmium					0.0014			0.0011			1	1
Task 3	Lead					0.0069						18	14
	Ammonia	0.1										-	-
	Cyanide											-	-
	Sulfide											-	-
	Station No.	01	02	03	04	05	06	07	08	09	-		
	Sample Station Location	Barnes Well	Lamance Well	Wilcox Well	Polk Well	Sharp Well	SMALL Well	Smith trading Post Well	KOA Well	Bacca Well	Field Blank		

1. Ambient background concentrations apply only to soil matrix samples. Values obtained from "Geochemistry of Some Rocks, Soils, Plant and Vegetables in the Conterminous United States" Geological Survey Professional Paper

2. Reference for East/West Division is the 97° W longitudinal line which bisects Region VI.

C - Concentration corrected for lab blank concentration

TABLE I. INORGANIC ANALYSIS SUMMARY

CASE NUMBER: 2009

SITE NAME/CODE: Abandoned Refinery

NM 1228

CONCENTRATIONS (ppm)

	PARAMETER	EPA Sample Numbers										Ambient Background 1.	
		MF 145	MF 146									Western U.S. 2.	Eastern U.S. 2.
Task 1	Matrix Type	Soil	Soil									Soil	Soil
	Aluminum	20,200										54,000	33,000
	Chromium	9.9										38	36
	Barium	169										560	500
	Beryllium	0.64										0.6	0.6
	Cobalt	4.7										8	7
	Copper	2.5										21	14
	Iron	9260										20,000	15,000
	Nickel	7.2										16	13
	Manganese	217										390	290
	Zinc	24										51	36
	Boron											22	32
	Vanadium	16										66	46
	Silver	1										-	-
Task 2	Arsenic	14										6.1	5.4
	Antimony											150	-
	Selenium											0.25	0.39
	Thallium											-	-
	Mercury											0.055	0.096
	Tin	58										10	10
	Cadmium											1	1
Task 3	Lead	41										18	14
	Ammonia											-	-
	Cyanide											-	-
	Sulfide											-	-
	Station No.	12	-										
	Sample Station Location	NW of W pit, SW of E pit	Field Blank										

1. Ambient background concentrations apply only to soil matrix samples. Values obtained from "Geochemistry of Some Rocks, Soils, Plant and Vegetables in the Conterminous United States" Geological Survey Professional Paper

2. Reference for East/West Division is the 97° W longitudinal line which bisects Region VI.

C - Concentration corrected for lab blank concentration

TABLE II. ORGANIC ANALYSIS SUMMARY

CASE NUMBER: 2009

SITE NAME/CODE: Abandoned Refinery NM 1228

PARAMETERS					CONCENTRATIONS (ppm) EPA SAMPLE NUMBERS							
Compound	Fraction	[1] P.P.	[2] S.H.S.	[3] T.I.	F 2353	F 2354	F 2355	F 2356	F 2357	F 2358	F 2359	F 2360
Benzene	VOA	X			0.072							
ethyl benzene	VOA	X			0.0036							
methylene chloride	VOA	X			0.035	<0.005						
hexamethyl cyclotrisiloxane	VOA			X	0.179	0.2	0.2	0.2	0.2	0.14	0.14	16
unknown	VOA			X	0.005							
2-methyl butane	VOA			X	0.043							
cyclo hexane	VOA			X	0.029							
methyl cyclo pentane	VOA			X	0.021							
methyl cyclo hexane	VOA			X	0.009							
unknown	ABN			X	Present	Present	Present	Present	Present	Present	Present	Present
unknown phthalate	ABN			X		NQ			NQ			
unknown	ABN			X		Present						
Matrix Type					Water	Water	Water	Water	Water	Water	Water	Wate
Sample Station Number					01	02	03	04	05	06	07	08
Sample Station Location					Barnes Well	Lamance Well	Wilcox Well	Polk Well	Sharp Well	Small Well	Smith Trading Post Well	KOA Well

1. Priority Pollutant.
2. Specified Hazardous Substance.
3. Tentatively Identified.

NQ - Not Quantified by lab
Present - peak present but not reported.

TABLE II. ORGANIC ANALYSIS SUMMARY

CASE NUMBER: _____

SITE NAME/CODE: _____

PARAMETERS					CONCENTRATIONS (ppm) EPA SAMPLE NUMBERS							
Compound	Fraction	1 P.P.	2 S.H.S.	3 T.I.	F 2361	F 2362	F 2363	F 2364	Lab Blanks			
methylene chloride	VOA	X			<0.005	<0.005		0.0038				
hexa methyl cyclotrisiloxane	VOA			X	0.16	0.233	0.2	0.25	0.164			
unknown	ABN				Present	Present	Present	Present	Present			
aldrin	Pest	X					0.32					
dieldrin	Pest	X					0.06					
4,4'-DDT	Pest	X					0.30					
4,4'-DDD	Pest	X					0.12					
alpha-endosulfan	Pest	X					0.12					
endrin	Pest	X					0.09					
endrin aldehyde	Pest	X					0.42					
heptachlor	Pest	X					0.02					
heptachlor epoxide	Pest	X					0.06					
alpha-BHC	Pest	X					0.04					
gamma- BHC	Pest	X					0.16					
delta - BHC	Pest	X					0.03					
unknown	VOA			X			NQ					
unknown	ABN			X			NQ					
unknown	ABN			X			NQ					
hydrocarbon	ABN			X			NQ					
unknown	ABN			X			NQ					
hydrocarbon	ABN			X			NQ					
unknown	ABN			X			NQ					
UNKNOWN	ABN			X			NQ					
unknown	ABN			X			NQ					
unknown hydrocarbon	ABN			X			NQ					
unknown, possible PNA	ABN			X			NQ					
Matrix Type					Water	Water	Soil	Soil				
Sample Station Number					09	Blank	12	Blank				
Sample Station Location					Bacca Well	Field Blank	NW of W pit SW of E Pit	Field Blank				

Priority Pollutant.
Specified Hazardous Substance.
Tentatively Identified.

TABLE II. ORGANIC ANALYSIS SUMMARY

CASE NUMBER: _____

SITE NAME/CODE: _____

PARAMETERS					CONCENTRATIONS (ppm) EPA SAMPLE NUMBERS							
Compound	Fraction	1 P.P.	2 S.H.S.	3 T.I.	F 2361	F 2362	F 2363	F 2364	Lab Blanks			
Unknown	ABN			X			NQ					
Unknown	ABN			X			NQ					
Unknown	ABN			X			NQ					
Unknown	ABN			X			NQ					
Unknown	ABN			X			NQ					
Unknown, possible PNA	ABN			X			NQ					
Unknown	ABN			X			NQ					
Unknown	ABN			X			NQ					
Unknown	ABN			X			NQ					
Sample F2363 contains numerous other peaks that no identification was attempted on												
bis(2-ethyl hexyl) phthalate	ABN	X						0.075	0.64			
di-n-butyl phthalate	ABN	X						0.020	0.15			
unknown	VOA			X				NQ				
Matrix Type												
Sample Station Number												
Sample Station Location												

1. Priority Pollutant.
2. Specified Hazardous Substance.
3. Tentatively Identified.

NQ- not quantified by lab.

TABLE II. ORGANIC ANALYSIS SUMMARY

CASE NUMBER: 2009

SITE NAME/CODE: Abandoned Refinery

NM 1228

High Concentration

CONCENTRATIONS (ppm)

PARAMETERS			EPA SAMPLE NUMBERS									
Compound	Fraction	Class	F 5094	F 5095	F 5096	F 5099	F 5097	F 5098	F 5100			
Phenanthrene	ABN	1	80		180		18					
Pyrene	ABN	1	120				110					
Hydrocarbon	ABN	3	380	P	3170		715	1620				
Hydrocarbon	ABN	3	368	263	3140		811	1530				
Hydrocarbon	ABN	3	409	490	3050		850	1050				
Hydrocarbon	ABN	3	355	452	2570		797	P				
Hydrocarbon	ABN	3	310	460	2510		819	P				
Hydrocarbon	ABN	3	315	389	1820		828	P				
Hydrocarbon	ABN	3	271	308	1460		715					
Hydrocarbon	ABN	3	132	P	P		459					
Unknown	ABN	3	1930	P	P	P	P	P	P			
Unknown	ABN	3	2090	P	P	P	P	P	P			
Unknown	ABN	3	10									
Hydrocarbon	ABN	3	P	308	P	217	P	P				
Hydrocarbon	ABN	3	P	P	P		300	1640				
Hydrocarbon	ABN	3	P	2540	2700		326	1350				
Endrin	Pest	1			0.230							
Heptachloro epoxide	Pest	1			0.150		0.380					
Benzo(bork) Fluoranthene	ABN	1					52					
Chrysene	ABN	1					36					
Hydrocarbon	ABN	3					262	1000				
Hydrocarbon	ABN	3	P	P	P		531	3880				
Hydrocarbon	ABN	3					572	1850				
Hydrocarbon	ABN	3	P	P	P		385	1480				
Hydrocarbon	ABN	3	P	P	P		312	P				
Hydrocarbon	ABN	3	P	230	P		554					
Matrix Type			Soil	Soil	lig	lig	Soil	lig	lig			
Sample Station Number			10	11	11	11	13	14	14			
Sample Station Location			West waste pit	East waste pit	East waste pit	East waste pit	Separator discharge	Separator oil	Separator aqueous			

1. Priority Pollutant.
2. Specified Hazardous Substance.
3. Tentatively Identified.

NDB - Concentration less than determined in lab blank
C - Concentration corrected for lab blank concentration
KaLT ( ) - Present in sample below quantification limit (quantification limit)
P - Present in sample (tentatively identified compounds)

TABLE II. ORGANIC ANALYSIS SUMMARY

CASE NUMBER: 2009

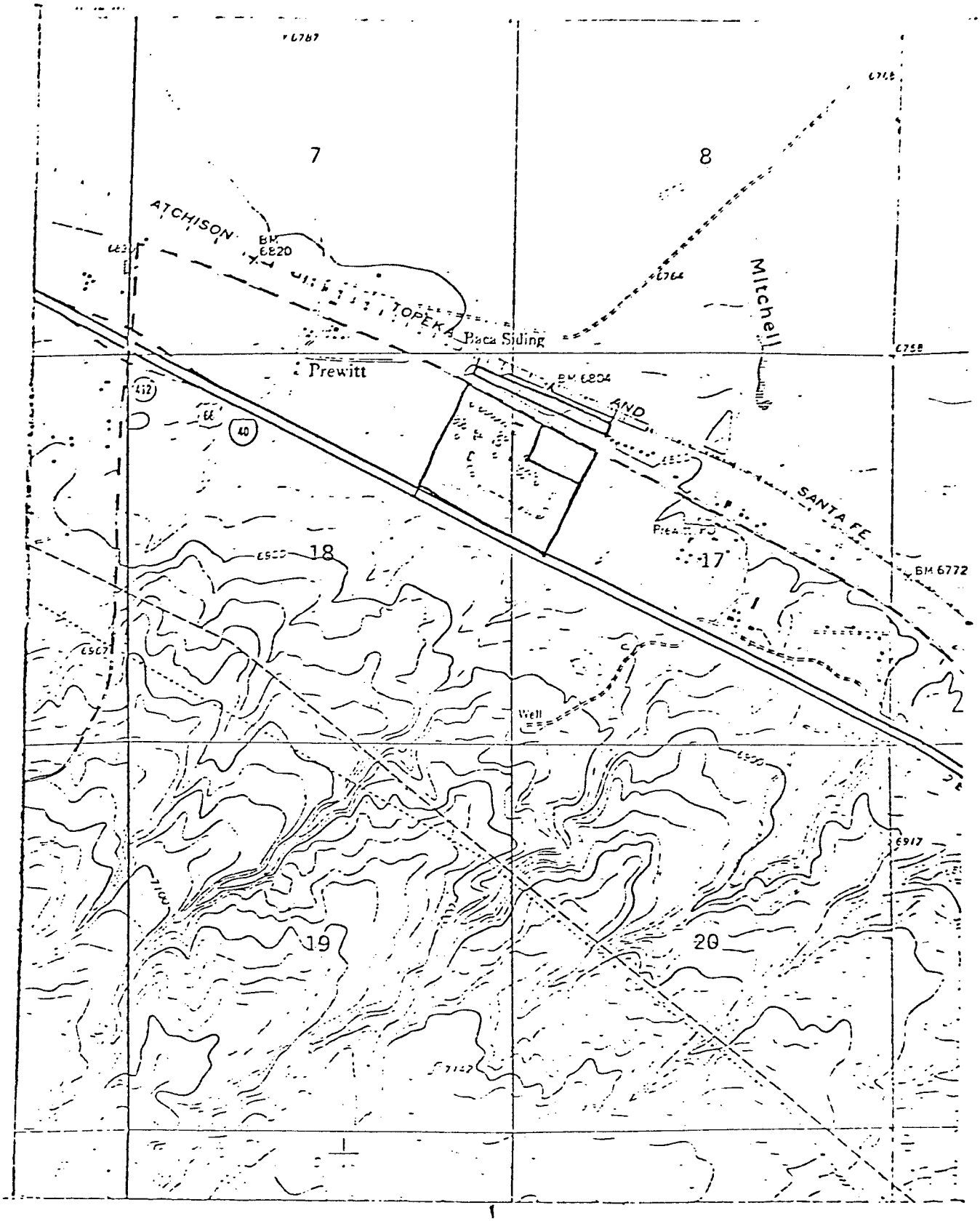
SITE NAME/CODE: Abandoned Refinery

NM 1228

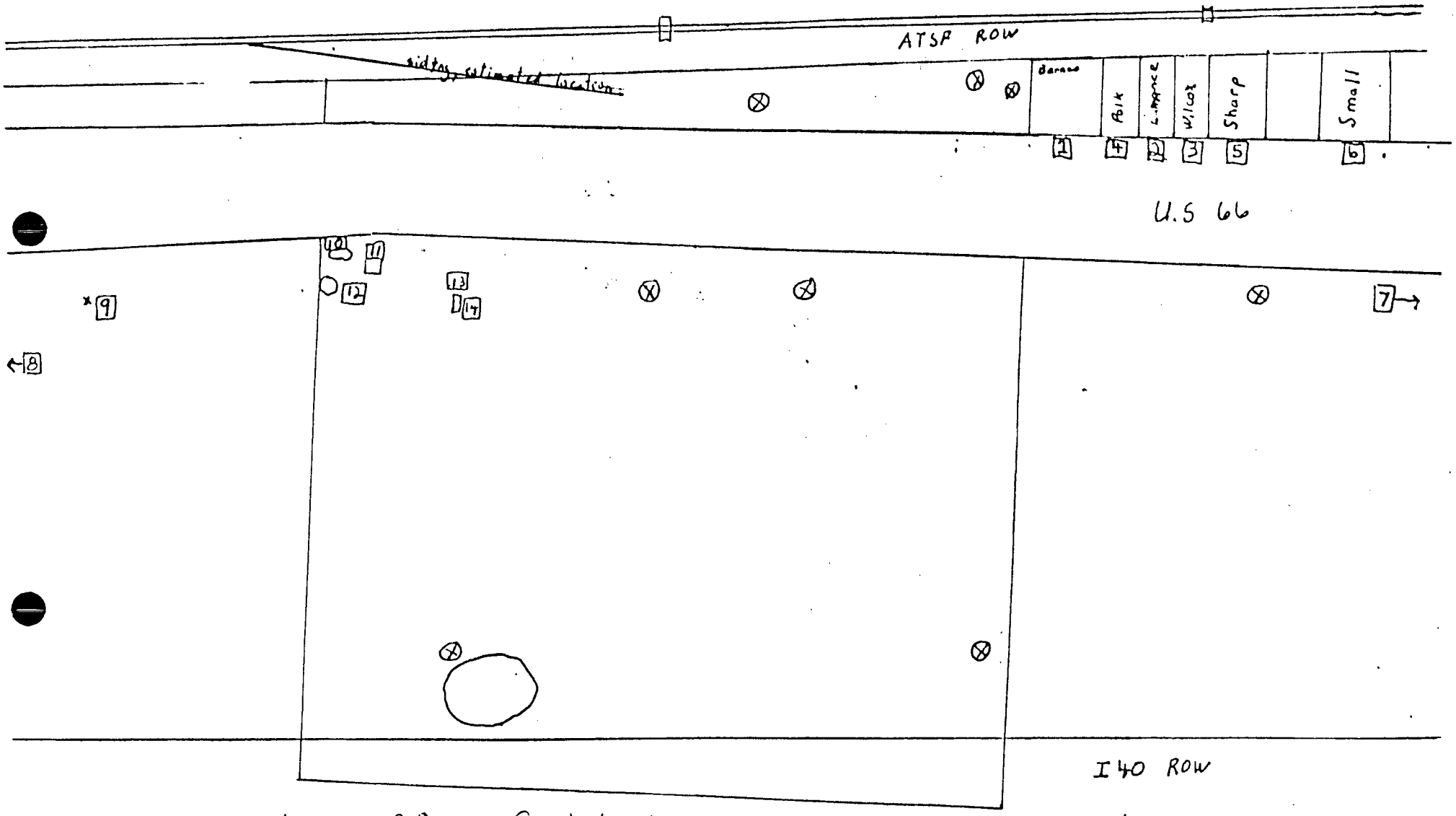
PARAMETERS			CONCENTRATIONS (ppb) EPA SAMPLE NUMBERS									
Compound	Fraction	Class	F 5094	F 5095	F 5096	F 5099	F 5097	F 5098	F 5100			
Hydrocarbon	ABN	3	P	P	P		403,000					
Hydrocarbon	ABN	3	P	P	P		291,000					
Unknown	ABN	3	P	P	P		P					
Hydrocarbon	ABN	3						1500,000				
Hydrocarbon	ABN	3						4870,000				
Unknown	ABN	3				P			P			
Matrix Type												
Sample Station Number												
Sample Station Location												

