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

January 29, 1991

MEMORANDUM

SUBJECT: Bluewater Uranium Mine Preliminary Assessment Data

FROM: Donald C. White, Chief
Field Operations Branch

TO: Richard Guimond, Director
Office of Radiation Programs

Enclosed are the radionuclide and gamma survey data collected by the Emergency Response Section (ERS) preliminary assessment, conducted on November 15-16, 1990, at the Brown-Vandever and Desiderio Uranium Mine Sites, located outside of Prewitt, Navajo Nation, New Mexico. This assessment was performed at the request of the Agency for Toxic Substances and Disease Registry (ATSDR) to identify if the Sites pose any immediate adverse environmental and health hazards.

Site Background

The Navajo-Brown Vandever (N-BV) and Navajo-Desiderio (N-D) mine sites are located within the Ambrosia Lake subdistrict of the Grants Uranium Mining District. The N-BV mine site encompasses approximately 155 acres, and the N-D covers 130 acres. The sites lie within a sparsely populated agricultural area.

Several families live on both mine sites. Approximately thirty people live on the N-BV site, including children, and approximately forty people live on the N-D site. The land is primarily utilized as grazing areas for the cattle, horses, sheep and goats.

Both mine sites consist of strip mine pits, tailing piles and open vent and mine shafts. There are presently no barriers prohibiting access to these mined areas.

ATSDR issued a Health Advisory for the sites on November 21, 1990. Since then, ERS has been consulting with Greg Demspey and Colleen Petullo, Office of Air and Radiation, Las Vegas and Bill Nelson, ATSDR.

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Data

Figure 1 shows the locations of the mine sites. Figure 2 shows the Brown-Vandever Mine Site and Figure 3 shows the Desiderio Mine Site. Table 1 contains the gamma survey data. Table 2 lists the radionuclide data obtained from the water and soil samples. Figure 4 divides the Brown-Vandever Mine Site into four sections which were surveyed and sampled. Figures 5-8 show the sampling locations within each section of the Brown-Vandever Mine Site. Figure 9 shows the sampling locations from the Desiderio Mine Site. Appendix A contains the results of the Radon Flux experiment conducted at the Desiderio Mine Site. Appendix B contains the heavy metal sample results. Appendix C contains the laboratory data sheets.

OAR Assistance

We are requesting OAR assistance in interpreting the radionuclide assessment data for the purpose of determining if an imminent and substantial health risk exists at either of the sites. For instance, the data reveals that nearly all of the sampling points within the mined areas appear to exceed the promulgated standard for Radium-226, which should not exceed 5 pCi/g above background within the first fifteen centimeters of soil, as outlined in 40 CFR Section 192.12. We need help in determining if the sites pose an acute (need to do a removal action) or a chronic (remedial action more appropriate) health risk. One criterion that could be used to determine if a removal action is warranted is an increased carcinogenic health risk of 1 in 10,000 or more after a two year exposure. This criterion is based on the following:

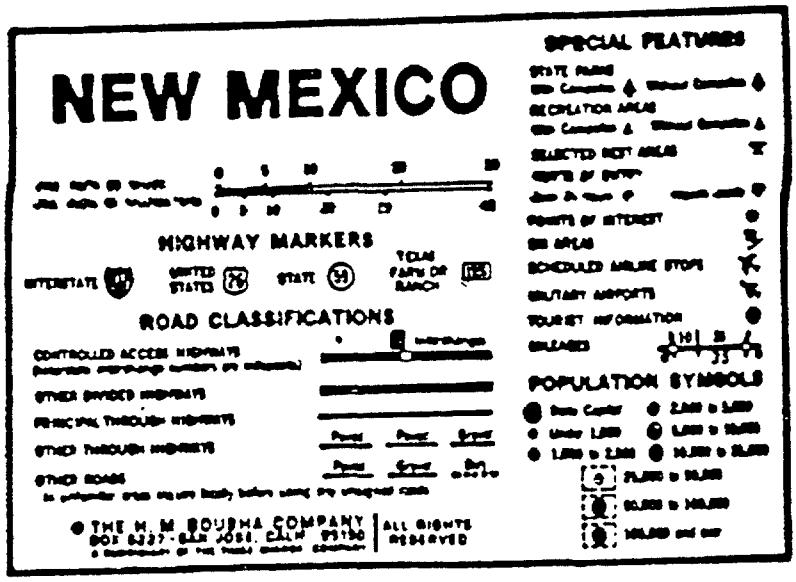
A) A risk of 1 in 10,000 is the high end of the risk range established by EPA in the NCP which requires a response action;

B) It is estimated that it would take over two years for the remedial program to be able to address these sites since neither has yet to be placed on the NPL.

It is important to select a number or criteria that can be used on more than one site since there are many similar sites in Arizona and New Mexico. Our decision is likely to set a precedent for future potential removal actions at these type of uranium mine tailing sites. In addition, ATSDR must determine what steps they must undertake in response to their Health Advisory based on what we determine to do at these sites.

I look forward to your quick response on this issue. If you have any questions concerning the data, please contact Robert Bornstein, On-Scene-Coordinator, at 415-744-2298 (FTS 484-2298).

cc: Colleen Petullo, OAR
Greg Dempsey, OAR
Mike Bandroski, Radiation Program-Region IX



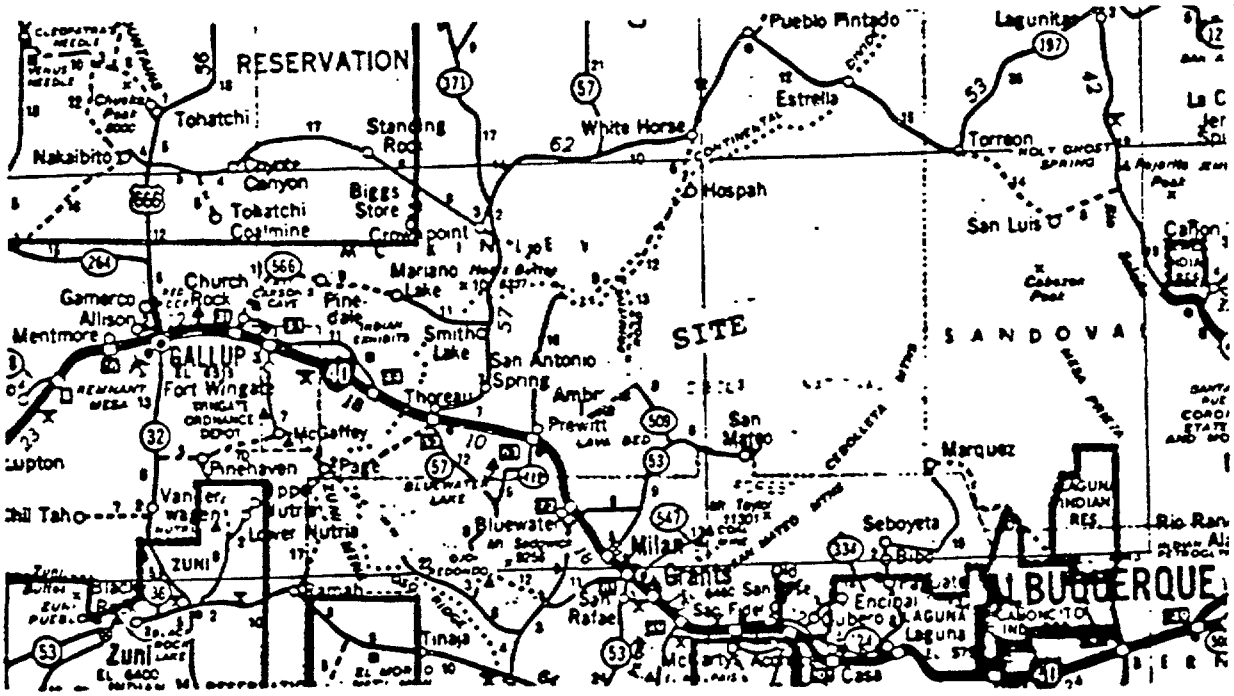


FIGURE # 1 ; REPRINTED BY PERMISSION

NAVAJO SUPERFUND OFFICE

NAVAJO-BROWN VANDEVER URANIUM MINE

JUNE,'90 P. MOLLOY

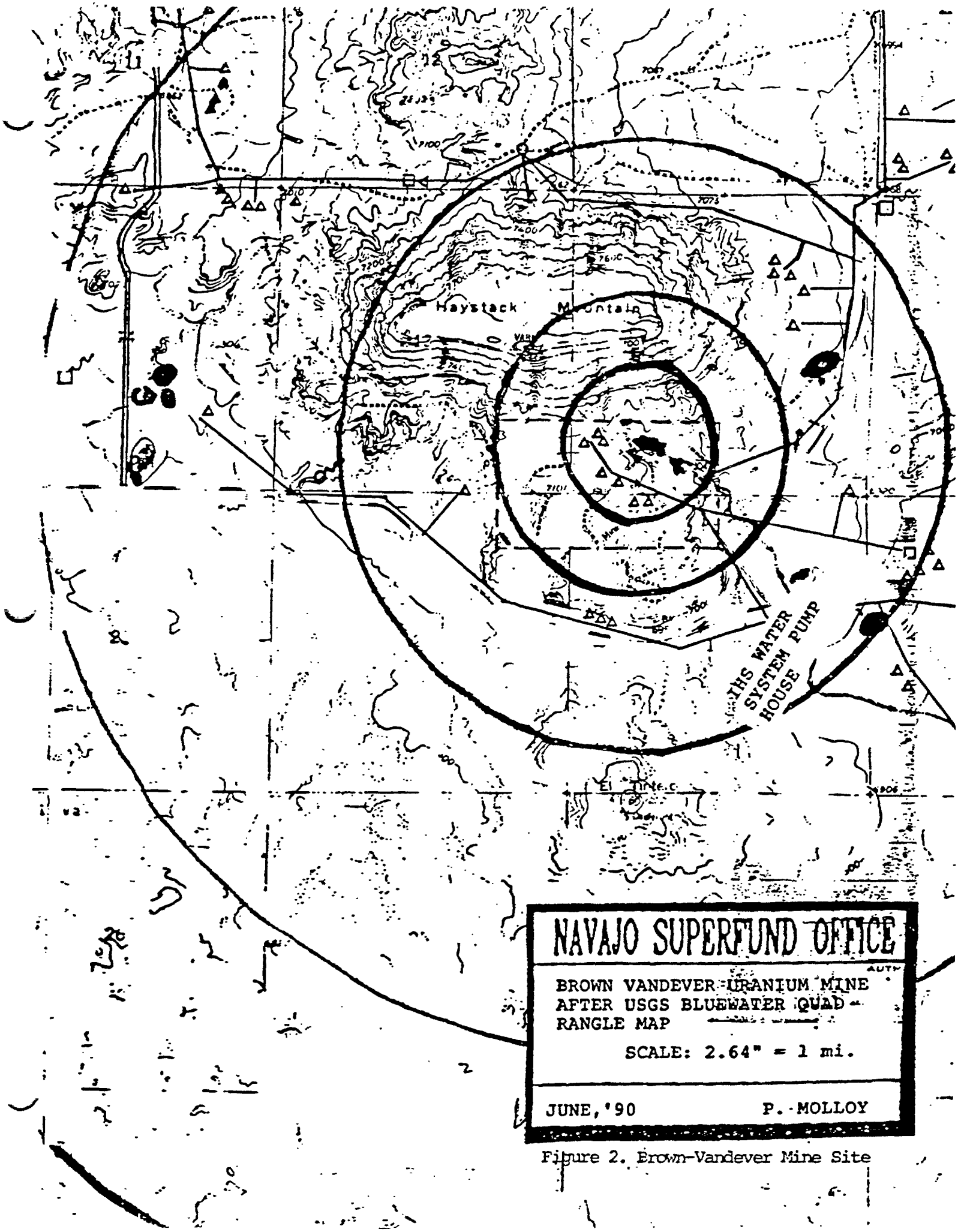
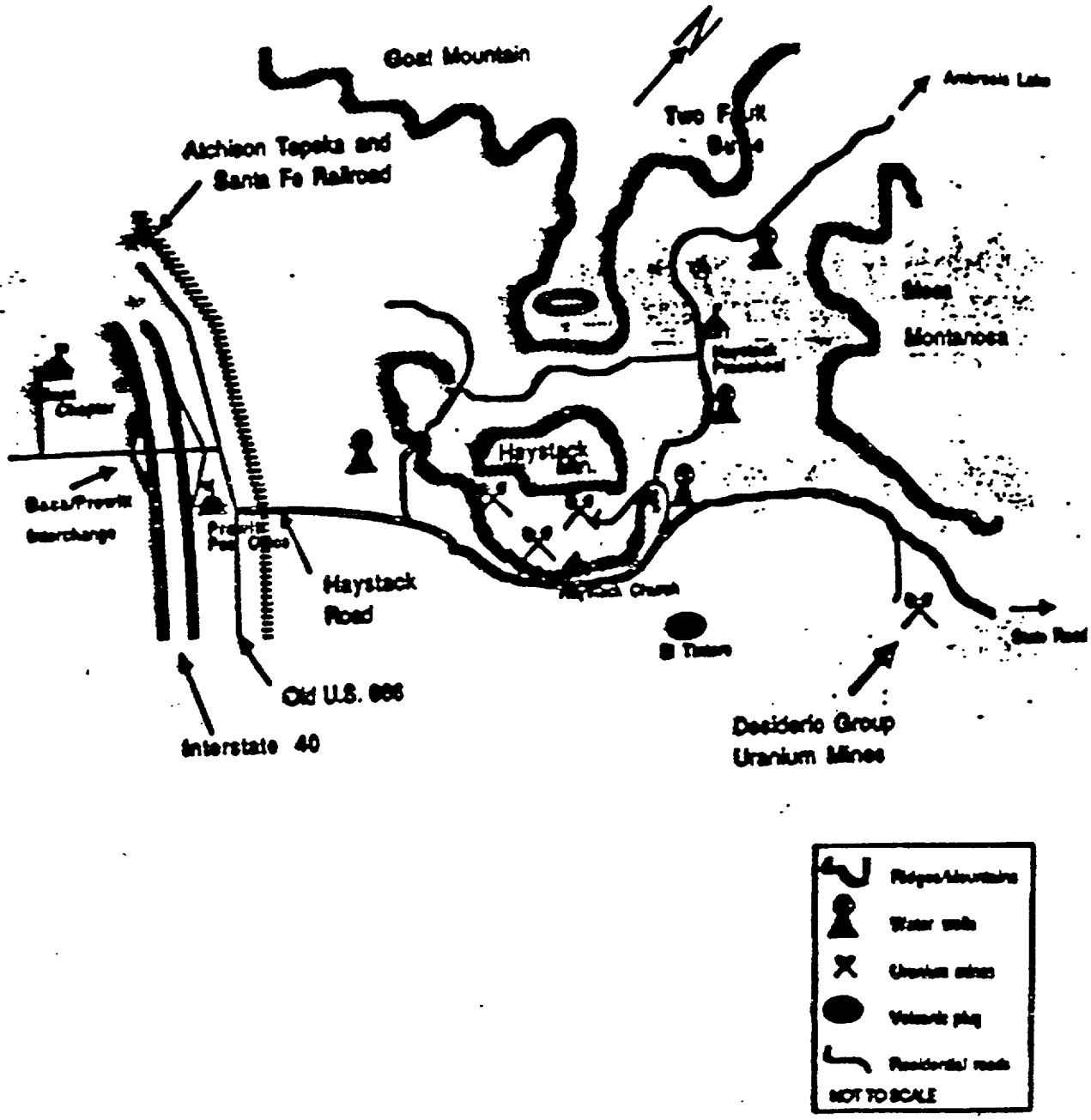


