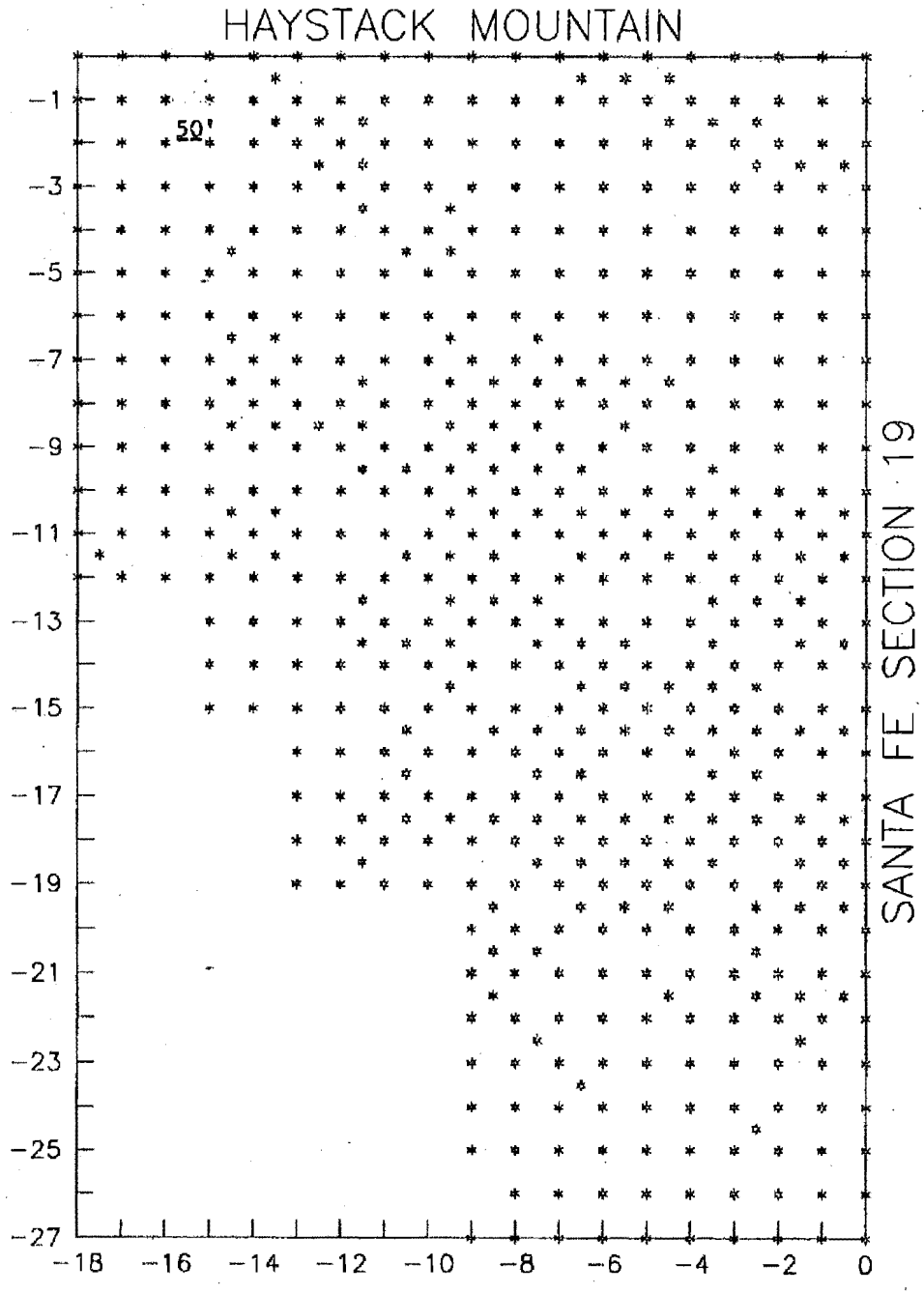
Bluewater Uranium Mine

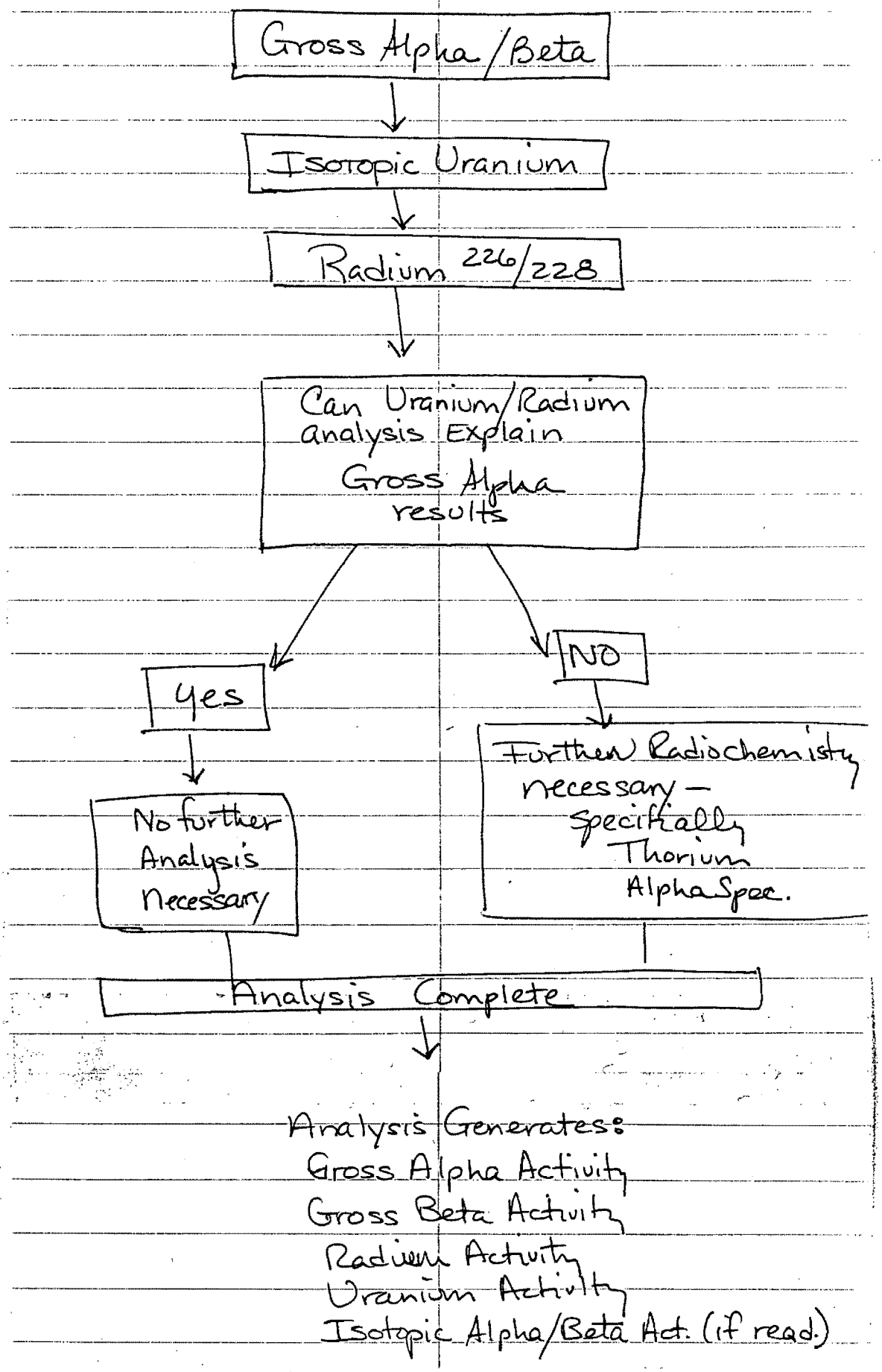
SDMS # 2287833 (5 of 5)

SDMS DOCID # 1156362

SURVEY STATIONS (Sec. 24, T13N, R11W)



Analysis Tree for Prewitt/Bluewater NM
Water Samples



INDOOR RADON AT VANDEVER AND DESIDERIO MINE SITES

There is some concern about indoor radon concentrations at the Vandever and Desiderio uranium mine sites (the Bluewater Mine Sites) near Prewitt, New Mexico. Strip mining operations occurred at both of these locations in the past, indicating that relatively rich uranium deposits lie fairly close to the surface and in close proximity to the home sites.

Two questions need to be answered at these locations: (1) How do indoor concentrations measured at these two sites compare with concentrations measured elsewhere? And, (2) Is it either likely or possible that past mining operations have adversely affected the radon concentrations indoors?

