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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, Ca. 94105

FEDERAL ON-SCENE-COORDINATOR'S REPORT

BLUEWATER URANIUM MINE SITES
PREWITT, NAVAJO NATION, NEW MEXICO
AUGUST 11 - SEPTEMBER 19, 1991

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, Ca. 94105

September 22, 1991

MEMORANDUM

SUBJECT: OSC Report for the Bluewater Uranium Mine Site, Navajo Nation, Prewitt, New Mexico

FROM: Robert Bornstein RB
On-Scene-Coordinator H-8-3

TO: Joanne Manygoats
Navajo Superfund Program
P.O Box 2946
Window Rock, Arizona 86515

Enclosed for your review is a copy of the On-Scene-Coordinator Report for the ERS response at the Bluewater Uranium Mine Site, Prewitt, New Mexico. As you are aware, ERS conducted a mine reclamation action at the Site to reduce elevated gamma radiation levels and soil radionuclide concentrations.

I want to thank you and your staff for all of the assistance and outstanding support throughout this project. I enjoyed working with you and my stay in New Mexico. It is one of the most beautiful places in America. Please stay in touch and call me if I could be of any further assistance.

If you have any questions about the report please contact me at 415-744-2298.

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EXECUTIVE SUMMARY

SITE: Bluewater Uranium Mine Sites

LOCATION: Prewitt, Navajo Nation, New Mexico

PROJECT DATES: August 11- September 19, 1991

The Bluewater Uranium Mine Sites are composed of the Brown-Vandever, Brown-Nanabah and Navajo-Desiderio Mines. The Sites are located approximately five miles west of Prewitt, New Mexico and lie with in the Grants Uranium Mining District. The Brown-Vandever and Brown-Nanabah mines are located on four parcels of land which includes two Indian Allotment parcels, on Federal parcel administered by the Department of Energy and one privately owned parcel.

At the request of the Agency for Toxic Substances and Disease Registry (ATSDR) and the Navajo Superfund Program, EPA ERS was requested to assess the radiological conditions at the sites and to evaluate if a removal action was warranted. A radiological assessment was conducted in November of 1990 by EPA ERS and assisted by the Office of Air and Radiation, Las Vegas.

Elevated gamma emissions (exceeding fifty times background in certain locations) were detected during the assessment. In addition, elevated concentrations of radionuclides were detected within on site soil.

After careful review by EPA ERS, the Office of Air and Radiation (OAR), and ATSDR, it was determined that a response action was warranted at the Sites. After several coordination meetings with several agencies, including the Department of Energy, Department of Interior's Bureaus of Indian Affairs and Land Management, it was decided that EPA should proceed with a response. DOE, which owns portions of the Brown-Vandever Site will conduct its own response on its lands pursuant to Executive Order 12580.

To reduce the immediate potential radiological hazards associated with the two mine sites, ERS conducted the following response actions:

Phase 1

Applied earth cover to effectively reduce gamma radiation emissions and potential for radionuclide migration.

Phase 2

Filled, sealed and capped mine adits, inclines and ventilation shafts to reduce the migration of radon gas emissions.

Phase 3

Revegetated and posted warning signs of reclamated areas.

Post response gamma surveys reveal that the gamma radiation levels have been effectively reduced to natural conditions. EPA and ATSDR concur that the sites have been adequately reclamated to levels which are protective of public health.

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I. SUMMARY OF EVENTS

A. SITE CONDITIONS AND BACKGROUND

1. Initial Situation

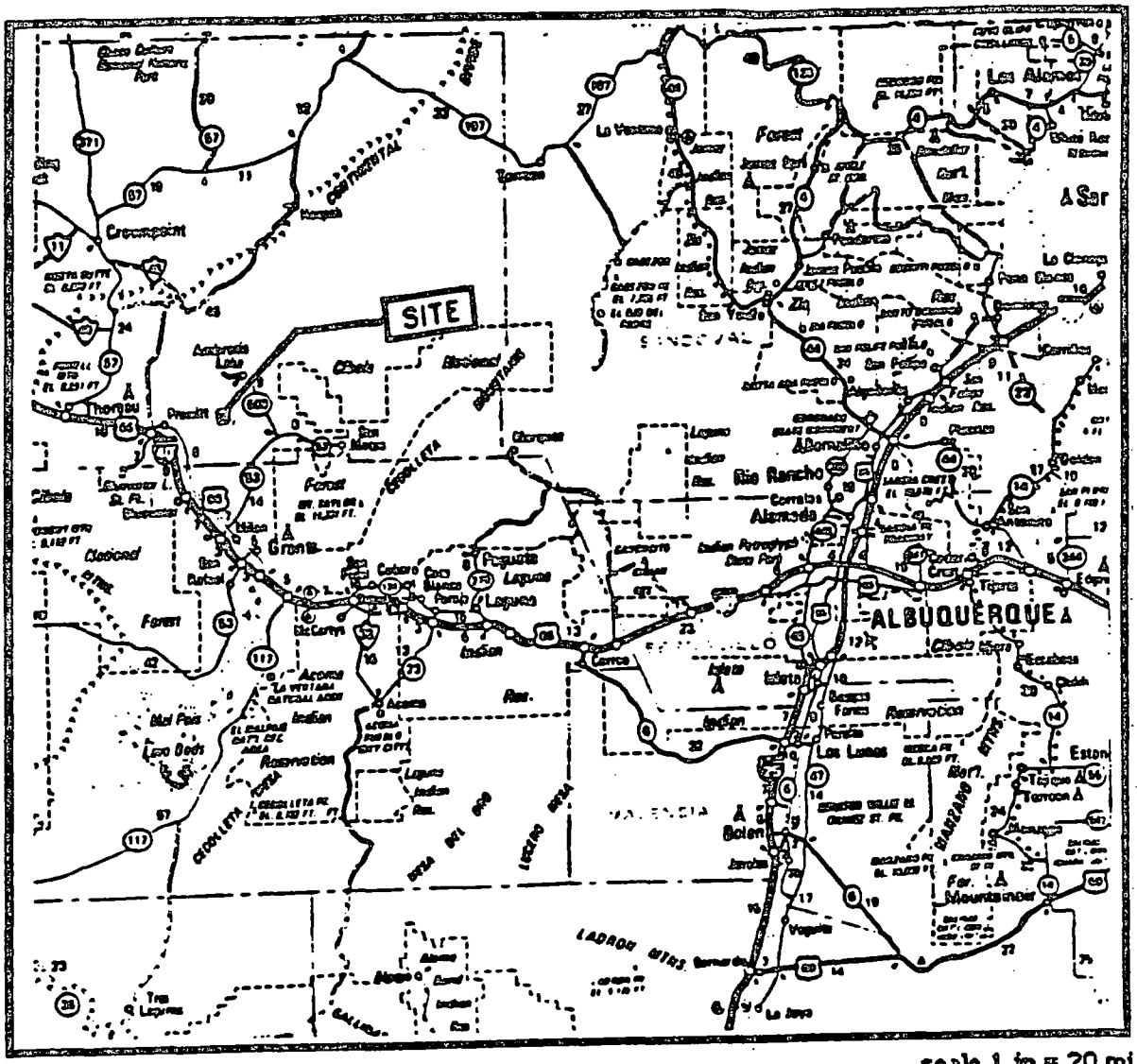
On October 3, 1990, the Emergency Response Section (ERS) was notified by the Agency for Toxic Substance and Disease Registry (ATSDR) of the potential health hazards associated with the uranium mine tailings, waste and debris located at the Brown-Vandever, Brown-Nanabah, and Navajo-Desiderio Mine sites (the Bluewater Uranium Mine Sites). After collecting limited data and conducting several site visits, ATSDR concluded that the Sites may pose a significant health hazard to the local population because of the presence of radioactive mine tailings, physical hazards, and potential for heavy metal contamination. On November 21, 1990, as a result of their investigations, ATSDR issued a Public Health Advisory pursuant to Section 104(i)(6)(H) of CERCLA concerning the Sites.

EPA Region IX ERS was tasked to assess the present radiological and geochemical conditions at the Sites and to determine if an emergency response action was warranted.

The Bluewater Uranium Mine Sites consist of three nearby abandoned mining areas, the Brown-Vandever, Brown-Nanabah and Navajo Desiderio Mine, which are located in the central portion of western New Mexico. The Brown-Vandever and Brown-Nanabah mine sites are located on four parcels of land, which include two Indian Allotment parcels (Section 24, Township 13N, Range 11W and

Section 18, Township 13N, Range 10W), one Federal parcel administered by the Department of Energy (Section 13, Township 13, Range 11W), and one privately owned parcel (Section 19, Township 13, Range 10W). The Desiderio Mine consists of one parcel of Indian Allotment property located on Section 26, Township 13N, Range 10W. All of these parcels lie within the Bluewater U.S. Geological Survey (USGS) Quadrangle (see Figure 1-3). The EPA has conducted response actions on all three Indian Allotments; while Cerrillos Land Company, Santa Fe Pacific Railroad and the Atchison Topeka, and Santa Fe Railway responded to Section 19 under an EPA CERCLA 106 Order. The United States Department of Energy has assumed responsibility in overseeing the response actions on Section 13 pursuant to Executive Order 12580.

The Brown-Vandever and Brown Nanabah parcels are located at the foot of Haystack Butte located approximately five miles west of Prewitt, New Mexico and 15 miles north of Grants, New Mexico. The elevation of the Site varies from 6900 to 7100 feet above sea level. The Desiderio Mine site lies approximately five miles east of the other two sites and is located on Section 26, Township 13N, Range 10W. All of the sites lie within the Ambrosia Lake Subdistrict of the Grants Uranium Mining District. The Brown-Vandever and Brown-Nanabah site encompasses approximately 155 acres, with approximately a third of this area disturbed and scared by uranium mining. The Navajo-Desiderio site covers approximately 130 acres, with nearly 30 acres disturbed by mining


SITE
Grants
ALBUQUERQUE
Los Lunas
Belen
Rio Rancho
Bernalillo
Los Alamos
Creamopoint
Thoreau
Prewitt
Acoma
Laguna
Pueblo
Tijeras
Mountainair
Estancia
Tome
Valencia
Cibola
Forest
Reservation
Indian
Res.
Mesa
Mt.
Ft.
Bluff
Tres Lagunas
Mesa Del Rio
Sandia Mts.
Manzano Mts.
Ladron Mts.
Zia
Sandoval
Bernalillo
Torrance
Lo Cienega
Lo Cienega
Lo Vecinos
Los Ranchos
Alameda
Corrales
Cedar Crest
Tijeras
Edgewood
Estancia
Torreon
Mountainair
Vaughn
La Joya
Tres Lagunas
Mesa Del Rio
Mesa Del Rio
Mesa Del Rio

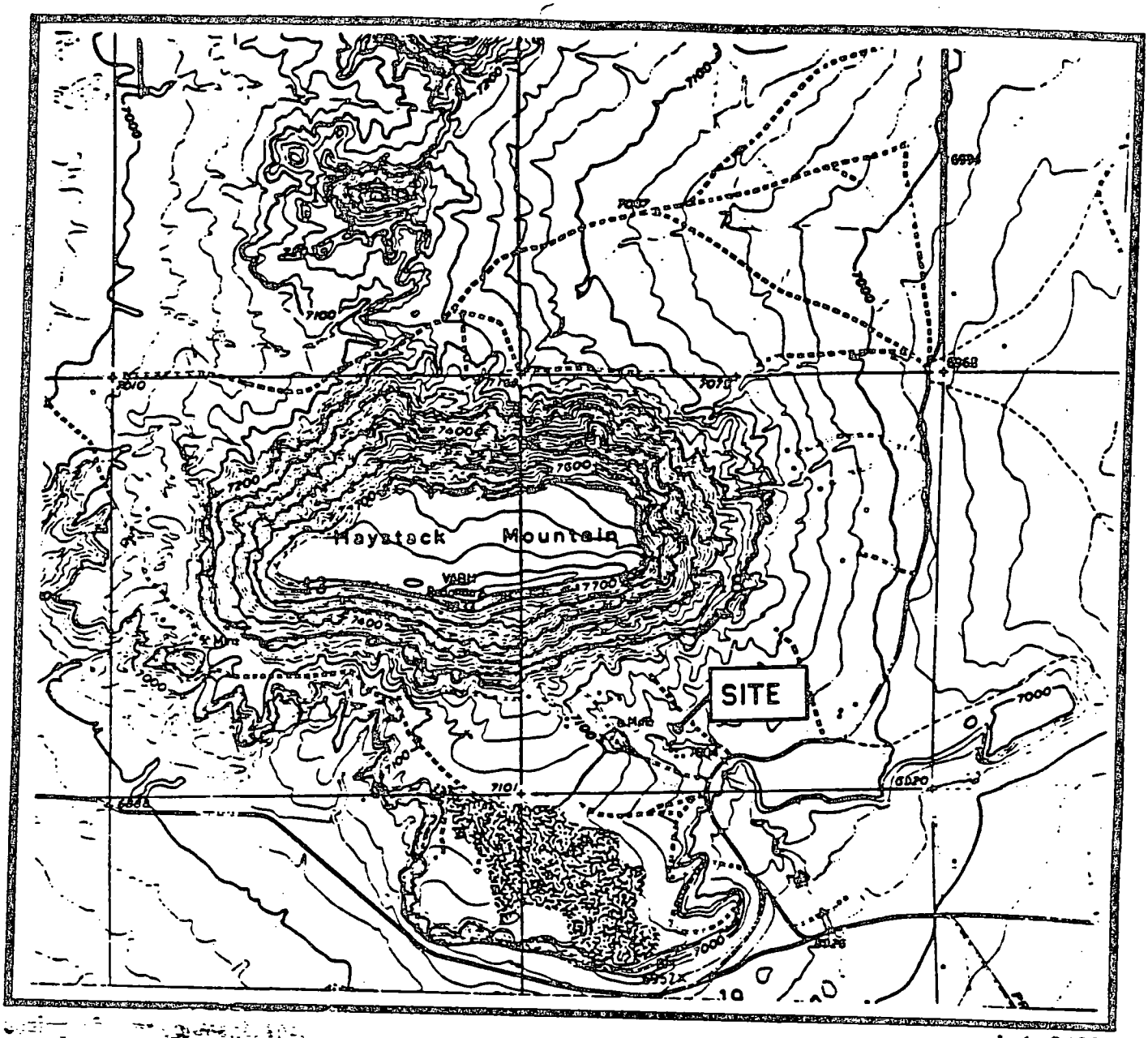


FIGURE 2
Site Location Map
Navajo Brown Vandever Mine

Source: USGS map
Bluewater, NM Quadrangle
1980

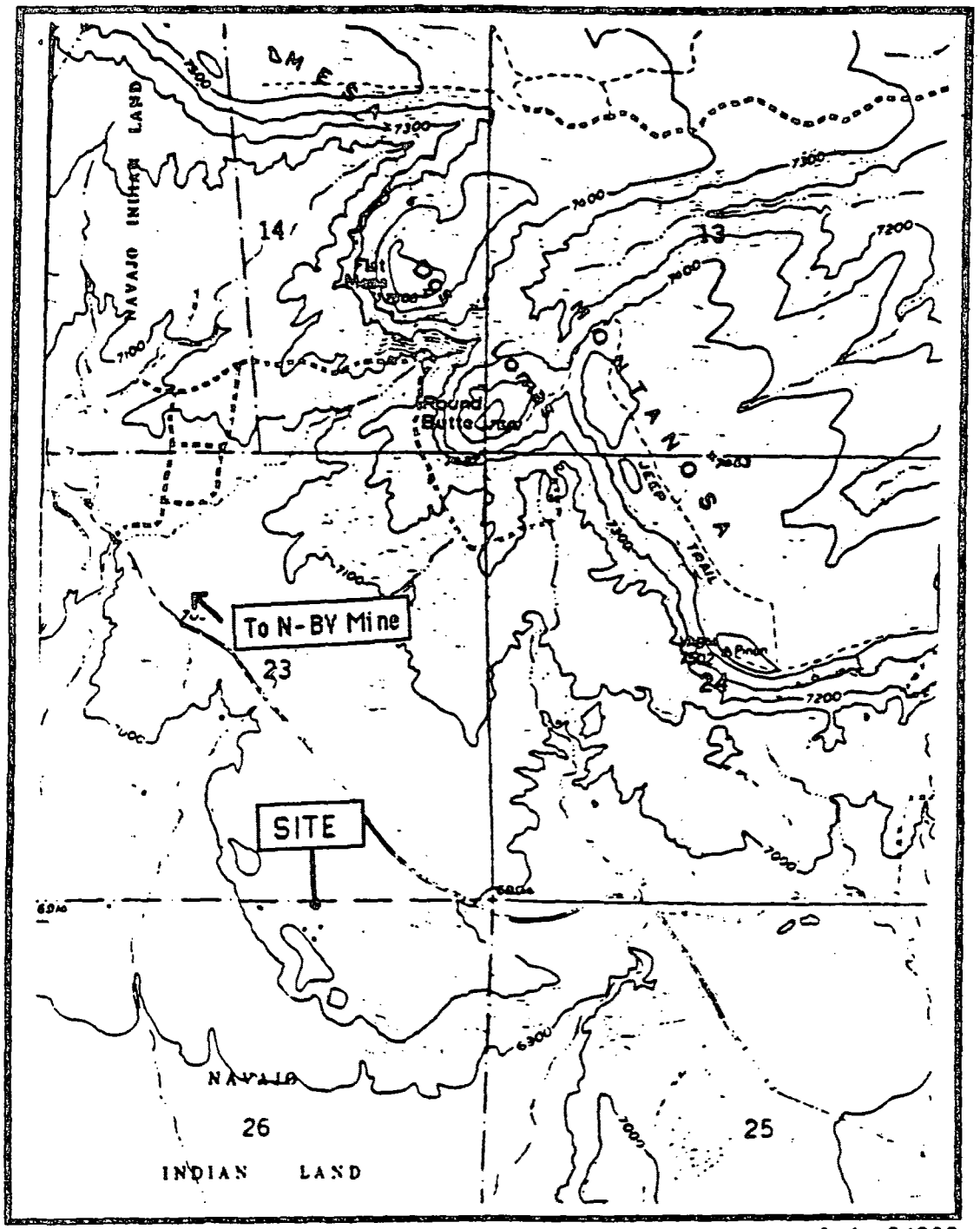


FIGURE 3
Site Location Map
Navajo Desiderio Mine

Source: USGS Map
Dos Lomas, NM Quadrangle
1980

activities (Photo A-D).