1. Priority Pollutant.
2. Specified Hazardous Substance.
3. Tentatively Identified.

NDB - Concentration less than determined in lab blank
C - Concentration corrected for lab blank concentration
KaLT ( ) - Present in sample below quantification limit (quantification limit)
P - Present in sample (tentatively identified compounds)

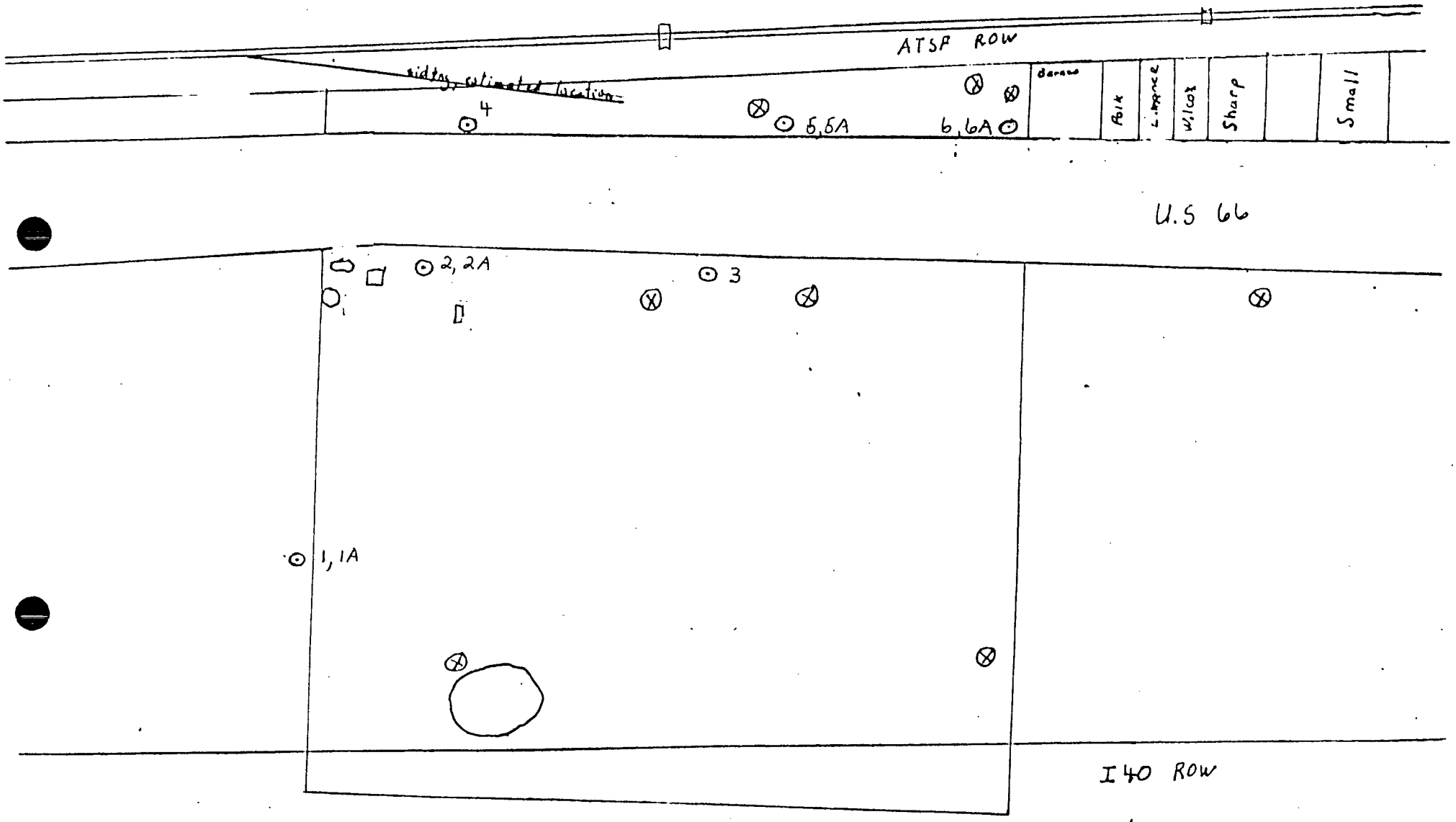


Abandoned Refinery
Prewitt Tar Pits
Prewitt, New Mexico



Abandoned Refinery : Sample Locations
NM 1228
Prewitt, NM
□ Sample Sta
⊗ Site Wall Locations

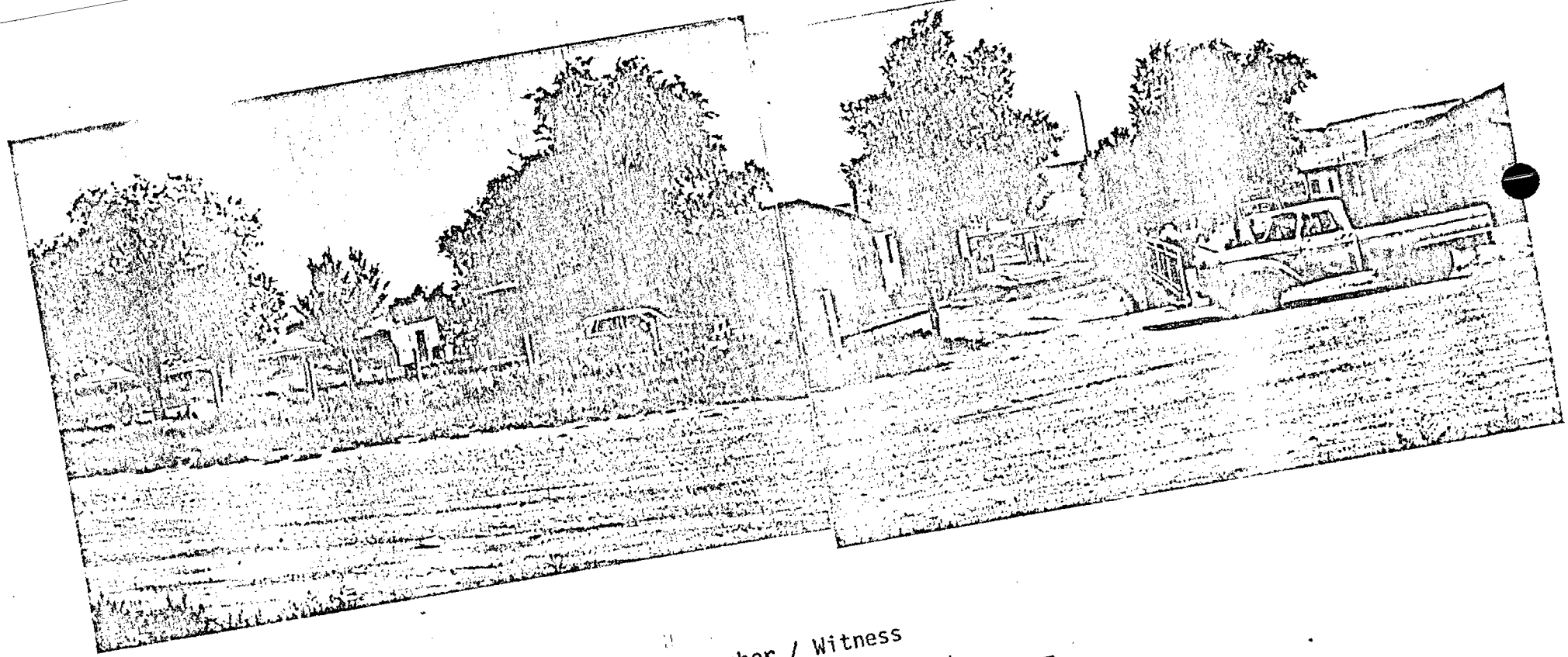
N



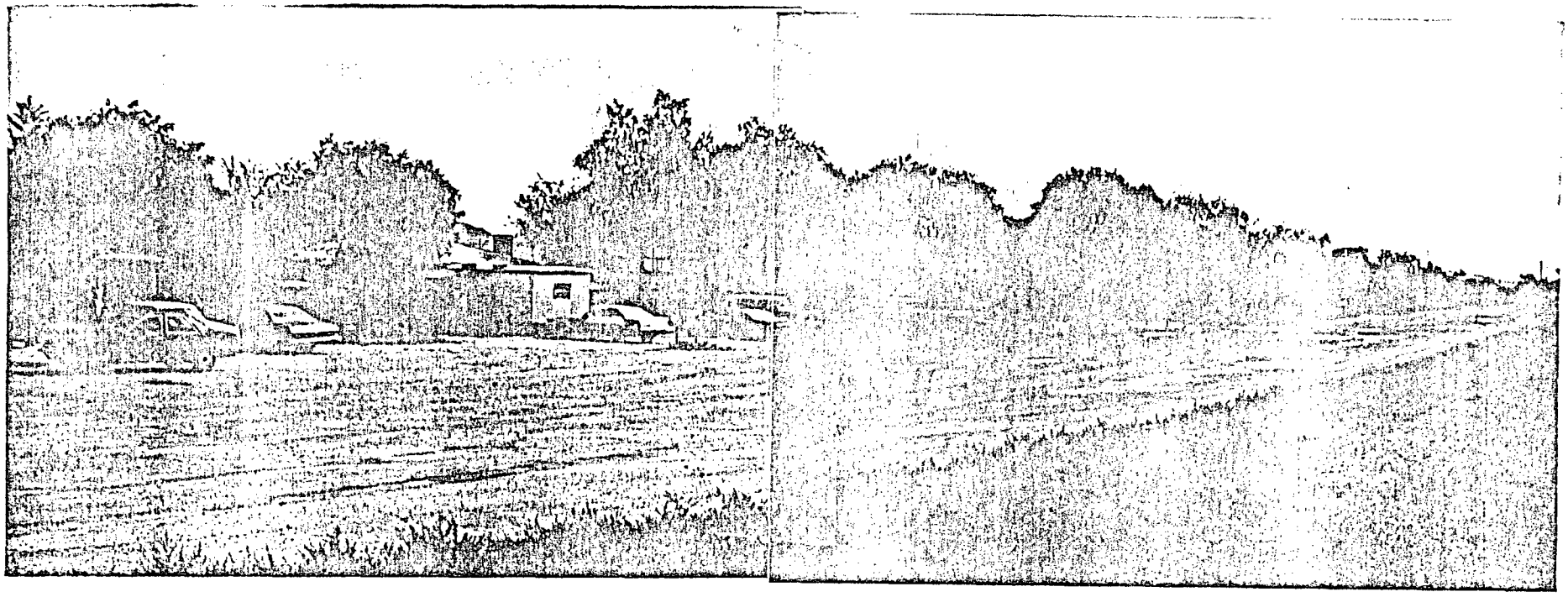
Abandoned Refinery : Proposed Monitor Well Locations ⊙
NM 1228
Prewitt, NM

⊗ Site Well Locations

N



Photographer / Witness
David Anderson / Deborah Vaughn
Date / Time / Direction
8-31-83 / 1002 / N
Comments:
film Roll #1, photo 6, 7
Backs of Polk residences
NE of site



Photographer / Witness

David Anderson / Deborah Vaughn

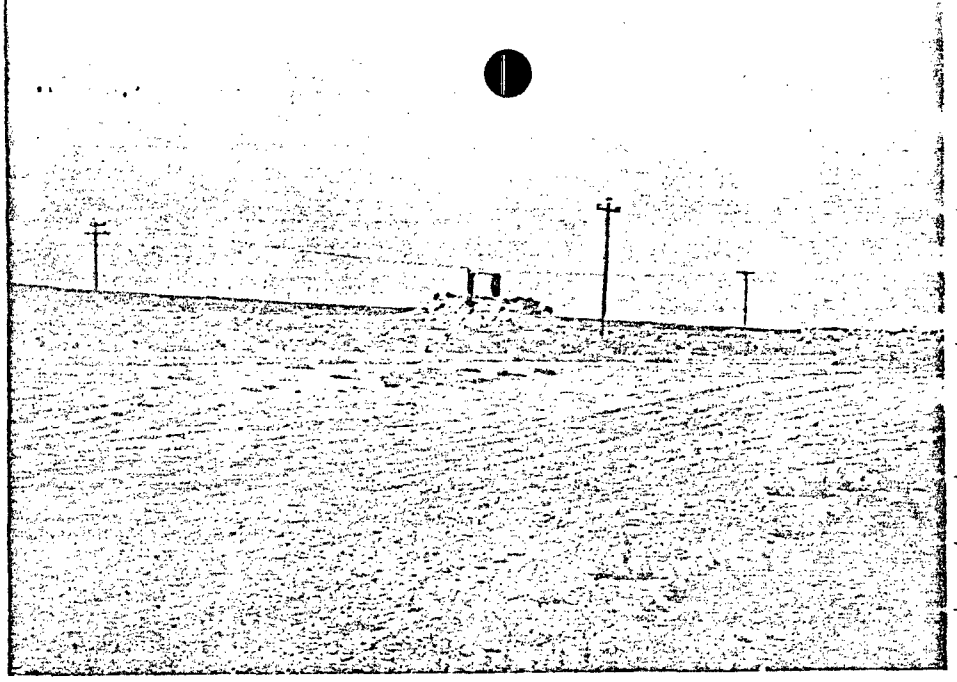
Date / Time / Direction

8-31-83 / 1002 / N/E

Comments:

Film roll #1, photo 8, 9

- continuation of sheet #1, Lamance, Wilcox & Sharp residence



Photographer / Witness

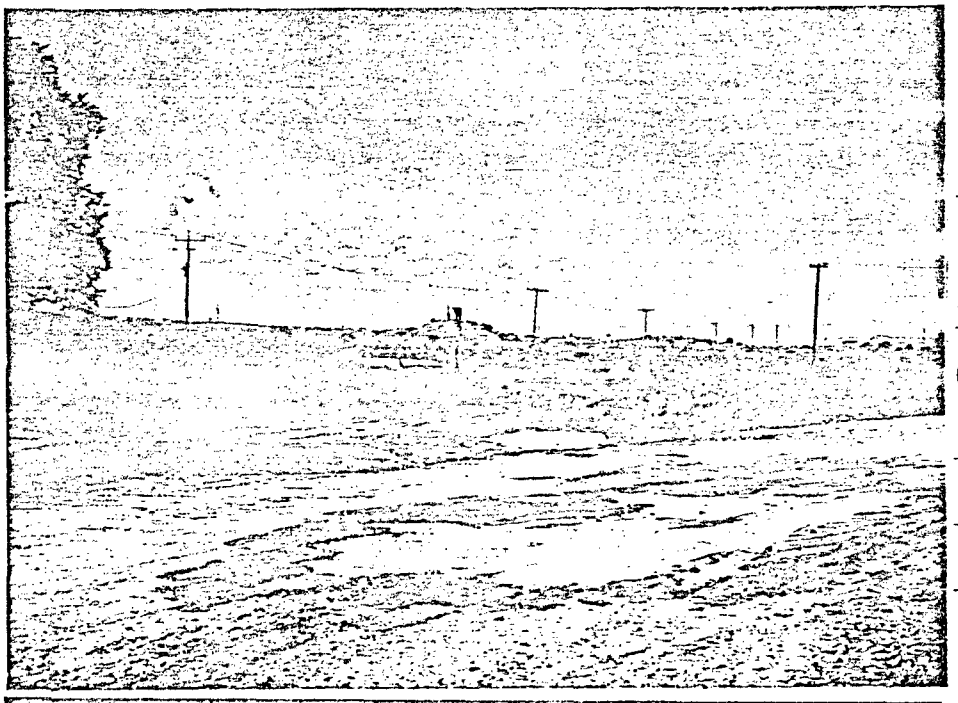
David Anderson / Deborah Vaughn

Date / Time / Direction

8-31-83 / 0858 / SW

Comments: photo # 2 roll 1

site from Barnes Residence



Photographer / Witness

David Anderson / Deborah Vaughn

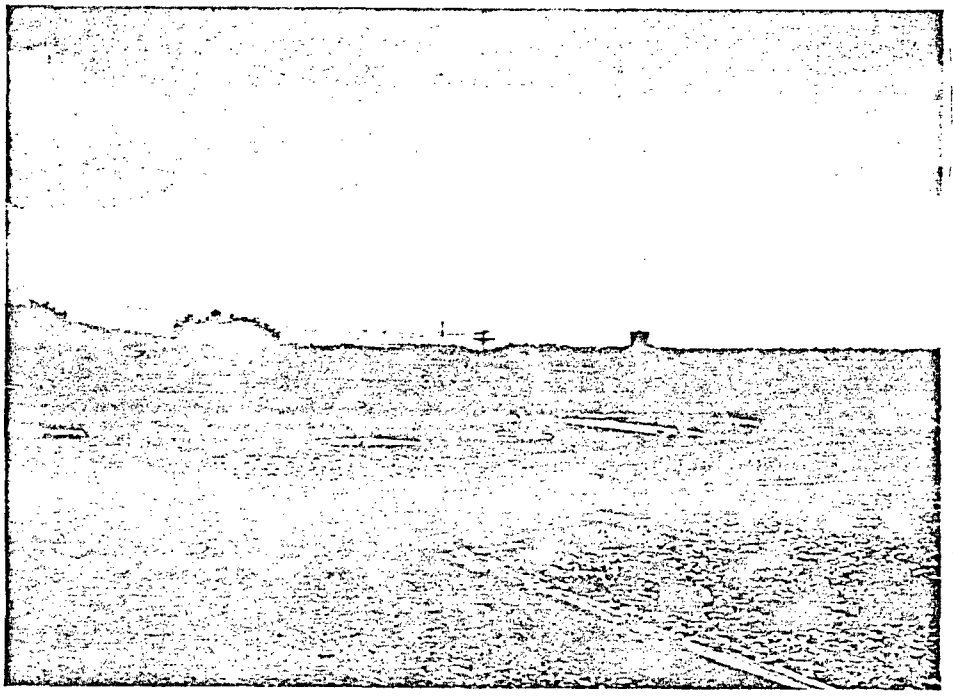
Date / Time / Direction

8-31-83 / 1138 / WSW

Comments: photo # 15 roll 1

site from Smith Trading

Post



Photographer / Witness

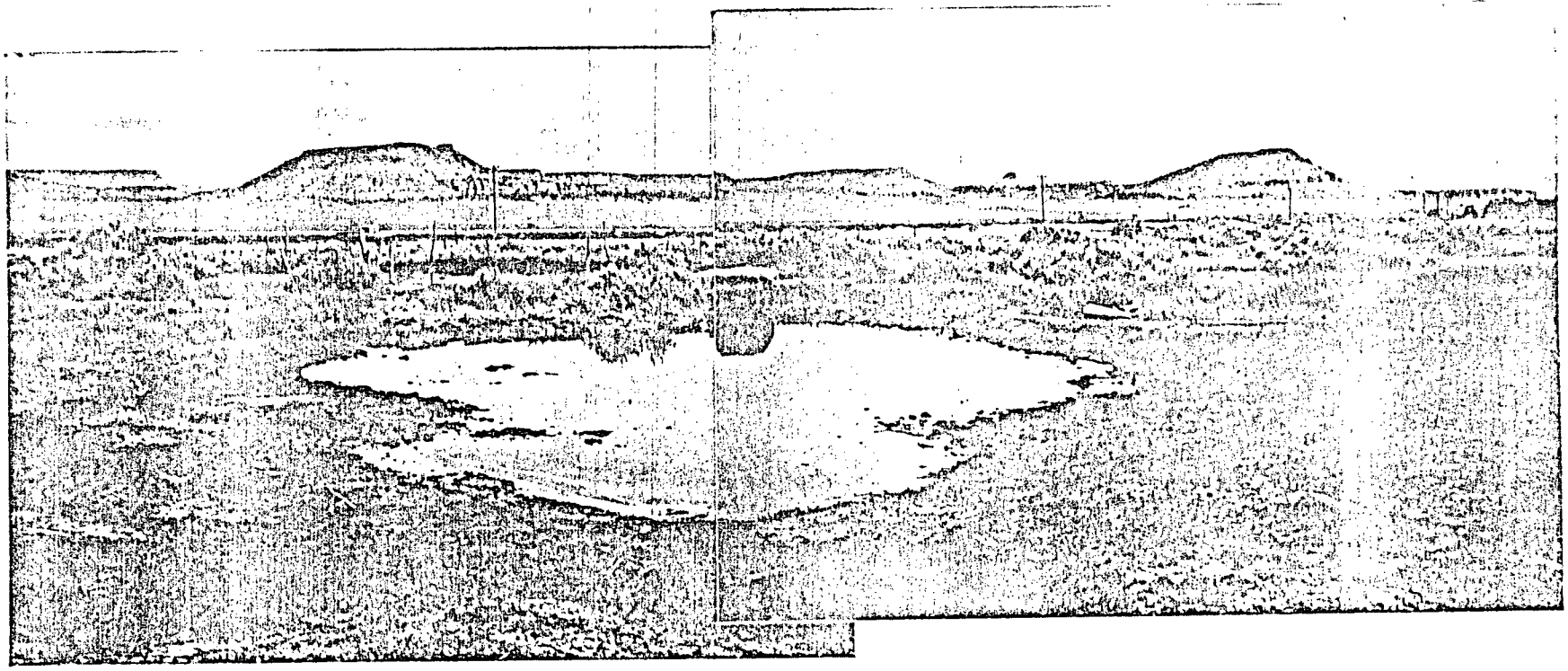
David Anderson / Deborah Vaughn

Date / Time / Direction

8-31-83 / 1210 / ESE

Comments: photo 16 roll 1

site from KOA Campground



Photographer / Witness

Deborah Vaught / David Anderson

Date / Time / Direction

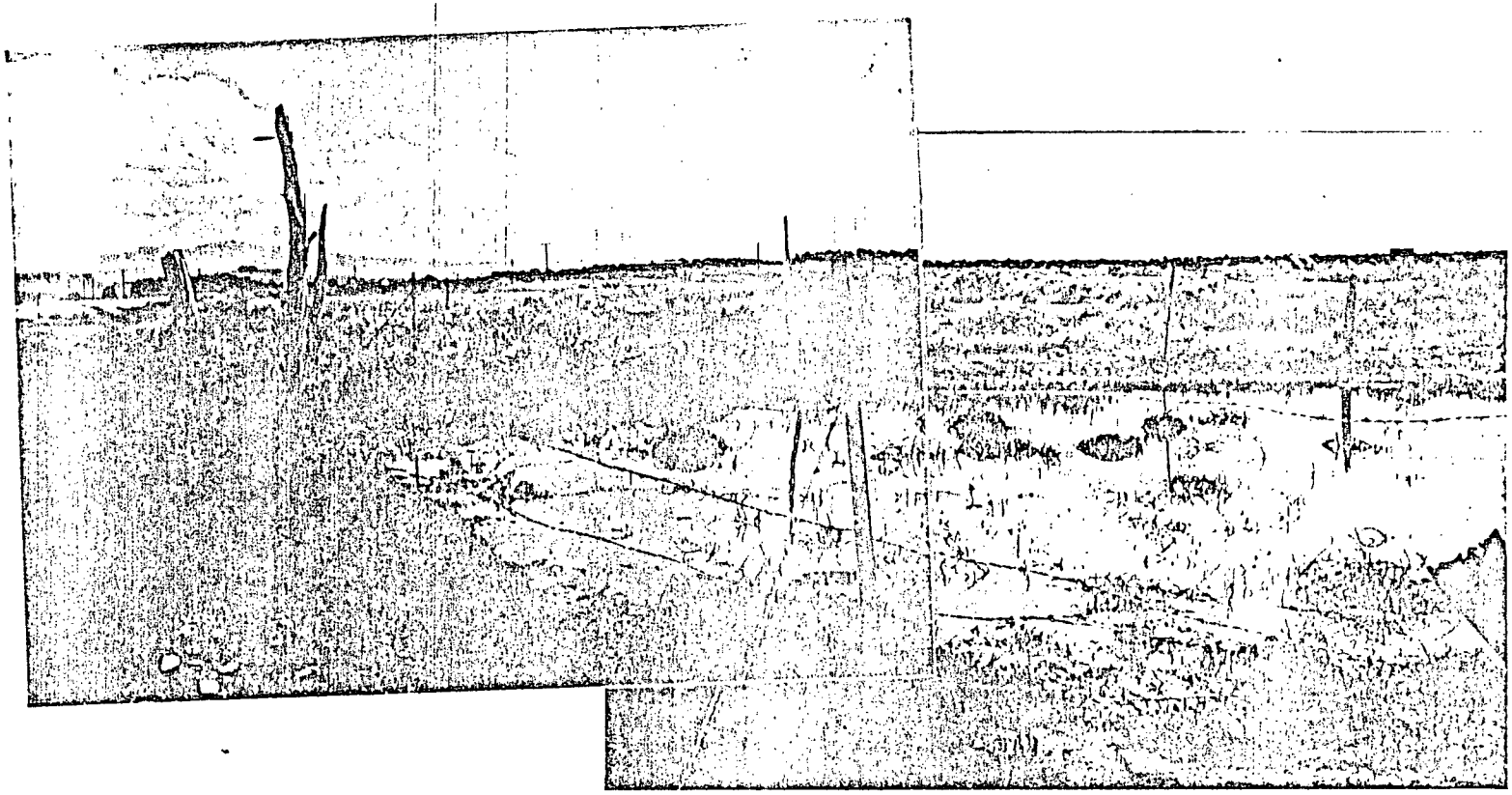
8-31-83 / 1329 / 000 NE

Comments:

photo # 17-18, roll 1

West wastepit

sample station 10



Photographer / Witness

Deborah Vaughn / David Anderson

Date / Time / Direction

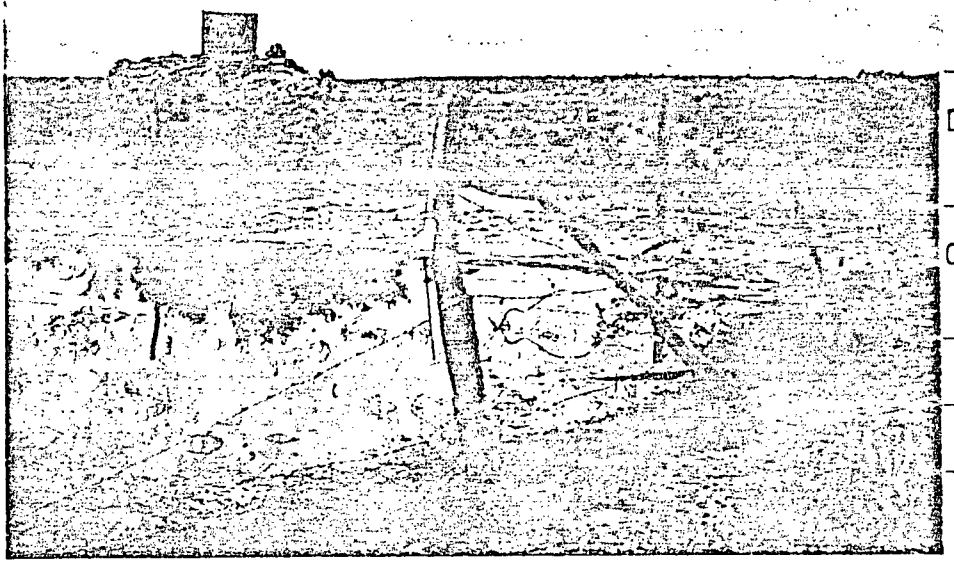
6-21-83 / 1386 / ESE

Comments:

photo roll #1, photo 19, 20

East Waste pit

sample Sta 11



Photographer / Witness

Deborah Vaughn / David Anderson

Date / Time / Direction

8-31-83 / 1336 / ESE

Comments: roll #1 photo #24

East Waste pit

continuation of sheet 5

Photographer / Witness

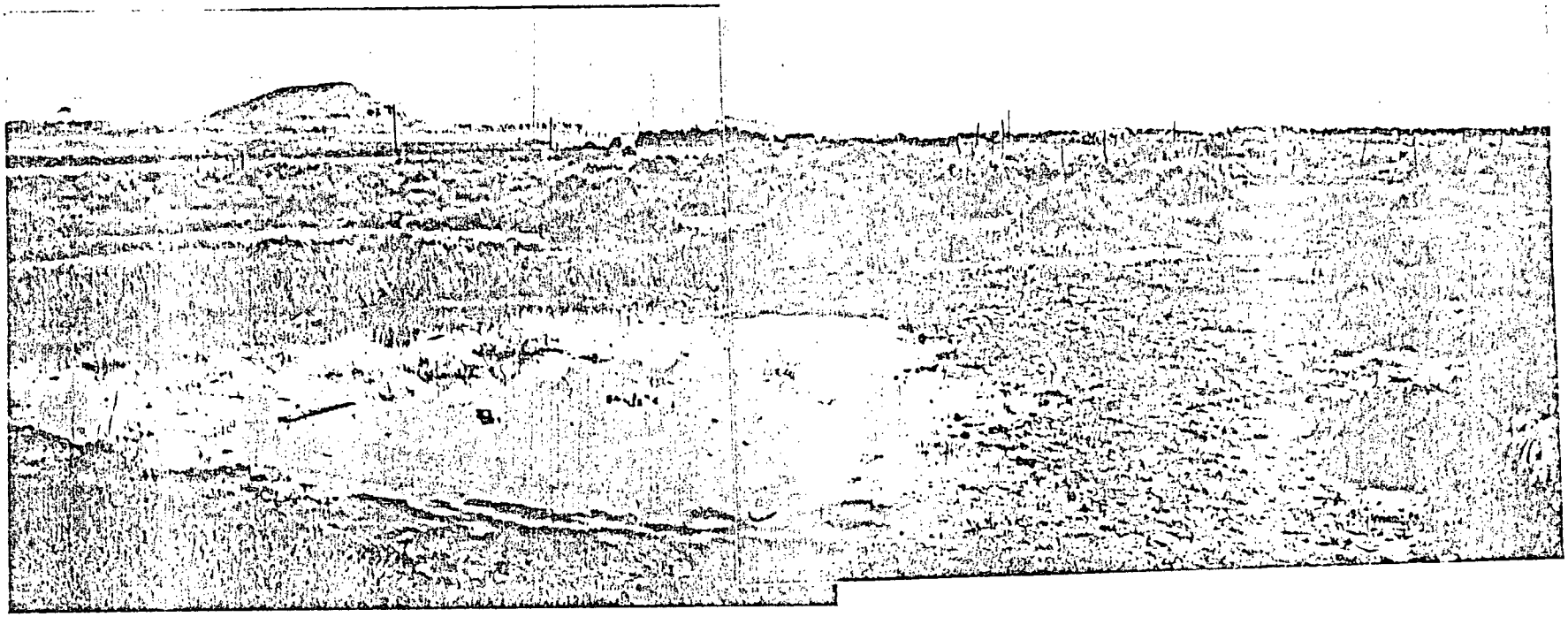
Date / Time / Direction

Comments:

Photographer / Witness

Date / Time / Direction

Comments:



Photographer / Witness

Deborah Vaughn / David Anderson

Date / Time / Direction

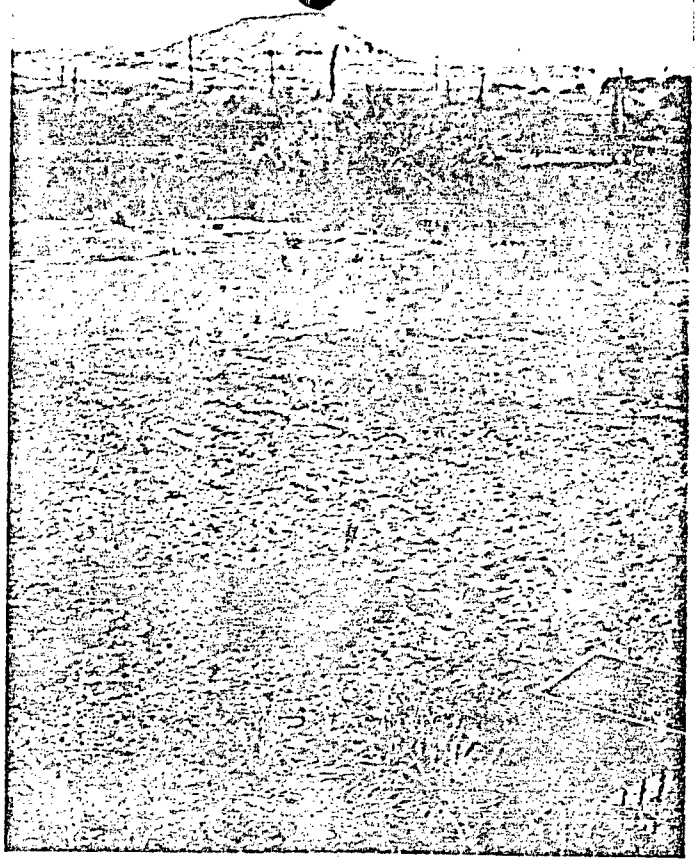
8-31-83 / 1410 / ENE

Comments:

photos # 2+3, roll 2

For West Waste Pit

East Wast Pit in background



Photographer / Witness

Deborah Vaughn / David Anderson

Date / Time / Direction

8-31-83 / 1416 / NE

Comments: photo # 4, roll 2

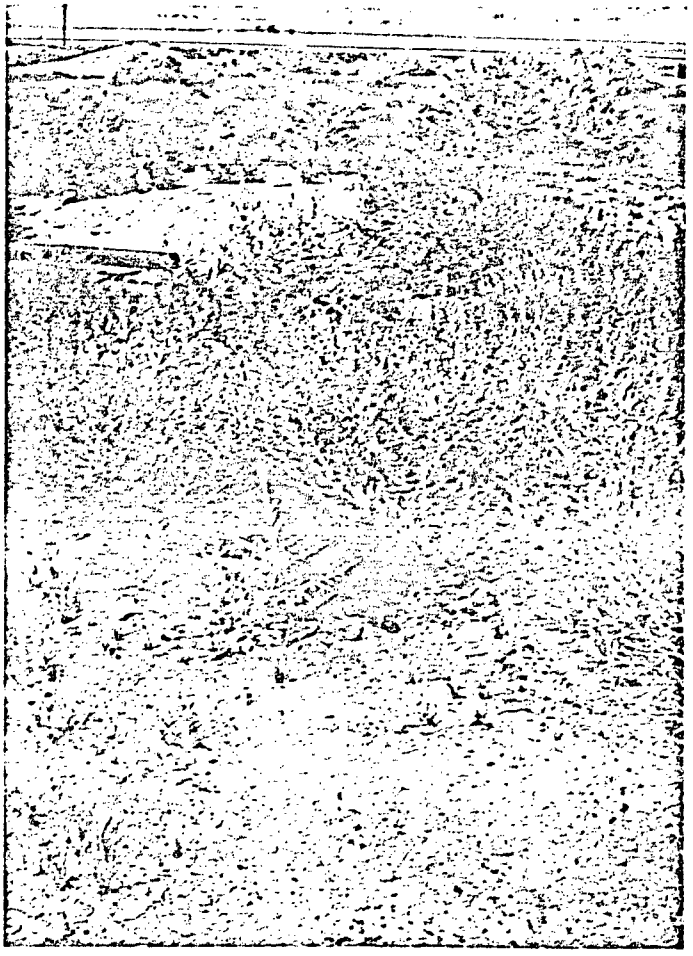
Sample Sta #12

East Waste pit in background.

Photographer / Witness

Date / Time / Direction

Comments:



Photographer / Witness

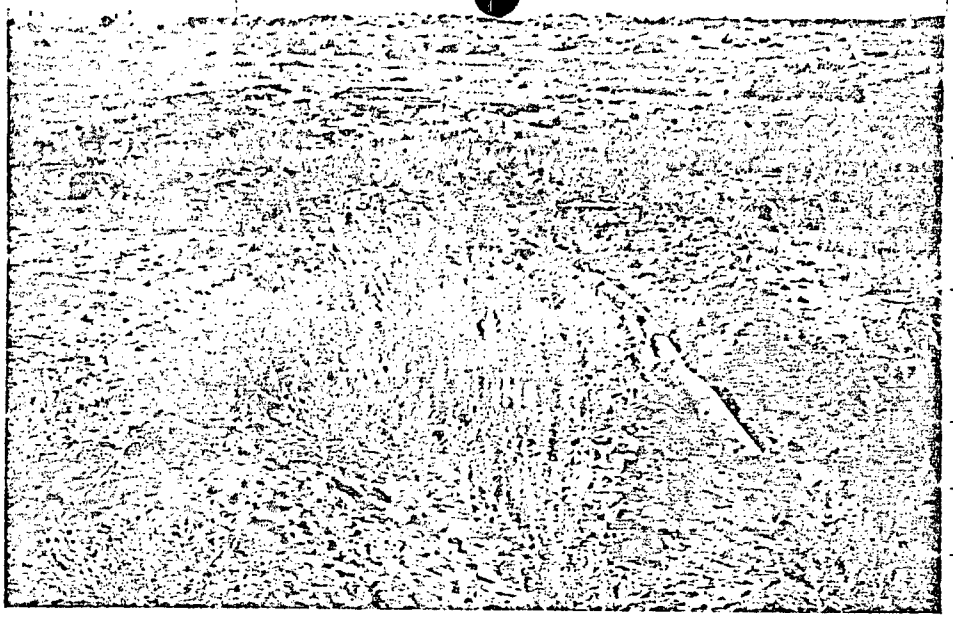
Deborah Vaughn / David Anderson

Date / Time / Direction

8-31-83 / 1421 / N

Comments: photo #5 roll 2

Tarry seek SW of separator.



Photographer / Witness

Deborah Vaughn / David Anderson

Date / Time / Direction

8-31-83/1423 / E

Comments: photo #6 roll 2 exposed pipeline SW of separator, and contaminated soil

Photographer / Witness

Date / Time / Direction

Comments:

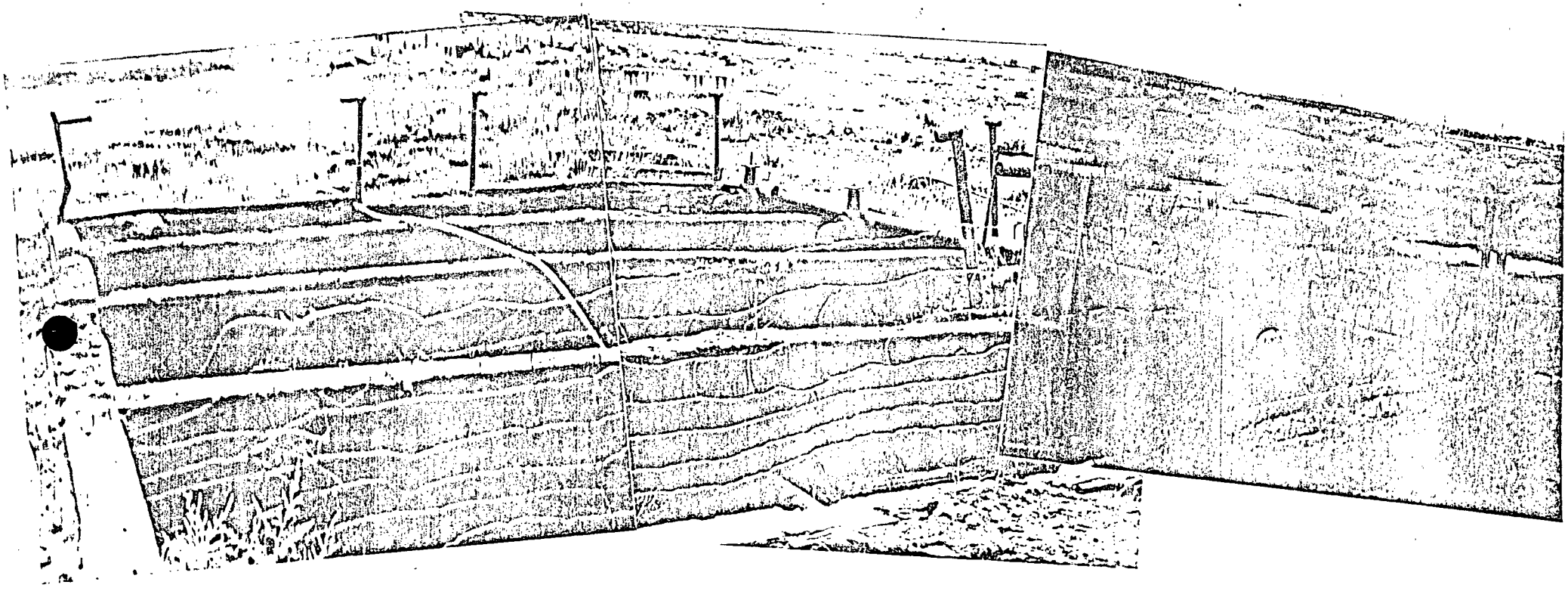
Photographer / Witness

Deborah Vaughn / David Anderson

Date / Time / Direction

8-31-83 / 1425 / S

Comments: photo #7 roll 2 Sample Station 13 discharge from separator in background.



Photographer / Witness

Deborah Vaughn / David Anderson

Date / Time / Direction

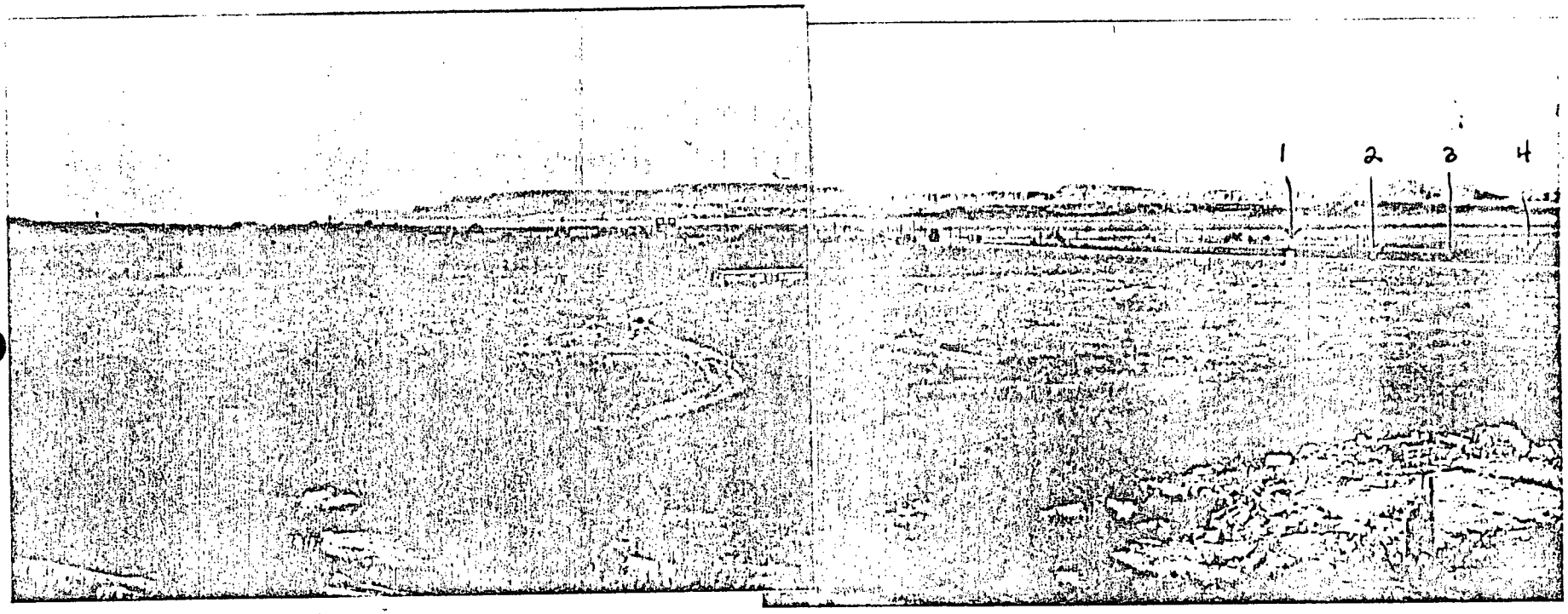
8-31-83 / 1430 / S

Comments:

photo # 8-10 roll 2

Separator tanks

Station 14



Photographer / Witness

David Anderson / Deborah Vaughn

Date / Time / Direction

8-31-83 / 1445 / NW

Comments:

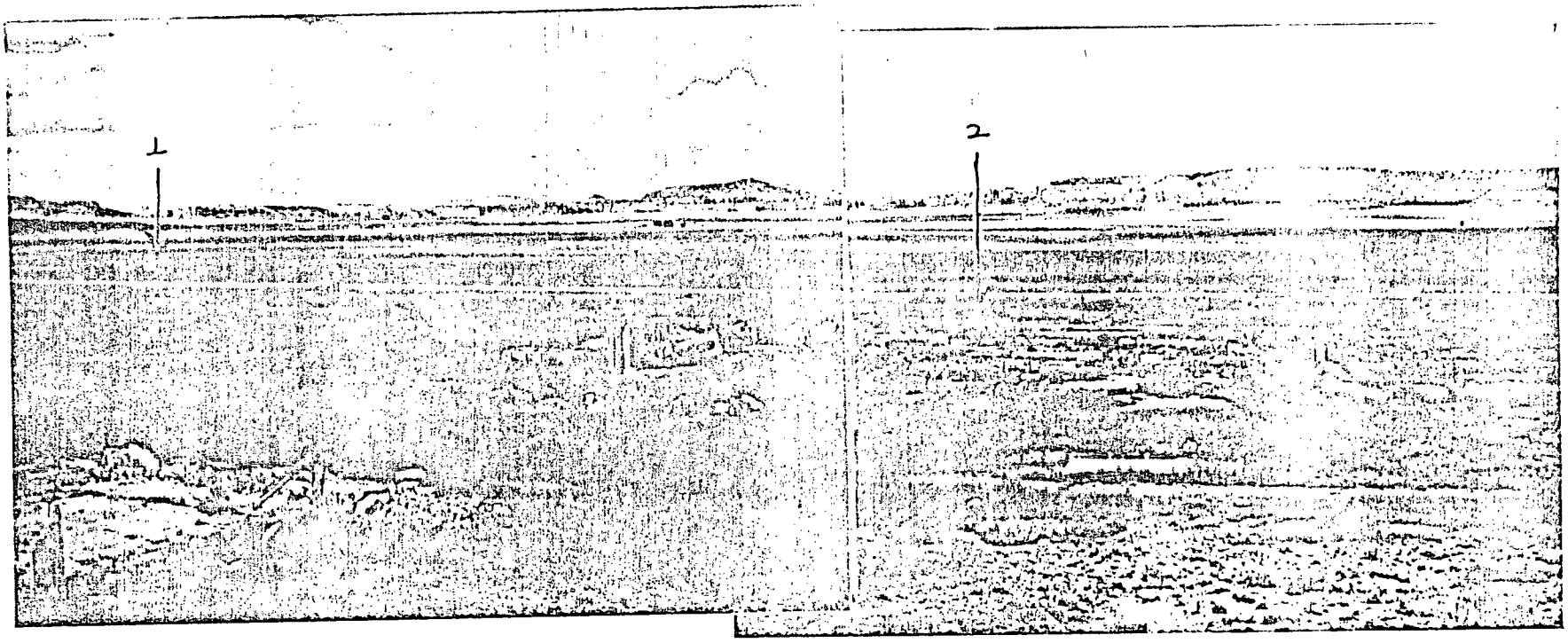
roll #2 photo 11,12

panorama of site

1. Bacco Well, 2. West Pit

3. Far West Pit 4. East pit

12/



Photographer / Witness

David Andersen/ Deborah Vaughn

Date / Time / Direction

8-31-83 / 1445 / NNW

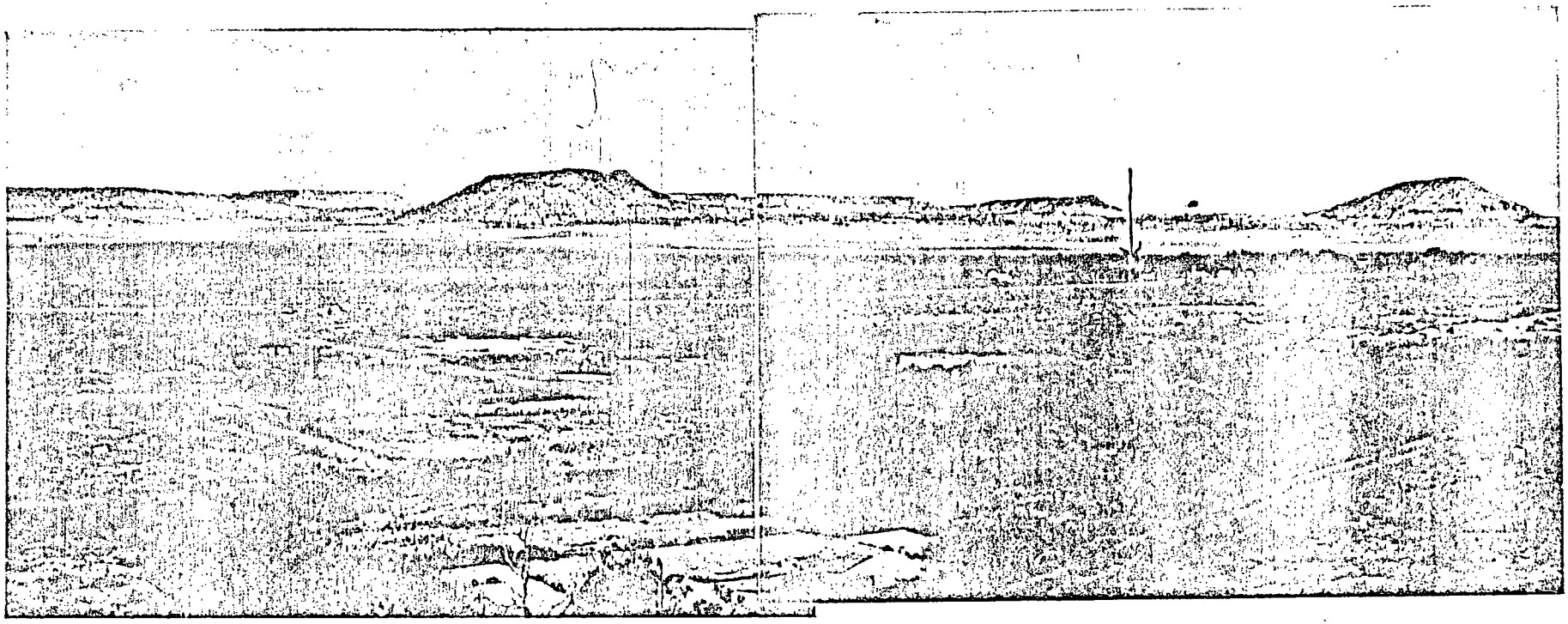
Comments:

roll # 2 photo 13, 14

continuation of panorama sheet 11

arrow 1, east pit

2, separator



Photographer / Witness

David Anderson / Deborah Vaughn

Date / Time / Direction

8-31-83 / 1445 / NNE

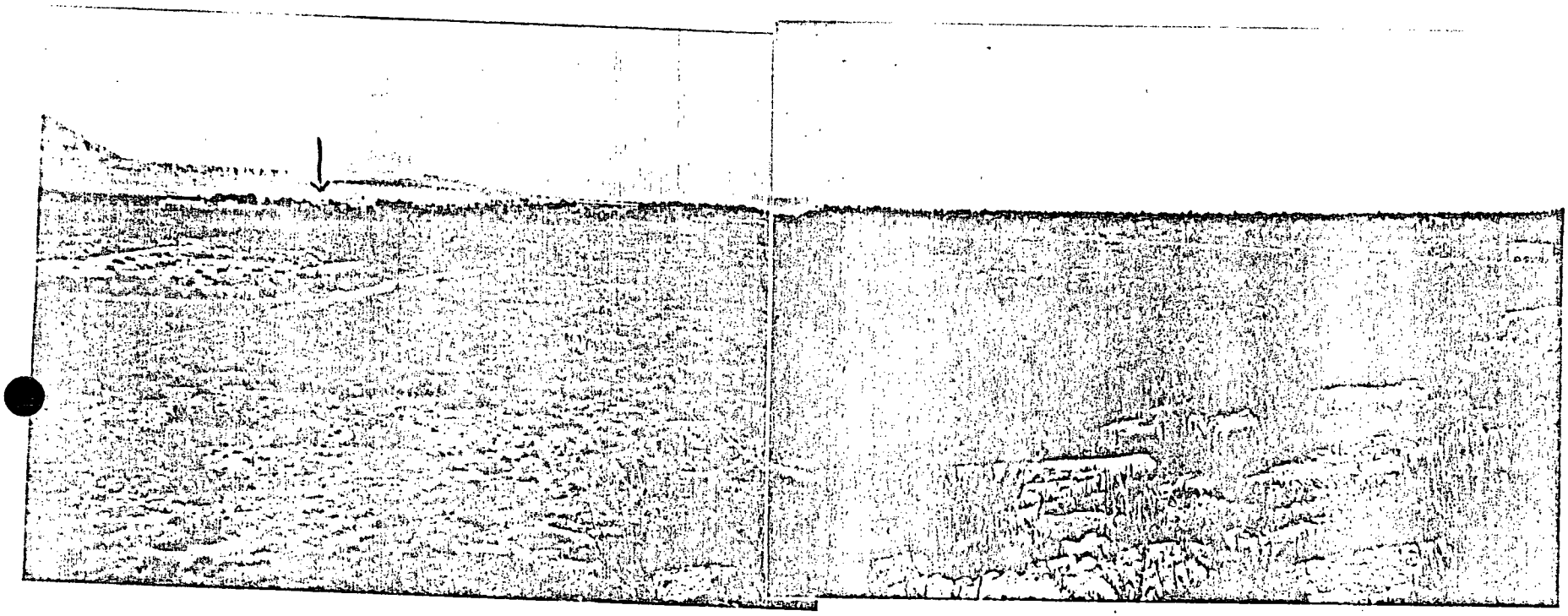
Comments:

roll # 2 photo 15, 16

continuation of panorama, sheet 12

arrow indicates Barnes Residence

14



Photographer / Witness

David Anderson / Deborah Vaughn

Date / Time / Direction

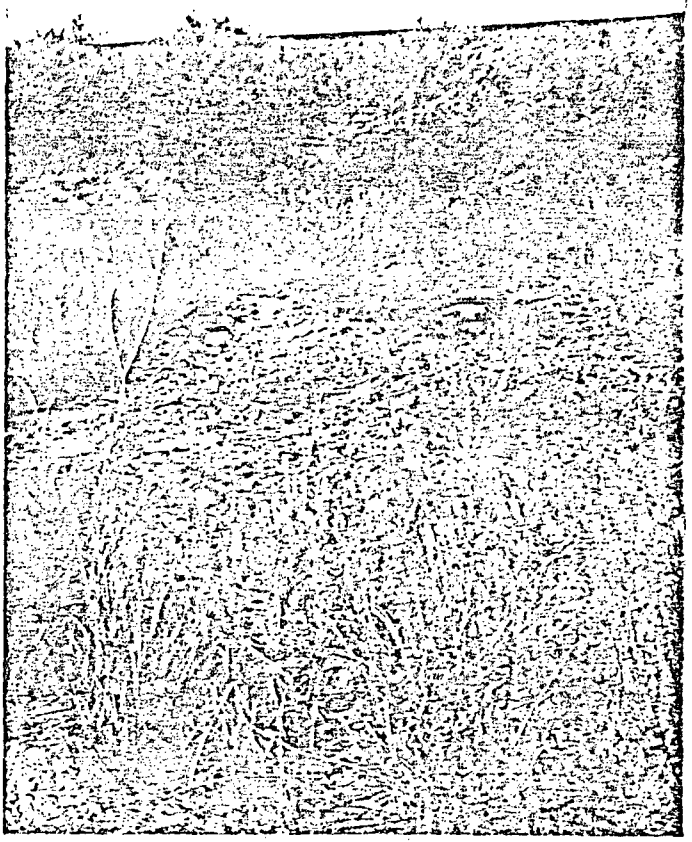
8-31-83 / 1445 / E

Comments:

roll #2 photo 17,18

continuation of panorama sheet 13

arrow indicates Smith Trading Post



Photographer / Witness

David Anderson / Deborah Vaughn

Date / Time / Direction

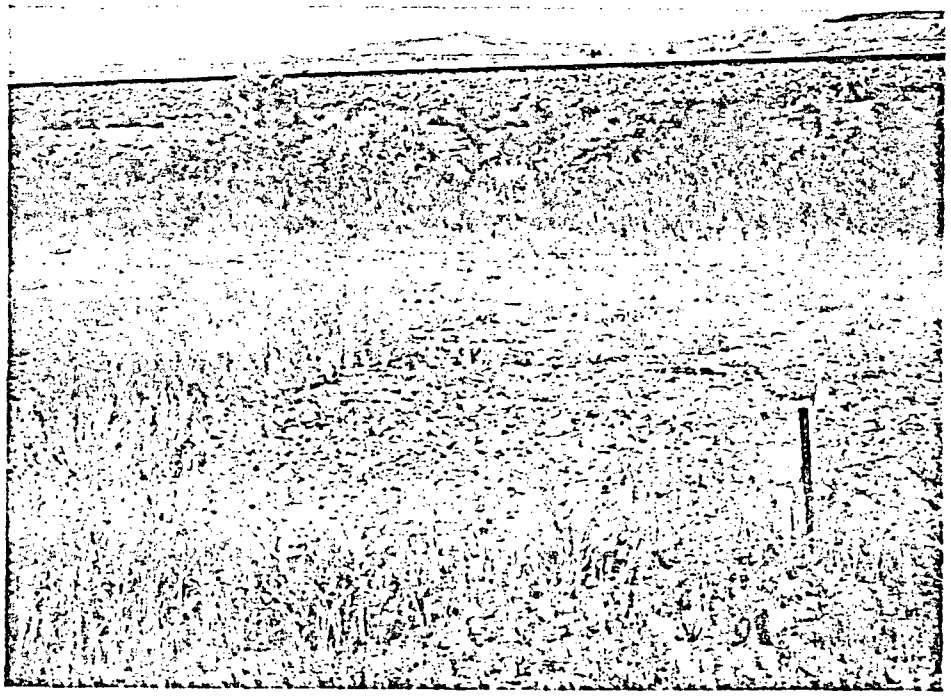
8-31-83 / 1500 / N1

Comments: photo 19 roll 2
Tar
seep along ATSF
right of way

Photographer / Witness

Date / Time / Direction

Comments:



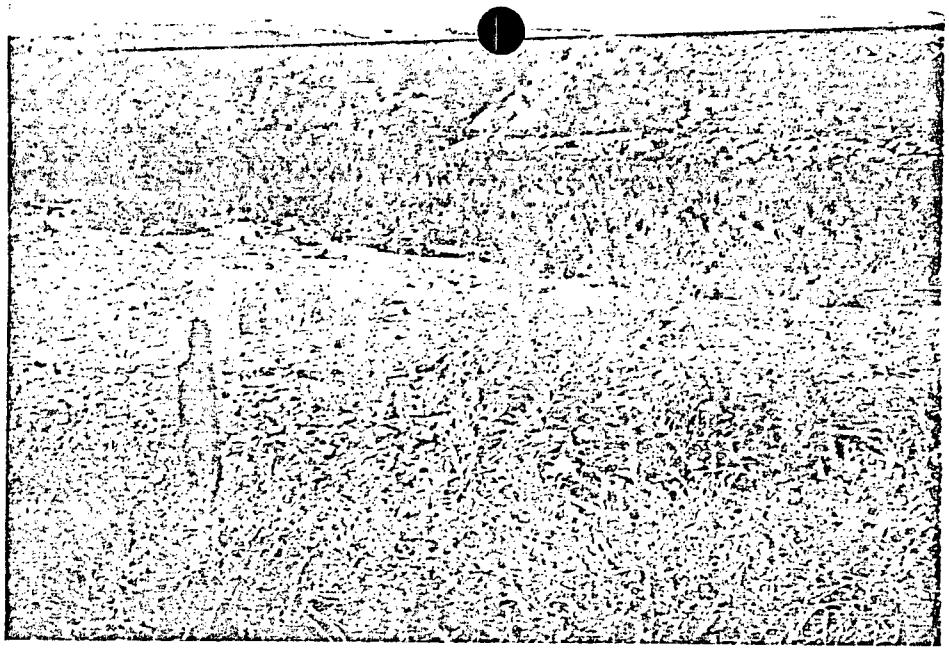
Photographer / Witness

David Anderson / Deborah Vaughn

Date / Time / Direction

8-31-83 / 1505 / N1

Comments: photo 20 roll 2
tarry seep, ATSF
right of way



Photographer / Witness

David Anderson / Deborah Vaughn

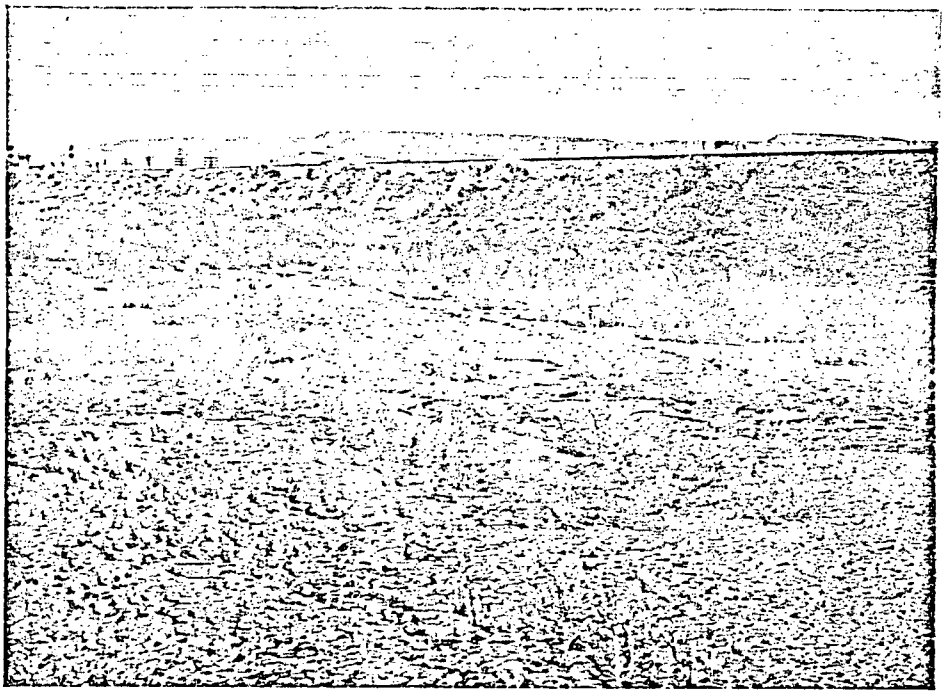
Date / Time / Direction

8-31-83 / 1510 / NW

Comments: photo 21 roll 2

Tarry seep, ATSF

right of way



Photographer / Witness

David Anderson / Deborah Vaughn

Date / Time / Direction

8-31-83 / 1515 / W/NW

Comments: photo 22 roll 2

tarry seep, ATSF

right of way

Photographer / Witness

Date / Time / Direction

Comments:

PLEASE COMPLETE ALL INFORMATION IN THE 5 BLOCKS OUTLINED IN ORANGE
SEE BACK OF FORM SET FOR COMPLETE PREPARATION INSTRUCTIONS

YOUR FEDERAL EXPRESS ACCOUNT NUMBER: 0752-5840-2

DATE: 4-1-83

FROM (Your Name): David Anderson

TO (Recipient's Name): Ben Tyson

If Hold For Pick-Up or Saturday Delivery, Recipient's Phone Number:

COMPANY: ECOLOGY & ENVIRONMENT INC

DEPARTMENT/FLOOR NO.:

COMPANY: EAL Corp

DEPARTMENT/FLOOR NO.:

STREET ADDRESS: 1509 MAIN ST STE 814

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE): 2030 Wright Ave

CITY: DALLAS STATE: TX

CITY: Richmond, California STATE:

AIRBILL NO. 28705277 6

ZIP ACCURATE ZIP CODE REQUIRED FOR CORRECT INVOICING: 7 5 2 0 1

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ZIP ACCURATE ZIP CODE REQUIRED FOR ON-TIME DELIVERY: 9 4 8 0 4

SHIPPER'S COPY

YOUR NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE): K6-0305-27

PAYMENT: ☐ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☒ Bill Credit Card 4200077514 ☐ Cash In Advance

Account Number/Credit Card Number:

SERVICES (CHECK ONLY ONE BOX)	DELIVERY AND SPECIAL HANDLING (CHECK SERVICES REQUIRED)	PACKAGES	WEIGHT	DECLARED VALUE	O/S
PRIORITY 1 (Overnight Packages) (Up to 70 LBS.)	1 ☐ HOLD FOR PICK-UP AT FOLLOWING FEDERAL EXPRESS LOCATION SHOWN IN SERVICE GUIDE. RECIPIENT'S PHONE NUMBER IS REQUIRED.				
OVERNIGHT LETTER (Up to 2 oz.)	2 ☒ DELIVER				
COURIER PAK (Overnight Envelope) (Up to 2 LBS.)	3 ☐ SATURDAY SERVICE REQUIRED (See Reverse) (Extra charge applies for delivery.)				
(Overnight Box) (Up to 25 LBS.)	4 ☒ RESTRICTED ARTICLES SERVICE (R-1 and Standard Air Packages only, extra charge)				
(Tube) (Up to 4 LBS.)	5 ☐ SSS (Signature Security Service) (requires extra charge applies)				
STANDARD AIR (Overnight Business Day Following Pick-Up) (Up to 70 LBS.)	6 ☐ DRY ICE _____ LBS.				
	7 ☐ OTHER SPECIAL SERVICE				
	8 ☐				
	9 ☐				
	TOTAL	TOTAL	TOTAL		

"OVERNIGHT" IS NEXT BUSINESS DAY (MONDAY THROUGH FRIDAY); TWO DAYS FROM ALASKA/HAWAII. SATURDAY DELIVERY AVAILABLE IN CONTINENTAL U.S. SEE "SPECIAL HANDLING."

DRY'S AND RADIOACTIVE MATERIAL ONLY

RECEIVED AT: ☐ SHIPPER'S DOOR ☐ REGULAR STOP ☐ ON-CALL STOP ☐ F.E.C. LOC

Federal Express Corporation Employee No.: 4200

DATE/TIME For Federal Express Use: 4/1 1145

FEDERAL EXPRESS USE

FREIGHT CHARGES

DECLARED VALUE CHARGE

AGT/PRO

ADVANCE ORIGIN

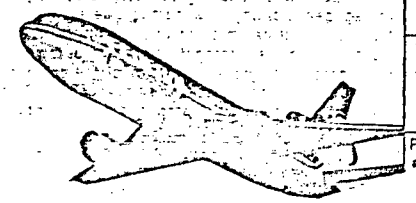
AGT/PRO

ADVANCE DESTINATION

OTHER

TOTAL CHARGES

PART #2041730751 FEC-S-0751 D 0/8 REVISION DATE 2/83 $ PRINTED U.S.A.



PLEASE COMPLETE ALL INFORMATION IN THE 5 BLOCKS OUTLINED IN ORANGE
SEE BACK OF FORM SET FOR COMPLETE PREPARATION INSTRUCTIONS.

AIRBILL NUMBER: 130245301

YOUR FEDERAL EXPRESS ACCOUNT NUMBER: 0752-5840-2

DATE: 4-1-83

(Your Name): David Anderson

TO (Recipient's Name): Ben Tyson

If Hold For Pick-Up or Saturday Delivery, Recipient's Phone Number:

COMPANY: ECOLOGY & ENVIRONMENT INC

DEPARTMENT/FLOOR NO.:

COMPANY: EAL Corp

DEPARTMENT/FLOOR NO.:

STREET ADDRESS: 509 MAIN ST STE 814

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE): 2030 Wright Ave

CITY: DALLAS STATE: TX

CITY: Richmond STATE: California

AIRBILL NO. 130245301

ZIP ACCURATE ZIP CODE REQUIRED FOR CORRECT INVOICING: 7 5 2 0 1

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ZIP ACCURATE ZIP CODE REQUIRED FOR ON-TIME DELIVERY: 9 4 8 0 4

SHIPPER'S COPY

NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE):

PAYMENT: ☐ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☐ Bill Credit Card ☐ Cash In Advance

Account Number/Credit Card Number:

SERVICES (CHECK ONLY ONE BOX)	DELIVERY AND SPECIAL HANDLING (CHECK SERVICES REQUIRED)	PACKAGES	WEIGHT	DECLARED VALUE	O/S
PRIORITY 1 (Overnight Packages) (Up to 70 LBS.)	1 ☐ HOLD FOR PICK-UP AT FOLLOWING FEDERAL EXPRESS LOCATION SHOWN IN SERVICE GUIDE. RECIPIENT'S PHONE NUMBER IS REQUIRED.	1	11		
OVERNIGHT LETTER (Up to 2 oz.) 6 ☐	2 ☒ DELIVER				
COURIER PAK (Overnight Envelope) 7 ☐	3 ☐ SATURDAY SERVICE REQUIRED (See Reverse) (Extra charge applies for delivery.)				
(Overnight Box) 8 ☐	4 ☐ RESTRICTED ARTICLES SERVICE (R-1 and Standard Air Packages only, extra charge)				
(Tube) 9 ☐	5 ☐ SSS (Signature Security Service) (requires extra charge applies)				
STANDARD AIR (Overnight Business Day Following Pick-Up) (Up to 70 LBS.)	6 ☐ DRY ICE _____ LBS.				
	7 ☐ OTHER SPECIAL SERVICE				
	8 ☐				
	9 ☐				
	TOTAL	TOTAL	TOTAL		

"OVERNIGHT" IS NEXT BUSINESS DAY (MONDAY THROUGH FRIDAY); TWO DAYS FROM ALASKA/HAWAII. SATURDAY DELIVERY AVAILABLE IN CONTINENTAL U.S. SEE "SPECIAL HANDLING."

RECEIVED AT: ☐ SHIPPER'S DOOR ☐ REGULAR STOP ☐ ON-CALL STOP ☐ F.E.C. LOC

Federal Express Corporation Employee No.:

DATE/TIME For Federal Express Use: 4/1 1155

FEDERAL EXPRESS USE

FREIGHT CHARGES

DECLARED VALUE CHARGE

AGT/PRO

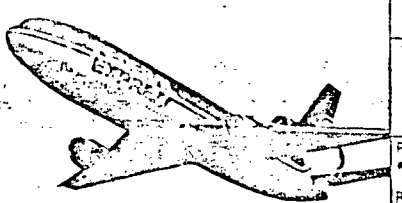
ADVANCE ORIGIN

AGT/PRO

ADVANCE DESTINATION

OTHER

TOTAL CHARGES



PART #2041730751 FEC-S-0751 D 0/8 REVISION DATE 2/83 $ PRINTED U.S.A.

FEDERAL EXPRESS

PLEASE COMPLETE ALL INFORMATION IN THE 5 BLOCKS OUTLINED IN ORANGE
SEE BACK OF FORM SET FOR COMPLETE PREPARATION INSTRUCTIONS.

130245220

00752

YOUR FEDERAL EXPRESS ACCOUNT NUMBER: 0752-5040-7

DATE: 9-1-83

FROM (Your Name): David Anderson

TO (Recipient's Name): Ben Tyson

If Hold For Pick-Up or Saturday Delivery, Recipient's Phone Number:

COMPANY: ECOLOGY & ENVIRONMENT INC

DEPARTMENT/FLOOR NO.:

COMPANY: EAL Corp

DEPARTMENT/FLOOR NO.:

STREET ADDRESS: 1509 MAIN ST STE 814

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE): 2020 Wright Ave

CITY: DALLAS STATE: TX

CITY: Richmond STATE: California

AIRBILL NO. 130245220

ZIP (ACCURATE ZIP CODE REQUIRED FOR CORRECT INVOICING): 7 5 2 0 1

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ZIP (ACCURATE ZIP CODE REQUIRED FOR OVERNIGHT DELIVERY): 9 4 8 0 4

YOUR NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE): RC-5305-27

PAYMENT: ☐ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☐ Bill Credit Card ☐ Cash In Advance

Account Number/Credit Card Number: 0200-7751-4

FEDERAL EXPRESS USE
FREIGHT CHARGES
DECLARED VALUE CHARGE
AGT/PRO
ADVANCE ORIGIN
AGT/PRO
ADVANCE DESTINATION
OTHER
TOTAL CHARGES

SERVICES — CHECK ONLY ONE BOX

PRIORITY 1
1 ☐ (OVERNIGHT PACKAGES) (Up to 70 LBS.)
COURIER PAK
2 ☐ OVERNIGHT ENVELOPE (Up to 2 LBS.)
3 ☐ OVERNIGHT BOX (Up to 5 LBS.)
4 ☐ OVERNIGHT TUBE (Up to 5 LBS.)

OVERNIGHT LETTER
6 ☐ (Up to 2 OZ.)
7 ☐
8 ☐
9 ☐

STANDARD AIR
5 ☐ DELIVERY 2ND BUSINESS DAY FOLLOWING PICK-UP (Up to 70 LBS.)

"OVERNIGHT" IS NEXT BUSINESS DAY (MONDAY THROUGH FRIDAY); TWO DAYS FROM ALASKA/HAWAII. SATURDAY DELIVERY AVAILABLE IN CONTINENTAL U.S. SEE "SPECIAL HANDLING."

DELIVERY AND SPECIAL HANDLING — CHECK SERVICES REQUIRED

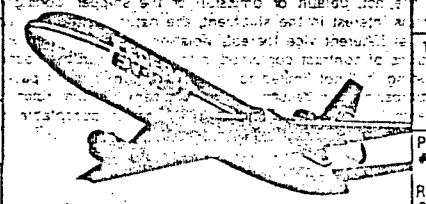
1 ☐ HOLD FOR PICK-UP AT FOLLOWING FEDERAL EXPRESS LOCATION SHOWN IN SERVICE GUIDE. RECIPIENT'S PHONE NUMBER IS REQUIRED.
2 ☒ DELIVER
3 ☐ SATURDAY SERVICE REQUIRED (See Reverse. Extra charge applies for delivery.)
4 ☐ RESTRICTED ARTICLES SERVICE (P-1 and Standard Air Packages only, extra charge)
5 ☐ SSS (Signature Security Service required, extra charge applies)
6 ☐ DRY ICE ____ LBS
7 ☐ OTHER SPECIAL SERVICE
8 ☐
9 ☐

PACKAGES	WEIGHT	DECLARED VALUE	O/S
1	1.5		
TOTAL	TOTAL 1.5	TOTAL	

RECEIVED AT
SHIPPER'S DOOR
☐ REGULAR STOP
☐ ON-CALL STOP
☑ F.E.C. LOC

Federal Express Corporation Employee No.: 21858

DATE/TIME For Federal Express Use: 9/1



PART #2041730751
FEC-S-0751 D/O/B
REVISION DATE 2/83 $
PRINTED U.S.A.