Figure 2. Brown-Vandever Mine Site



NAVAJO SUPERFUND OFFIC

DESIDERIO GROUP MINES

Site location

Figure 3. Desiderio Mine Si

S. EDISON JUNE '9

Figure 3

TABLE 1
GAMMA RADIATION SURVEY DATA
BROWN-VANDEVER MINE SITE, NAVAJO NATION

NOVEMBER 14-15, 1990

Operator - Collen Petullo Recorder - Robert Bornstein

Instrument	ID#	Calibration date	Calibration Source
1 Ludlum 19	452663	11-08-90	Ra-226
2 Bicron	825481	10-15-90	Cs-137
3 Ludlum 12 Pancake	140830	11-08-90	Pu-239,Sr-90

Date 11/14/90 SECTION 1

Inst.	Time	Station	Ground	Waist	Comments
1 3	0900 0903	Background1	11 uR/hr 100 cpm	11 uR/hr 100 cpm	2.5 mi from site.
1 3	0908 0910	Background2	11 uR/hr 100 cpm	11 uR/hr 100 cpm	1.0 mi from site.
1	0930	Brown Home	13 uR/hr	14 uR/hr	stage area
1 2	1000 1001	Station 1	35 uR/hr 25 urem/hr	36 uR/hr 25 urem/hr	Center of dirt road
1 2	1003 1004	Station 2	130 uR/hr 70 urem/hr	135 uR/hr 60 urem/hr	near tree
1 2	1007 1008	Station 3	90 uR/hr 50 urem/hr	N/A N/A	contact on ground
1 2	1010 1011	Station 4	115 uR/hr* 75 urem/hr	100 uR/hr # 50 urem/hr	
1 2	1015 1017	Station 5	130 uR/hr 85 urem/hr	145 uR/hr 60 urem/hr	
1 2	1019 1020	Station 6	1200 uR/hr 800 urem/hr	800 uR/hr 400 urem/hr	In pit zone
1 2	1028 1033	Station 7	40 uR/hr 20 urem/hr	44 uR/hr 25 urem/hr	Away from pit area
1 2	1040 1044	Station 8	150 uR/hr 90 urem/hr	140 uR/hr 72 urem/hr	

Table 1. (Continued)

Inst.	Time	Station	Ground	Waist	Comments
1 2	1055 1057	Station 9	190 uR/hr 120 urem/hr	170 uR/hr 90 urem/hr	
1 2	1105 1108	Station 10	1250 uR/hr 750 urem/hr	800 uR/hr 350 urem/hr	open area
1 2	1113 1115	Station 11	400 uR/hr 300 urem/hr	200 uR/hr 150 urem/hr	
1 2	1118 1120	Station 12	600 uR/hr 500 urem/hr	500 uR/hr 300 urem/hr	
1 2	1122 1124	Station 13	500 uR/hr 250 urem/hr	500 uR/hr 400 urem/hr	
1 2	1127 1128	Station 14	600 uR/hr 300 urem/hr	700 uR/hr 300 urem/hr	
1 2	1134 1136	Station 15	230 uR/hr 150 urem/hr	280 uR/hr 150 urem/hr	
1 2	1140 1141	Station 16	700 uR/hr 300 urem/hr	600 uR/hr 250 urem/hr	
1 2	1150 1151	Station 17	80 uR/hr 40 urem/hr	120 uR/hr 35 urem/hr	
1 2	1155 1156	Station 18	90 uR/hr 50 urem/hr	65 uR/hr 35 urem/hr	
1 2	1300 1303	Station 19 SECTION 2	700 uR/hr 450 urem/hr	600 uR/hr 350 urem/hr	
1 2	1306 1309	Station 20	900 uR/hr 650 urem/hr	800 uR/hr 500 urem/hr	on pad
1 2	1314 1315	Station 21	300 uR/hr 250 urem/hr	230 uR/hr 150 urem/hr	attic
1 2	1320 1321	Station 22	230 uR/hr 130 urem/hr	210 uR/hr 100 urem/hr	edge of pile
1 2	1330 1334	Station 23	120 uR/hr 40 urem/hr	50 uR/hr 40 urem/hr	

Table 1. (Continued)

Inst.	Time	Station	Ground	Waist	Comments
1 2	1346 1348	Station 24	220 uR/hr 120 urem/hr	220 uR/hr 110 urem/hr	
1 2	1350 1352	Station 25	500 uR/hr 250 urem/hr	400 uR/hr 175 urem/hr	
1 2	1358 1400	Station 26	300 uR/hr 170 urem/hr	300 uR/hr 170 urem/hr	
1 2	1405 1408	Station 27	250 uR/hr 150 urem/hr	200 uR/hr 150 urem/hr	
1 2	1320 1322	Station 28 **SECTION 3**	10 uR/hr 5 urem/hr	10 uR/hr 5 urem/hr	11/15/90
1 2	1330 1330	Station 29	N/A	13 uR/hr 10 urem/hr	at window of vent
1 2	1333 1334	Station 30	80 uR/hr 50 urem/hr	80 uR/hr 50 urem/hr	lots of stones
1 3	1337 1338	Station 31	75 uR/hr 300 uR/hr	 Lgm micro	on casing in hole
1 2	1345	Station 32	350 - 90 uR/hr 250 - 50 urem/hr	on brick wall on brick wall	
1 2	1355 1400	Station 33 **SECTION 4**	15 uR/hr 10 urem/hr	15 uR/hr 10 urem/hr	
1 2	1405 1407	Station 34	125 uR/hr 90 urem/hr	90 uR/hr 50 urem/hr	
1 2	1410 1411	Station 35	25 uR/hr 10 urem/hr	25 uR/hr 10 urem/hr	
1 2	1415 1417	Station 36	225 uR/hr* 130 urem/hr	110 uR/hr# 70 urem/hr	on wall face
1 2	1420 1423	Station 37	600 uR/hr 300 urem/hr	600 uR/hr 300 urem/hr	dug area
1 2	1430 1433	Station 38	240 uR/hr 200 urem/hr	200 uR/hr 240 urem/hr	

Table 1. (Continued)

Inst.	Time	Station	Ground	Waist	Comments
1 2	1440 1443	Station 39	18 uR/hr 10 urem/hr	18 uR/hr 10 urem/hr	
1 2	1446 1448	Station 40	700 uR/hr 600 urem/hr	600 uR/hr 300 urem/hr	
1 2	1452 1453	Station 41	500 uR/hr* 350 urem/hr	400 uR/hr# 250 urem/hr	

* On contact with rock/tailing outcrop
\# 3 feet from contact

DESIDERIO MINE SITE, NAVAJO NATION
NOVEMBER 15, 1990

Operator - Collen Petullo Recorder - Vicky Radvilla

Instrument	ID#	Calibration date	Calibration Source
1 Ludlum 19	452663	11-08-90	Ra-226
2 Bicron	825481	10-15-90	Cs-137
3 Ludlum 12 Pancake	140830	11-08-90	Pu-239,Sr-90

Date 11/15/90 SECTION 1

Inst.	Time	Station	Ground	Waist	Comments
1 3	0825	Background1	11 uR/hr 100 cpm	11 uR/hr 100 cpm	2.5 mi from site
1 3	0830	Background2	11 uR/hr 100 cpm	11 uR/hr 100 cpm	1.0 mi from site
1 2	0855 0856	Station 1	12 uR/hr 7 urem/hr	12 uR/hr 6 urem/hr	at pond site
1 2	0857 0859	Station 2	18 uR/hr 8 urem/hr	18 uR/hr 8 urem/hr	at fense
1 2	0940 0941	Station 3	10 uR/hr 5 urem/hr	10 uR/hr 5 urem/hr	at base station
1 2	0955 0956	Station 4	20 uR/hr 7 urem/hr	24 uR/hr 7 urem/hr	large pit

Table 1. (Continued)

1 2	1000 1001	Station 5@	90 uR/hr 50 urem/hr	75 uR/hr 40 urem/hr	pile near St. 4
1 2	1045 1046	Station 6@	135 uR/hr 75 urem/hr	120 uR/hr 60 urem/hr	
1 2	1055 1056	Station 7@	85 uR/hr 50 urem/hr	75 uR/hr 40 urem/hr	
1 2	1058 1100	Station 8	170 uR/hr 90 urem/hr	120 uR/hr 60 urem/hr	
1 2	1105	Station 9			sediment only
Inst.	**Time**	**Station**	**Ground**	**Waist**	**Comments**
1 2	1107	Station 10			sediment only
1 2	1153 1154	Station 11	55 uR/hr 30 urem/hr	55 uR/hr 30 urem/hr	
1 2	1214 1215	Station 12	900 uR/hr 400 urem/hr	400 uR/hr 250 urem/hr	near attic

@ radon flux canister area

TABLE 2
EPA ERS PRELIMINARY ASSESSMENT LABORATORY RESULTS
NAVAJO-BROWN-VANDEVER
NOVEMBER 15-16,1990

SAMPLE LOCATION	ID#	RADIONUCLIDE	RESULTS	UNITS
(WATER SAMPLES) Brown Vandever Livestock Well B-V)	W1	Ra(226)	00.8 ± 0.1	pCi/l
		Ra(228)	2.0 ± 5.0	
		U(233-4)	2.0 ± 0.4	
		U(235)	00.3 ± 0.1	
		U(238)	0.4 ± 0.2	
B-V Livestock Well	W2	Ra(226)	00.2 ± 0.1	pCi/l
		Ra(228)	0.0 ± 5.0	
		U(233-4)	0.5 ± 0.2	
		U(235)	00.0 ± 0.1	
		U(238)	00.0 ± 0.1	
B-V Tap Water	W3	Ra(226)	00.2 ± 0.1	pCi/l
		Ra(228)	0.0 ± 5.0	
		U(233-4)	2.1 ± 0.5	
		U(235)	1.0 ± 0.3	
		U(238)	0.8 ± 0.3	
Water Line B-V	W4	Ra(226)	.1 ± 0.1	pCi/l
		Ra(228)	0 ± 5	
		U(233-4)	1.4 ± 0.4	
		U(235)	0.5 ± 0.2	
		U(238)	0.5 ± 0.2	
Desiderio Stock Pond	W5	Ra(226)	.3 ± 0.1	pCi/l
		Ra(228)	0 ± 5	
		U(233-4)	2.3 ± 0.4	
		U(235)	0.1 ± 0.2	
		U(238)	2.2 ± 0.2	
Desiderio Tap	W6	Ra(226)	.3 ± 0.1	pCi/l
		Ra(228)	0 ± 5	
		U(233-4)	1.2 ± 0.4	
		U(235)	0.0 ± 0.2	
		U(238)	0.2 ± 0.2	
~~Preschool Well (EXCEEDS DRINKING WATER STANDARDS: POTENTIAL LAB/ SAMPLING ERROR, ADVISE IMMEDIATE RESAMPLING)~~	~~W7~~	~~Ra(226)~~	~~1.0 ± 0.1~~	~~pCi/l~~
		~~Ra(228)~~	~~22.0 ± 6~~	
		~~U(233-4)~~	~~130.0 ± 10~~	
		~~U(235)~~	~~3.0 ± 0.5~~	
		~~U(238)~~	~~74.0 ± 7~~	