Geology locally consists of exposures of Jurassic Todilto limestone and Entrada sandstone. Vegetation consists of sparse grassland and pinyon-juniper woodlands.

Several families live and work near the Site. Approximately forty people, including children, live within one quarter mile of the Brown-Vandever and Brown-Nanabah sites. Approximately thirty people live on the Navajo-Desiderio site. The residents primarily utilize the affected mine areas to graze livestock. In addition, it was reported by ATSDR and the Navajo Nation Superfund that children often play in the mined areas.

2. **Location of Hazardous Substances**

The uranium ore is primarily calcium carnoite, $CaO-2UO_3-V_2O_5-nH_2O$, which disseminates through the Todilto limestone. Operations at the sites consisted of both open pits and underground mining techniques. Open pit mining was conducted predominantly with large front end loaders and haul trucks. The overburden, consisting of topsoil, alluvium and sandstone was blasted, removed and placed in large waste piles. It is estimated by the Navajo Nation that 25,000 tons of uranium ore was removed from these sites. Mined ore which failed to contain significant quantities of uranium were discarded at the mine sites; and no formal reclamation program was undertaken after mining operations ceased. Because of the dry climate and lack of chemical weathering, these mining tailings and waste remained exposed and

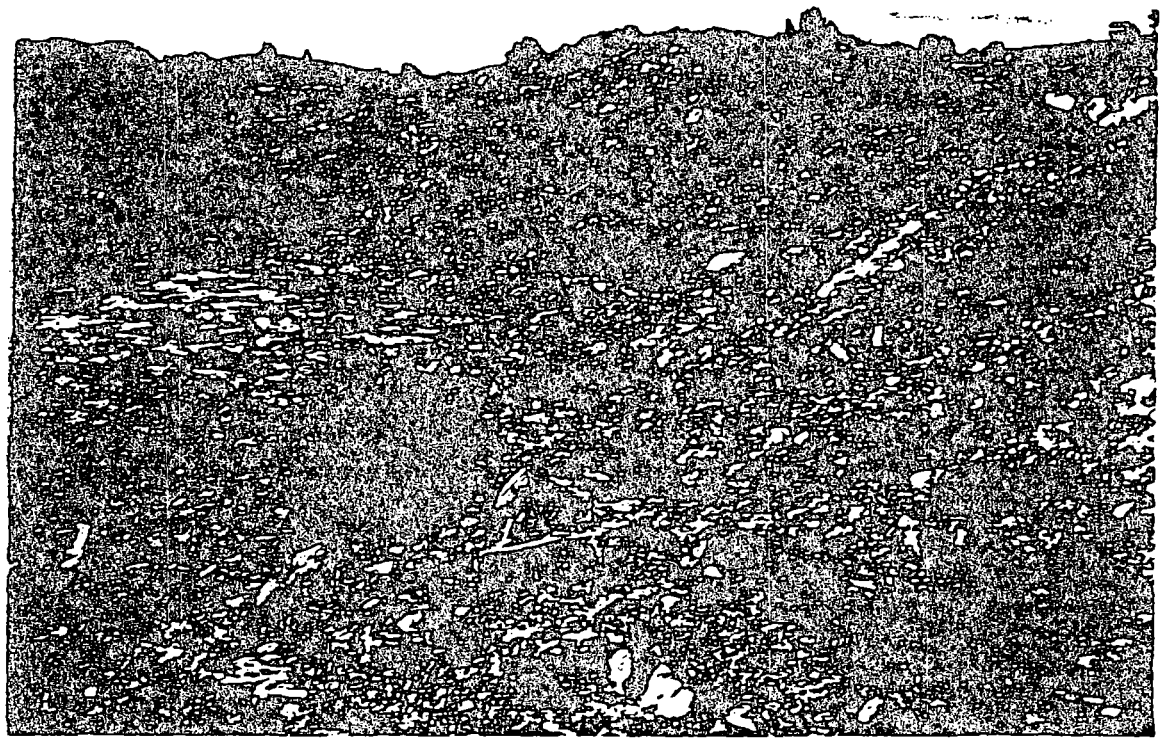


Photo A. Mine waste and protore (low grade ore) on Section 24, Brown-Vandever Allotment. (photo by Robert Bornstein)

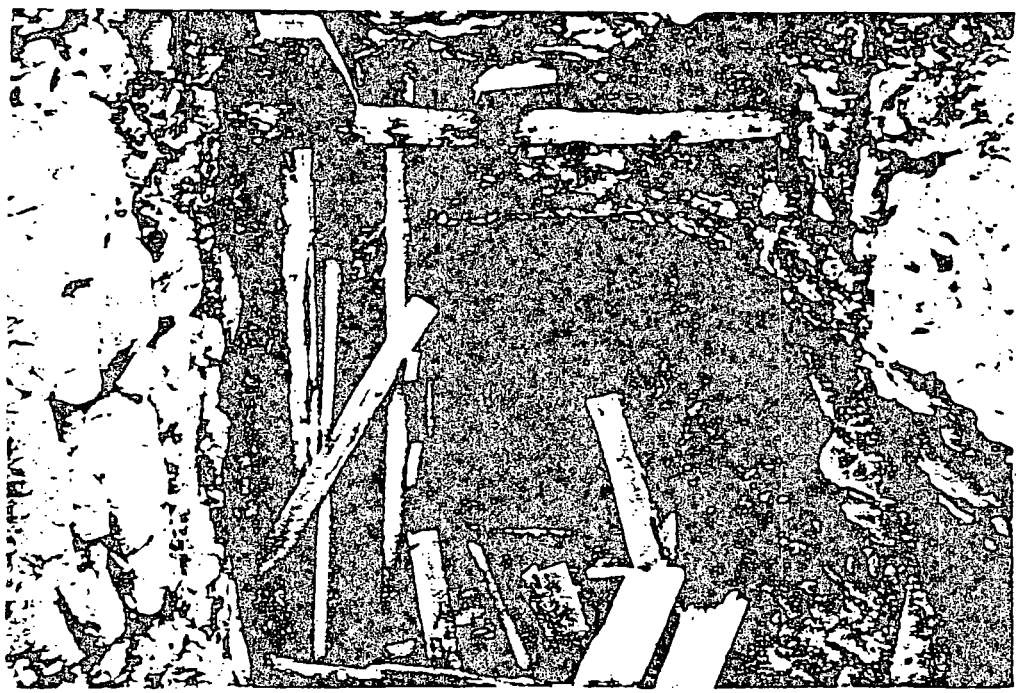


Photo B. Open mine adit located on the Navajo-Desiderio Mine Site. (photo by Craig Dodd, REAC)

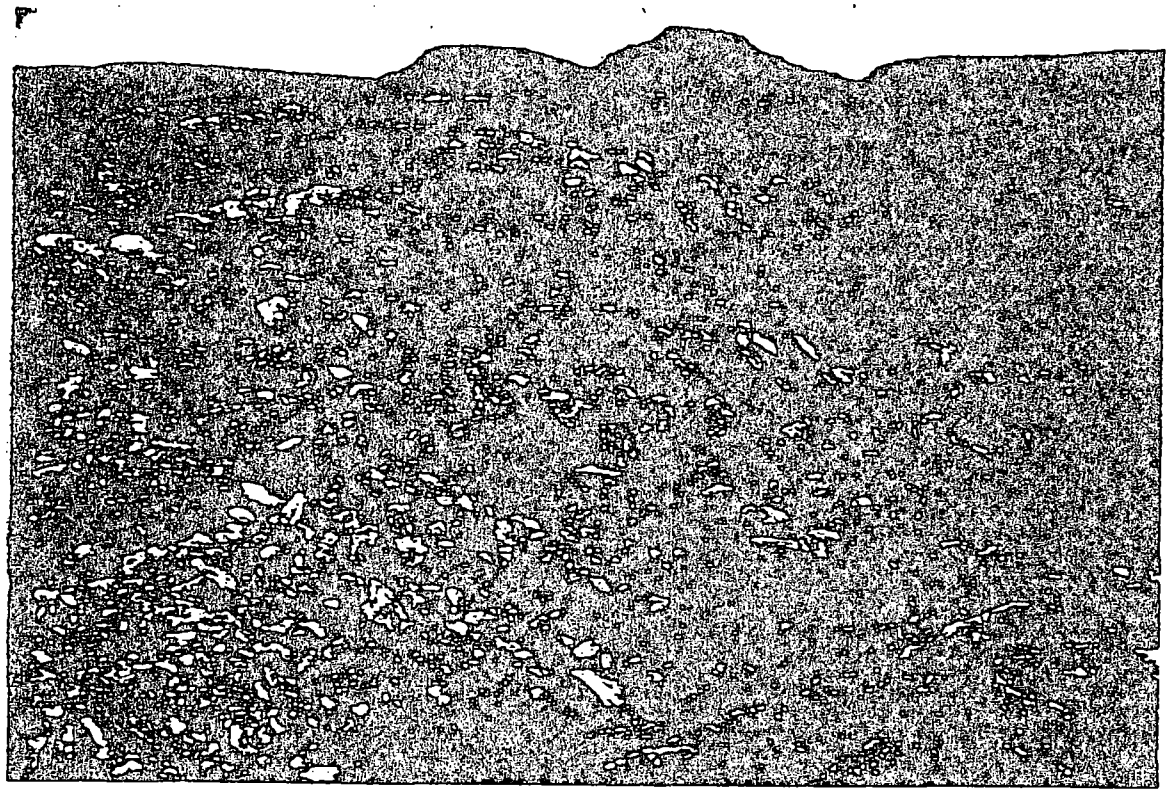


Photo C. Protore (low grade uranium ore) and overburden piles on the Navajo-Desiderio Mine site looking North from residence. (photo by Robert Bornstein)

Photo D. Large open pits and protore on the Navajo-Desiderio Mine Site looking east from residence. Mt. Taylor in background. (photo by Brad Shipley).

the landscape scared.

3. **Cause of the Release or Discharge**

As a result of mining operations, uranium bearing rock and soil littered the Sites. On November 15-16, 1990, the ERS staff, assisted by members of the EPA Office of Air and Radiation, conducted a field gamma survey and collected water and soil samples on and about the Brown-Vandever, Brown-Nanabah, and Desiderio Mine sites.

In order to assess the conditions present at the sites, the ERS staff using standard radiation detection equipment (Ludlum model 19), first obtained background radiation measurements at a distance of 2.5 miles, 1.0 mile and approximately .5 miles from the sites. ERS staff took radiation readings at several sampling locations within the immediate vicinity of the sites. Measurements were taken at both ground level and at waist level. Waist level measurements are indicative of human exposure levels, whereas the contact measurements taken at ground level suggest the emission rate of the radioactive materials from the soil.

Ground level background readings obtained by the ERS staff ranged from 11 microroentgens per hour (uR/hr) to 20 uR/hr, while waist level background readings ranged from 11 uR/hr to 15 uR/hr. Within the immediate vicinity of the sites, the net waist level (ba ground subtracted) radiation levels ranged from 20 uR/hr to over 750 uR/hr. On ground contact, the maximum on-Site radiation level was recorded over 1000 uR/hr.

Elevated concentrations of radium (Ra-226/228) and uranium isotopes (U-223/224/235/238) were also detected in on-site soils. The maximum levels detected for radioisotopes in surface soils at the sites (within the top 15 centimeters of soil) were radium, which was measured in excess of 260 picocuries per gram of soil (pCi/g) and for uranium species, which were measured at more than 300 pCi/g. Soil samples which were analyzed for heavy metal contamination did not reveal any significant amount of contamination.

A more through gamma survey was conducted on August 11-19, 1991 by EPA on Section 24 (Brown-Nanabah) and Section 18 (Brown-Vandever) and Desiderio Site prior to reclamation activities (See Appendix A). The surveys were conducted using a 50 foot by 50 foot grid. Figures 4-6 show the respective results from the surveys.

Radiation is a known carcinogen, mutagen and teratogen. Exposure to elevated gamma radiation is known to cause cancer, cataracts, and shorten the life span of affected individuals. As indicated above, elevated radionuclide levels were detected at the sites in both the soil and waste materials. These radionuclides have been found to emit radiation at levels which may present a danger to populations in the vicinity of the Site. Uranium and several of its decay daughters are alpha emitters. The inhalation of radionuclides that are alpha emitters exposes an affected individual's internal organs to damaging alpha radiation. Once