SHIPPER'S COPY

FEDERAL EXPRESS

AIRBILL NUMBER 130245194

PLEASE COMPLETE ALL INFORMATION IN THE 5 BLOCKS OUTLINED IN ORANGE
SEE BACK OF FORM SET FOR COMPLETE PREPARATION INSTRUCTIONS.

00752

YOUR FEDERAL EXPRESS ACCOUNT NUMBER: 0752-5040-7

DATE: 9-1-83

FROM (Your Name): David Anderson

TO (Recipient's Name): Ben Tyson

If Hold For Pick-Up or Saturday Delivery, Recipient's Phone Number:

COMPANY: ECOLOGY & ENVIRONMENT INC

DEPARTMENT/FLOOR NO.:

COMPANY: EAL Corp.

DEPARTMENT/FLOOR NO.:

STREET ADDRESS: 1509 MAIN ST STE 814

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE): 2020 Wright Ave

CITY: DALLAS STATE: TX

CITY: Richmond STATE: California

AIRBILL NO. 130245194

ZIP (ACCURATE ZIP CODE REQUIRED FOR CORRECT INVOICING): 7 5 2 0 1

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ZIP (ACCURATE ZIP CODE REQUIRED FOR OVERNIGHT DELIVERY): 9 4 8 0 4

YOUR NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE): RC-5305-27

PAYMENT: ☐ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☐ Bill Credit Card ☐ Cash In Advance

Account Number/Credit Card Number: 0200-7751-4

FEDERAL EXPRESS USE
FREIGHT CHARGES
DECLARED VALUE CHARGE
AGT/PRO
ADVANCE ORIGIN
AGT/PRO
ADVANCE DESTINATION
OTHER
TOTAL CHARGES

SERVICES — CHECK ONLY ONE BOX

PRIORITY 1
1 ☒ (OVERNIGHT PACKAGES) (Up to 70 LBS.)
COURIER PAK
2 ☐ OVERNIGHT ENVELOPE (Up to 2 LBS.)
3 ☐ OVERNIGHT BOX (Up to 5 LBS.)
4 ☐ OVERNIGHT TUBE (Up to 5 LBS.)

OVERNIGHT LETTER
6 ☐ (Up to 2 OZ.)
7 ☐
8 ☐
9 ☐

STANDARD AIR
5 ☐ DELIVERY 2ND BUSINESS DAY FOLLOWING PICK-UP (Up to 70 LBS.)

"OVERNIGHT" IS NEXT BUSINESS DAY (MONDAY THROUGH FRIDAY); TWO DAYS FROM ALASKA/HAWAII. SATURDAY DELIVERY AVAILABLE IN CONTINENTAL U.S. SEE "SPECIAL HANDLING."

DELIVERY AND SPECIAL HANDLING — CHECK SERVICES REQUIRED

1 ☐ HOLD FOR PICK-UP AT FOLLOWING FEDERAL EXPRESS LOCATION SHOWN IN SERVICE GUIDE. RECIPIENT'S PHONE NUMBER IS REQUIRED.
2 ☒ DELIVER
3 ☐ SATURDAY SERVICE REQUIRED (See Reverse. Extra charge applies for delivery.)
4 ☐ RESTRICTED ARTICLES SERVICE (P-1 and Standard Air Packages only, extra charge)
5 ☐ SSS (Signature Security Service required, extra charge applies)
6 ☐ DRY ICE ____ LBS
7 ☐ OTHER SPECIAL SERVICE
8 ☐
9 ☐

PACKAGES	WEIGHT	DECLARED VALUE	O/S
1	1.5		
TOTAL	TOTAL 1.5	TOTAL	

RECEIVED AT
SHIPPER'S DOOR
☐ REGULAR STOP
☐ ON-CALL STOP
☐ F.E.C. LOC

Federal Express Corporation Employee No.:

DATE/TIME For Federal Express Use:

PART #2041730751
FEC-S-0751 D/O/B
REVISION DATE 2/83 $

SHIPPER'S COPY

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SEE BACK OF FORM SET FOR COMPLETE PREPARATION INSTRUCTIONS

AIRBILL NUMBER 2670527165

YOUR FEDERAL EXPRESS ACCOUNT NUMBER 0752-5040-2

DATE 9-21-94

FROM (Your Name) David Anderson

TO (Recipient's Name) Tony Maiorana

If Hold For Pick-Up or Saturday Delivery, Recipient's Phone Number

COMPANY ECOLOGY & ENVIRONMENT INC

DEPARTMENT/FLOOR NO.

COMPANY Rocky Mtn. Analytical

STREET ADDRESS 1509 MAIN ST STE 211

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE) 5530 Marshall St.

CITY DALLAS STATE TX

CITY Arvada STATE Colorado

AIRBILL NO. 2670527165

ZIP ACCURATE ZIP CODE REQUIRED FOR CORRECT INVOICING 75212

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ZIP ACCURATE ZIP CODE REQUIRED FOR OVERNIGHT DELIVERY 80002

YOUR NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE) RG-9305-94

PAYMENT ☐ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☐ Bill Credit Card
☐ Cash In Advance Account Number/Credit Card Number #20077514

FEDERAL EXPRESS USE
FREIGHT CHARGES
DECLARED VALUE CHARGE
AGT/PRO
ADVANCE ORIGIN
AGT/PRO
ADVANCE DESTINATION
OTHER
TOTAL CHARGES

SERVICES CHECK ONLY ONE BOX

PRIORITY 1 (OVERNIGHT PACKAGES) (UP TO 70 LBS.)

STANDARD AIR ☐ DELIVERY 2ND BUSINESS DAY FOLLOWING PICK-UP (UP TO 70 LBS.)

"OVERNIGHT" IS NEXT BUSINESS DAY (MONDAY THROUGH FRIDAY). TWO DAYS FROM ALASKA/HAWAII. SATURDAY DELIVERY AVAILABLE IN CONTINENTAL U.S. SEE "SPECIAL HANDLING."

DELIVERY AND SPECIAL HANDLING CHECK SERVICES REQUIRED

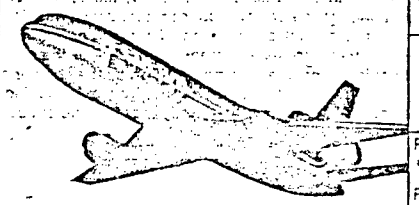
1 ☐ HOLD FOR PICK-UP AT FOLLOWING FEDERAL EXPRESS LOCATION SHOWN IN SERVICE GUIDE. RECIPIENT'S PHONE NUMBER IS REQUIRED.
2 ☒ DELIVER
3 ☐ SATURDAY SERVICE REQUIRED See Reverse (Extra charge applies for delivery.)
4 ☐ RESTRICTED ARTICLES SERVICE (P-1 and Standard Air Packages only, extra charge)
5 ☐ SSS (Signature Security Service required, extra charge applies)
6 ☐ DRY ICE _____ LBS
7 ☐ OTHER SPECIAL SERVICE
8 ☐
9 ☐

PACKAGES	WEIGHT	DECLARED VALUE	O/S
TOTAL	TOTAL	TOTAL	
1	15?		

RECEIVED AT
SHIPPER'S DOOR
☐ REGULAR STOP
☐ ON-CALL STOP 871
☐ F.E.C. LOC

Federal Express Corporation Employee No. 3608

DATE/TIME For Federal Express Use 9/1 0834



PART #2041730764
REVISION DATE 10/82S
PRINTED U.S.A.

SHIPPER'S COPY

FEDERAL EXPRESS

PLEASE COMPLETE ALL INFORMATION IN THE 5 BLOCKS OUTLINED IN ORANGE
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AIRBILL NUMBER 1302452216

YOUR FEDERAL EXPRESS ACCOUNT NUMBER 0752-5040-2

DATE 9-1-93

FROM (Your Name) David Anderson

TO (Recipient's Name) Tony Maiorana

If Hold For Pick-Up or Saturday Delivery, Recipient's Phone Number

COMPANY ECOLOGY & ENVIRONMENT INC

DEPARTMENT/FLOOR NO.

COMPANY Rocky Mtn. Analytical

STREET ADDRESS 1509 MAIN ST STE 211

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE) 5530 Marshall St.

CITY DALLAS STATE TX

CITY Arvada STATE Colorado

AIRBILL NO. 1302452216

ZIP ACCURATE ZIP CODE REQUIRED FOR CORRECT INVOICING 75212

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ZIP ACCURATE ZIP CODE REQUIRED FOR OVERNIGHT DELIVERY 80002

YOUR NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE) RG-9305-94

PAYMENT ☐ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☐ Bill Credit Card
☐ Cash In Advance Account Number/Credit Card Number #20077514

FEDERAL EXPRESS USE
FREIGHT CHARGES
DECLARED VALUE CHARGE
AGT/PRO
ADVANCE ORIGIN
AGT/PRO
ADVANCE DESTINATION
OTHER
TOTAL CHARGES

SERVICES CHECK ONLY ONE BOX

PRIORITY 1 (OVERNIGHT PACKAGES) (UP TO 70 LBS.) ☒
OVERNIGHT LETTER 6 ☐ (UP TO 2 OZ.)
COURIER PAK 7 ☐
8 ☐
9 ☐

STANDARD AIR ☐ DELIVERY 2ND BUSINESS DAY FOLLOWING PICK-UP (UP TO 70 LBS.)

"OVERNIGHT" IS NEXT BUSINESS DAY (MONDAY THROUGH FRIDAY). TWO DAYS FROM ALASKA/HAWAII. SATURDAY DELIVERY AVAILABLE IN CONTINENTAL U.S. SEE "SPECIAL HANDLING."

DELIVERY AND SPECIAL HANDLING CHECK SERVICES REQUIRED

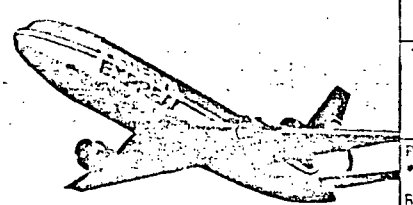
1 ☐ HOLD FOR PICK-UP AT FOLLOWING FEDERAL EXPRESS LOCATION SHOWN IN SERVICE GUIDE. RECIPIENT'S PHONE NUMBER IS REQUIRED.
2 ☒ DELIVER
3 ☐ SATURDAY SERVICE REQUIRED See Reverse (Extra charge applies for delivery.)
4 ☐ RESTRICTED ARTICLES SERVICE (P-1 and Standard Air Packages only, extra charge)
5 ☐ SSS (Signature Security Service required, extra charge applies)
6 ☐ DRY ICE _____ LBS
7 ☐ OTHER SPECIAL SERVICE
8 ☐
9 ☐

PACKAGES	WEIGHT	DECLARED VALUE	O/S
1	15		
TOTAL	TOTAL	TOTAL	
1			

RECEIVED AT
SHIPPER'S DOOR
☐ REGULAR STOP
☐ ON-CALL STOP
☒ F.E.C. LOC

Federal Express Corporation Employee No. 3608

DATE/TIME For Federal Express Use 9/1



PART #2041730751
FEC-S-0751 D O B
REVISION DATE 2/83 S
PRINTED U.S.A.

SHIPPER'S COPY

FEDERAL EXPRESS

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SEE BACK OF FORM SET FOR COMPLETE PREPARATION INSTRUCTIONS

AIRBILL NUMBER 130245205

YOUR FEDERAL EXPRESS ACCT. NUMBER: 3792-5240-2

DATE: 7-1-93

FROM (Your Name): David Anderson

TO (Recipient's Name): Terry Montana

If Hold For Pick Up or Saturday Delivery, Recipient's Phone Number:

COMPANY: ECOLOGY & ENVIRONMENT INC

DEPARTMENT/FLOOR NO.:

COMPANY: Rocky Mtn Analytical

STREET ADDRESS: 1100 MAIN ST STE 514

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE): 5520 Marshall St.

CITY: Dallas STATE: TX

CITY: Arvada STATE: Colorado

AIRBILL NO. 130245205

ZIP: 7 5 2 0 1

IN TENDERING THIS SHIPMENT, SHIPPER AGREES THAT F.E.C. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM CARRIAGE HEREOF. F.E.C. DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THIS SHIPMENT. THIS IS A NON-NEGOTIABLE AIRBILL SUBJECT TO CONDITIONS OF CONTRACT SET FORTH ON REVERSE OF SHIPPER'S COPY. UNLESS YOU DECLARE A HIGHER VALUE, THE LIABILITY OF FEDERAL EXPRESS CORPORATION IS LIMITED TO $100.00. FEDERAL EXPRESS DOES NOT CARRY CARGO LIABILITY INSURANCE.

ZIP: 8 0 0 1 2

YOUR NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE): 26-1305-27

PAYMENT ☐ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☐ Bill Credit Card ☐ Cash in Advance

Account Number/Credit Card Number: 0200-7731-4

FEDERAL EXPRESS USE

FREIGHT CHARGES

DECLARED VALUE CHARGE

SERVICES — CHECK ONLY ONE BOX

PRIORITY 1 — OVERNIGHT LETTER

1 ☒ PRIORITY 1 (OVERNIGHT PACKAGES) (up to 70 LBS.)
COURIER PAK
2 ☐ OVERNIGHT ENVELOPE (up to 2 LBS.)
3 ☐ OVERNIGHT BOX (up to 5 LBS.)
4 ☐ OVERNIGHT TUBE (up to 5 LBS.)
6 ☐ OVERNIGHT LETTER (up to 2 OZ.)
7 ☐
8 ☐
9 ☐

STANDARD AIR

5 ☐ DELIVERY ONE BUSINESS DAY FOLLOWING PICK-UP (up to 70 LBS.)

"OVERNIGHT" IS NEXT BUSINESS DAY (MONDAY THROUGH FRIDAY). TWO DAYS FROM ALASKA/HAWAII. SATURDAY DELIVERY AVAILABLE IN CONTINENTAL U.S. SEE "SPECIAL HANDLING."

DELIVERY AND SPECIAL HANDLING — CHECK SERVICES REQUIRED

1 ☐ HOLD FOR PICK-UP AT FOLLOWING FEDERAL EXPRESS LOCATION SHOWN IN SERVICE GUIDE. RECIPIENT'S PHONE NUMBER IS REQUIRED.
2 ☒ DELIVER
3 ☐ SATURDAY SERVICE REQUIRED (See Reverse. Extra charge applies for delivery.)
4 ☐ RESTRICTED ARTICLES SERVICE (P-1 and Standard Air Packages only, extra charge)
5 ☐ SSS (Signature Security Service required, extra charge applies)
6 ☐ DRY ICE _____ LBS.
7 ☐ OTHER SPECIAL SERVICE _____
8 ☐
9 ☐

PACKAGES	WEIGHT	DECLARED VALUE	O/S
1	5		
TOTAL 1	TOTAL	TOTAL	

RECEIVED AT
SHIPPER'S DOOR
☐ REGULAR STOP
☐ ON-CALL STOP
☐ F.E.C. LOC

Federal Express Corporation Employee No.

DATE/TIME For Federal Express Use

AGT./PRO

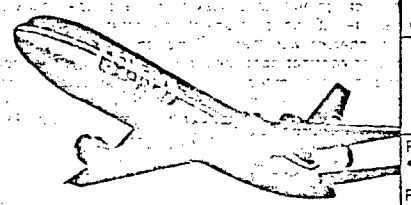
ADVANCE ORIGIN

AGT./PRO

ADVANCE DESTINATION

OTHER

TOTAL CHARGES



PART #2041730751 FEC-S-0751 D/O/B. REVISION DATE 2/93 $ PRINTED U.S.A.