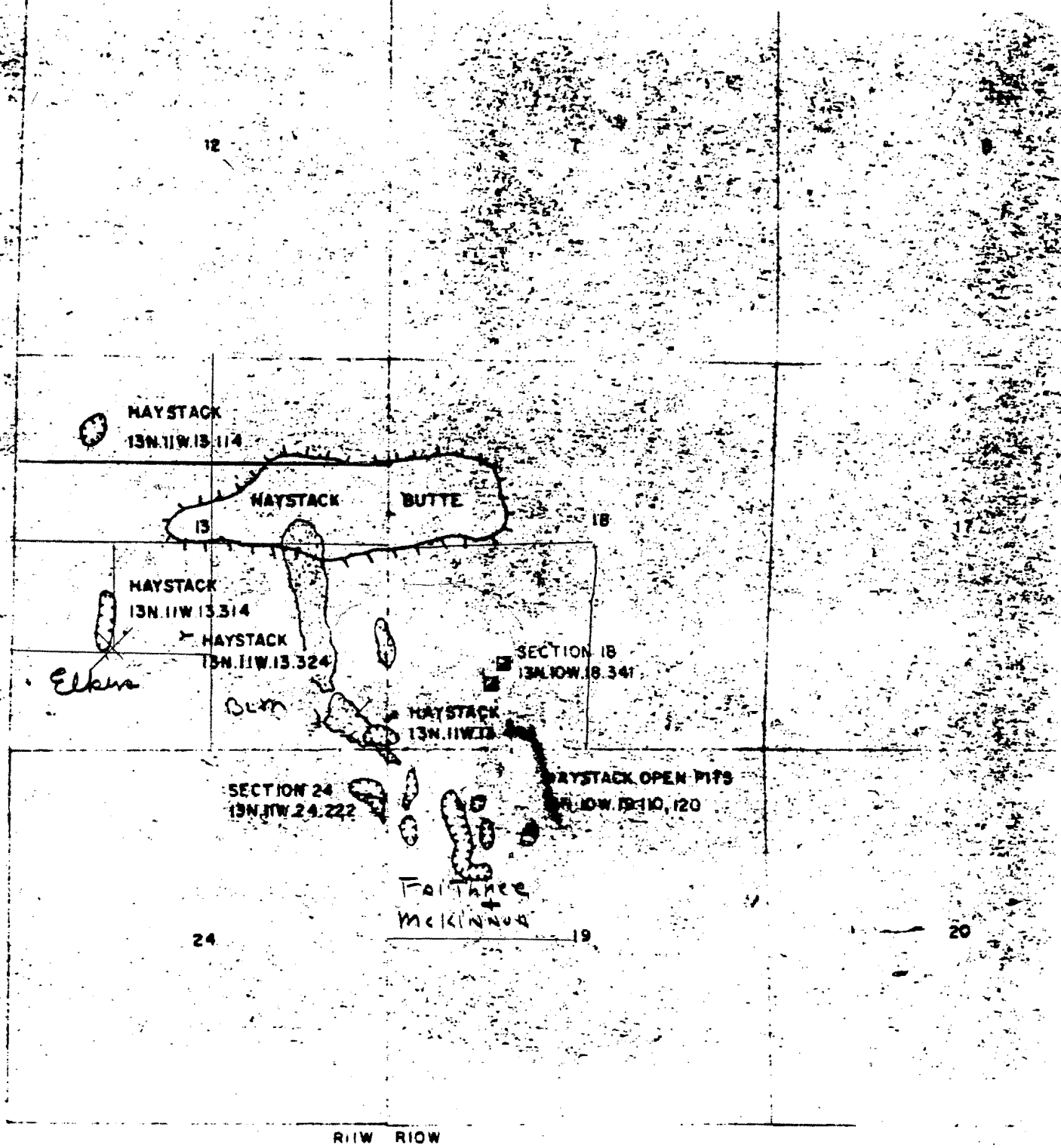
To answer the first question, it has been reported that a concentration of 4.6 pCi/L has been measured at one of the homes at the Desiderio Site, as well as concentrations between 1.5 and 3.3 pCi/L at other homes on site. These measurements were taken with alpha track detectors left in place for two to three months. The results reported at the mine sites are typical for this area (IHS survey, January, 1990,) and in most areas of the country. In the immediate Bluewater area, thirteen homes were measured in the IHS survey, ranging from <1.0 to 7.5 pCi/L, with the average being 2.5 pCi/L. As another point of comparison, a survey in North Dakota showed average radon concentrations of about 6 pCi/L. The conclusion is that there seems to be nothing unusual about the results reported at the two mine sites.