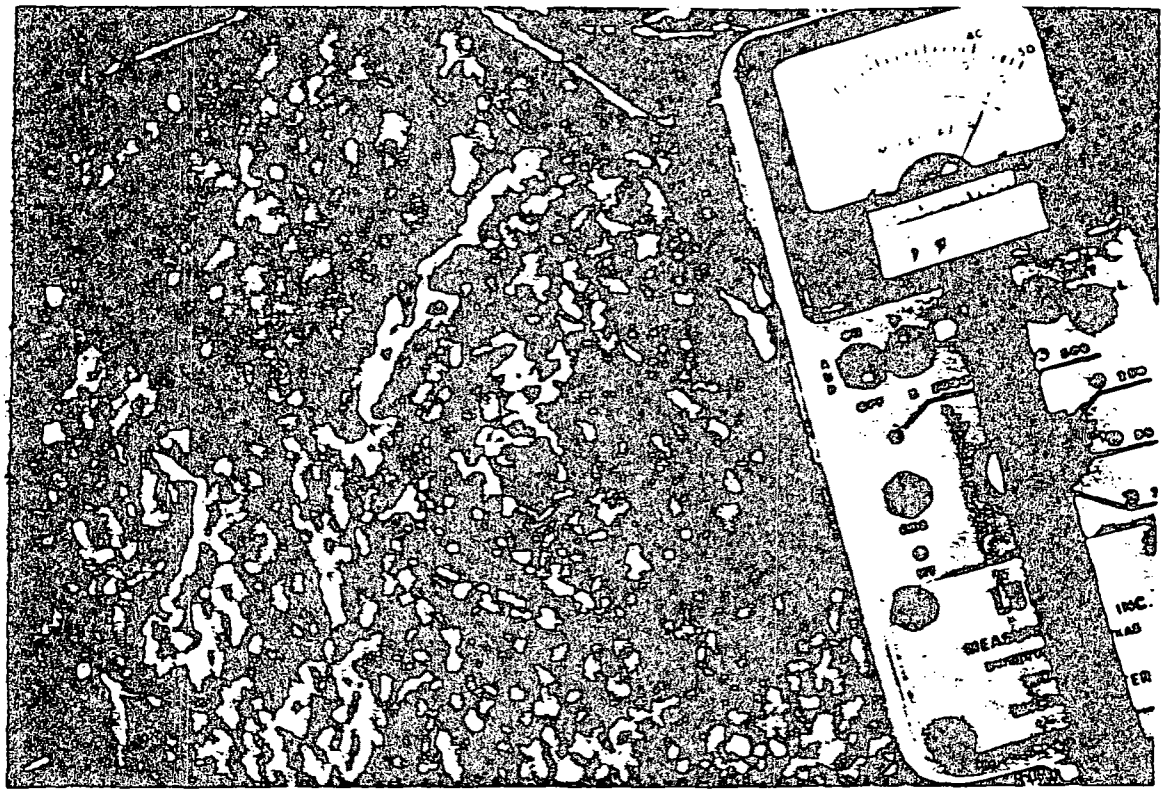


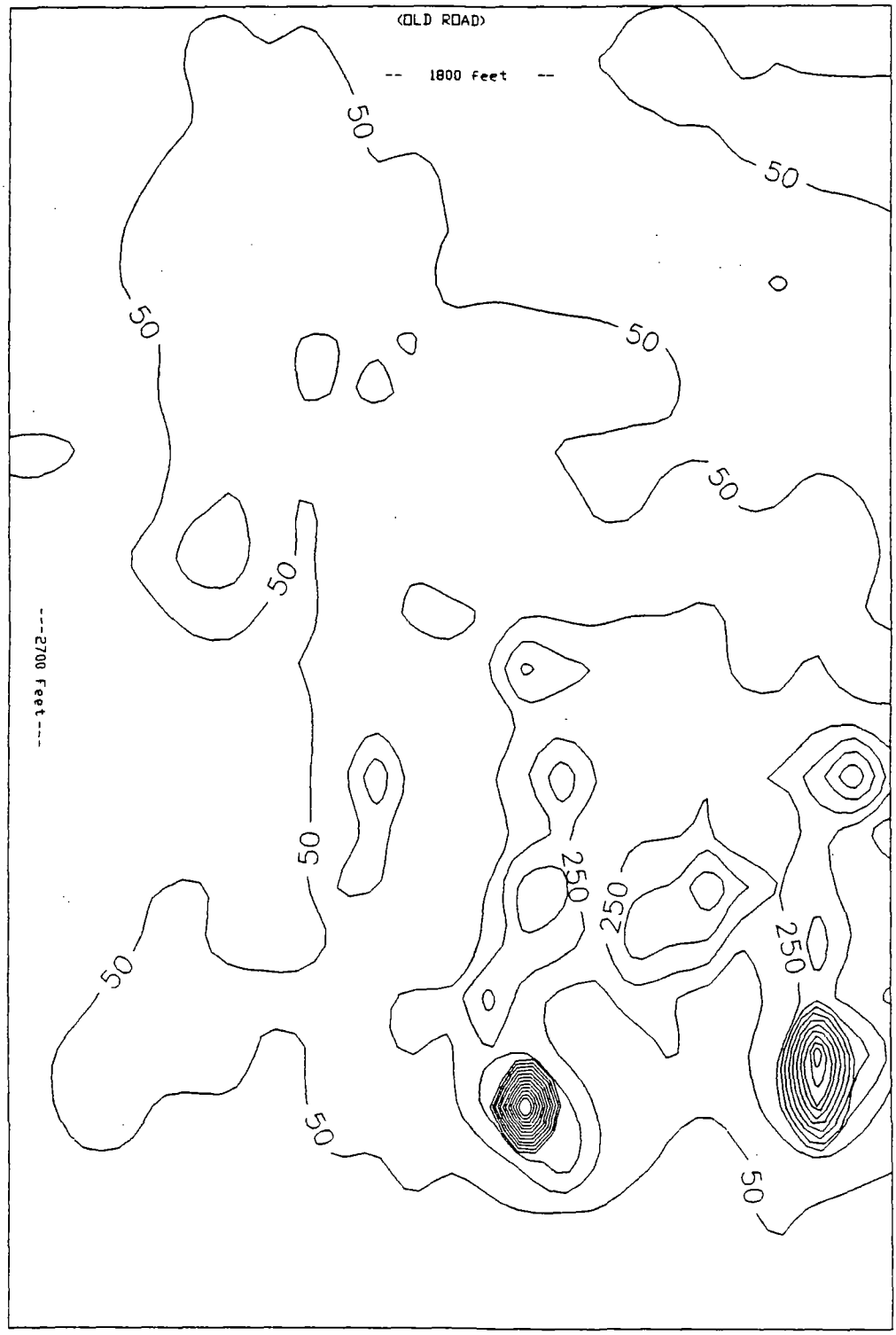
Photo E. Todilto limestone containing uranium ore. Meter is reading 230 uR/hr. (photo by Jerry Gels, REAC)

Photo F. Gamma survey being conducted by Chris Dodd, REAC on Section 18 (Brown-Vandever). (photo by Robert Bornstein)

Figure 4.

PRE-RECLAMATION
NANABAH ALLOTMENT (SEC. 24, T13N, R11W)

HAYSTACK MOUNTIAN



SECTION 19 (Santa Fe Pacific Minerals)

LEGEND

VALUES IN uR/Hr

Survey Conducted on 50' X 50' Grid

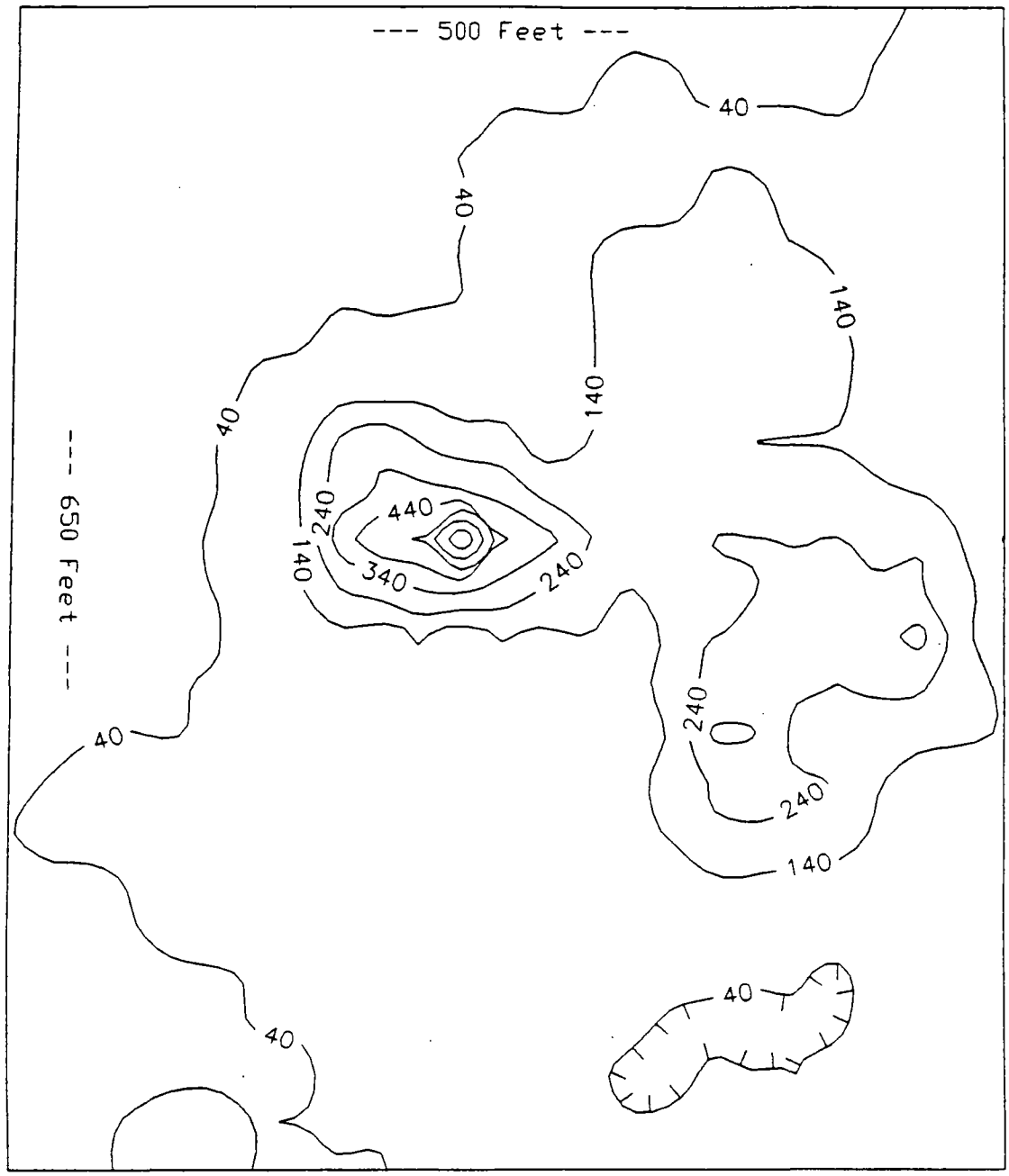
Waist Level Measurements

NORTH

Figure 5.

PRE-RECLAMATION

BROWN-VANDEVER ALLOTMENT (SEC. 18, T13N, R10W)



LEGEND

VALUES IN uR/Hr

Survey Conducted on 50' X 50' Grid

Waist Level Measurements

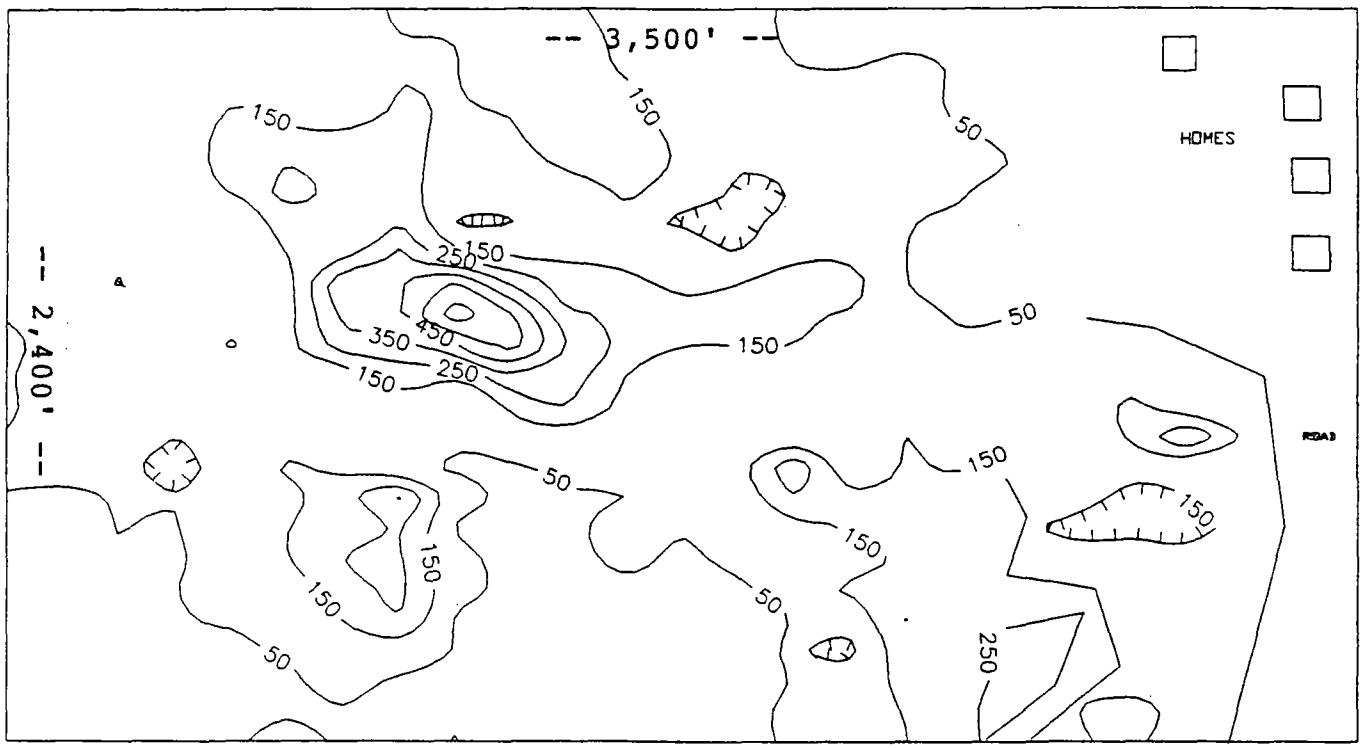
100 uR/Hr Contour Interval

NORTH

ERS Graphics 9/91

Figure 6.

PRE-RECLAMATION
NAVAJO-DESIDERIO MINE SITE



LEGEND
VALUES IN uR/Hr
Survey Conducted on 100' X 100' Grid

Waist Level Measurements
100 uR/Hr Contour Interval

ERS Graphics 9/91

N

ingested, the alpha emitters become trapped within the body, and can thereby cause severe organ damage as well as certain genetic defects.

4. Efforts to Obtain Response by Responsible Parties

a. Federal and Indian Allotments

The Bluewater Uranium sites consist of parcels administered, owned and/or operated by several entities. An interagency task force consisting of representatives of the Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), Department of the Interior (DOI), Department of Energy (DOE), EPA, Navajo Nation Superfund Program (NSF), Indian Health Services (IHS), and ATSDR was organized to discuss response options for the sites. The Region IX Emergency Response Section (ERS) began an ongoing dialog with local and regional BIA and DOI representatives in late 1990, in order to ensure close coordination between all Federal Agencies regarding a response action at the Bluewater Sites. To acquire specific information regarding the leases at the Sites, EPA issued BIA a CERCLA 104 Request for Information. Several of the leases on the Indian Allotments contained reclamation clauses that appeared not to be enforced.

On April 8, 1991, members of the BIA, BLM, DOI, IHS and Navajo Nation met to discuss response activities. EPA ERS could not attend the meeting in Albuquerque because of travel restrictions. At the meeting, it was determined that EPA most

EPA's response costs). Furthermore, the IAG itself stated that BIA's agreement to pay EPA for certain costs of the response action would in no way constitute an admission of liability under the Act. Finally, a special condition to the IAG clearly indicated that the Agreement was not to be viewed as a precedent for the payment of EPA's response costs at other sites in Indian country.

Since the time of the first Interagency meeting concerning the Bluewater sites, it has been EPA's understanding that DOI representatives in Washington D.C. had been generally apprised of the development of the IAG, and had received copies of the relevant correspondence concerning this cooperative effort. Based on this understanding, EPA sent the proposed agreement to DOI Assistant Secretary John Schrote for signature on July 15, 1991.

Thereafter, on August 1, 1991, DOI representatives informed EPA Region IX that, contrary to previous indications from local and regional DOI officials, the DOI would not agree to participate as a signatory to the IAG.

DOI officials believed that the Agreement might be viewed by other parties as a precedent for future response actions. DOI proposed to EPA that it would perform the necessary response actions on the Indian Allotments.

In response to DOI's concern, EPA first offered to revise the IAG, to incorporate any new language that DOI might suggest. However, DOI responded that it was the very concept of the IAG,

likely could provide the most expedient response.

A second Interagency meeting was held on June 3, 1991 to visit the Sites and discuss the time critical actions and potential cooperative agreements. At this meeting, the DOE stated it would assume full responsibility in conducting response actions on the DOE parcel (Section 18).

At this meeting DOI OEA stated it would try to enter into an Interagency Agreement (IAG) with EPA to conduct the response activities on the Indian Allotments. Several drafts of the IAG were created and revised by both EPA and DOI OEA.

For several months, an effort to develop an IAG for the response action was undertaken by ERS and DOI representatives. Pursuant to the terms of the negotiated IAG, ERS was to conduct the response activities at the site, and DOI was to reimburse EPA for specified costs of the response, pursuant to its authority under the Snyder Act.

In drafting the IAG, EPA Region IX was well aware of DOI's sensitivity concerning the possible precedent which the Agreement might establish for the remediation of other BIA-adminstered mining sites. In light of this concern, EPA Region IX crafted site-specific IAG language, to minimize the implication of BIA liability for site remediation under CERCLA. While the proposed IAG still referred to CERCLA (as the statutory basis for EPA's response activity at the sites), it also specifically referenced the Snyder Act (as the authority supporting BIA reimbursement of

rather than its specific language, that was objectionable to the Department. EPA then indicated that it would consider DOI's proposal to perform the response action. However, EPA stressed the need for prompt action at the sites. A deadline of August 5, 1991 was agreed upon for DOI to submit to EPA a work plan outlining its response action and schedule. The August 5 deadline passed without any additional communication between DOI and EPA. On August 6, EPA still did not receive a firm commitment from DOI to promptly initiate work at the sites. DOI informed EPA that it was having problems obtaining the required funding to perform the site response and that a special request to Congress was required. This request was estimated to take at least two to three weeks.