SHIPPER'S COPY

FEDERAL EXPRESS

PLEASE COMPLETE ALL INFORMATION IN THE 5 BLOCKS OUTLINED IN ORANGE
SEE BACK OF FORM SET FOR COMPLETE PREPARATION INSTRUCTIONS

AIRBILL NUMBER 130245312

YOUR FEDERAL EXPRESS ACCOUNT NUMBER: 3792-5240-2

DATE: 7-1-93

FROM (Your Name): David Anderson

TO (Recipient's Name): Terry Montana

If Hold For Pick-Up or Saturday Delivery, Recipient's Phone Number:

COMPANY: ECOLOGY & ENVIRONMENT INC

DEPARTMENT/FLOOR NO.:

COMPANY: Rocky Mtn Analytical

STREET ADDRESS: 1100 MAIN ST STE 514

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE): 5520 Marshall St.

CITY: DALLAS STATE: TX

CITY: Arvada STATE: Colorado

AIRBILL NO. 130245312

ZIP: 7 5 2 0 1

IN TENDERING THIS SHIPMENT, SHIPPER AGREES THAT F.E.C. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM CARRIAGE HEREOF. F.E.C. DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THIS SHIPMENT. THIS IS A NON-NEGOTIABLE AIRBILL SUBJECT TO CONDITIONS OF CONTRACT SET FORTH ON REVERSE OF SHIPPER'S COPY. UNLESS YOU DECLARE A HIGHER VALUE, THE LIABILITY OF FEDERAL EXPRESS CORPORATION IS LIMITED TO $100.00. FEDERAL EXPRESS DOES NOT CARRY CARGO LIABILITY INSURANCE.

ZIP: 8 0 0 1 2

YOUR NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE):

PAYMENT ☐ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☐ Bill Credit Card ☐ Cash in Advance

Account Number/Credit Card Number: 0200-7731-4

FEDERAL EXPRESS USE

FREIGHT CHARGES

DECLARED VALUE CHARGE

SERVICES — CHECK ONLY ONE BOX

PRIORITY 1 — OVERNIGHT LETTER

1 ☒ PRIORITY 1 (OVERNIGHT PACKAGES) (up to 70 LBS.)
COURIER PAK
2 ☐ OVERNIGHT ENVELOPE (up to 2 LBS.)
3 ☐ OVERNIGHT BOX (up to 5 LBS.)
4 ☐ OVERNIGHT TUBE (up to 5 LBS.)
6 ☐ OVERNIGHT LETTER (up to 2 OZ.)
7 ☐
8 ☐
9 ☐

STANDARD AIR

5 ☐ DELIVERY ONE BUSINESS DAY FOLLOWING PICK-UP (up to 70 LBS.)

"OVERNIGHT" IS NEXT BUSINESS DAY (MONDAY THROUGH FRIDAY). TWO DAYS FROM ALASKA/HAWAII. SATURDAY DELIVERY AVAILABLE IN CONTINENTAL U.S. SEE "SPECIAL HANDLING."

DELIVERY AND SPECIAL HANDLING — CHECK SERVICES REQUIRED

1 ☐ HOLD FOR PICK-UP AT FOLLOWING FEDERAL EXPRESS LOCATION SHOWN IN SERVICE GUIDE. RECIPIENT'S PHONE NUMBER IS REQUIRED.
2 ☒ DELIVER
3 ☐ SATURDAY SERVICE REQUIRED
4 ☐ RESTRICTED ARTICLES SERVICE
5 ☐ SSS (Signature Security Service required, extra charge applies)
6 ☐ DRY ICE _____ LBS.
7 ☐ OTHER SPECIAL SERVICE _____
8 ☐
9 ☐

PACKAGES	WEIGHT	DECLARED VALUE	O/S
1	5		
TOTAL 1	TOTAL	TOTAL	

RECEIVED AT
SHIPPER'S DOOR
☐ REGULAR STOP
☐ ON-CALL STOP
☐ F.E.C. LOC

Federal Express Corporation Employee No.

DATE/TIME For Federal Express Use

AGT./PRO

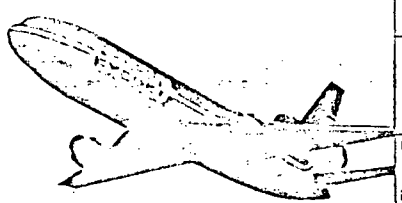
ADVANCE ORIGIN

AGT./PRO

ADVANCE DESTINATION

OTHER

TOTAL CHARGES



PART #2041730751 FEC-S-0751 D/O/B REVISION DATE 2/93 $ PRINTED U.S.A.

SHIPPER'S COPY

FEDERAL EXPRESS

PLEASE COMPLETE ALL INFORMATION IN THE 5 BLOCKS OUTLINED IN ORANGE
SEE BACK OF FORM SET FOR COMPLETE PREPARATION INSTRUCTIONS.

AIRBILL NUMBER 287053012

YOUR FEDERAL EXPRESS ACCOUNT NUMBER 0752-5042-2

DATE 9/11/93

FROM (Your Name)

COMPANY ECOLOGY & ENVIRONMENT INC (1)

DEPARTMENT/FLOOR NO.

STREET ADDRESS 1509 MAIN ST STE 814

CITY DALLAS STATE TX

ZIP

TO (Recipient's Name)

If Hold For Pick-Up or Saturday Delivery, Recipient's Phone Number

COMPANY (2)

DEPARTMENT/FLOOR NO.

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE)

CITY STATE

ZIP ACCURATE ZIP CODE REQUIRED FOR OVERNIGHT DELIVERY

AIRBILL NO. 287053012

ZIP ACCURATE ZIP CODE REQUIRED FOR CORRECT INVOICING 7 5 2 0 1

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SHIPPER'S COPY

YOUR NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE)

SAN RAFAEL (3)

PAYMENT ☐ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☐ Bill Credit Card
☐ Cash in Advance Account Number/Credit Card Number 20077514

SERVICES CHECK ONLY ONE BOX	DELIVERY AND SPECIAL HANDLING CHECK SERVICES REQUIRED	PACKAGES	WEIGHT	DECLARED VALUE	O/S
PRIORITY 1 ☐ (Overnight Packages Up to 70 LBS.)	1 ☐ HOLD FOR PICK-UP AT FOLLOWING FEDERAL EXPRESS LOCATION SHOWN IN SERVICE GUIDE. RECIPIENT'S PHONE NUMBER IS REQUIRED.				
(4)	2 ☒ DELIVER				
	3 ☐ SATURDAY SERVICE REQUIRED (See Federal Express Service Guide for delivery.)				
	4 ☐ RESTRICTED ARTICLES SERVICE (See Federal Express Service Guide for Packaging and Charges.)				
STANDARD AIR ☐ (Overnight Packages Up to 70 LBS.)	5 ☐ SSS (See Federal Express Service Guide for Service and Charges.)				
OVERNIGHT IS NEXT BUSINESS DAY MONDAY THROUGH FRIDAY). TWO DAYS FROM ALASKA/HAWAII. SATURDAY DELIVERY AVAILABLE IN CONTINENTAL U.S. (SEE SPECIAL HANDLING.)	6 ☐ DRY ICE _____ LBS.				
	7 ☐ OTHER SPECIAL SERVICE _____				
	8 ☐ _____				
	9 ☐				
	TOTAL	TOTAL	TOTAL		

(5)

RECEIVED AT
SHIPPER'S DOOR
☐ REGULAR STOP
☐ ON CALL STOP
☐ F.E.C. LOC.

Federal Express Corporation Employee No.

DATE/TIME For Federal Express Use

FEDERAL EXPRESS USE

FREIGHT CHARGES

DECLARED VALUE CHARGE

AGT/PRO

AGT/PRO

ADVANCE ORIGIN

ADVANCE DESTINATION

OTHER

TOTAL CHARGES

PART #2041730764

REVISION DATE 10/93

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First Internation Building
1201 Elm Street
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
[illegible]	Abandoned Refinery

SAMPLERS: (Signature) [illegible] A. Smedley
[illegible] David Andash

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	[illegible]	Sulfide	Cyanide	Arsenic	Toxicity Bioassay	[illegible]	REMARKS
[illegible]	[illegible]	[illegible]		X	Bacca Council Well	[illegible]	X						FMI tag # [illegible] 0192 MF 0143
"	"	"		"	"	[illegible]							" " 0195 "
"	"	"		"	"	1			X				" " 0193 "
"	"	"		"	"	1				X			" " 0194 "
Blank	8-31-83	1445		"	Blanks	1	X						" " 0200 MF 0144
"	"	"		"	"	1							" " 0203 "
"	"	"		"	"	1			X				" " 0201 "
"	"	"		"	"	1				X			" " 0202 "
12	"	1415		"	NW of West Waste Pit SW of East Pit - 8 oz. jar	1	X		X	X	X		" " 0204 MF 0145
Blank	"	—		"	8 oz. jar	1					X		" " 0211 MF 0146

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[illegible]	9-1-83 830	Federal Express			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	[illegible] 1302, 5016
					Chain of Custody Seal [illegible]

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First Internation Building
1201 Elm Street
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
[illegible]	Abandoned Refinery

SAMPLERS: *(Signature)* [illegible] A. [illegible], [illegible], David Clardson

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	low conc. water (extractable)	low conc. water VOA	surface soil (ext.)	surface soil (VOA)			REMARKS
[illegible]	[illegible]	1330		X	Bacca Council Well	2	X						[illegible] 188 189 F3361
"	"	"		"	"	2		X					" 190 191 "
Blank	"	1345		"	Blanks	2	X						" 196 197 F3362
"		"		"	"	2							" 198 [illegible] "
12	"	1415		"	NW of West Waste Pit SW of East Waste Pit	1			X				" [illegible]005 F3363
"	"	"		"	"	1				X			" [illegible]006 "
Blank	"	—		"	Blank 8 oz. jar	1			X				" [illegible]009 F3364
"	"	"		"	"	1				X			" [illegible]010 "

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
[illegible]	8-31-83 0830	Federal Express			

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks
				[illegible] – 1330 [illegible]

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6-

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First Internation Building
1201 Elm Street
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
NM1008	Abandoned Refinery

SAMPLERS: *(Signature)* [illegible] a. Smith

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Unpreserved water (for total metals)	Preserved water (for dissolved metals)					REMARKS
07	8-31-83	1130		X	Smith's Trading Post Well	2	X						EPA Tag # [illegible] F-23359
"	"	"		X	"	2		X					" [illegible] "
08	"	1155		X	KOA Campground Well	2	X						EPA Tag # [illegible] F-23360
"	"	"		X	"	2		X					" [illegible] "

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
[illegible] a. Smith	9-1-83 830 AM	Federal Express			
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	AIRBill # 1302 5194

Case no. 09

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6- [illegible]

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First Internation Building
1201 Elm Street
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
[illegible]	Navajo Refinery

SAMPLERS: *(Signature)* [illegible]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Volatile organics	Acid extractable organics	Base/neutral extractable organics	Pesticides/PCB's	Metals	Other	REMARKS
05	8-3-83	1130		X	Smith's Trading Post Well	1	X						EPA Lab # 113 MW 0141
"	"	"		X	"	1		X					" " 175 "
"	"	"		X	"	1			X				" " 174 "
"	"	"		X	"	1				X			" " 176 "
06	8-3-83	1155		X	KOA Campground Well	1	X						" " 143 MW 0142
"	"	"		X	"	1		X					" " 181 "
"	"	"		X	"	1			X				" " 182 "
"	"	"		X	"	1				X			" " 184 "
—	—	—		X	—								

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
[illegible]	9-1-83 0930 AM	Federal Express			
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	
					[illegible] # 1303-1305

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6-[illegible]

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First Internation Building
1201 Elm Street
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
0011038	Abandoned Refinery

SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Low conc. water (ref. only)	Low conc. water	Low conc. VOA				REMARKS
01	8-31-8	1000		X	Polk's Well	2	X						EPA log # F1356
"	"	"		X	"	2		X					"
03	8-31-8	1020		X	Sharp Well	2	X						" F1357
"	"	"		X	"	2		X					"
06	8-31-8	1100		X	Small Well	2	X						" F1358
"	"	"		X	"	2		X					"

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	9-1-83 830 AM	Federal Express			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	2009

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6-

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First Internation Building
1201 Elm Street
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
[illegible]	[illegible] Refinery

SAMPLERS: *(Signature)* [illegible]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	REMARKS
04	5-31-83	1000		X	Polk's Well	1	X						EPA Log # [illegible] 01338
"	"	"		"	"	1							" [illegible] 150 "
"	"	"		"	"	1			X				" [illegible] 152 "
"	"	"		"	"	1				X			" [illegible] 151 "
05	5-31-83	1090		X	Sharp Well	1	X						" [illegible] 150 01339
"	"	"		"	"	1		X					" [illegible] 155 "
"	"	"		"	"	1			X				" [illegible] 153 "
"	"	"		"	"	1				X			" [illegible] 154 "
06	5-31-83	1100		X	Small Well	1	X						" [illegible] 01340
"	"	"		"	"	1							" [illegible] "
"	"	"		"	"	1			X				" [illegible] 158 "
"	"	"		"	"	1				X			" [illegible] 157 "

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
[illegible]	9-1-83 830 AM	Federal Express			
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	[illegible] 0031 [illegible] 0009 AIRBILL # 1802453[illegible]

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First Internation Building
1201 Elm Street
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
NM1208	Abandoned Re-finery

SAMPLERS: *(Signature)* Johnnie G. Bradley

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Lead	Arsenic	Gasoline	Cyanide			REMARKS
01	1-3-83	1545		X	Barnes Well	1	X						6-00137 MF 0135
"	"			X	↓	1		X					6-00136 "
"	"			X		1			X				6-00135 "
"	"			X		1				X			6-00134 "
02	1-3-83	0845		X	Lamance Well	1	X						6-00112 MF 0136
"	"	"		X	↓	1		X					6-00111 "
"	"	"		X		1			X				6-00144 "
"	"	"		X	↓	1				X			6-00143 "
03	1-3-83	0930		X	Wilcox Well	1	X						6-00124 MF 0137
"	"	"		X	"	1		X					6-00127 "
"	"	"		X	"	1			X				6-00126 "
"	"	"		X	"	1				X			6-00125 "

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Johnnie G. Bradley	1-3-83 / 1-31-83 0830				
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6-

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

REGION 6
First Internation Building
1201 Elm Street
Dallas, Texas 75270

PROJ. NO.	PROJECT NAME
[illegible]	Halmond Refinery

SAMPLERS: *(Signature)*

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Volatile org. water	Volatile org. conc. VOA	Low conc. water	Low conc. soil			REMARKS
01	8-31-83	0830		X	Barnes Well	2	X						" F 9353
"	"	"		X	"	2		X					" "
02	8-31-83	0845		X	Lamance Well	2	X						" F 9354
"	"	"		X	"	2		X					" "
03	8-31-83	0930		X	Wilcox Well	2	X		X				" F 9355
"	"	0930		X	"	2		X		X			" "

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
[illegible]	9-1-83 830 AM	Federal Express			
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	
				Airbill # [illegible] 052 2nd Cont Day	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6- [illegible]36

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First International Building
1201 Elm Street
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
[illegible]	Abandoned Refinery

SAMPLERS: *(Signature)* James A. Hurley
[illegible] R. Perry

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS
[illegible]	[illegible]	1324		X	Westmark Pit	1	X						[illegible] 1 190
11	[illegible]	1334		X	Westmark Pit solids	1	X						[illegible] 1 195
[illegible]	[illegible]	1331		X	Westmark Pit liquids	1	X						[illegible] 1 191
12	[illegible]	1424		X	Discharge from separator	1	X						[illegible] 1 192
181	[illegible]	1427		X	Oil separator	1	X						[illegible] 1 193

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
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