↳ RESAMPLED BY THE INDIAN HEALTH SERVICE

RESULTS WERE BELOW MCLS

Table 2. (Continued) SOIL SAMPLES

SAMPLE LOCATION	ID#	RADIONUCLIDE	RESULTS	UNITS
BACKGROUND		Ra(226)	00.8 ± 00.1	pCi/g
Road to B-V	A9	Ra(228)	0.0 ± 01.0	
		U(233-4)	0.6 ± 00.1	
		U(235)	00.0 ± 0.1	
		U(238)	000.7 ± 00.1	
Station 20	1A	Ra(226)	300.0 ± 10.0	pCi/g
(Section 2)		Ra(228)	1.0 ± 01.0	dry
B-V		U(233-4)	240.0 ± 20.0	
		U(235)	13.0 ± 1.0	
		U(238)	250.0 ± 20.0	
Station 22	2A	Ra(226)	34.0 ± 3.0	pCi/g
(Tailing Pile)		Ra(228)	0.0 ± 1.0	dry
Section 2		U(233-4)	25.0 ± 2.0	
B-V		U(235)	1.0 ± 0.2	
		U(238)	25.0 ± 2.0	
Station 23	3A	Ra(226)	24.0 ± 2.0	pCi/g
(Drainage Area)		Ra(228)	0.0 ± 1.0	
Section 2		U(233-4)	21.0 ± 2.0	
B-V		U(235)	.8 ± 0.1	
		U(238)	20.0 ± 2.0	
Station 25	4A	Ra(226)	4.7 ± 0.5	pCi/g
(Upper Drainage)		Ra(228)	0.0 ± 1.0	
Section 2		U(233-4)	3.4 ± 0.4	
B-V		U(235)	.1 ± 0.1	
		U(238)	3.5 ± 0.4	
Station 6	5A	Ra(226)	49.0 ± 5.0	pCi/g
(Pebble Area)		Ra(228)	.0 ± 1.0	
Section 1		U(233-4)	24.0 ± 2.0	
B-V		U(235)	1.0 ± 0.2	
		U(238)	25.0 ± 2.0	
Station 10	6A	Ra(226)	130.0 ± 10.0	pCi/g
(Strip Area)		Ra(228)	0.0 ± 1.0	
Section 1		U(233-4)	100.0 ± 20.0	
B-V		U(235)	4.7 ± 0.5	
		U(238)	100.0 ± 10.0	

Table 2. (Continued)

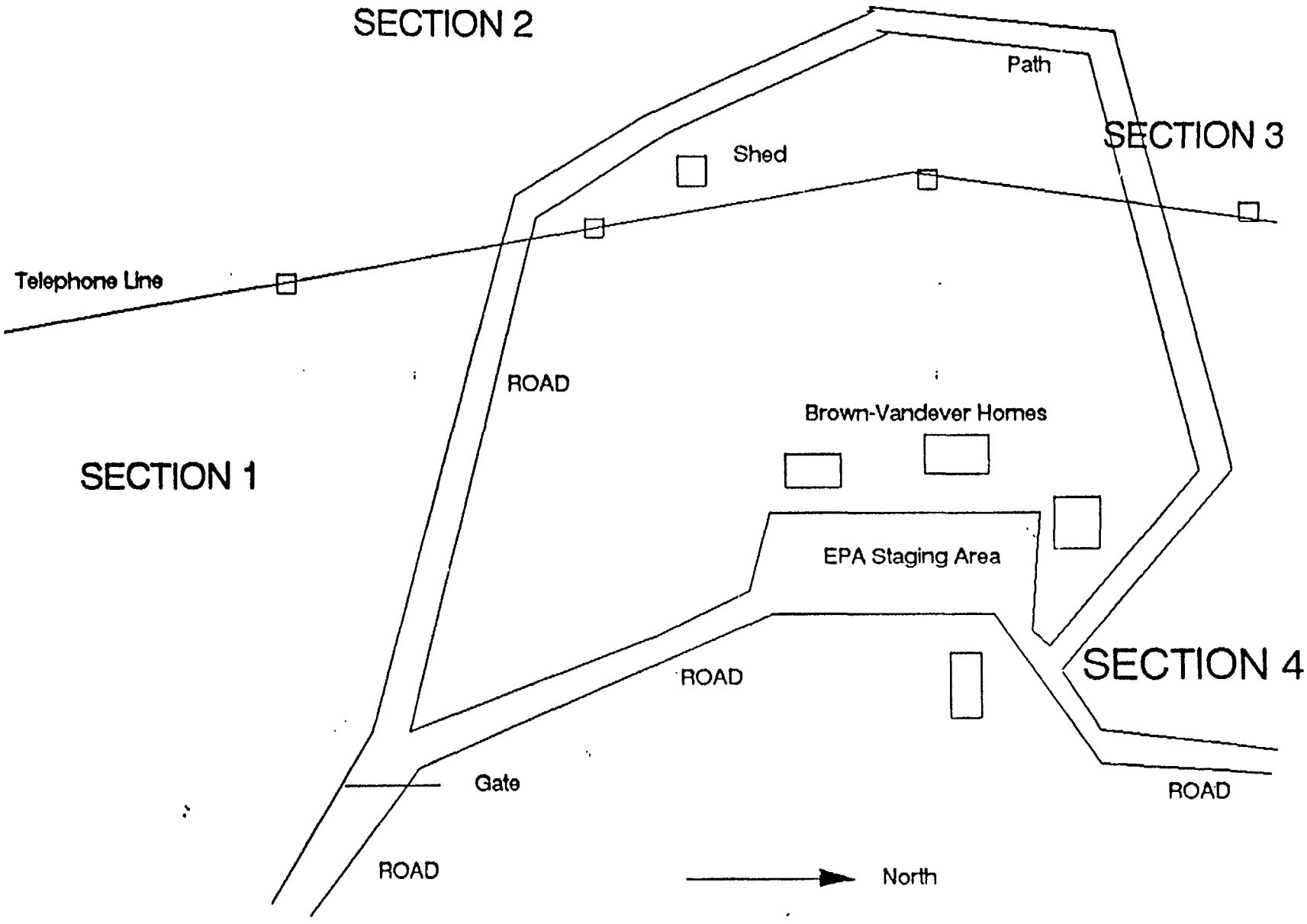
SAMPLING LOCATION	ID#	RADIONUCLIDE	RESULTS	UNITS
Station 11 Section 1 B-V	7A	Ra(226)	260.0 ± 10.0	pCi/g
		Ra(228)	1.0 ± 1.0	
		U(233-4)	290.0 ± 30.0	
		U(235)	20.0 ± 2.0	
		U(238)	310.0 ± 30.0	
Wash Area Near B-V	8A	Ra(226)	1.9 ± 0.2	pCi/g
		Ra(228)	1.0 ± 1.0	
		U(233-4)	1.1 ± 0.1	
		U(235)	00.0 ± 0.1	
		U(238)	1.1 ± 0.2	
Background For Desiderio Road to Desiderio	10A	Ra(226)	1.3 ± 0.1	pCi/g
		Ra(228)	0.0 ± 1.0	
		U(233-4)	0.6 ± 0.1	
		U(235)	00.0 ± 0.1	
		U(238)	0.8 ± 0.2	
Radon Flux Area Desiderio	12A	Ra(226)	34.0 ± 3.0	pCi/g
		Ra(228)	0.0 ± 1.0	
		U(233-4)	17.0 ± 2.0	
		U(235)	00.7 ± 0.1	
		U(238)	17.0 ± 0.2	
Radon Flux Area Desiderio	13A	Ra(226)	30.0 ± 3.0	pCi/g
		Ra(228)	0.0 ± 1.0	
		U(233-4)	17.0 ± 2.0	
		U(235)	00.0 ± 0.1	
		U(238)	1.1 ± 0.2	
Station 11 Desiderio	14A	Ra(226)	1.8 ± 0.2	pCi/g
		Ra(228)	0.0 ± 0.6	
		U(233-4)	0.6 ± 0.1	
		U(235)	0.0 ± 0.1	
		U(238)	0.7 ± 0.1	
Station 12 Desiderio	15A	Ra(226	3.0 ± 0.3	pCi/g
		Ra(228	0.0 ± 1.0	
		U(233-4)	1.7 ± 0.2	
		U(235)	0.1 ± 0.1	
		U(238)	1.5 ± 0.1	

Table 2. (Continued)

SAMPLING LOCATION	ID#	RADIONUCLIDE	RESULTS	UNITS
Station 30	18A	Ra(226)	0.8 ± 0.1	pCi/g
Drainage		Ra(228)	1.0 ± 1.0	
near Station 30		U(233-4)	0.7 ± 0.1	
B-V		U(235)	0.1 ± 0.1	
Section 3		U(238)	0.8 ± 0.1	
Station 36	19A	Ra(226)	20.0 ± 2.0	pCi/g
On Tailing Outcrop		Ra(228)	0.0 ± 1.0	
B-V Section 3		U(233-4	28.0 ± 3.0	
		U(235)	1.2 ± 0.2	
		U(238)	28.0 ± 3.0	
Duplicate of 19A	20A	Ra(226)	33.0 ± 3.0	pCi/g
		Ra(228)	0.0 ± 1.0	
		U(233-4	29.0 ± 3.0	
		U(235)	1.3 ± 0.2	
		U(238)	28.0 ± 3.0	
Station 40	21A	Ra(226)	450.0 ± 50.0	pCi/g
Section 4		Ra(228)	0.0 ± 01.0	
B-V		U(233-4)	330.0 ± 30.0	
		U(235)	29.0 ± 3.0	
		U(238)	390.0 ± 40.0	

Laboratory -- TMA Eberline
7021 Pan American Freeway, N.E.
Albuquerque, NM

SAMPLING SECTION LOCATIONS, BROWN-VANDEVER MINE SITE



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EPA SURVEY, NOVEMBER 1990

Figure 4. Section Location Map

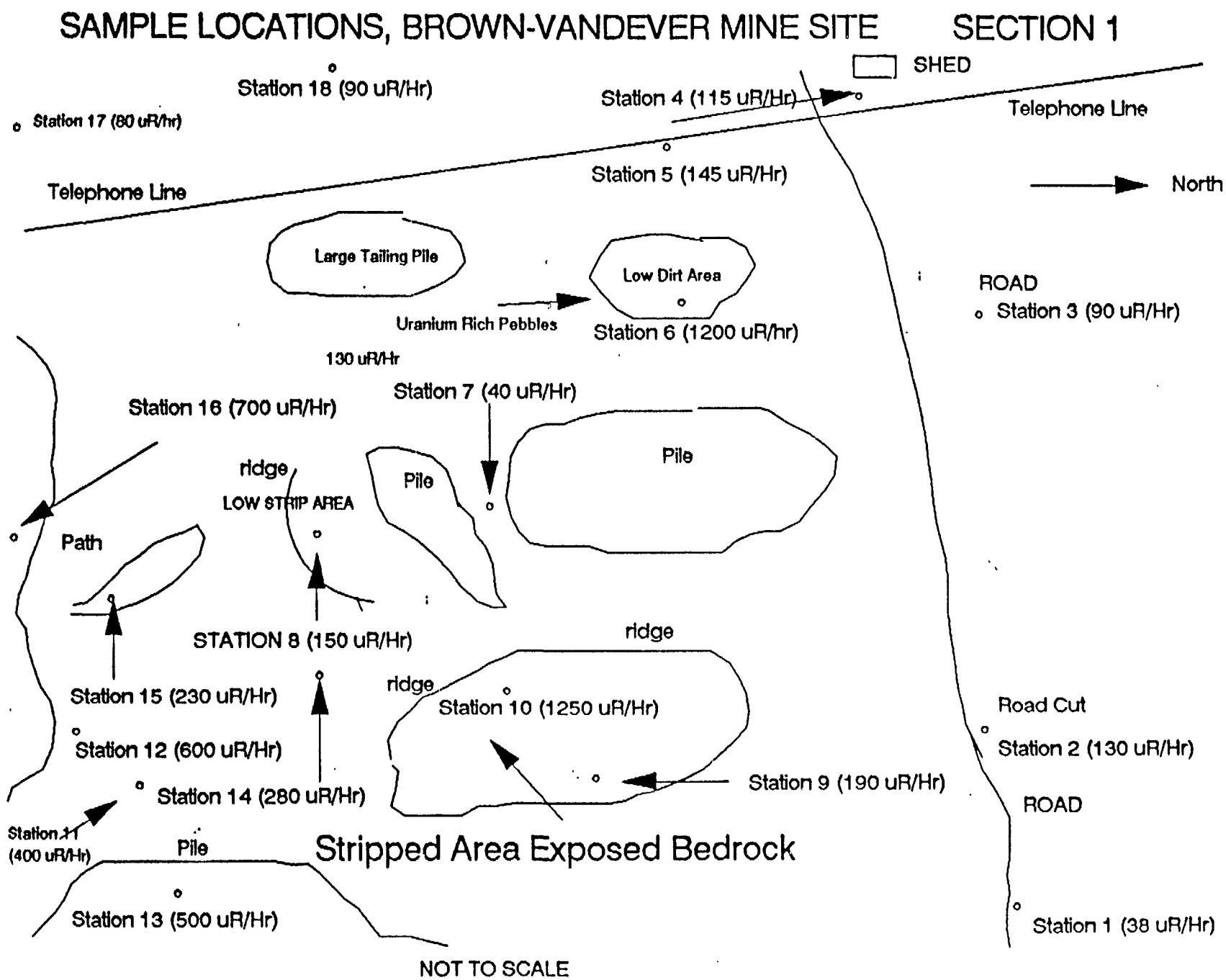


Figure 5. Section 1 B-V.