Given the serious health hazards which the sites posed and the need for prompt action to abate those hazards, EPA had no choice but to proceeded on schedule to undertake the required response activities.

EPA is coordinating with the EPA Headquarter Federal Affairs Office and the Department of Justice to further investigate options on seeking cost reimbursement from DOI.

b. Private Land

EPA conducted a Potential Responsible Party search to investigate the historical mining records. The PRP search revealed that the mineral rights for Section 19, Township 13N, Range 10W was held and controlled by the Santa Fe Pacific Railroad Company (SFPR). SFPR owned the mineral rights to the site for the

period from 1951 to the early 1980's. During this period of time, uranium mining operation were conducted at the site. In mid-1980, mineral rights were transferred to Cerrillos Land Company, a SFPR company.

From November 21, 1950, to September 30, 1952, SFPR conducted drilling, sampling, test pitting and other mining operations at the Site. According to the mineral leasing history and corporate chronology supplied to EPA by Mr. Tim Leftwich, Director of Environmental Quality for both the Cerrillos Land Company (CLC) and the Santa Fe Pacific Minerals Corporation (SFPM), the Haystack Mountain Development Company (HMDC) was incorporated on October 15, 1951, as a subsidiary of the Atchison, Topeka and Santa Fe Railway. From September 30, 1952 to November 30, 1961, SFPR formally leased the mineral rights to Section 19 to HMDC. From September 30, 1952 to November 30, 1961, HMCD conducted mining operations on Section 19.

From the mining history record, EPA served a CERCLA 106 Unilateral Order to Cerrillos Land Company, Santa Fe Pacific Railroad Company and the Atchison, Topeka and Santa Fe Railway Company (ATSF) on July 29, 1991.

On August 13, 1991, a conference was held in Albuquerque with the respondents of the Order. It was agreed upon that Cerrillos Land Company would assume the "lead" entity during the response action and that the respondents would comply with the Order. On August 26, 1991, Taylor Excavation mobilized on Section 19 to

begin reclamation activities for Cerrillos Land Company.

B. ORGANIZATION OF THE RESPONSE

On June 10, 1991, Jeff Zelikson, Director, Hazardous Waste Management Division, Region IX approved the Action Memorandum. Pursuant to OSWER Directive 9360.0-19, the Bluewater action is considered nationally significant, and therefore, required EPA Headquarter's concurrence. After much anticipation, on July 26, 1991, Henry Longest, Director of the Office of Emergency and Remedial Response concurred on the Action Memorandum. With Headquarters approval, ERS prepared to conduct the response.

The response action was conducted in three phases. Phase 1 contained activities to further characterize and define areas with elevated gamma radiation readings; Phase 2 dealt with the excavation and covering of uranium ore, mine waste, and closing of shafts and adits; and Phase 3 involved revegetation activities and the posting of warning signs.

* Phase 1 Definition and Extent of Problem
  - Conduct extensive gamma survey using a 50' X 50' grid.
  - Evaluate soil and overburden piles for use as cover.
* Phase 2 Excavation and Earth Moving Activities
  - Fill and cover in all open pits with radioactive materials.
  - Reduce elevated gamma radiation readings to below 50 uR/Hr.
  - Fill and Close all shafts, adits and inclines.
  - Conduct Post Removal gamma surveys to ensure proper clean-up levels.

* Phase 3 Revegetation and Posting

  - Disk and Drill seed mixture.

  - Post warning signs in English, Navajo and Spanish to advise people to not disturb the reclamated surface.

To conduct Phase 2 and 3 activities, EPA Region IX contracted with Laguna Construction Company. A site specific contract was negotiated between Jeri Simmons, Region IX Contracting Officer and Neal Kasper, President of Laguna Construction. Laguna Construction was selected by EPA Region IX for the following reasons:

* Experience in the field of Uranium Mining Reclamation

Laguna Construction was established with the assistance of the Bureau of Indian Affairs and the Publeo of Laguna to perform the mine reclamation action at the Jackpile Mine, the world's largest open-pit uranium mine. Laguna construction has moved over 11.8 million cubic yards of material at Jackpile and has built an outstanding track record in mine reclamation actions.

The Bluewater response action required similar actions and expertise demonstrated by Laguna Construction at Jackpile. In addition, Laguna Construction was the most qualified mine reclamation contractor in the Bluewater-Grants Mining District. The company was familiar with the regional geology and topography.

* Minority owned and Operated Business

It is the policy of the EPA to enter into contracts with small minority business that could adequately perform the tasks. Laguna Construction is a wholly owned and operated enterprise of the Pueblo of Laguna Indians. EPA wishes to use an Indian owned and operated company on Indian Lands.

EPA Region IX believed that a site specific contract to conduct this action would be more practical and cost efficient rather than issuing a delivery order to the present ERCS

contractor.

To assist in conducting the radiological surveys and providing site health physicist support, ERS utilized the expertise and experience of the Environmental Response Team's (ERT) radiological support staff and its contractor Weston (REAC). Additional radiological support was provided to ERS by EPA Region IX Office of Air and Radiation (OAR). Both ERT/REAC and OAR provided invaluable support and expertise throughout the response action. Additional site support was provided by the Navajo Superfund Program (NSP). Table 1 outlines the organization of the response and lists key site personnel contacts.

C. **INJURY/POSSIBLE INJURY TO NATURAL RESOURCES**

Wildlife species in the area of the Sites are restricted to birds, reptiles, and small mammals characteristic of the pinyon-juniper and grassland habitats. This includes rabbits, foxes, field rodents, rattlesnakes, hawks, blue birds, and other creatures. Livestock utilizing the sites are horses, cows, goats and sheep. Continuous exposure to the elevated gamma emissions could adversely impact local wildlife and grazing livestock.

2. **Trustee Damage Assessment and Restoration Activities**

No formal endangerment assessment was performed at the sites by the Department of the Interior or EPA.

The affected reclamated areas were revegetated using native

Table 1. Organization of Response

AGENCY/PARTY	CONTACT	DESCRIPTION OF DUTIES
USEPA-REG IX Emergency Response H-8-3 75 Hawthorne Street SF, CA 94015 415-744-2298	Rob Bornstein	Federal OSC, responsible for all site operations
	Bill Weis	Enforcement Investigator Cost Recovery Specialist
USEPA-ORC 75 Hawthorne Street SF, CA 94105 415-744-1359	Linda Wandres	Attorney assigned to the site
USEPA-OAR 75 Hawthorne Street SF., CA 94105 415-744-1049	Steve Dean	Health Physicist Radiation Support
USEPA-ERT 26 W. MLK Dr. Cinn., OH 45268 513-569-7537	Art Ball	ERT Response Manager Radiation Support
Weston REAC 11 Spiral Dr. Suite 6-7, Bldg. B Florence, KY 41042 606-282-7868	Jerry Gels	Health Physicist Radiation Support
	Craig Dodd	Radiation Support
Navajo Superfund P.O. Box 2946 Window Rock, AZ 602-871-7331	Pat Antonio Stan Edison Guarva Rajen	Assisted in PA/SI and Response Support
Laguna Const. P.O. Box 206 Laguna, NM 87026 505-552-6000	Neal Kasper Jack Presnell	Prime Contractor conducting response

grass species. Additional pinyon and juniper trees will be planted by the Navajo Nation in early Spring of 1992.

D. CHRONOLOGICAL NARRATIVE OF RESPONSE ACTIONS

1. THREAT ABATEMENT ACTION TAKEN

a. Phase 1

Phase 1 activities commenced on August 12, 1991. OSC Bornstein assisted by Art Ball (ERT), Jerry Gels (REAC), Ken Munney (REAC) and the Navajo Superfund laid out a 50 foot by 50 foot grid across the hummocky topography on Section 24 and Section 18 of the Brown-Vandever-Nanabah Allotments. The grid was laid across an area of 1800 feet East-West by 2700 feet North-South on Section 24 and 650 feet North-South by 150 feet East-West across Section 18. A modified 50 foot by 50 foot survey utilizing the site's aerial photograph was performed on the Desiderio mine site (refer to Figures 4-6).

After the grids were established, a Ludlum model 19 instrument was utilized to conduct a thorough gamma survey. Gamma readings were collected at both waist level and ground contact at each grid node. A second survey was conducted at waist level targeting limestone contacts and rubble to pin point "hot spots."

During the week of August 11, 1991, surveyors from Laguna Construction surveyed and developed contour maps on each affected section.

b. Phase 2

Phase 2 activities began on August 19, 1991 with the

mobilization of Laguna Constructions equipment and personnel. Mobilized on site to conduct the earth moving activities were three Cat D-9N dozers, one Cat D-6H dozer, one Cat 14G grader and one Cat 980C front end loader. In addition, Laguna Construction mobilized a lube and fuel truck, mechanic truck, fuel storage tank, and lunch room. All of the equipment arrived on schedule and in excellent working condition.

Earth moving activities began on Section 24 (Brown-Nanabah Allotment) on August 19, 1991. The D-9N dozers were utilized to push and cut the large piles of overburden fill. Piles containing "clean" fill (gamma readings of 20 uR/hr or less) were isolated and stockpiled for use as cover material. The large pits were first back filled with protore (low grade ore) and mine tailings and then covered with 1-3 feet of "clean" fill. After an area was completed, a gamma survey was conducted to ensure that gamma levels were under 50 uR/hr. Areas exceeding 50 uR/hr were flagged by ERT/REAC personnel and latter reworked. Laguna Construction completed earth moving activities on Section 24 on August 27, 1991. From August 27-31, earth moving activities were performed on Section 18.

Activities on Section 18 included back filling a large open adit, recontouring area drainage channels away from reclamated zones, and installing a drainage culvert.

On September 2, 1991, all of the tractors and support equipment were transported to the Navajo-Desiderio site. Earth

moving activities on the Desiderio site included the back filling of several large (up to 30 feet deep and 50 yards across) pits, the sealing and closure of a mine adit, the transportation, burial and covering of large protore piles, and the rechannelling and grading of drainage channels. Earth moving activities at the Desiderio site were completed on September 18, 1991. A 100 foot by 100 foot survey was conducted over the reclamated area to ensure that gamma radiation readings were below 50 uR/hr. Laguna Construction demobilized its equipment on September 19-20, 1991.

Throughout earth-moving activities, REAC conducted air monitoring using an aerosol particulate monitor to assess if level C personnel protection was necessary. At no time was level C personnel protection required during the response. Appendix B summaries the results of this study. Photos G-N show Laguna Construction equipment at work.

c. Phase 3

Phase 3 activities began in early September with the posting of the warning signs. The signs were placed along the perimeter of each reclamated section. Each sign was in English, Navajo and Spanish (see photo O). James Ranch was subcontracted by Laguna Construction to perform the revegetation activities. On September 18, 1991, James Ranch personnel and equipment mobilized at the Brown-Vandever site. The reclamated zones were disked and drill seeded using a mixture of native grasses. By September 21, 1991, James Ranch completed the job reseeding 70 acres of reclamated

Photo G. Laguna Construction Cat D-9N pushes mine tailings and protore on Section 24 (Brown-Nanabah). (photo by Robert Bornstein)

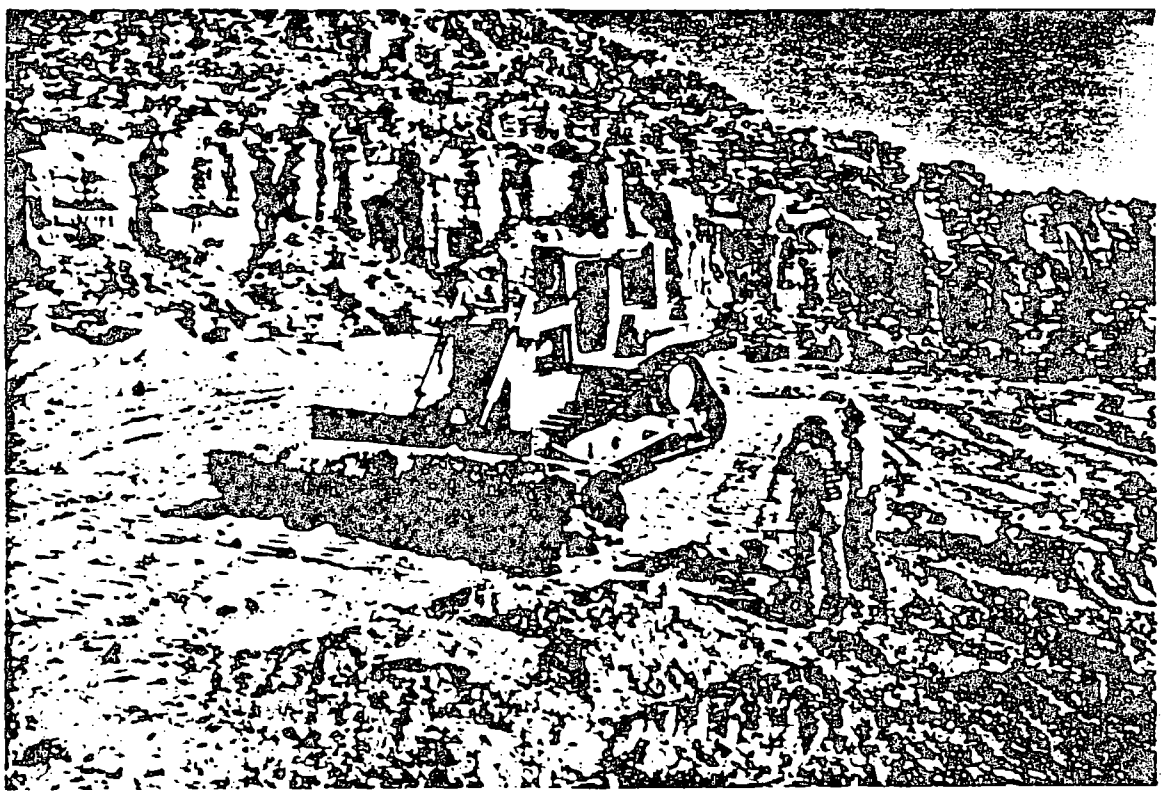


Photo H. Drainage colvert being installed by Laguna Construction on Section 18 (Brown-Vandever). Drainage routes were directed around reclamated areas. (photo by Jerry Gels, REAC)

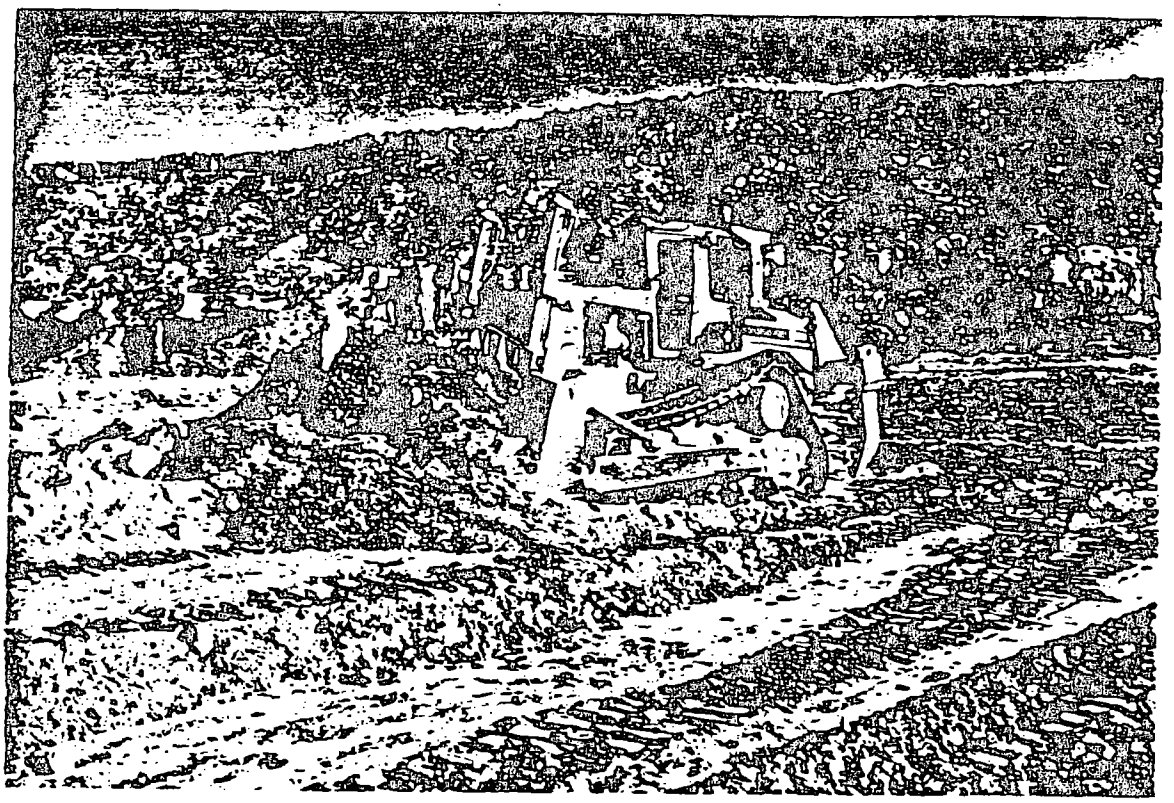


Photo I. A D-9N pushes "clean" fill over burried protore and mine tailings on Section 24 (Brown-Nanabah). Note, Haystack Mountain in background. (photo by Robert Bornstein)

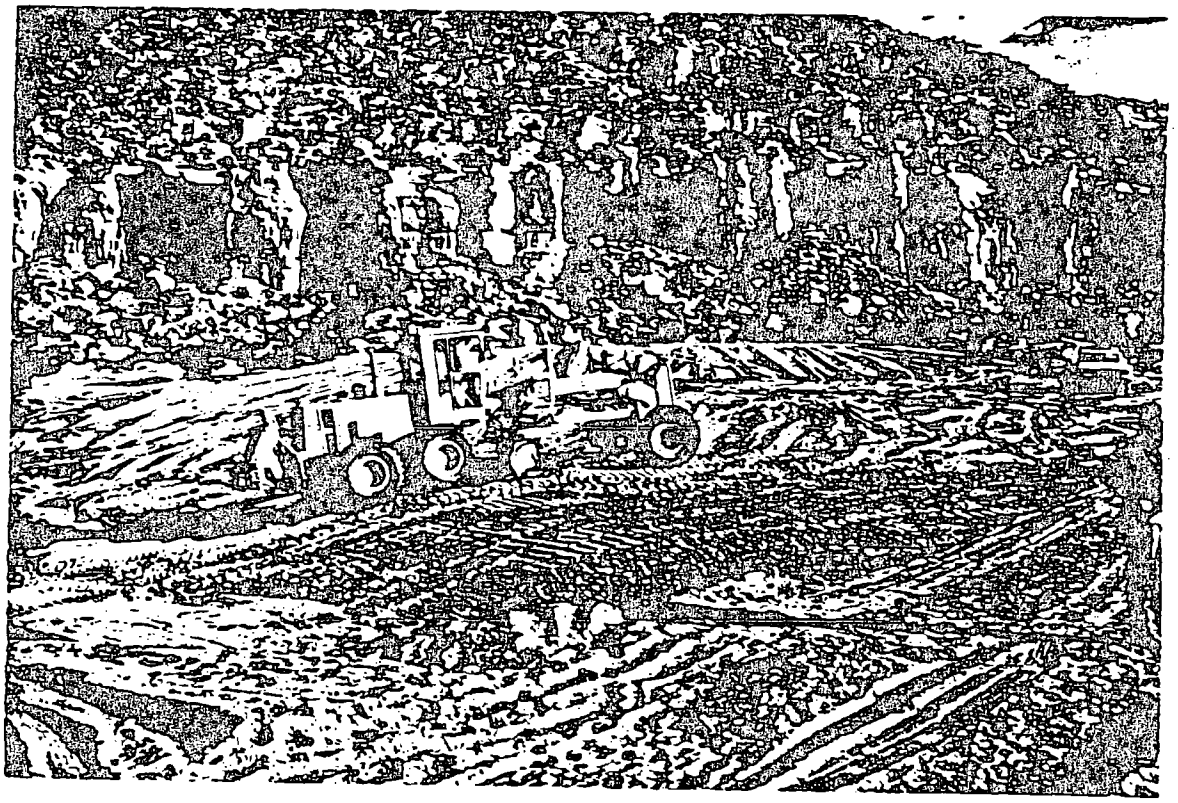


Photo J. A Cat 14G road grader was utilized to smooth the dozer wind rows and prepare the site for reseeding. Photo is taken looking north on Section 18 (Brown-Vandever). (photo by Robert Bornstein)

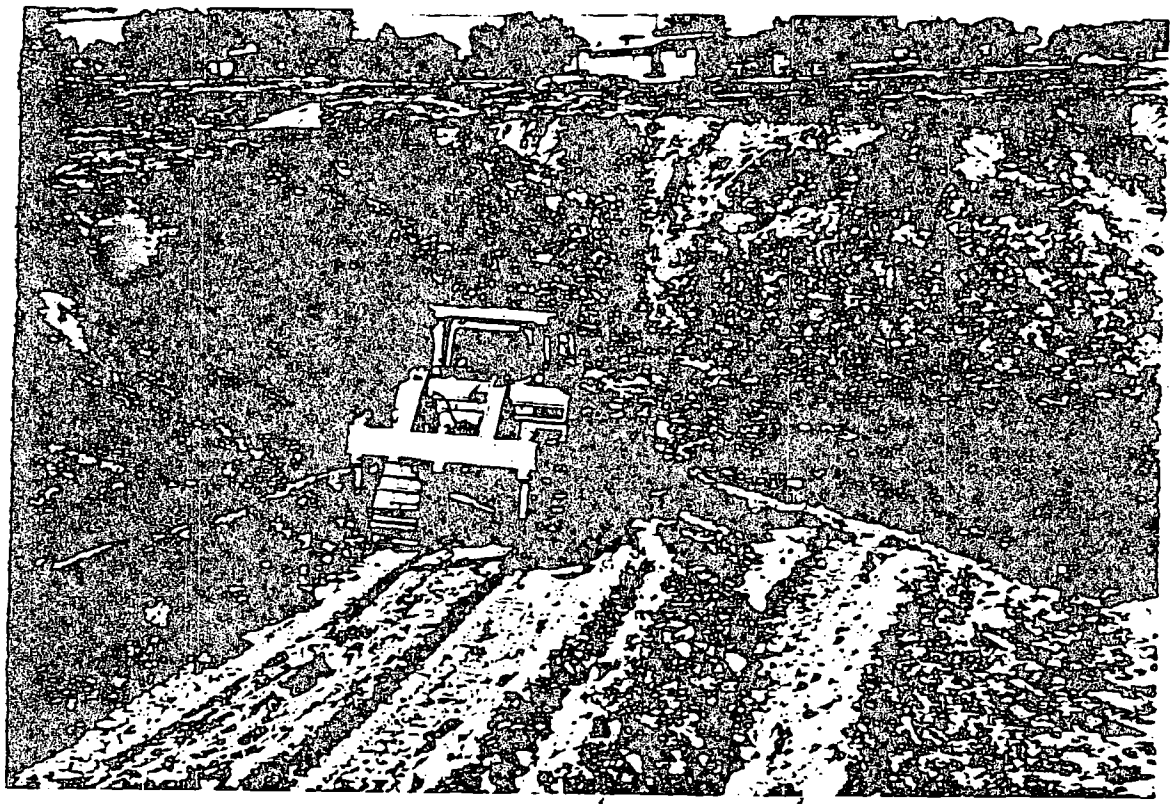


Photo K. A D-9N tractor pushes mine tailings and overburden into one of the many large open pits at the Desiderio Mine Site. (photo by Robert Bornstein)

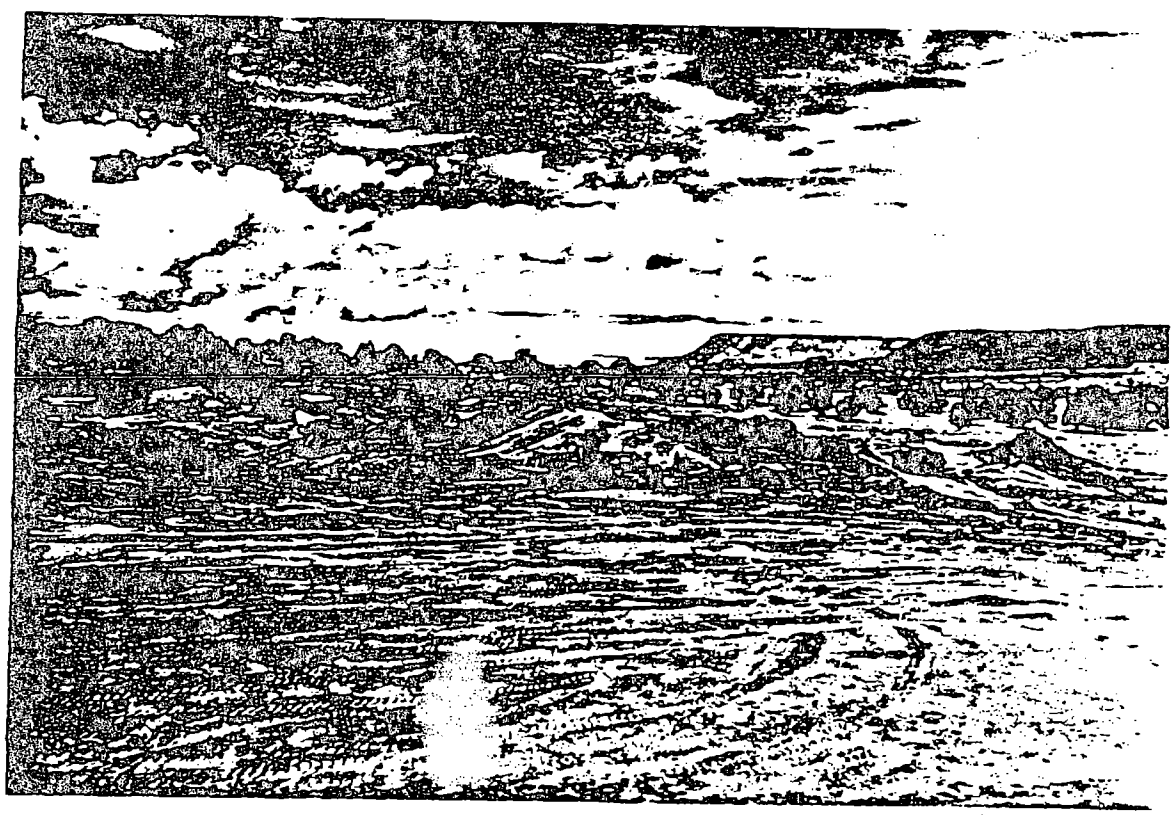


Photo L. D-9N tractors, Cat 14G road grader and a 980C-front end loader complete mine reclamation activities on the Desiderio Mine Site. (photo by Robert Bornstein)

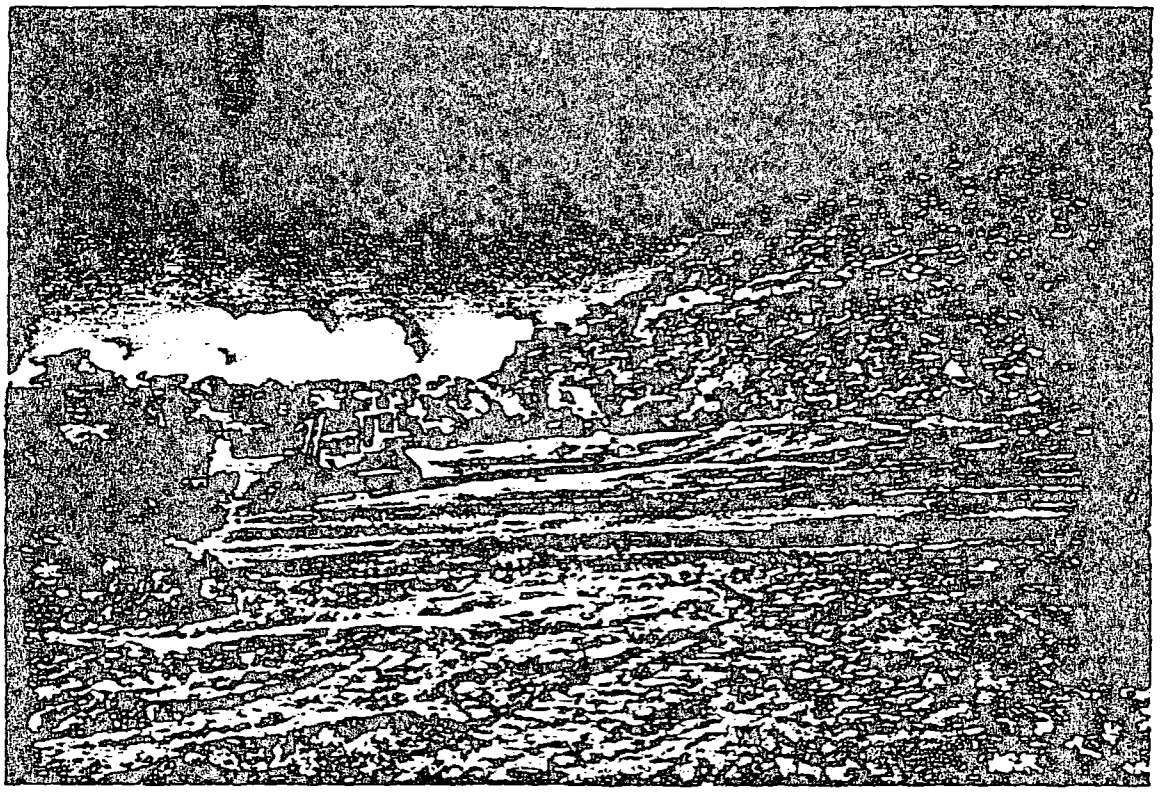


Photo M. A D-9N completes the finishing smoothing activities on Section 18 (Brown-Vandever). (photo by Robert Bornstein)

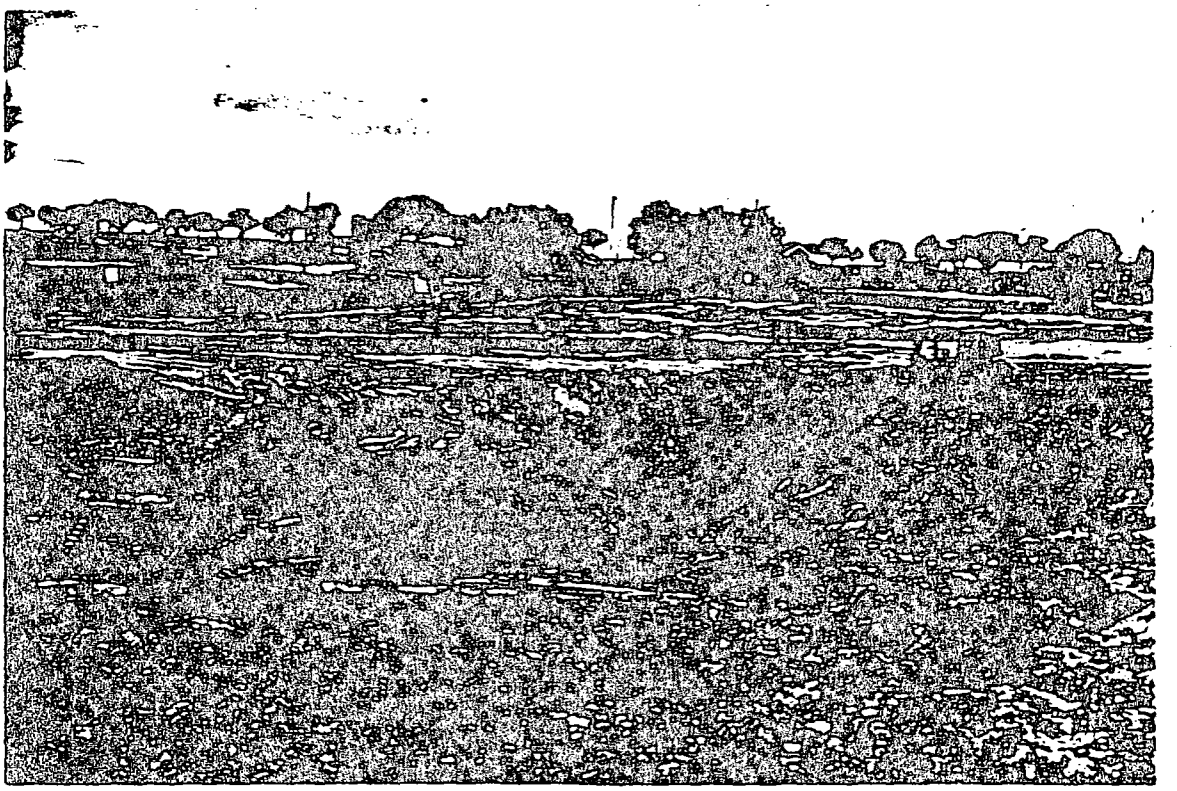


Photo N. Two massive D-9N work to fill in large pit on the Desiderio Mine Site. (photo by Robert Bornstein)