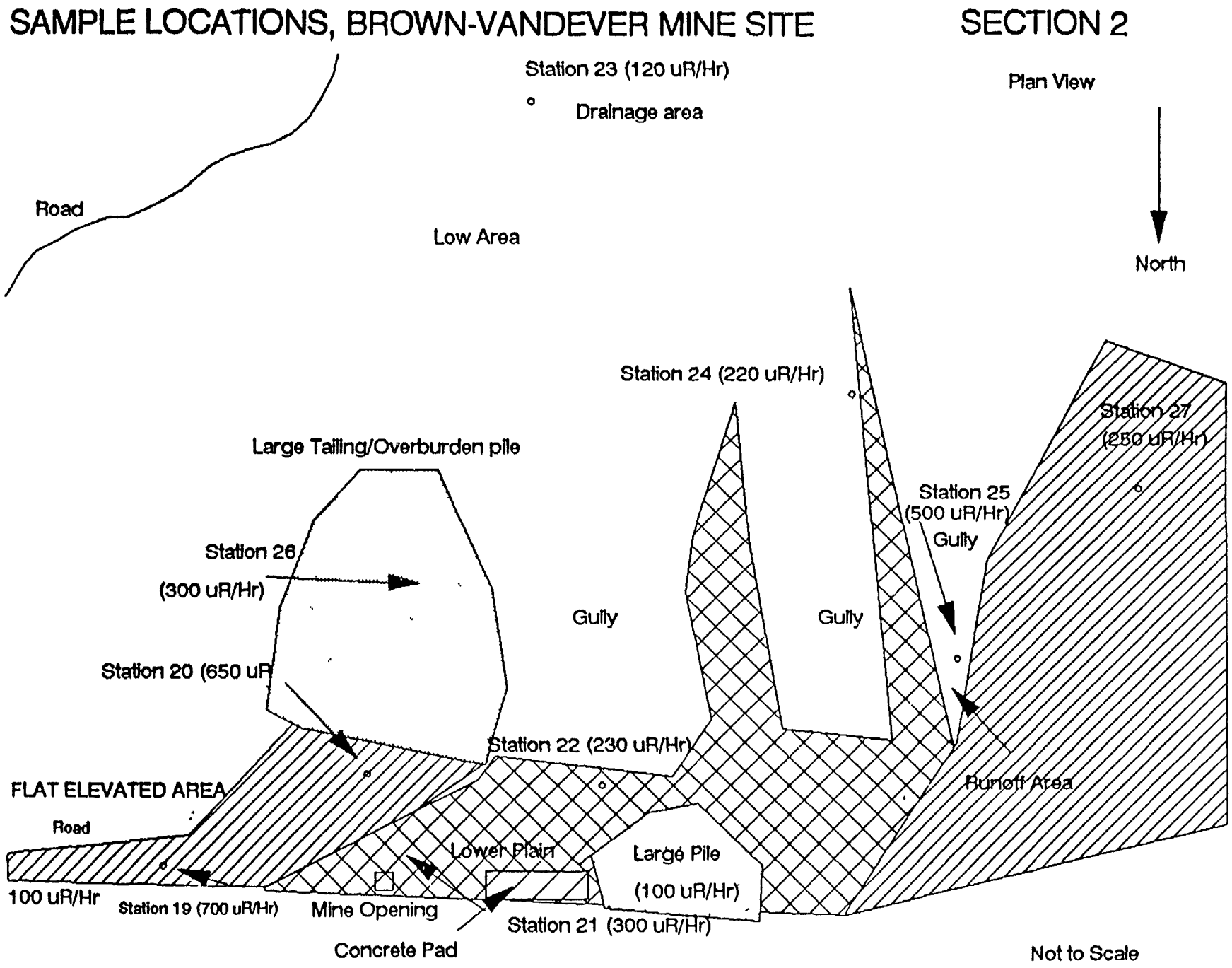


Figure 6. Section 2 B-V.

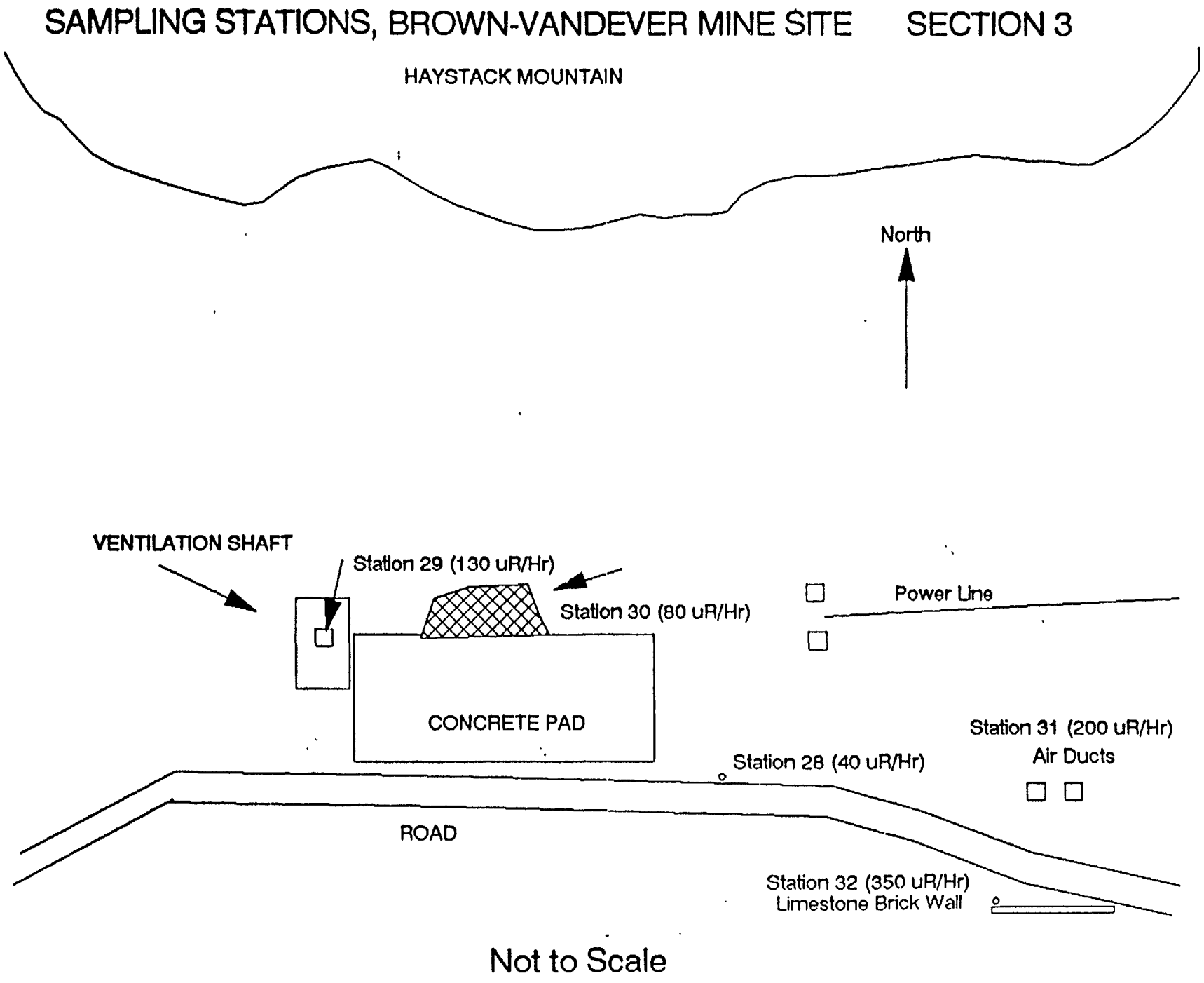
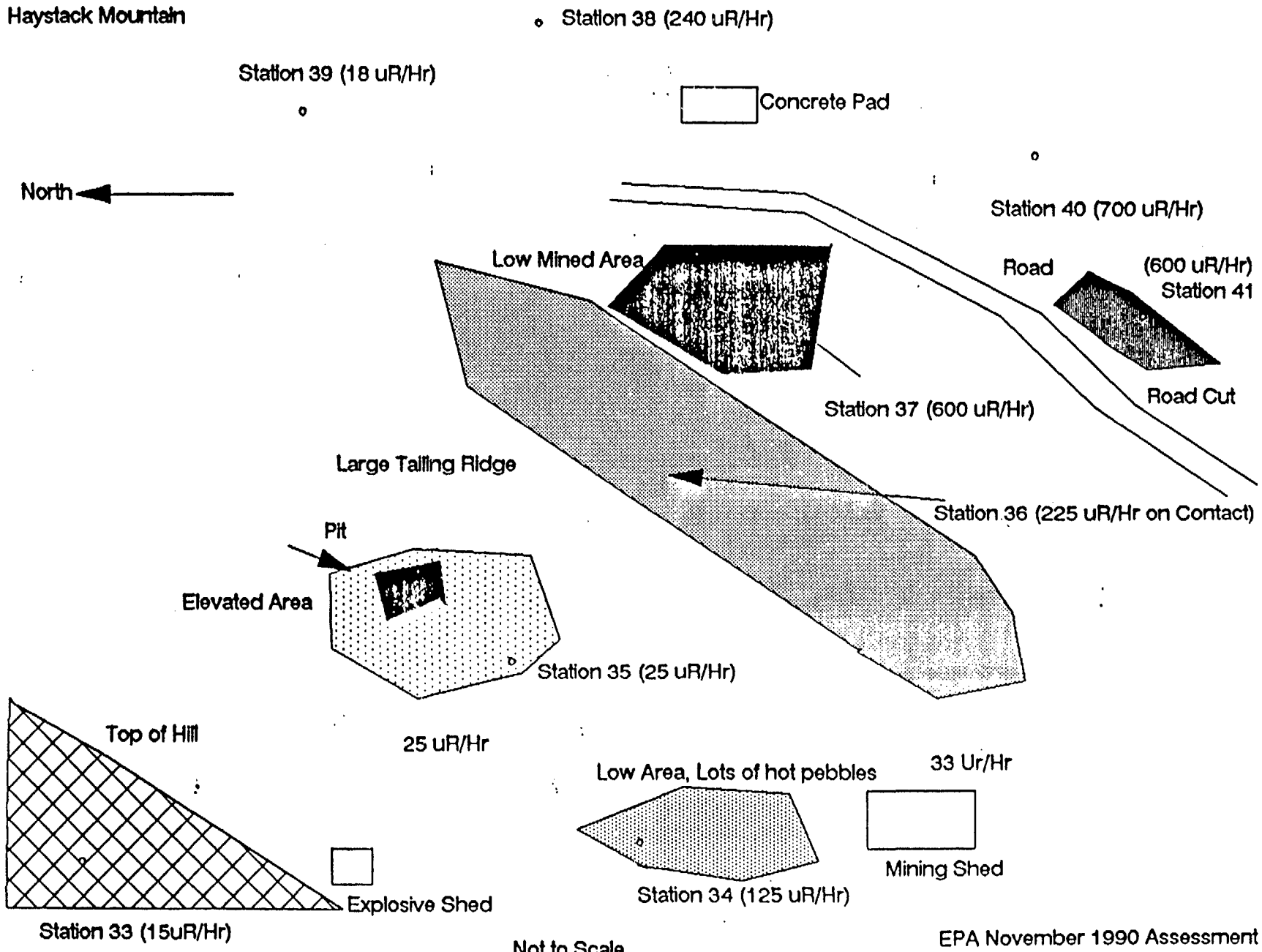


Figure 7. Section 3 B-V.

SAMPLING STATIONS, BROWN-VANDEVER MINE SITE SECTION 4



EPA November 1990 Assessment
Figure 8. Section 4 B-V.

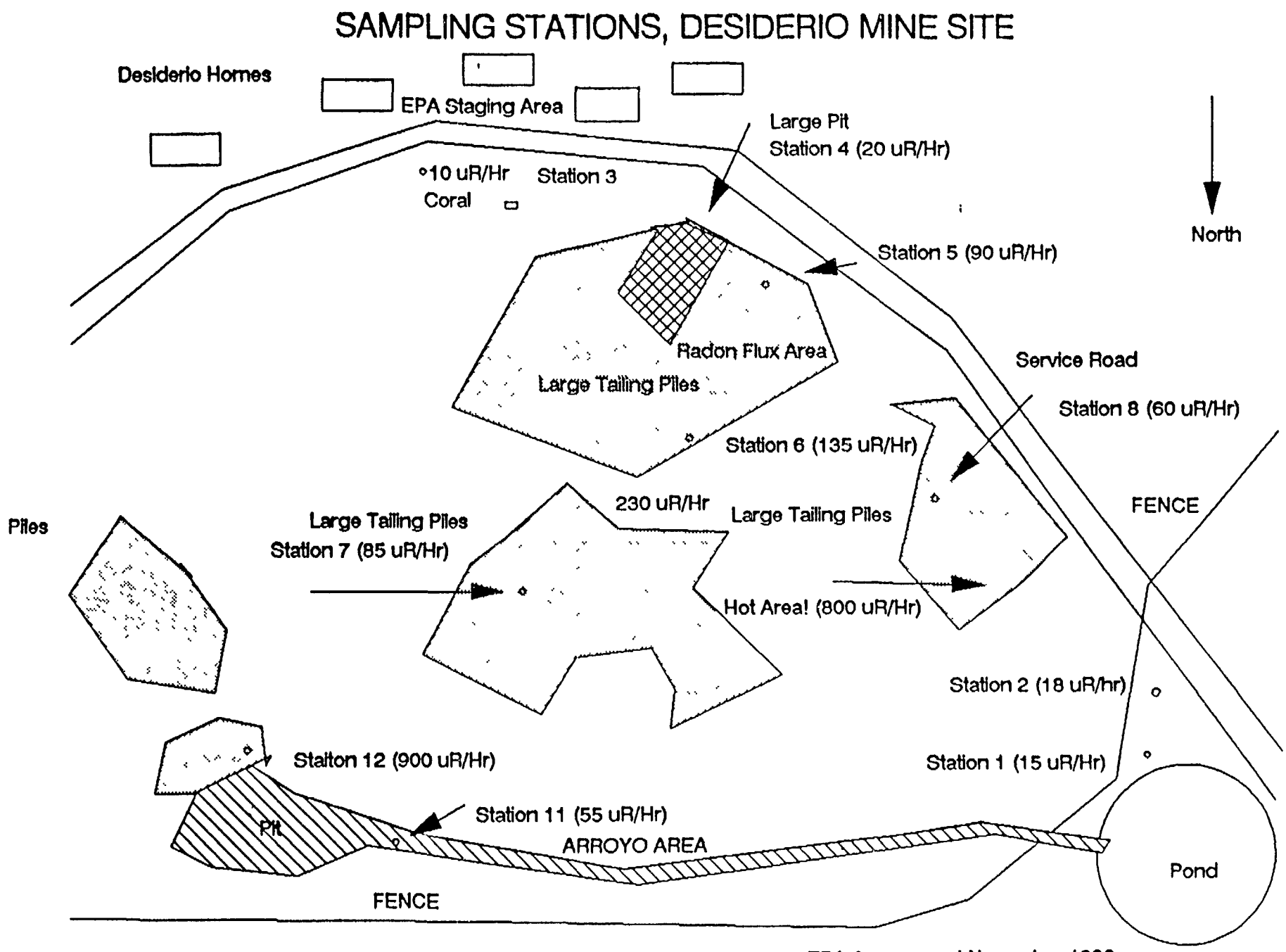


Figure 9. Desiderio Mine Site.