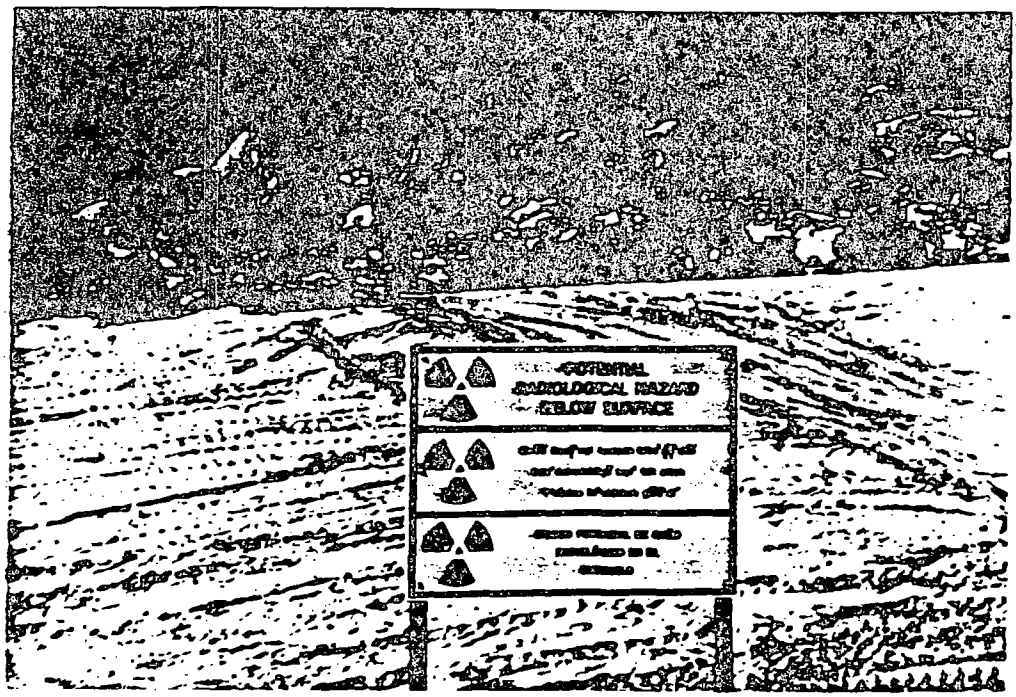


Photo O. Posted warning sign on Section 18 (Brown-Vandever). Note that the signs are in three languages: English, Navajo, and Spanish.(photo by Jerry Gels, REAC)

Photo P. Completed Section 24 looking south-easterly from section line. (photo by Jerry Gels, REAC)

land.

3. **Public Information and Community Relation Activities**

EPA's Office of External Affairs issued a press release informing the media of the response action. In addition, a Navajo Nation sponsored Press Conference was held on August 28, 1991 at the Baca Chapter House. Navajo President Peter Zah and OSC Robert Bornstein informed the media of the response action and answered several questions. Following the press conference, the media was invited to the site for a tour. News reports and articles regarding EPA's actions appeared on local TV stations and newspapers including the Albuquerque Journal, Navajo Times, Grants Beacon and Gallup Independent.

Throughout the response action, OSC Bornstein assisted by the Navajo Superfund informed the local residents on the progress and success of the response actions. A grant was given to the Navajo Superfund Program from ATSDR to conduct further community relation activities to inform the general public of the hazards of old uranium mines.

Copies of the Administrative Record were sent to the libraries in Grants and Gallup, New Mexico.

E. RESOURCES COMMITTED

The Emergency Response Section incurred a total estimated cost of $332,565.00. Out of this amount, $233,901 is for extramural costs associated with the work conducted by Laguna Construction. The remaining costs are for TAT, REAC, ERT and EPA.

Table 2 outlines the cost breakdown to date. EPA Region IX is consulting with EPA HQ Office of Federal Affairs and the Department of Justice in pursuing the Department of the Interior with cost recovery.

Table 2. Estimated Project Cost Summary

Ceilings:	Site Total	$629,770.00
	Laguna Construction	$300,877.00
	TAT/REAC	$ 56,000.00
Extramural Costs:		
	Laguna Construction	$233,901.00
EPA Contract Costs		
	TAT - Ecology and Environment	$ 6,156.00
	REAC - Weston	$ 30,000.00
EPA/ERT Costs		
	EPA/ERT	$ 62,508.00
RESPONSE TOTAL TO DATE		$332,565.00

II. EFFECTIVENESS OF REMOVAL ACTION

The following response activities were completed by September 18, 1991:

* Filled, graded and applied an earth cover to areas emitting elevated gamma radiation;
* Filled, sealed and capped mine adits, inclines and shafts;
* Posted warning signs on site to advise people to not disturb reclamated areas;
* Revegetated affected zones with natural grasses.

The National Council on Radiation Protection and Measurements (NCRP) Report 91 (1987) recommends the adoption of a limit for continuous or frequent exposure to radiation, at 100 mrem/yr effective dose equivalent (EDE) from all radiation sources (including external as well as internal sources but excluding natural background and medical exposures). The NCRP report also recommends that a limit of 500 mrem/yr be established for infrequent or "short term" exposure. In accordance with the above referenced NCRP guidelines, EPA's Office of Air and Radiation (OAR) has concurred with Region IX's Action Memorandum for the Bluewater Sites, which recommends that a limit of 100 mrem/yr of excess gamma radiation be adopted as a standard in this case.

Natural background gamma radiation from external sources in the vicinity of the Bluewater Uranium Mine Sites varies considerably and is dependent upon local geology. It may be as low as 12 uR/hr in areas lacking natural uranium deposits and as high as 20 uR/hr in areas containing uranium rich ore. Naturally exposed uranium rich Todilto limestone outcrops at the Desiderio Mine Site recorded readings as high as 50 uR/hr at waist level. For the purpose of this response action, EPA has estimated that the population in question (on average) spends two hours a day for 300 days/yr in the areas affected by mine operations. A more conservative estimate of 7 hours a day was given to EPA by the Navajo Superfund Program in May of 1991.

Navajo Superfund Program in May of 1991.

A. RESPONSE RESULTS

BROWN-VANDEVER-NANABAH SECTION 24

A 50 foot by 50 foot grid survey was conducted at the Brown-Vandever-Nanabah sites. The results of the post removal survey on Section 24, Township 13N, Range 10W of the Bluewater Quadrangle (Brown-Nanabah site) reveal that gamma radiation levels (once exceeding 500 uR/hr in places) have been drastically reduced (Figure 7). The average gamma reading within the reclaimed area is presently 28 uR/hr. The highest reading recorded within the survey was 56 uR/hr. In addition to reducing gamma radiation emissions, the covering of the protore and mine wastes most likely has reduced the surface radium and other radionuclide concentrations in the top 15 cm of soil (post analytical results are pending), as well as radon flux.

Using the average gamma reading, the population would receive a yearly excess gamma radiation dose of 7.8 mrem/yr. This compares to the average annual background radiation dose received in the United States of 300 mrem/yr as reported by the NCRP.

(28 uR/hr - 15 uR/hr) * 2 hours * 300 days/yr = 7800 uR/yr
7800 uR/yr = 7.8 mR/yr = 7.8 mrem/yr

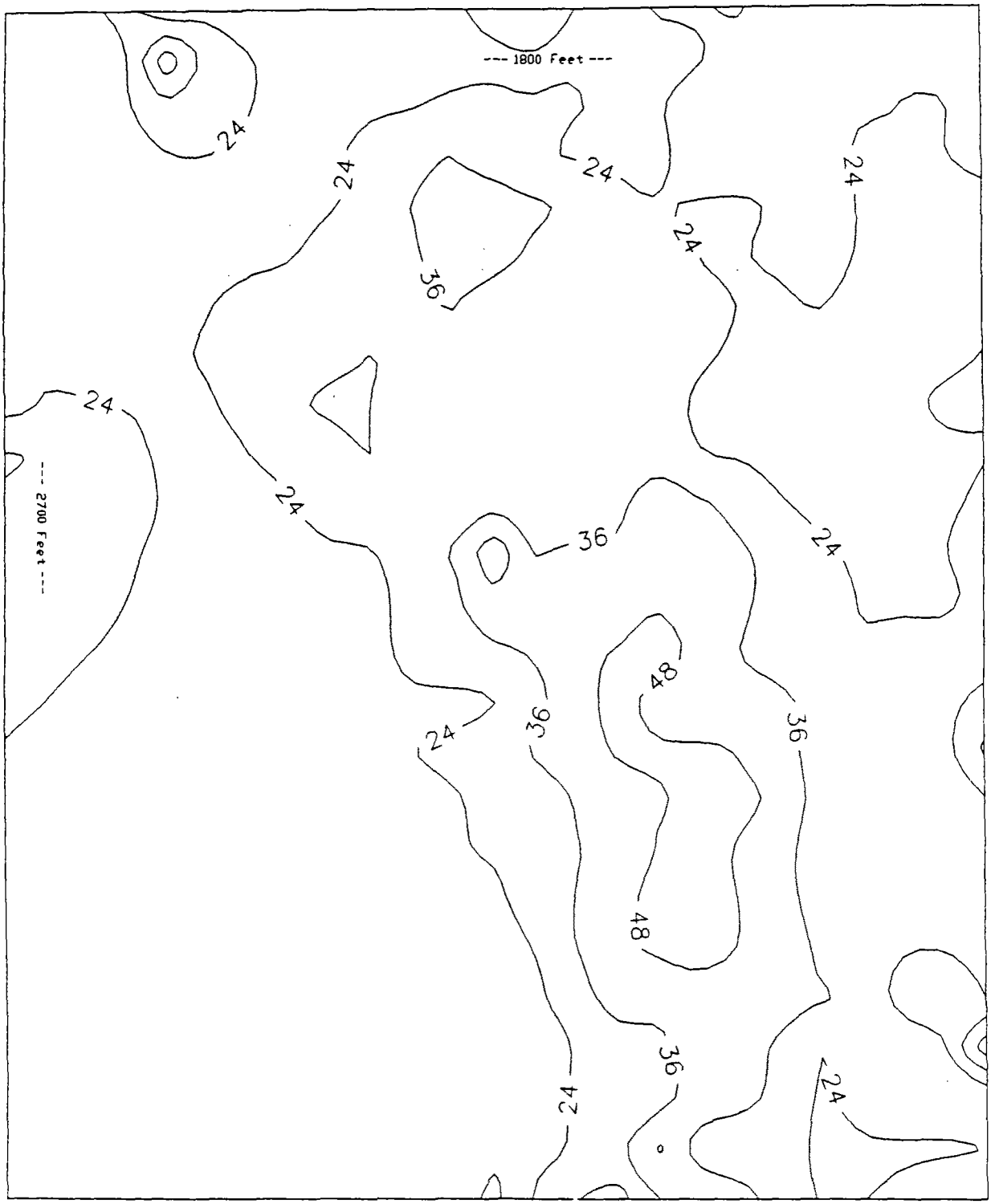
Using the conservative estimate of 7 hours a day and the average gamma reading for section 24, the excess gamma radiation for 300 days would be 27.3 mrem/year. This exposure is also well below the NCRP standards.

Therefore, in reclaimed areas, using EPA's estimations,

Figure 7.

POST RECLAMATION
NANABAH ALLOTMENT (SEC. 24, T13N, R11W)

HAYSTACK MOUNTIAN



SECTION 19 (Santa Fe Pacific Minerals)

LEGEND

VALUES IN uR/Hr

Survey Conducted on 50' X 50' Grid

Waist Level Measurements

NORTH

ERS Graphics 9/91

the population frequenting the site will not receive any significant excess gamma exposure. Their excess gamma exposures would not exceed the NCRP recommendation.

For frequent exposures (long term) the NCRP recommends populations to not exceed 100 mrem/yr EDE from all sources (excluding natural background and medical sources). With background being approximately 15 uR/hr in the affected area, populations could reside on areas of reclaimed land reading 27 uR/hr or less to adequately stay within this guideline (assuming they are not exposed to other excess radiation sources besides uranium chain gamma). Approximately 60% of the reclaimed land is potentially suitable for full time occupancy.

These are very conservative calculations because no credit is taken for the shielding effect of the home on any increases in terrestrial radiation. Additional studies should be conducted within the reclaimed area prior to allowing any homes to be built. However, it is highly unlikely that prior to mining operations, the gamma radiation levels presently being emitted were significantly lower. It is probable that some portions of the strip-mined area were naturally higher than the average background elsewhere as a result of the proximity to the surface of uranium-rich ore.

Therefore, the removal action appears to have effectively reduced the potential radiological hazards associated with the abandoned mine operations and has returned the land to a

productive environment.

BROWN-VANDEVER SECTION 18

The post removal survey conducted on Section 18, Township 13N, Range 10W of the USGS Bluewater Quadrangle (the Brown Vandever site) revealed that the average gamma reading was 13 uR/hr. The highest reading was 29 uR/hr. This reading is essentially background and therefore, no additional action should be taken on this section (Figure 8).

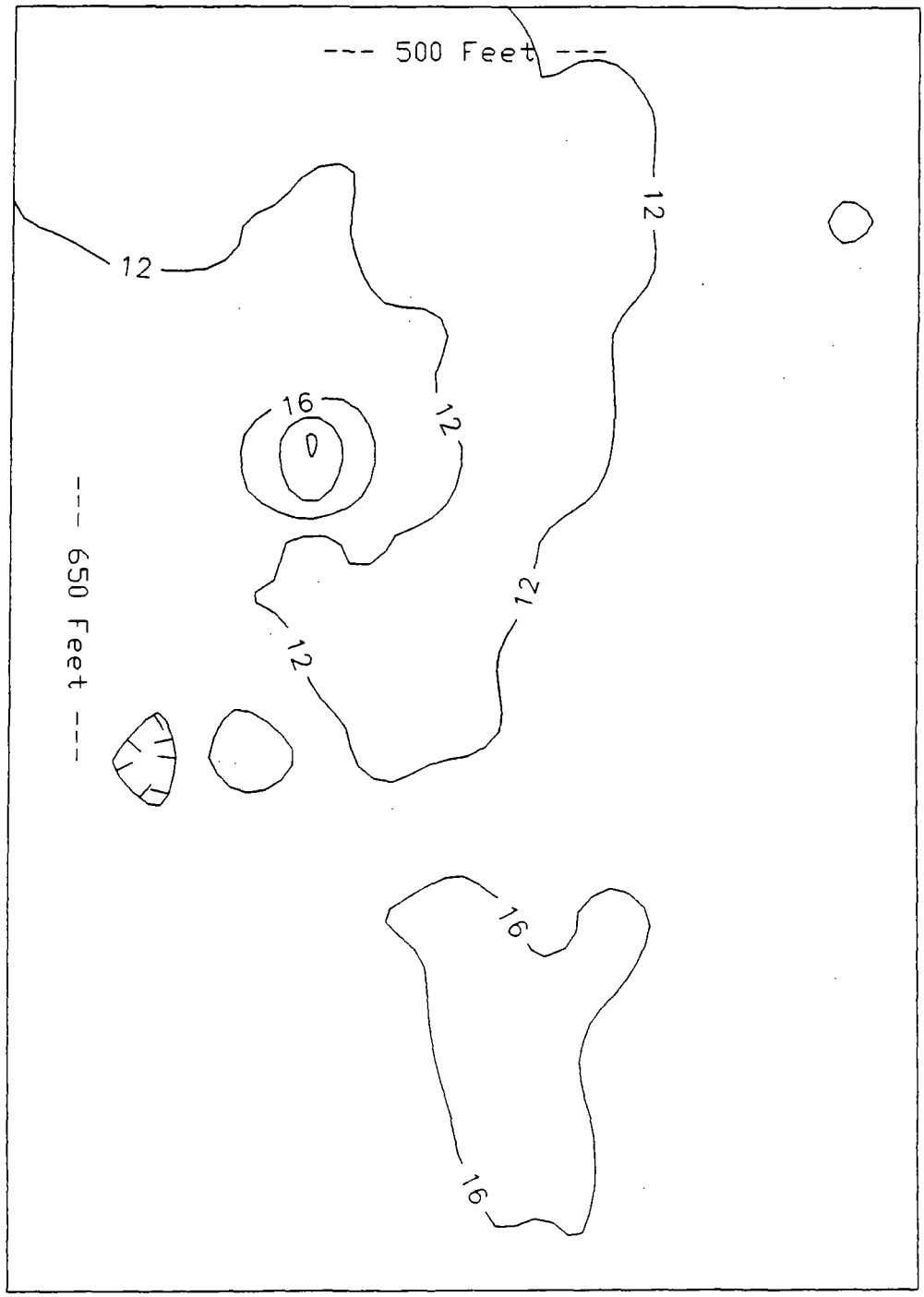
DESIDERIO MINE SITE

A post removal survey using a 100 foot by 100 foot grid was conducted on the top 15 acre portion (Starting at the residences and heading due east) at the Desiderio site (Section 26, Township 13N, Range 10W). This survey revealed that the average gamma reading within the reclamated area was 15 uR/hr . A random survey was conduct on the other reclamated areas near the road, the once far southern pits, and the old shaft areas. Values ranged from a high of 50 uR/hr to a low of 15 uR/hr. The average reading within these isolated locations was approximately 28 uR/hr.

Like the Vandever sections, the post removal results at the Desiderio site reveal that the gamma emissions (once exceeding 700 uR/hr in places) have been drastically reduced. Levels present at the site are well within reclamation guideline levels and pose no significant health risks for long term exposures. It is likely that the reclamated gamma emissions are no greater than those detected prior to mining operations at all three reclamated

Figure 8.

POST RECLAMATION
BROWN-VANDEVER ALLOTMENT (SEC. 18, T13N, R10W)



LEGEND

VALUES IN uR/Hr

Survey Conducted on 50' X 50' Grid

Waist Level Measurements

4 uR/Hr Contour Interval

NORTH

ERS Graphics 9/91

sections (Readings of 50 uR/hr were detected on unmined naturally occurring Todilto limestone outcrops) (Figure 9).

On September 24, 1991, ATSDR concurred with EPA that the response action was satisfactory in eliminating the potential radiological hazards and protective of public health (See appendix C contains post response data, Appendix D, ATSDR letter).

B. ACTIONS TAKEN BY PRPs

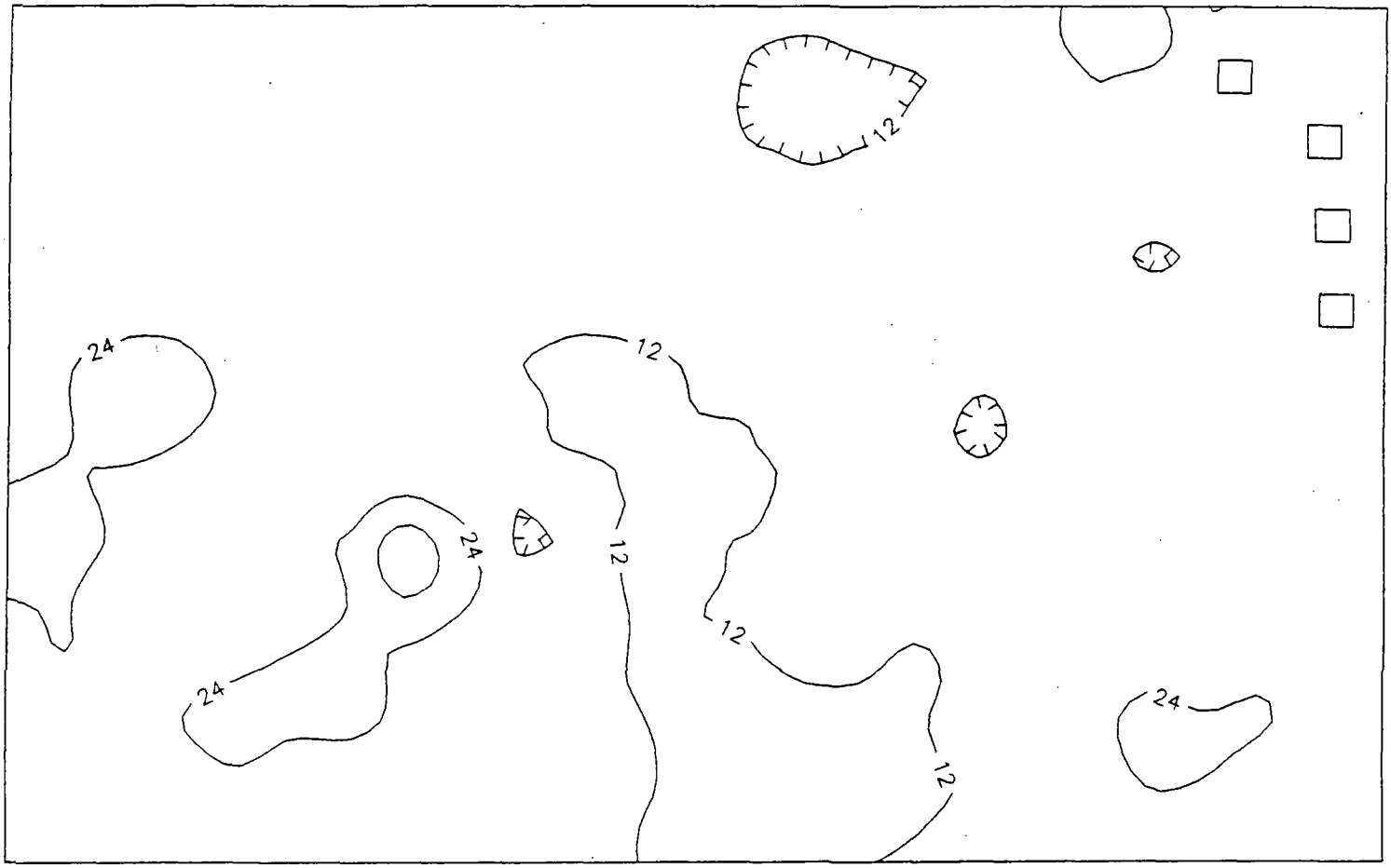
Cerrillos Land Company conducted a gamma survey on Section 19 and at the advise of EPA, Cerrillos identified "hot" spots within the grid. Cerrillos Land Company, acting as the "lead" respondent, submitted a draft site stabilization plan to EPA on August 25, 1991. In addition, Cerrillos stated that it would comply with the Order. A revised plan was accepted by EPA on August 30, 1991 and Cerrillos mobilized its contractor, Taylor Excavation, on September 4, 1991.

From September 4, 1991 to October 23, 1991, Taylor Excavation conducted earth moving activities on Section 19 to reduce the gamma radiation emissions to below 50 uR/hr.

C. ACTIONS BY STATE AND LOCAL AGENCIES

The Navajo Superfund Program identified the sites during 1990 as part of their Site Evaluation program. The Navajo Superfund Program played a vital and active role in pursuing a response action at the Sites. During the response action, the Navajo Superfund Program provided invaluable assistance and support throughout the response action. Members of the Navajo Superfund

Figure 9.
POST RECLAMATION
NAVAJO-DESIDERIO MINE SITE



LEGEND

VALUES IN uR/Hr

Survey Conducted on 100' X 100' Grid

Waist Level Measurements
100 uR/Hr Contour Interval

N

staff assisted EPA in conducting radiological surveys and public relations activities.

D. ACTIONS TAKEN BY FEDERAL AGENCIES

During the response activities, DOI and BIA representative were updated by EPA via pollution reports and correspondence. Copies of the post removal exposure summary report were sent to DOI, BLM, and DOI. The Grants BLM/NPS ranger station was utilized by EPA to distribute email pollution reports. Overall, BIA, BLM and DOI did not significantly contribute to the success of this response action.

DOE has informed EPA that it will pursue undertaking response activities on Section 13. DOE is presently trying to work with the mine lessee, George Warnock, in performing the required actions.

E. ACTIONS TAKEN BY CONTRACTORS

Three EPA contractors contributed to the success of the response action:

Ecology and Environment - TAT

- Conducted preliminary assessment and gamma survey support.

Weston - REAC

- Provided assistance in conducting pre and post gamma surveys.
- Provided site health physicist and radiological expertise.
- Conducted field photo documentation and assisted in data interpretations.
- Conducted air monitoring and assisted enforcing site safety plan.

Laguna Construction

- Conducted earth moving activities, sign posting and revegetation activities.

Weston REAC provided assistance throughout the removal action. Jerry Gils, REAC Health Physicist and project manager, provided outstanding field support in assisting in planning the response, conducting the extensive surveys and managing and interpreting site data.

Laguna Construction performed a superb job in reclamation. Gamma radiation readings and soil radionuclide concentrations were significantly reduced. Every aspect of the job went successfully. Mobilization was on time, maintenance and refueling of equipment went smoothly and the sign construction and placement was performed without any problems. Laguna Construction machine operators transformed the hummocky, scared topography back to "natural" conditions. Throughout the job, each tractor was meticulously cared for and maintained. At the conclusion of the job, no radioactive contamination was found on Laguna Construction equipment.

III. DIFFICULTIES ENCOUNTERED

A. ITEMS THAT AFFECTED THE RESPONSE

The Bluewater Uranium Mine response action was the first abandoned uranium mine emergency response action performed by Region IX. The action itself was a complete success in alleviating all of the potential radiological hazards noted by the

ATSDR Health Advisory.

The most difficult problem encountered on this project was determining if a response was warranted. Presently, EPA does not have any set guidance or action levels to respond to abandoned uranium mine sites. The data from the November 1990 assessment was distributed to ATSDR, OAR and IHS for review and comments. To accurately assess the data without actually spending time at the sites proved to be a difficult task. ATSDR concluded within its Health Advisory that the sites posed a significant health problem to the local population. However, the Advisory lacked data to substantiate its concerns (limited radiological data, no thorough exposure assessment, no analytical analysis). ATSDR and the Navajo Nation were convinced after reviewing the preliminary assessment data that a response action was warranted. However, after waiting several months for a response, OAR-HQ requested additional data from the sites before making a final determination. EPA Region IX decided that it would be prudent to conduct a response at the site since the assessment data did indicate elevated radiological readings and since a health advisory was issued concerning the site.

B. <u>ISSUES OF INTERGOVERNMENTAL COORDINATION</u>

Several interagency meetings were held to discuss the response actions at the sites. The Region IX Emergency Response Section (ERS) began an ongoing dialog with local and regional BIA, BLM, IHS, Navajo Nation, DOE and DOI representatives in order to

ensure close coordination between all Federal Agencies regarding a response action at the Bluewater Sites. For several months, an effort to develop an IAG for the response action was undertaken by EPA and regional DOI representatives. Unfortunately, it appears that DOI and it's Bureaus failed to coordinate their actions. As a result of this miscommunication, EPA was unable to successfully enter into an agreement with DOI.

IV. RECOMMENDATIONS

To assist in responding and evaluating future uranium mine sites, the following recommendations should be implemented:

a) Thorough and complete gamma and radiological surveys should be completed on potential sites using a 50' by 50 ' grid to accurately assess radiological conditions.

ATSDR and earlier assessments noted extremely high gamma radiation readings. However, these extremely high gamma radiation readings were often anomalies rather than the norm.

b) After completing thorough gamma surveys, exposure assessments should be conducted. Accurate data on land use and population is required to adequate assess health risks.

In order to accurate assess the risk to human health from these mine sites, a complete and accurate risk assessment should be undertaken. The following critical questions must be accurately addressed:

How often and how long do people frequent the areas?
What uses are made of the land in question?

c) EPA and the BLM Office of Surface Mining (OSM) need to develop a joint strategy in addressing future mine sites.

Presently, OSM is conducting mine reclamation activities under the authority of the Surface Mining Control and Reclamation Act (SMCRA). SMCRA applies to mines worked prior to August 3,

1977 and mines posing an imminent hazard to the public health and safety.

A Memorandum of Understanding should be developed between EPA and OSM agreeing that sites eligible for CERCLA actions should receive high prioritization for reclamation under SMCRA. In addition, BLM OSM should have enforcement powers to require responsible parties to undertake the required reclamation actions.

APPENDIX B

DUST GENERATION SUMMARY DURING RECLAMATION ACTION

APPENDIX C

POST RECLAMATION GAMMA SURVEY DATA
SEPTEMBER, 1991

APPENDIX D

ATSDR POST RECLAMATION LETTER

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Date September 24, 1991

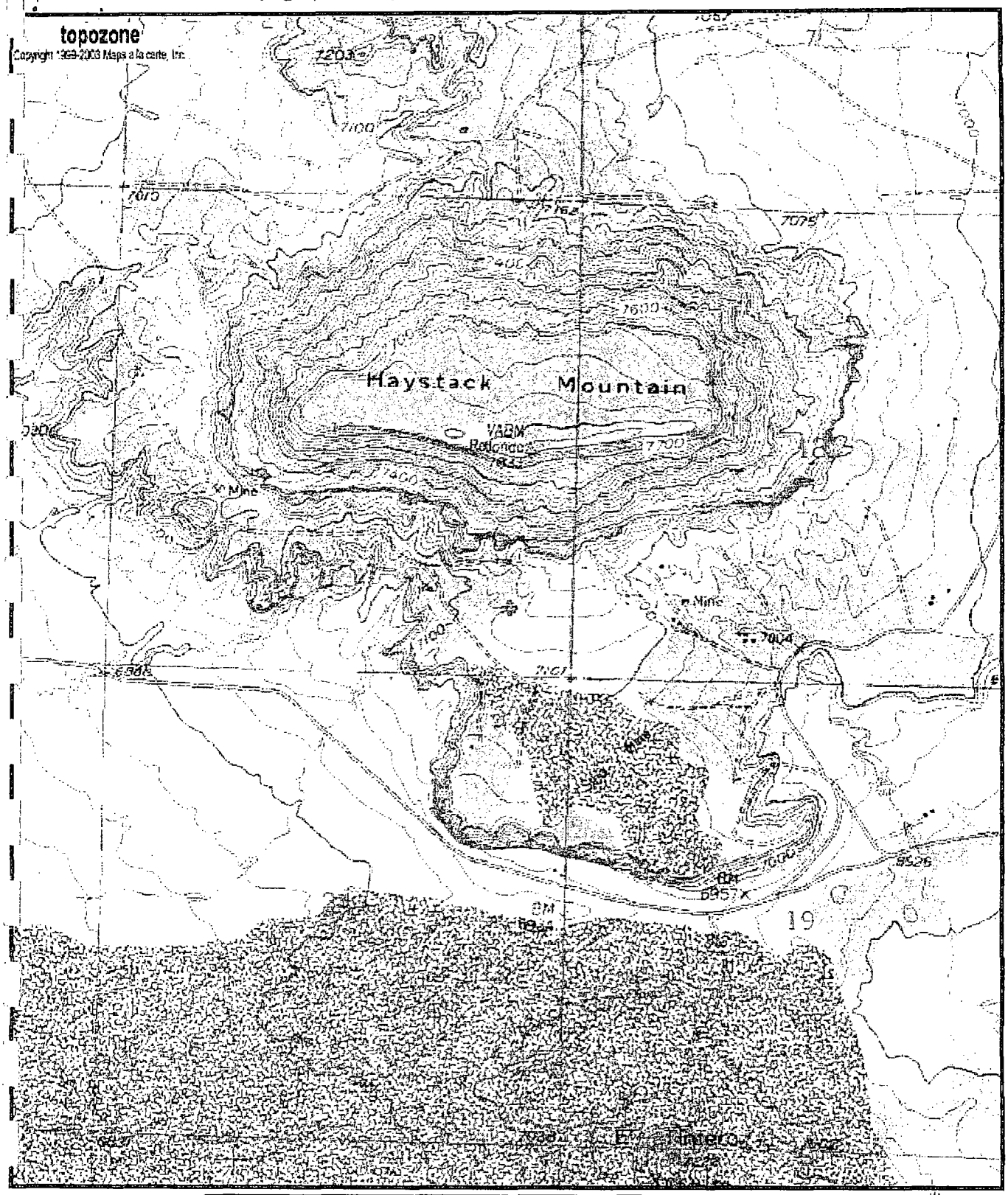
From William Q. Nelson, Senior Regional Representative, Region IX

Subject Review of Response Actions at the Bluewater Uranium Site

To Robert Bornstein, EPA OSC/ERS, H-8-3, Rm 8155

The Agency for Toxic Substances and Disease Registry (ATSDR) has reviewed the draft and final document dated September 23, 1991, describing the past removal action summary of exposure for the above site.

In consultation with Dr. Paul Charp of ATSDR, we find that the described removal actions are satisfactory for those areas indicated and are protective of public health.