APPENDIX A

SCIENTIFIC ANALYSIS, INC.

November 30, 1990

Ms. Mary Sue Philp
Ecology & Environment
160 Spear St.
San Francisco, CA 94105

Subject: Results of Radon Flux Testing
Navajo Uranium Mine Sites
New Mexico

Dear Ms. Philp:

Scientific Analysis, Inc, is pleased to provide you with the results of 50 radon flux measurements performed on November 15-16, 1990 on three Navajo uranium mine sites using the 4" charcoal canister device (SAACC). While the SAACC procedure is not an EPA approved method, side by side measurements using the SAACC and the EPA approved procedure (LAACC) demonstrate comparable results when respective arithmetic means are computed and compared with each other.

The arithmetic mean radon flux levels were 51.4, 67.0, and 47.7 pCi/m^2-s, respectively for stations 5, 6, and 7. For comparison purposes, the 40 CFR Part 61 standard for operating uranium mill tailings piles limits radon emissions to 20 pCi/m^2-s.

Individual flux results are presented in the attached Tables Tx where the prefix NU5 refers to Navajo Uranium Station 5, NU6 refers to Navajo Uranium Station 6, and NU7 refers to Navajo Uranium Station 7. Each table is divided into subparts (v) valid test results, (d) duplicate test results to demonstrate counting precision, and (b) "blank" results to check internal quality control. Based on counting results, measurements identified as NU5-20404, NU6-20420, and NU7-20433 are most likely blanks (i.e. unexposed SAACC).

Table QA outlines the quality assurance results. Sampling conditions such as ambient temperature and rainfall are unknown to SAI but are assumed to be within the limits prescribed in the SAACC procedure. In addition, a copy of the sample chain of custody form is included for your files.

If you have any questions regarding these results and this letter report, please do not hesitate to call me. All data and reports

6012 E. SHIRLEY LANE, MONTGOMERY, AL 36117 □ TEL: 205-271-0643 □ FAX: 205-271-0818

will be treated as confidential and will not be released without your written approval.

Sincerely,

SCIENTIFIC ANALYSIS, INC.

Thomas R. Horton

Thomas R. Horton
Radiation Consultant

TH/rlr

attach: Table (4)

6012 E. SHIRLEY LANE, MONTGOMERY, AL 36117 ▫ TEL: 205-271-0643 ▫ FAX: 205-271-0818

Table QA

Quality Assurance Results

Mine Stations	% Completeness	Counting % Precision	Blank (Blind) Identification
Overall	100	0.2	*

*All blanks (blinds) were presumably found and calculated to have an equivalent flux of zero.

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U.S. EPA LISTED
RADON LABORATORY

SUMMARY OF RADON FLUX COMPUTATIONS
TABLE Iv. VALID TEST RESULTS FOR TOP OF STACK
Scientific Analysis, Inc.; Montgomery, Alabama 36117 11/27/90

Detector	On Stack		Off Stack		Count Begun		Counter Eff.	Gross Cnts	Background	Flux
WU5-20384	11/15/90	11:38 am	11/16/90	10:17 am	11/20/90	09:14 am	0.1659	56136	616	52.9
WU5-20385	11/15/90	11:40 am	11/16/90	10:17 am	11/20/90	09:26 am	0.1659	65891	616	62.3
WU5-20386	11/15/90	11:32 am	11/16/90	10:21 am	11/20/90	09:46 am	0.1659	37381	616	34.9
WU5-20387	11/15/90	11:30 am	11/16/90	10:18 am	11/20/90	09:58 am	0.1659	38564	616	36.1
WU5-20388	11/15/90	11:34 am	11/16/90	10:19 am	11/20/90	10:09 am	0.1659	41146	616	38.7
WU5-20389	11/15/90	11:37 am	11/16/90	10:18 am	11/20/90	10:20 am	0.1659	50799	616	48.1
WU5-20390	11/15/90	11:42 am	11/16/90	10:15 am	11/20/90	10:31 am	0.1659	41825	616	39.8
WU5-20391	11/15/90	11:44 am	11/16/90	10:16 am	11/20/90	10:42 am	0.1659	37511	616	35.7
WU5-20392	11/15/90	11:31 am	11/16/90	10:18 am	11/20/90	10:53 am	0.1659	72031	616	68.5
WU5-20393	11/15/90	11:30 am	11/16/90	10:21 am	11/20/90	11:04 am	0.1659	73480	616	69.7
WU5-20394	11/15/90	11:27 am	11/16/90	10:20 am	11/20/90	11:18 am	0.1659	67716	616	64.3
WU5-20395	11/15/90	11:23 am	11/16/90	10:20 am	11/20/90	11:31 am	0.1659	41909	616	39.5
WU5-20396	11/15/90	11:45 am	11/16/90	10:21 am	11/20/90	11:50 am	0.1659	133063	616	129
WU5-20397	11/15/90	11:44 am	11/16/90	10:22 am	11/20/90	12:01 pm	0.1659	124722	616	121
WU5-20398	11/15/90	11:40 am	11/16/90	10:21 am	11/20/90	12:13 pm	0.1659	26268	616	24.9
WU5-20399	11/15/90	11:41 am	11/16/90	10:21 am	11/20/90	12:26 pm	0.1659	70727	616	68.3
WU5-20400	11/15/90	11:48 am	11/16/90	10:13 am	11/20/90	12:39 pm	0.1659	21932	616	21.0
WU5-20401	11/15/90	11:45 am	11/16/90	10:17 am	11/20/90	12:56 pm	0.1659	27380	616	26.3
WU5-20402	11/15/90	11:51 am	11/16/90	10:13 am	11/20/90	01:06 pm	0.1659	19879	616	19.1
WU5-20403	11/15/90	11:48 am	11/16/90	10:23 am	11/20/90	01:18 pm	0.1659	28771	616	27.7

NOTE: All times are local stack times; Counting time is 10 minutes; Flux is given in pCi/Sec-Sq M
NOTE: Number of Flux Measurements = 20; Average flux = 51.4

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SUMMARY OF RADON FLUX COMPUTATIONS
TABLE Td. DUPLICATE TEST RESULTS FOR TOP OF STACK
Scientific Analysis, Inc.; Montgomery, Alabama 36117 11/27/90

Detector	On Stack		Off Stack		Count Begun		Counter Eff.	Gross Cnts	Background	Flux
WU5-20390	11/15/90	11:42 am	11/16/90	10:15 am	11/21/90	11:40 am	0.1647	34465	570	39.9
WU5-20399	11/15/90	11:41 am	11/16/90	10:21 am	11/21/90	11:51 am	0.1647	59115	570	68.6

NOTE: All times are local stack times; Counting time is 10 minutes; Flux is given in pCi/Sec-Sq M
NOTE: Number of Flux Measurements = 2; Average flux = 54.3

SUMMARY OF RADON FLUX COMPUTATIONS
TABLE Tb. BLANK TEST RESULTS FOR TOP OF STACK
Scientific Analysis, Inc.; Montgomery, Alabama 36117 11/27/90

Detector	---- On Stack -----	--- Off Stack ----	-- Count Begun ---	Counter Eff.	Gross Cnts	Background	Flux
NU5-20404	11/15/90 11:50 am	11/16/90 10:19 am	11/20/90 01:30 pm	0.1659	627	616	0.0

NOTE: All times are local stack times; Counting time is 10 minutes; Flux is given in pCi/Sec-Sq M
NOTE: Number of Flux Measurements = 1; Average flux = 0.0

SUMMARY OF RADON FLUX COMPUTATIONS
TABLE Iv. VALID TEST RESULTS FOR TOP OF STACK
Scientific Analysis, Inc.; Montgomery, Alabama 36117 11/27/90

Detector	---- On Stack -----		--- Off Stack ----		-- Count Begun ---		Counter Eff.	Gross Cnts	Background	Flux
WU6-20405	11/15/90	12:05 pm	11/16/90	10:23 am	11/20/90	01:41 pm	0.1659	18532	616	17.9
WU6-20406	11/15/90	12:03 pm	11/16/90	10:23 am	11/20/90	01:52 pm	0.1659	65963	616	65.2
WU6-20407	11/15/90	12:00 pm	11/16/90	10:23 am	11/20/90	02:03 pm	0.1659	88587	616	87.7
WU6-20408	11/15/90	12:01 pm	11/16/90	10:25 am	11/20/90	02:14 pm	0.1659	58818	616	58.1
WU6-20409	11/15/90	12:07 pm	11/16/90	10:27 am	11/20/90	02:25 pm	0.1659	45538	616	45.0
WU6-20410	11/15/90	12:06 pm	11/16/90	10:28 am	11/20/90	09:03 am	0.1638	43613	618	41.8
WU6-20411	11/15/90	12:02 pm	11/16/90	10:26 am	11/20/90	09:14 am	0.1638	84389	618	81.5
WU6-20412	11/15/90	12:04 pm	11/16/90	10:29 am	11/20/90	09:26 am	0.1638	62770	618	60.5
WU6-20413	11/15/90	11:59 am	11/16/90	10:30 am	11/20/90	09:46 am	0.1638	46518	618	44.6
WU6-20414	11/15/90	12:07 pm	11/16/90	10:31 am	11/20/90	09:58 am	0.1638	46848	618	45.2
WU6-20415	11/15/90	12:10 pm	11/16/90	10:28 am	11/20/90	10:09 am	0.1638	57169	618	55.6
WU6-20416	11/15/90	11:55 am	11/16/90	10:25 am	11/20/90	10:20 am	0.1638	57660	618	55.7
WU6-20417	11/15/90	11:58 am	11/16/90	10:25 am	11/20/90	10:31 am	0.1638	146693	618	143
WU6-20418	11/15/90	11:57 am	11/16/90	10:25 am	11/20/90	10:42 am	0.1638	124072	618	121
WU6-20419	11/15/90	11:53 am	11/16/90	10:25 am	11/20/90	10:53 am	0.1638	84129	618	81.8

NOTE: All times are local stack times; Counting time is 10 minutes; Flux is given in pCi/Sec-Sq M
NOTE: Number of Flux Measurements = 15; Average flux = 67.0

SUMMARY OF RADON FLUX COMPUTATIONS
TABLE Id. DUPLICATE TEST RESULTS FOR TOP OF STACK
Scientific Analysis, Inc.; Montgomery, Alabama 36117 11/27/90

Detector	On Stack		Off Stack		Count Begun		Counter Eff.	Gross Cnts	Background	Flux
WU6-20410	11/15/90	12:06 pm	11/16/90	10:28 am	11/21/90	11:40 am	0.1642	35937	634	41.9
WU6-20420	11/15/90	11:50 am	11/16/90	10:25 am	11/21/90	11:51 am	0.1642	625	634	0.0

NOTE: All times are local stack times; Counting time is 10 minutes; Flux is given in pCi/Sec-Sq M
NOTE: Number of Flux Measurements = 2; Average flux = 20.9

SUMMARY OF RADON FLUX COMPUTATIONS
TABLE Tb. BLANK TEST RESULTS FOR TOP OF STACK
Scientific Analysis, Inc.; Montgomery, Alabama 36117 11/27/90

Detector	On Stack		Off Stack		Count Begun		Counter Eff.	Gross Cnts	Background	Flux
WU6-20420	11/15/90	11:50 am	11/16/90	10:25 am	11/20/90	11:04 am	0.1638	640	618	0.0

NOTE: All times are local stack times; Counting time is 10 minutes; Flux is given in pCi/Sec-Sq M
NOTE: Number of Flux Measurements = 1; Average flux = 0.0

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SUMMARY OF RADON FLUX COMPUTATIONS
TABLE Iv. VALID TEST RESULTS FOR TOP OF STACK
Scientific Analysis, Inc.; Montgomery, Alabama 36117 11/27/90

Detector	On Stack		Off Stack		Count Begun		Counter Eff.	Gross Cnts	Background	Flux
WU7-20421	11/15/90	12:14 pm	11/16/90	10:29 am	11/20/90	11:18 am	0.1638	40588	618	39.7
WU7-20422	11/15/90	12:16 pm	11/16/90	10:29 am	11/20/90	11:31 am	0.1638	67549	618	66.7
WU7-20423	11/15/90	12:18 pm	11/16/90	10:30 am	11/20/90	11:50 am	0.1638	53832	618	53.2
WU7-20424	11/15/90	12:22 pm	11/16/90	10:30 am	11/20/90	12:01 pm	0.1638	29053	618	28.6
WU7-20425	11/15/90	12:22 pm	11/16/90	10:30 am	11/20/90	12:13 pm	0.1638	37118	618	36.7
WU7-20426	11/15/90	12:19 pm	11/16/90	10:30 am	11/20/90	12:26 pm	0.1638	37697	618	37.3
WU7-20427	11/15/90	12:15 pm	11/16/90	10:30 am	11/20/90	12:39 pm	0.1638	42691	618	42.2
WU7-20428	11/15/90	12:18 pm	11/16/90	10:33 am	11/20/90	12:56 pm	0.1638	55381	618	55.1
WU7-20429	11/15/90	12:20 pm	11/16/90	10:34 am	11/20/90	01:06 pm	0.1638	39554	618	39.2
WU7-20430	11/15/90	12:12 pm	11/16/90	10:35 am	11/20/90	01:18 pm	0.1638	41457	618	41.0
WU7-20431	11/15/90	12:24 pm	11/16/90	10:34 am	11/20/90	01:30 pm	0.1638	46276	618	46.3
WU7-20432	11/15/90	12:26 pm	11/16/90	10:32 am	11/20/90	01:41 pm	0.1638	84987	618	85.9

NOTE: All times are local stack times; Counting time is 10 minutes; Flux is given in pCi/Sec-Sq M
NOTE: Number of Flux Measurements = 12; Average flux = 47.7

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SUMMARY OF RADON FLUX COMPUTATIONS
TABLE Td. DUPLICATE TEST RESULTS FOR TOP OF STACK
Scientific Analysis, Inc.; Montgomery, Alabama 36117 11/27/90

Detector	On Stack		Off Stack		Count Begun		Counter Eff.	Gross Cnts	Background	Flux
WU7-20430	11/15/90	12:12 pm	11/16/90	10:35 am	11/21/90	12:02 pm	0.1642	35074	634	40.9

NOTE: All times are local stack times; Counting time is 10 minutes; Flux is given in pCi/Sec-Sq M
NOTE: Number of Flux Measurements = 1; Average flux = 40.9

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SUMMARY OF RADON FLUX COMPUTATIONS
TABLE Tb. BLANK TEST RESULTS FOR TOP OF STACK
Scientific Analysis, Inc.; Montgomery, Alabama 36117 11/27/90

Detector	On Stack		Off Stack		Count Begun		Counter Eff.	Gross Cnts	Background	Flux
WU7-20433	11/15/90	12:15 pm	11/16/90	10:30 am	11/20/90	01:52 pm	0.1638	622	618	0.0

NOTE: All times are local stack times; Counting time is 10 minutes; Flux is given in pCi/Sec-Sq M
NOTE: Number of Flux Measurements = 1; Average flux = 0.0

SCIENTIFIC ANALYSIS, INC.

CHAIN OF CUSTODY RECORD

Radon Flux Testing

Job Name: Ecology & Environment – Navajo Uranium Mine Sites

Samplers (Name and Signature): Mary Sue Philp [signature]
Beverly Pester [signature]

Sample Locations/Sample ID Numbers (Collector Numbers):
#20384 to #20433

Sample Type: Exposed Charcoal in Plastic Container

Total Number of Samples: 50

Collection Date: 11/15/90 to 11/16/90

Relinquished By (Name and Signature): Mary Sue Philp [signature]

Date/Time: 11/16/90

Received By (Name and Signature): Faith ann McWhorter [signature]

Date/Time: 11-19-90 10:00 am

Relinquished By (Name and Signature):

Date/Time:

Received By (Name and Signature):

Date/Time:

APPENDIX B

eceived: 12/06/90 01/21/91 15:49:23

REPORT TO: TMA Eberline Corporation
5635 Jefferson Street NE
Albuquerque, NM 87109

ATTEN: Rick Haaker

CLIENT: TMA EBERLINE SAMPLES 28
COMPANY: TMA Eberline Corporation
ACILITY: Albuquerque, NM

WORK ID: E & E
TAKEN: By TMA Staff
TRANS: By UPS
TYPE: Solid & Liquids
P.O. #: Verbal - Dennis Wells
INVOICE: under separate cover

PREPARED BY: Thermo Analytical, Inc.
160 Taylor Street
Monrovia, CA 91016

ATTEN: Ms. Carole Harris
PHONE: 818-357-3247

CERTIFIED BY: [signature]

CONTACT REM

This report is for the sole and exclusive use of the client to whom it is addressed and represents only those samples herein described. Samples not destroyed in testing are retained a maximum of 30 days unless otherwise requested.

SAMPLE IDENTIFICATION

01	01A
01	01A duplicate
01	01A Spike
01	01A Spike Duplicate
02	02A
03	03A
04	04A
05	05A
06	06A
07	07A
08	08A
09	09A
10	10A
11	11A
12	12A
13	13A
14	14A
15	15A
16	16A
17	17A
18	18A

TEST CODES and NAMES used on this workorder

3050IC	Strong Acid Dig.-Tot. Met.
AS L	Arsenic - Liquids
AS S	Arsenic - Solids
AS SED	As/Se Digestion
METALS	METALS ANALYSIS
MPREPS	Metals Prep. - Solid
MPREPW	Metals Prep. - Liquid
PB LF	Lead by HGF
PB SF	Lead by HGF
SE L	Selenium - Liquids
SE S	Selenium - Solid
SR L	Strontium - Liquids
SR S	Strontium - Solids
ZR L	Zirconium - Liquids
ZR S	Zirconium - Solids

SAMPLE IDENTIFICATION

19 19A
20 20A
21 21A
22 W1
22 W1 Dulpicate
22 W1 Spike
22 W1 Spike Duplicate
23 W2
24 W3
25 W4
26 W5
27 W6
28 W7

Received: 12/06/90

Results by Sample

SAMPLE ID 01A AREA 20

FRACTION 01A TEST CODE METALS NAME METALS ANALYSIS
Date & Time Collected 11/14/90 Category

AREA

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	474.	3
Titanium	ICP	26.	1
Magnesium	ICP	2770.	22
Manganese	ICP	260.	1
Barium	ICP	221.	1
Aluminum	ICP	4107.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	1.6	0.1
Selenium	FURNACE	0.9	0.2
Strontium	FLAME	150.	5
Lead	FURNACE	17.9	0.1

Received: 12/06/90

Results by Sample

SAMPLE ID 01A duplicate Area 20 FRACTION 01B TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/14/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	465.	3
Titanium	ICP	9.	1
Magnesium	ICP	1860.	22
Manganese	ICP	250.	1
Barium	ICP	154.	1
Aluminum	ICP	3360.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	1.8	0.1
Selenium	FURNACE	1.5	0.2
Strontium	FLAME	180.	5
Lead	FURNACE	14.4	0.1

Received: 12/06/90

Results by Sample

SAMPLE ID 01A Spike

FRACTION 01C TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/14/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	137.	2
Vanadium	ICP	738.	3
Titanium	ICP	139.	1
Magnesium	ICP	4130.	22
Manganese	ICP	453.	1
Barium	ICP	368.	1
Aluminum	ICP	12300.	3
Molybdenum	ICP	154.	4
Arsenic	FURNACE	NA	0.1
Selenium	FURNACE	NA	0.2
Strontium	FLAME	NA	5
Lead	FURNACE	NA	0.1

Received: 12/06/90

Results by Sample

SAMPLE ID 01A Spike Duplicate

FRACTION 01D TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/14/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	139.	2
Vanadium	ICP	791.	3
Titanium	ICP	97.	1
Magnesium	ICP	4540.	22
Manganese	ICP	461.	1
Barium	ICP	408.	1
Aluminum	ICP	13950.	3
Molybdenum	ICP	150.	4
Arsenic	FURNACE	NA	0.1
Selenium	FURNACE	NA	0.2
Strontium	FLAME	NA	5
Lead	FURNACE	NA	0.1

Received: 12/06/90

Results by Sample

SAMPLE ID 02A Area 22

FRACTION 02A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/14/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	NA	2
Vanadium	ICP	105.	3
Titanium	ICP	20.	1
Magnesium	ICP	1300.	22
Manganese	ICP	146.	1
Barium	ICP	86.2	1
Aluminum	ICP	2120.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	0.8	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	162.	5
Lead	FURNACE	4.1	0.1

Received: 12/06/90

Results by Sample

SAMPLE ID 03A Area 23

FRACTION 03A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/14/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst RCM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	53.4	3
Titanium	ICP	15.0	1
Magnesium	ICP	993.	22
Manganese	ICP	151.	1
Barium	ICP	106.	1
Aluminum	ICP	1830.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	0.7	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	103.	5
Lead	FURNACE	4.1	0.1

Received: 12/06/90

Results by Sample

SAMPLE ID 04A *area 25*

FRACTION 04A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/14/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst: REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	8.28	3
Titanium	ICP	10.8	1
Magnesium	ICP	612.	22
Manganese	ICP	142.	1
Barium	ICP	76.4	1
Aluminum	ICP	1240.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	0.5	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	24.3	5
Lead	FURNACE	1.7	0.1

A

Received: 12/06/90

Results by Sample

SAMPLE ID 05A Area 6 FRACTION 05A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/14/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst RCM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	186.	3
Titanium	ICP	52.8	1
Magnesium	ICP	1800.	22
Manganese	ICP	226.	1
Barium	ICP	196.	1
Aluminum	ICP	4210.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	0.8	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	182.	5
Lead	FURNACE	9.2	0.1

Received: 12/06/90

TMA Inc. REPORT

Results by Sample

SAMPLE ID 06A Area 10

FRACTION 06A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/14/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	185.	3
Titanium	ICP	40.	1
Magnesium	ICP	2000.	22
Manganese	ICP	229.	1
Barium	ICP	79.	1
Aluminum	ICP	3640.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	0.8	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	154.	5
Lead	FURNACE	8.3	0.1

Received: 12/06/90

TMA Inc. REPORT Work Order # A0-12-025

Results by Sample

SAMPLE ID 07A Area 11 FRACTION 07A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/14/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	847.	3
Titanium	ICP	15.9	1
Magnesium	ICP	2580.	22
Manganese	ICP	273.	1
Barium	ICP	200.	1
Aluminum	ICP	4320.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	1.7	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	15.3	5
Lead	FURNACE	26.6	0.1

APPENDIX C

Laboratory Preliminary Results

ALBUQUERQUE LABORATORY

PRELIMINARY DATA REPORT

CUSTOMER Ecology and Environment
ADDRESS 160 Spear Street #930
CITY San Francisco Ca. 94105

PROJ# ZT1091 E0920195 AA

ATTN: Mary Sue Philp. Ph# (415) 777-2811

E2732

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS
1	7	Water - Radium 226/8, Isotopic Uranium

LAB. NO.	CUSTOMER IDENTIFICATION	CUSTOMER SAMPLE NO.	DATE COLLECTED	TYPE OF ANALYSIS	[illegible]	[illegible]	[illegible]	[illegible]
E500	B-V Limestock Well	W1	0830 11-16-90	Ra^{226}	3839.3 ml			0.8±0.1
				Ra^{228}	3840			0±5
				$U^{233/4}$				2.0±0.4
				U^{235}				0.3±0.1
				U^{238}				0.4±0.2
01	B-U Limestock well	W2	0835 11-16-90	Ra^{226}	2708.3			0.2±0.1
				Ra^{228}	2710			0±5
				$U^{233/4}$				0.5±0.2
				U^{235}				0.0±0.1
				U^{238}				0.0±0.1
02	B-V Tap Water	W3	0910 11-16-90	Ra^{226}	3961.9			0.2±0.1
				Ra^{228}	3960			0±5
				$U^{233/4}$				2.1±0.[illegible]
				U^{235}			KB 1-14-91	~~0.9~~ 1.0 ±0.[illegible]
				U^{238}				0.8±0.[illegible]

RTP acidified & filtered 11/16/90

* INSERT UNITS

P-FAX 1-14-91 Need Ra^{226} (TO E+E ALSO EPA)

TMA Eberline
Thermo Analytical Inc.
7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109

12-4-90

BY Paul Kirkland DA 12/16/90

CUSTOMER Ecology & Environment

ADDRESS

CITY

ALBUQUERQUE LABORATORY

PRELIMINARY DATA REPORT

E2732

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS

LAB NO.	CUSTOMER IDENTIFICATION	CUSTOMER SAMPLE NO.	DATE COLLECTED	ANALYSIS	TOTAL			
E503	B-V Well	W4	0905 11-16-90	Ra 226	3865.1			0.1±0.1
				Ra 228	3870			0±5
				U 233/4				1.4±0.4
				U 235				0.5±0.2
				U 238				0.5±0.2
04	Desiderio stock Pond	W5	0935 11-16-90	Ra 226	3891.4			0.3±0.1
				Ra 228	3890			0±5
				U 233/4				2.3±0.4
				U 235				0.1±0.1
				U 238				2.2±0.4
05	Desiderio tap Water	W6	0955 11-16-90	Ra 226	4054.1			0.3±0.1
				Ra 228	4050			0±5
				U 233/4				1.2±0.3
				U 235				0.0±0.2
				U 238				0.2±0.1

* INSERT UNITS

TMA Eberline
Thermo Analytical Inc.
7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109

BY DDK

11/16/90
~~12/31~~
DATE

CUSTOMER: Ecology & Environment

ADDRESS

CITY

CUST. A.O. NO.