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0 0.2 0.4 0.6 0.8 1 mi

Map center is UTM 13 232004E 3915928N (WGS84/NAD83)

Bluewater quadrangle

Projection is UTM Zone 13 NAD83 Datum

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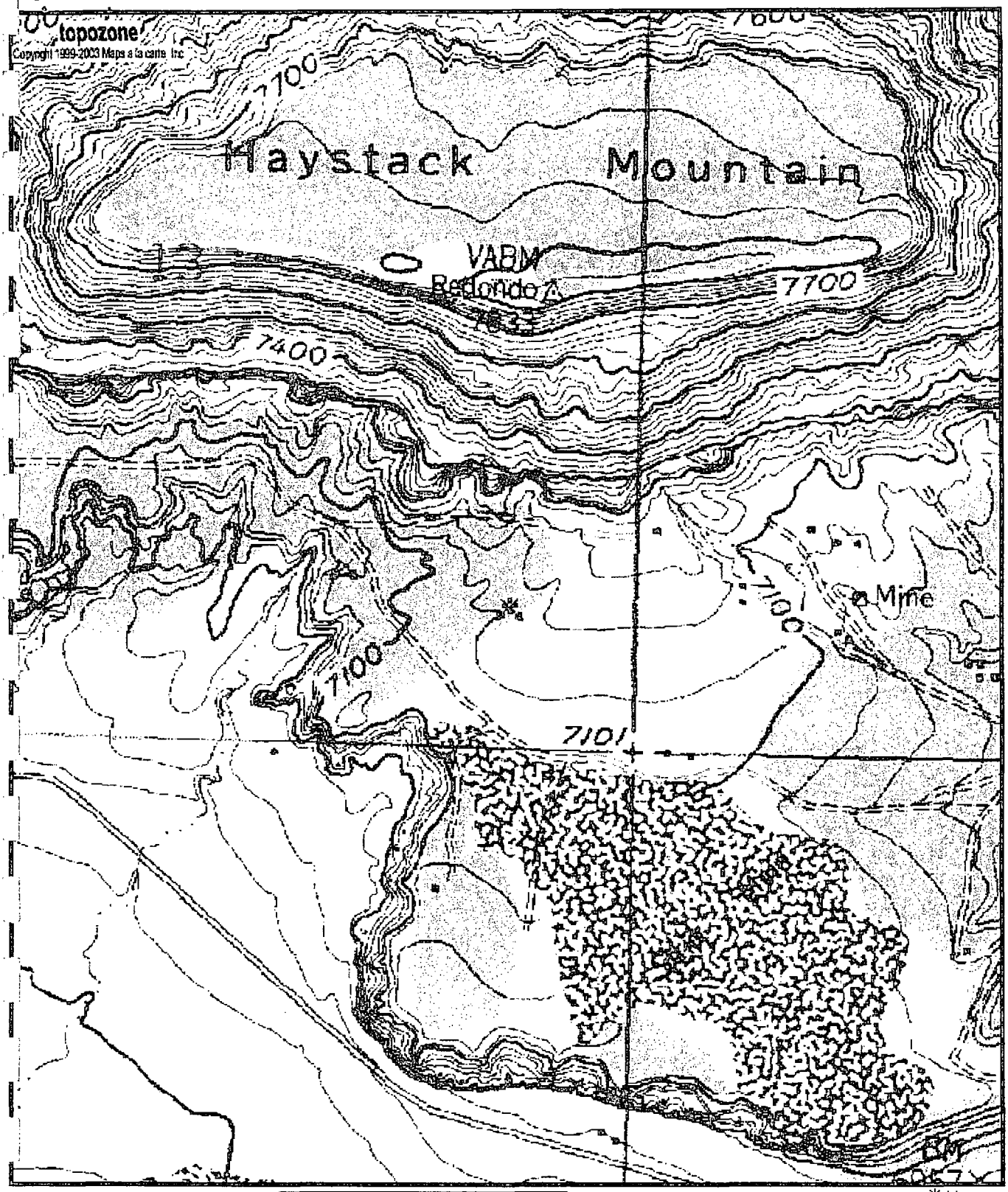

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Map center is UTM 13 232004E 3915928N (WGS84/NAD83)
Bluewater quadrangle
Projection is UTM Zone 13 NAD83 Datum

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USGS **121 km W of Albuquerque, New Mexico, United States** 09 Oct 1997

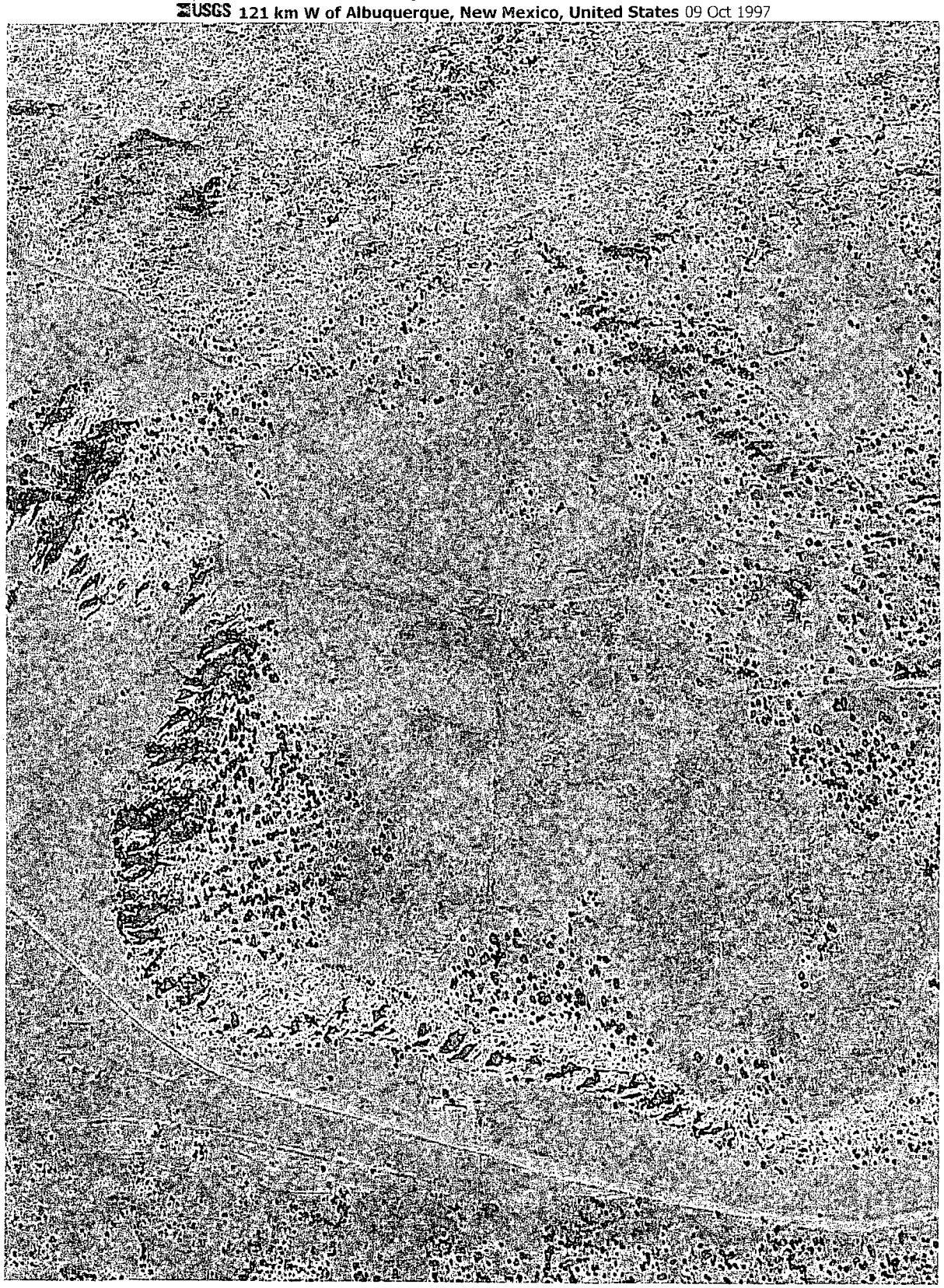

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Image courtesy of the U.S. Geological Survey

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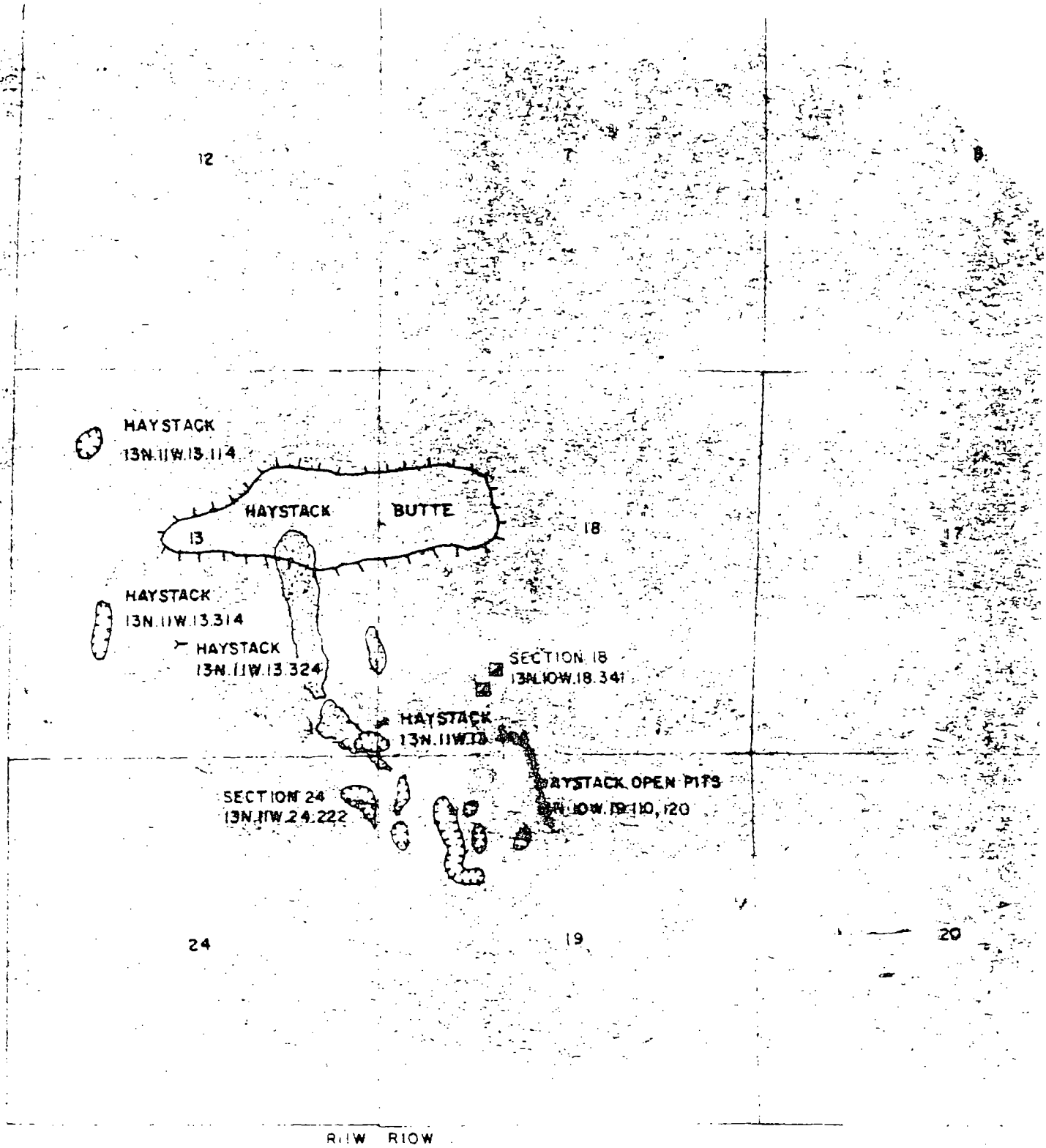
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SECTION 24
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, Ca. 94105-3901

December 23, 1991

MEMORANDUM

SUBJECT: Post Removal Soil Data, Bluewater Uranium Mine Sites

FROM: Robert Bornstein RB
Federal On-Scene-Coordinator

TO: Bluewater Interagency Committee

Enclosed for your review are the post removal soil sampling data collected at the Bluewater Uranium Mine Sites. During the week of September 15, 1991, ten composite samples were collected from the Bluewater Uranium Mine Sites. The composite samples were analyzed for Uranium isotopes and Radium 226 at the USEPA National Air and Radiation Environmental Lab located in Montgomery, Alabama.

BROWN-VANDEVER-NANABAH: Section 24, T13N, R11W

In order to collect the composite samples, the reclamated zone was subdivided into three areas: BV24A, BV24B, BV24C. Using a 45'X 50' grid (total 45 samples per section), samplers collected five tablespoon surface samples along the grid and placed them into a mixing bucket. After completing the sampling, the bucket was thoroughly mixed and a composite sample of one kilogram was collected and transferred into a zip lock bag. A background composite sample, BV24D, was collected by selecting 45 random samples from undisturbed portions of Section 24. See figure A.

BROWN-VANDEVER: Section 18, T13N, R10W

Two samples were collected within Section 18. A total of 45 samples were collected within the reclamated area. These samples were well mixed and a 1 Kg composit sample was drawn (BV18A). In addition, a random composite background sample was collected along the perimeter of the reclamated area in undisturbed areas (BV18B). See figure B.

DESIDERIO MINE SITE: Section 26, T 13N, R 10W

The Desiderio Mine Site area was subdivided into three equal sections. A 45'X 100'grid (total of 45 samples per section) was used to collect five tablespoon surface samples. The samples

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were placed into a mixing bucket and a 1 Kg composite sample was withdrawn. A random composite background sample was collected from non-disturbed areas around Section 26. See figure C.

DISCUSSION

The soil sampling data reveals that the reclamation action has successfully reduced any potential surface radiological hazard at these sites. The data shows that background conditions within the mine sites are not significantly lower than those detected within the reclamated areas. No sample exceeded the regulatory standard of 5 pCi/g over background pursuant to 40 CFR Section 192.

In general, the Radium 226 levels recorded within the reclamated zones are not uncommon to the natural Radium 226 concentrations detected within the Grants Mining District. Background Radium 226 concentrations in Milan, New Mexico (approximately 15 miles SE of the sites) have been reported by the Office of Radiation Programs[1] to be as high as 6.2 pCi/g. Background concentrations of Radium 226 of 2.2 pCi/g and 3.3 pCi/g were detected outside of San Mateo, New Mexico and within unmined areas of Ambrosia Lake.

Attached for your review is a copy of the Risk Assessment data generated by Steve Dean, Office of Air and Radiation, using sample BV24A. This sample was selected since it recorded the highest uranium and radium 226 content. The Assessment took into account all four possible pathways from soil exposure; ingestion, particulate inhalation, volatiles, and external gamma. The exposure scenario of eight (8) hours per day, 50 weeks per year for one year was used. Based on this scenario and a sample concentration of total uranium at 7.0 pCi/g and Radium 226 at 3.7 pCi/g (these samples include their respective background), the combined total risk from both metals for this sample is 3.0 in 10 million (3.0×10^{-7}). Using a Superfund residence scenario of thirty years, the total risk factor is 9 in 1 million excess cancer risk (9.0×10^{-6}).

Overall, the risk factor for the other samples are well below these figures. This risk calculation is a worst case scenario using the highest sample data. Risk associated with the natural conditions documented in the OAR Report[1] are also within the same risk factor or greater than those calculated for the BV24A sample. EPA uses the 10^{-6} risk value as a "point of departure" when selecting clean-up levels for National Priorities List Sites (40 CFR Section 300.430).

1 "Report of Ambient Outdoor Radon and Indoor Radon Progeny Concentrations During November 1975 At Selected Locations in the Grants Mineral Belt, New Mexico," Office of Radiation Programs, Las Vegas, NV., June 1976, Report # OAR/LV-76-4: USDC NTIS PB-258-257.

CONCLUSIONS

In conclusion, the reclamation action undertaken by EPA has significantly reduced the radiological hazards associated with the mining wastes at the Bluewater Uranium Mine Sites. Both gamma radiation and radionuclide concentrations at the sites have been reduced to "natural" or background conditions. As documented in the OAR report referenced above, it is not uncommon to find natural Radium 226 readings higher within the Grants Mining District than those detected within our samples. The EPA response team to Bluewater believes that these sites no longer pose any immediate health hazard to the local public or wildlife. As a safeguard, further radiological testing and monitoring should be performed prior to any residential structures being constructed on the Sites.

If you have any questions or concerns, please contact me at 415-744-2298 (FTS 484-2298).