PRELIMINARY DATA REPORT

E2732

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS

LAB. NO.	CUSTOMER IDENTIFICATION	CUSTOMER SAMPLE NO.	DATE COLLECTED	TYPE OF ANALYSIS	TOTAL			
E506	Preschool Well	W7	11-05 11-16-90	Ra 226	3690.1			1.0 ± 0.1
				Ra 228	3690			22 ± 6
				U 233/4				130 ± 10
				U 235				3.0 ± 0.5
				U 238				74 ± 7
T 5708	Dup.			Ra 226				
				Ra 228				
				U 233/4				
				U 235				
				U 238				
T 09	Blank			Ra 226				
				Ra 228				
				U 233/4				
				U 235				
				U 238				
T 10	Spike			Ra 226				
				Ra 228				
				U 233/4				
				U 235				
				U 238				

* INSERT UNITS

TMA Eberline
Thermo Analytical Inc.
7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

BY PDK

DATE 11/16/90

ALBUQUERQUE LABORATORY

CUSTOMER Ecology and Environment
ADDRESS 160 Spear Street #930
CITY San Francisco CA. 94105

PRELIMINARY DATA REPORT

CUST. P.O. NO.
PROJ # ZT1091 E0920195AA - Project Name: Navajo Desiderio Grp.
ATTN: Mary Sue Philp - uranium site

E2808

ITEM	NO. OF SAMPLES	
1	18	Soil - Radium 226/8, Isotopic Uranium

LAB. NO.	CUSTOMER IDENTIFICATION	CUSTOMER SAMPLE NO.	DATE COLLECTED	TYPE OF ANALYSIS	[illegible]	[illegible]	[illegible]	[illegible]
E948	1A *	Area 20	1455 11-14-90	Ra 226	518/464			300 ± 10
				Ra 228				1 ± 1
				U 233/4				240 ± 20
				U 235				13 ± 1
				U 238				250 ± 2
49	2A	22	11-14-90	Ra 226	570/549			34 ± 3
				Ra 228				0 ± 1
				U 233/4				25 ± 2
				U 235				1.0 ± 0.7
				U 238				25 ± 2
50	3A	23	11-14-90	Ra 226	480/447			24 ± 2
				Ra 228				0 ± 1
				U 233/4				21 ± 2
				U 235				0.8 ± 0.
				U 238				20 ± 2

* INSERT UNITS

TMA Eberline
Thermo Analytical Inc.
7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109

12-4-90

BY Paul Kirkland

12/4/9

ALBUQUERQUE LABORATORY

CUSTOMER Ecology & Environment

ADDRESS

CITY

PRELIMINARY DATA REPORT

CUST. P.O. NO.

TOTAL NO. OF SAMPLES

E2808

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS

LAB. NO.	CUSTOMER IDENTIFICATION	CUSTOMER SAMPLE NO.	DATE COLLECTED	TYPE OF ANALYSIS	TOTAL COLLECTED			
E951	4A	Area 25	1540 11-14-90	Ra 226	478/439			4.7±0.5
				Ra 228				0±1
				U 233/4				3.4±0.4
				U 235				0.1±0.1
				U 238				3.5±0.4
52	5A	6	1610 11-14-90	Ra 226	591/556			49±5
				Ra 228				0±1
				U 233/4				24±2
				U 235				1.0±0.2
				U 238				25±2
53	6A	10	1622 11-14-90	Ra 226	486/424			130±10
				Ra 228				0±1
				U 233/4				100±10
				U 235				4.7±0.5
				U 238				100±10

INSERT UNITS

TMA Eberline
Thermo Analytical Inc.
7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109

BY [signature] DATE 12/4/90

ALBUQUERQUE LABORATORY

CUSTOMER: Ecology & Environment

ADDRESS

CITY

PRELIMINARY DATA REPORT

CUST. P.O. NO. | DOST. P.O. NO.

E2808

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS

LAB. NO.	CUSTOMER IDENTIFICATION	CUSTOMER SAMPLE NO.	DATE COLLECTED	ANALYSIS				
E954	7A	Area 11	1625 11-14-90	Ra 226	612/610			260±30
				Ra 228				1±1
				U 233/4				290±30
				U 235				20±2
				U 238				310±30
55	8A	Washarea S. of Res.	1650 11-14-90	Ra 226	522/497			1.9±0.2
				Ra 228				1±1
				U 233/4				1.1±0.2
				U 235				0.0±0.1
				U 238				1.1±0.2
56	9A	Road to B-V	11-14-90	Ra 226	563/570			0.8±0.1
				Ra 228				0±1
				U 233/4				0.6±0.1
				U 235				0.0±0.1
				U 238				0.7±0.1

* INSERT UNITS

TMA Eberline
Thermo Analytical Inc.
7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE NEW MEXICO 87109

BY PDK

12/4/90
DATE

ALBUQUERQUE LABORATORY

CUSTOMER Ecology & Environment

ADDRESS

CITY

PRELIMINARY DATA REPORT

CUST. P.O. NO.

TOTAL NO. OF SAMPLES

E2808

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS

LAB. NO.	CUSTOMER IDENTIFICATION	CUSTOMER SAMPLE NO.	DATE COLLECTED	TYPE OF ANALYSIS	TOTAL			
E957	10A	On Rd to Desiderio	0830 11-15-90	Ra 226	430/343			1.3±0.1
				Ra 228				0±1
				U 233/4				0.6±0.1
				U 235				0.0±0.1
				U 238				0.8±0.1
58	12A	Radon Cart. areas	1125 11-15-90	Ra 226	487/454			34±3
				Ra 228				0±1
				U 233/4				19±2
				U 235				1.5±0.2
				U 238				19±2
59	13A	"	1125 11-15-90	Ra 226	505/474			30±3
				Ra 228				0±1
				U 233/4				17±2
				U 235				0.7±0.1
				U 238				17±2

INSERT UNITS

TMA Eberline
Thermo Analytical Inc.
7021 PAN AMERICAN FREEWAY, N.E.

BY PDK

12/4/90
DATE

ALBUQUERQUE LABORATORY

CUSTOMER Ecology & Environment

ADDRESS

CITY

PRELIMINARY DATA REPORT

E2808

ITEM	NO. OF SAMPLES	

LAB NO.	CUSTOMER IDENTIFICATION							
E960	14A	Sta. 11	1210 11-15-90	Ra 226	426/391			1.8±0.2
				Ra 228				0±1
				U 233/4				0.6±0.1
				U 235				0.0±0.1
				U 238				0.7±0.1
61	15A	11	1215 11-15-90	Ra 226	436/401			3.0±0.3
				Ra 228				0±1
				U 233/4				1.7±0.2
				U 235				0.0±0.1
				U 238				1.5±0.2
62	18A	Sta 10	1425 11-15-90	Ra 226	453/423			0.8±0.1
				Ra 228				0±1
				U 233/4				0.7±0.1
				U 235				0.1±0.1
				U 238				0.8±0.1

* INSERT UNITS

TMA Eberline
Thermo Analytical Inc.
7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109

BY DDK

12/4/9

DA

ALBUQUERQUE LABORATORY

CUSTOMER Ecology & Environment

ADDRESS

CITY

PRELIMINARY DATA REPORT

CUST. P.O. NO.

E2808

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS

LAB. NO.	CUSTOMER IDENTIFICATION	CUSTOMER SAMPLE NO.	DATE COLLECTED					
E963	19A	Sta. 10	1515 11-15-90	Ra 226	551/533			20±2
				Ra 228				0±1
				U 233/4				28±3
				U 235				1.2±0.2
				U 238				28±3
64	20A	"	1520 11-15-90	Ra 226	576/559			33±3
				Ra 228				0±1
				U 233/4				29±3
				U 235				1.3±0.2
				U 238				28±3
65	21A	Sta. 40	1540 11-15-90	Ra 226	543/508			450±50
				Ra 228				0±1
				U 233/4				330±30
				U 235				29±3
				U 238				390±40

* INSERT UNITS

TMA Eberline
Thermo Analytical Inc.
7021 PAN AMERICAN FREEWAY, N.E.
ALBUQUERQUE, NEW MEXICO 87109

BY PDK

12/4/90
DATE

CHAIN OF CUSTODY RECORD

San Francisco, California Office

PROJ. NO. 1091 12019STA

PROJECT NAME NAVAJO DESIDERIO GROUP URANIUM SITE

SAMPLERS. (Signature)

NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Radionuclides	Metals					REMARKS
*	11/14/90	1455	X		Area 20	2x8oz	X	X					
A		~~1515~~ 1515			Area 22		X	X					Time: 1515
A		~~1540~~ 1530			Area 23		X	X					Time: 1530
A		1540			Area 25		X	X					
A		1610			Area 6		X	X					
A		1620			Area 10		X	X					
A		1625			Area 11		X	X					
A		1650			Wash Area South of Residences		X	X					
7	11/14/90	—			Road to B-V	2x8oz	X	X					* Direct questions and invoice to Mary Sue Philp Ecology & Environment, Inc. 1600 Spear Street Ste. 930 San Francisco, CA 94105 (415) 777-2811

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	11/16/90 15:35				
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

9 12552

CHAIN OF CUSTODY RECORD

San Francisco, California 94105

PROJ NO. 3T1691 :49Z0195AA

PROJECT NAME Navajo Desiderio Group Uranium Site

SAMPLERS. (Signature) [signature] [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Radionuclides	Metals					REMARKS
10A	11/15/90	0830	X		On Road to Desiderio	2x8oz	X	X					
11A		1005	X		Mine Pit Near Corral	1x8oz		X					Station #4. C Desiderio site
12A		1125	X		Radon Cartridge Areas	2x8oz	X	X					Station #7 "
13A		1125	X		Radon Cartridge Areas	2x8oz	X	X					Duplicate of 12A
14A		1210	X		Station 11 Desiderio	2x8oz	X	X					
15A		1215	X		Station 12 "	2x8oz	X	X					
16A		1249	X		Station #9 "	1x8oz		X					
17A		1255	X		Station 10 "	1x8oz		X					
18A		1425	X		Drainage off station #30 CBU site.	2x8oz	X	X					*Direct questions and invoice
19A		1515	X		Station #36 "	2x8oz	X	X					to Mary Sue Philp
20A		1520	X		(Dup. of 19A)	2x8oz	X	X					(415) 777-2811
21A		1540	X		Station 40	2x8oz	X	X					160 Spear Street Ste 930
													San Francisco, CA 94105

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	11/16/90 1540				
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

9 12560

Office of Environment

CHAIN OF CUSTODY RECORD

San Francisco, Calif.

OJ. NO. 091 7Z019SAH

PROJECT NAME: Navajo Desiderio Group Uranium Mine

PLERS: (Signature) Nichi Radvila [signature]

NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Radionuclides	Metals					REMARKS
1	11/16/90	0830		X	B-V Livestock Well	1x1 gal 1x1 QT	X	X					
2		0835			B-V Livestock Well	1x1 gal 1x1 QT	X	X					
3		0910			B-V Tap Water		X	X					
4		0905			B-V Well		X	X					Gallon containers are for
5		0935			Desiderio Stock Pond		X	X					radionuclide analyses; Quart
		0955			Desiderio Tap Water		X	X					containers are for metals analysis
7	11/16/90	1105		X	Preschool Well	1x1 gal 1x1 QT	X	X					

* Direct Questions and invoice to
Mary Sue Philp
Ecology + Environment
160 Spear Street #930
San Francisco, CA 94105
(415) 777-2811

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	11/16/90 15:35				
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

9 12559

Received: 12/06/90

Results by Sample

SAMPLE ID 08A Wash S. of Residences

FRACTION 08A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/14/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	9.63	3
Titanium	ICP	25.3	1
Magnesium	ICP	1154.	22
Manganese	ICP	105.	1
Barium	ICP	58.5	1
Aluminum	ICP	2970.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	1.4	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	25.5	5
Lead	FURNACE	21.9	0.1

A

Received: 12/05/90

Results by Sample

SAMPLE ID 09A Road to B-V

FRACTION 09A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/14/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	6.07	3
Titanium	ICP	25.1	1
Magnesium	ICP	1480.	22
Manganese	ICP	2580.	14
Barium	ICP	4930.	1
Aluminum	ICP	3060.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	0.8	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	35.1	5
Lead	FURNACE	3.9	0.1

Received: ([illegible]/90 Results by (mple (

SAMPLE ID 10A In Road to Desiderio FRACTION 10A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

Date Prepared 1[illegible]/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	10.4	3
Titanium	ICP	90.3	1
Magnesium	ICP	2170.	22
Manganese	ICP	181.	1
Barium	ICP	124.	1
Aluminum	ICP	5530.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	1 8	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	22.6	5
Lead	FURNACE	5.9	0.1

TMA/ARLI 160 Taylor Street / Monrovia, CA 91016 / (818) 357-3247 / FAX (818) 359-5036

Received (/06/90 Results by(mple (

SAMPLE ID 11A Mine Pit Near Corral FRACTION 11A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

Date Prepared 1 /10/90
Date Analyzed 11/0/91

Analytical Test Results - METALS

Analyst RCM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	5.67	3
Titanium	ICP	41.3	1
Magnesium	ICP	2160.	22
Manganese	ICP	148.	1
Barium	ICP	91.0	1
Aluminum	ICP	3970.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	0.1	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	64.0	5
Lead	FURNACE	2.4	0.1

Received: (06/90 Results by (nple (

SAMPLE ID 12A Radon Cartridge Areas FRACTION 12A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

Date Prepared 10/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	11.0	3
Titanium	ICP	23.1	1
Magnesium	ICP	2450.	22
Manganese	ICP	136.	1
Barium	ICP	132.	1
Aluminum	ICP	4000.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	5.2	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	116.	5
Lead	FURNACE	9.5	0.1

Received: 1(16/90

Results by S(ple

AMPLE ID 13A Radon Cart. Areas FRACTION 13A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

ate Prepared 12/20/90
ate Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	12.7	3
Titanium	ICP	39.8	1
Magnesium	ICP	2440.	22
Manganese	ICP	245.	1
Barium	ICP	104.	1
Aluminum	ICP	3720.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	10.2	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	139.	5
Lead	FURNACE	7.0	0.1

Received: (/05/90 Results by(mple (

SAMPLE ID 14A Station 11 FRACTION 14A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst RFM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	11.2	3
Titanium	ICP	55.1	1
Magnesium	ICP	2049.	22
Manganese	ICP	131.	1
Barium	ICP	69.7	1
Aluminum	ICP	4000.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	1.4	0.1
Selenium	FURNACE	0.2	0.2
Strontium	FLAME	119.	5
Lead	FURNACE	3.3	0.1

RECEIVED: 12/06/90

Results by Sample

SAMPLE ID 15A

FRACTION 15A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	9.43	3
Titanium	ICP	60.1	1
Magnesium	ICP	2130.	22
Manganese	ICP	137.	1
Barium	ICP	58.4	1
Aluminum	ICP	4370.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	1.5	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	129.	5
Lead	FURNACE	3.1	0.1

A

Received (/06/90 Results by(mple (

SAMPLE ID 16A FRACTION 16A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

Date Prepared 12/10/90
Date Analyzed 01/01/91

Analytical Test Results - METALS

Analyst RFM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	6.85	3
Titanium	ICP	49 5	1
Magnesium	ICP	1500.	22
Manganese	ICP	115.	1
Barium	ICP	62 3	1
Aluminum	ICP	3920	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	1 0	0.1
Selenium	FURNACE	<0 2	0.2
Strontium	FLAME	21 3	5
Lead	FURNACE	2 9	0.1

Received: ('06/90

Results by (mple

SAMPLE ID 17A

FRACTION 17A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

Date Prepared 1/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	10.8	3
Titanium	ICP	46.3	1
Magnesium	ICP	1830.	22
Manganese	ICP	143.	1
Barium	ICP	20.5	1
Aluminum	ICP	3450.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	1.5	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	227.	5
Lead	FURNACE	2.4	0.1

Received: (/06/90 Results by(mple (

SAMPLE ID 18A FRACTION 18A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	7.59	3
Titanium	ICP	28.9	1
Magnesium	ICP	1400.	22
Manganese	ICP	109.	1
Barium	ICP	90.8	1
Aluminum	ICP	3450.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	1.2	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	23.0	5
Lead	FURNACE	3.0	0.1

Received: (/06/90

Results by(mple

SAMPLE ID 19A

FRACTION 19A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	89.9	3
Titanium	ICP	12.0	1
Magnesium	ICP	1310.	22
Manganese	ICP	118.	1
Barium	ICP	205.	1
Aluminum	ICP	2120.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	0.7	0.1
Selenium	FURNACE	<0.2	0.2
Strontium	FLAME	95.0	5
Lead	FURNACE	1.9	0.1

Received: (06/90 Results by (ple (

SAMPLE ID 20A FRACTION 20A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst RCM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	95.3	3
Titanium	ICP	10.7	1
Magnesium	ICP	1130.	22
Manganese	ICP	112.	1
Barium	ICP	201.	1
Aluminum	ICP	1740.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	0.8	0.1
Selenium	FURNACE	0.5	0.2
Strontium	FLAME	103.	5
Lead	FURNACE	2.7	0.1

Received: (06/90 Results by (mple (

SAMPLE ID 21A FRACTION 21A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/15/90 Category

Date Prepared 11/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/Kg

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	2
Vanadium	ICP	1410.	3
Titanium	ICP	22.5	1
Magnesium	ICP	1930.	22
Manganese	ICP	225.	1
Barium	ICP	65.0	1
Aluminum	ICP	3320.	3
Molybdenum	ICP	ND	4
Arsenic	FURNACE	6.0	0.1
Selenium	FURNACE	1.4	0.2
Strontium	FLAME	22.6	5
Lead	FURNACE	23.1	0.1

Received: (05/90

Results by (ple

SAMPLE ID W1

FRACTION 22A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/16/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/L

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	0.02
Vanadium	ICP	ND	0.03
Titanium	ICP	ND	0.01
Magnesium	ICP	11.7	0.22
Manganese	ICP	.103	0.01
Barium	ICP	ND	0.01
Aluminum	ICP	ND	0.03
Molybdenum	ICP	.052	0.04
Arsenic	FURNACE	0.003	0.001
Selenium	FURNACE	<0.002	0.002
Strontium	FLAME	11.2	0.05
Lead	FURNACE	0.002	0.0001

Received: 1/06/90 Results by Sample

SAMPLE ID W1 Duplicate FRACTION 22B TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/16/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/L

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	0.02
Vanadium	ICP	ND	0.03
Titanium	ICP	ND	0.01
Magnesium	ICP	11.2	0.22
Manganese	ICP	.1	0.01
Barium	ICP	ND	0.01
Aluminum	ICP	.19	0.03
Molybdenum	ICP	.05	0.04
Arsenic	FURNACE	ND	0.001
Selenium	FURNACE	ND	0.002
Strontium	FLAME	11.0	0.05
Lead	FURNACE	0.002	0.0001

Received: (/06/90

Results by(mple

SAMPLE ID W1 Spike

FRACTION 22C TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/16/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/L

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	0.85	0.02
Vanadium	ICP	0.93	0.03
Titanium	ICP	0.99	0.01
Magnesium	ICP	12.3	0.22
Manganese	ICP	1.0	0.01
Barium	ICP	0.76	0.001
Aluminum	ICP	0.96	0.003
Molybdenum	ICP	1.0	0.04
Arsenic	FURNACE	NA	0.001
Selenium	FURNACE	NA	0.002
Strontium	FLAME	NA	0.05
Lead	FURNACE	NA	0.0001

Received: (06/90

Results by (mple

SAMPLE ID W1 Spike Duplicate

FRACTION 22D TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/16/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/L

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	0.84	0.02
Vanadium	ICP	0.89	0.03
Titanium	ICP	0.99	0.01
Magnesium	ICP	12.27	0.22
Manganese	ICP	0.99	0.01
Barium	ICP	0.73	0.01
Aluminum	ICP	1.3	0.03
Molybdenum	ICP	1.0	0.04
Arsenic	FURNACE	NA	0.001
Selenium	FURNACE	NA	0.002
Strontium	FLAME	NA	0.05
Lead	FURNACE	NA	0.0001

Received: (06/90 Results by (nple (

SAMPLE ID W2 FRACTION 23A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/16/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/L

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	0.02
Vanadium	ICP	ND	0.03
Titanium	ICP	ND	0.01
Magnesium	ICP	2.08	0.22
Manganese	ICP	ND	0.01
Barium	ICP	ND	0.01
Aluminum	ICP	.042	0.03
Molybdenum	ICP	ND	0.04
Arsenic	FURNACE	ND	0.001
Selenium	FURNACE	ND	0.002
Strontium	FLAME	ND	0.05
Lead	FURNACE	0.013	0.0001

Received: (06/90 Results by(mple (

SAMPLE ID W3 FRACTION 24A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/16/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/L

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	0.02
Vanadium	ICP	ND	0.03
Titanium	ICP	ND	0.01
Magnesium	ICP	1.76	0.22
Manganese	ICP	ND	0.01
Barium	ICP	0.03	0.01
Aluminum	ICP	ND	0.03
Molybdenum	ICP	ND	0.04
Arsenic	FURNACE	ND	0.001
Selenium	FURNACE	ND	0.002
Strontium	FLAME	0.12	0.05
Lead	FURNACE	ND	

Received: 12/06/90

Results by Sample

SAMPLE ID W4

FRACTION 25A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/16/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/L

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	0.02
Vanadium	ICP	ND	0.03
Titanium	ICP	ND	0.01
Magnesium	ICP	ND	0.22
Manganese	ICP	ND	0.01
Barium	ICP	0.03	0.01
Aluminum	ICP	ND	0.03
Molybdenum	ICP	ND	0.04
Arsenic	FURNACE	ND	0.001
Selenium	FURNACE	ND	0.002
Strontium	FLAME	2.55	0.05
Lead	FURNACE	ND	0.0001

Received: ('06/90

Results by(mple

SAMPLE ID W5

FRACTION 26A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/16/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/L

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	0.02
Vanadium	ICP	ND	0.03
Titanium	ICP	ND	0.01
Magnesium	ICP	5.47	0.22
Manganese	ICP	0.03	0.01
Barium	ICP	4.79	0.01
Aluminum	ICP	6.51	0.03
Molybdenum	ICP	ND	0.04
Arsenic	FURNACE	ND	0.001
Selenium	FURNACE	ND	0.002
Strontium	FLAME	0.26	0.05
Lead	FURNACE	0.005	0.0001

Received: (/06/90

Results by(mple

SAMPLE ID W6

FRACTION 27A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/16/90 Category

Date Prepared 12/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/L

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	0.02
Vanadium	ICP	ND	0.03
Titanium	ICP	ND	0.01
Magnesium	ICP	ND	0.22
Manganese	ICP	ND	0.01
Barium	ICP	0.03	0.01
Aluminum	ICP	0.03	0.03
Molybdenum	ICP	ND	0.04
Arsenic	FURNACE	ND	0.001
Selenium	FURNACE	ND	0.002
Strontium	FLAME	0.12	0.05
Lead	FURNACE	0.006	0.0001

Received: (06/90 Results by (nple (

SAMPLE ID W7 FRACTION 28A TEST CODE METALS NAME METALS ANALYSIS

Date & Time Collected 11/16/90 Category

Date Prepared 11/20/90
Date Analyzed 01/07/91

Analytical Test Results - METALS

Analyst REM UNITS mg/L

ELEMENT	METHOD	RESULT	DETECTION LIMIT
Chromium	ICP	ND	0.02
Vanadium	ICP	0.22	0.03
Titanium	ICP	ND	0.01
Magnesium	ICP	1.61	0.22
Manganese	ICP	0.02	0.01
Barium	ICP	ND	0.01
Aluminum	ICP	1.06	0.03
Molybdenum	ICP	ND	0.04
Arsenic	FURNACE	ND	0.001
Selenium	FURNACE	ND	0.002
Strontium	FLAME	0.12	0.05
Lead	FURNACE	0.006	0.0001

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

[illegible]	I	305010	AS_SED	MPREPS
[illegible]	I	305010	AS_SED	MPREPS
[illegible]	I	305010	AS_SED	MPREPS
[illegible]	I	305010	AS_SED	MPREPS
[illegible]	I	305010	AS_SED	MPREPS
0[illegible]A	I	305010	AS_SED	MPREPS
[illegible]A	I	305010	AS_SED	MPREPS
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1[illegible]A	I	305010	AS_SED	MPREPS
1[illegible]A	I	305010	AS_SED	MPREPS
1[illegible]A	I	305010	AS_SED	MPREPS
1[illegible]A	I	305010	AS_SED	MPREPS
1[illegible]A	I	305010	AS_SED	MPREPS
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[illegible]	I	3010	AS_SED	MPREPW
[illegible]	I	3010	AS_SED	MPREPW
[illegible]	I	3010	AS_SED	MPREPW

TK 9

Thermo Analytical Inc.

TMA/Eberline
7021 Pan American Hwy.

Albuquerque, NM 87109
(505) 345-3461

CUSTODY TRANSFE[illegible] LAB WORK REQUEST

Received By _____ Client E & E Contact _____

Date Shipped 12/4/90 Contact M.S. Philips Date Due 12/27/90

Assigned to HELI Phone _____ WO Number _____

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

1 of 2

Sample No.	Client ID	Description *		Mat.	Collected	Container								
1A	Area 20	Soil	300 CPM	S	1455 11-14-90		Metals							
2A	22		BKG	S	11-14-90									
3A	23		BKG	S	11-14-90									
4A	25		BKG	S	1540 11-14-90									
5A	6		200 CPM	S	1610 11-14-90									
6A	10		80 CPM	S	1622 11-14-90									
7A	11		300 CPM	S	1625 11-14-90									
8A	wash area S. of Res.		BKG	S	1650 11-14-90									
9A	ROAD TO B-V		BKG	S	11-14-90									
10A	ROAD TO Desiderio		BKG	S	0830 11-15-90									
11A	mini pit near Corral		BKG	S	1005 11-15-90									
12A	Radon cartridge areas		BKG	S	1125 11-15-90									
13A	Radon cartridge areas		BKG	S	1125 11-15-90									
14A	STA. 11		BKG	S	1210 11-15-90									
15A			BKG	S	1215 11-15-90									
16A			BKG	S	1249 11-15-90									
17A	STA 10		BKG	S	1255 11-15-90									
18A			BKG	S	1425 11-15-90									
19A			BKG	S	1515 11-15-90									
20A			BKG	S	1520 11-15-90									

Matrix:
S-soil DL-drum liquid DS-drum solid
W-water B-bio samples X-other

Special instructions:

*RM14S

Item/Reason	Relinquished By	Received By	Date	Time	Item/Reason	Relinquished By	Received By	Date	Time
		[signature]	12/6/90						

TMA
Thermo Analytical Inc.

TMA/Eberline
7021 Pan American Hwy
Albuquerque, NM 87109
(505) 345-3461

CUSTODY TRANSFER RECORD/ LAB WORK REQUEST

Received By _____ Client _____ Contact _____
Date Shipped _____ Contact _____ Date Due _____
Assigned to _____ Phone _____ WO Number _____

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

2 of 2

Sample No.	Client ID	Description	*	Mat.	Collected	Container									
21A	STA 40	Soil	800 CPM	S	1540 11-15-90		METALS								
W1	E & E	Water	BKG	W	11-16-90										
W2	E & E		BKG	W	11-16-90										
W3	B-V TAP Water		BKG	W	0910 11-16-90										
W4	B-V Well		BKG	W	0905 11-16-90										
W5	Dendorio Stockpond		BKG	W	0935 11-16-90										
W6	Dendorio Tap Water		BKG	W	0955 11-16-90										
W7	Preschool Well		BKG	W	1105 11-16-90										

Matrix:
S-soil DL-drum liquid DS-drum solid
W-water B-bio samples X-other

Special instructions:
* RM145

Item/Reason	Relinquished By	Received By	Date	Time	Item/Reason	Relinquished By	Received By	Date	Time
		[illegible]	12/6/90						

POOR LEGIBILITY

ONE OR MORE PAGES IN THIS DOCUMENT ARE DIFFICULT TO READ
DUE TO THE QUALITY OF THE ORIGINAL