Is it likely, or even possible, that past mining operations have affected indoor concentrations at these sites? The source of indoor radon is the soil in direct proximity to the home. The distance that radon can travel before it decays is directly related to the soil porosity and inversely related to the moisture content. The two mine sites contain a soil horizon composed of fine to coarse grain sand and weathered limestone. The soil porosity is high and the moisture content is low. Therefore, the soil possesses very good soil gas diffusion characteristics. However, since the mean diffusion path length for a radon atom is only a few meters at most before it decays, and since no mining operations have taken place within 50 meters of any on the homes, it is unlikely that the mining operations have in any way affected the soil gas radon concentrations near the homes.

Since these two sites are not "normal" sites as far as the potential for outdoor concentrations of radon, the additional question might be asked, "Could these homes be affected by airborne radon from nearby exposed uranium seams or open mine shafts?". It is difficult to answer "No" to such a speculative question, since outdoor concentration measurements have never been made to my

knowledge. However, it is very unlikely that increases in outdoor concentrations near the homes have occurred as a result of mining operations. The distance of the homes from any potential airborne sources plus the vast volume of mixing air between source and receptor support this conclusion. Indirectly, it must be noted that while radon soil gas measurements have been used as a prospecting tool, radon air concentration measurements have never been used to prospect for uranium. This indicates that increased air concentrations are not associated with rich uranium soil deposits, and thus one would not expect to see any increase in airborne radon concentrations near the homes on these sites.

In conclusion, it does not appear that any increased indoor radon concentrations should be expected or have been measured at the homes on the Vandever and Desiderio sites. Additional long-term measurements following EPA protocols may help clarify this conclusion. It is recommended that any new home construction, particularly on land included as part of this removal action, include piping and sub-foundation gravel consistent with EPA recommendations for new home construction, so that if elevated concentrations are encountered (as have been in 8.3% of the homes in the IHS study), mitigation procedures will be cheap and effective.


12
HAYSTACK
13N.11W.13.114
HAYSTACK BUTTE
13
18
17
HAYSTACK
13N.11W.13.314
HAYSTACK
13N.11W.13.324
Elkins
Burn
SECTION 18
13N.10W.18.341
HAYSTACK
13N.11W.13
HAYSTACK OPEN PITS
13N.10W.19.110, 120
SECTION 24
13N.11W.24.222
Fairhaven
McKinnon
24
19
20
R11W R10W

(8) 450 320 290 300 120 140 160 180 190 200 210

(7) 30 60 100 300 200 100 100 180 210 280 400 300 140 120 220 222 240 165 180 170 200

(6) 30 28 180 270 200 180 220 300 80 140 160 280 180 250 290 200 200 180 175 200 165

(5) 50 60 60 170 400 200 220 260 800 160 70 80 100 165 170 120 180 165 200 220 140

(4) 25 28 30 50 100 140 340 500 900 300 100 150 (274) 150 165 170 200 210 240 200 130 200

(3) 24 30 65 100 300 150 220 300 200 140 100 (Portal) 300 200 180 180 140 180 200 220 110 200

(2) 20 150 200 300 450 1MR 200 100 60 100 80 80 100 125 170 120 125 100 60 50 30

(1) 27 150 200 450 600 800 210 100 80 70 85 40 30 30 28 30 26 30 20 25 28

(d) 20 20 16 18 15 30 30 30 30 28 30 27 26 25 28 30 30 18 20 25 26

		Pre	Post
9,	11,	160	
9,	12,	180	
9,	13,	200	
9,	14,	210	
9,	15,	210	
10	11	180	
10	12	160	
10	13	140	
10	14	200	
10	15	210	
11	11	160	
11	12	100	
11	13	110	
11	14	120	
11	15	130	
12	11	140	
12	12	80	
12	13	100	
12	14	180	
12	15	100	

126
20
106

PARTIALLY SCANNED
OVERSIZE ITEM(S)

See document # 2334376
for partially scanned image(s).
(15 OF 19 TO 19 OF 19)

For complete hardcopy version of the oversize document
contact the Region 9 Regional Records Center – Superfund Division

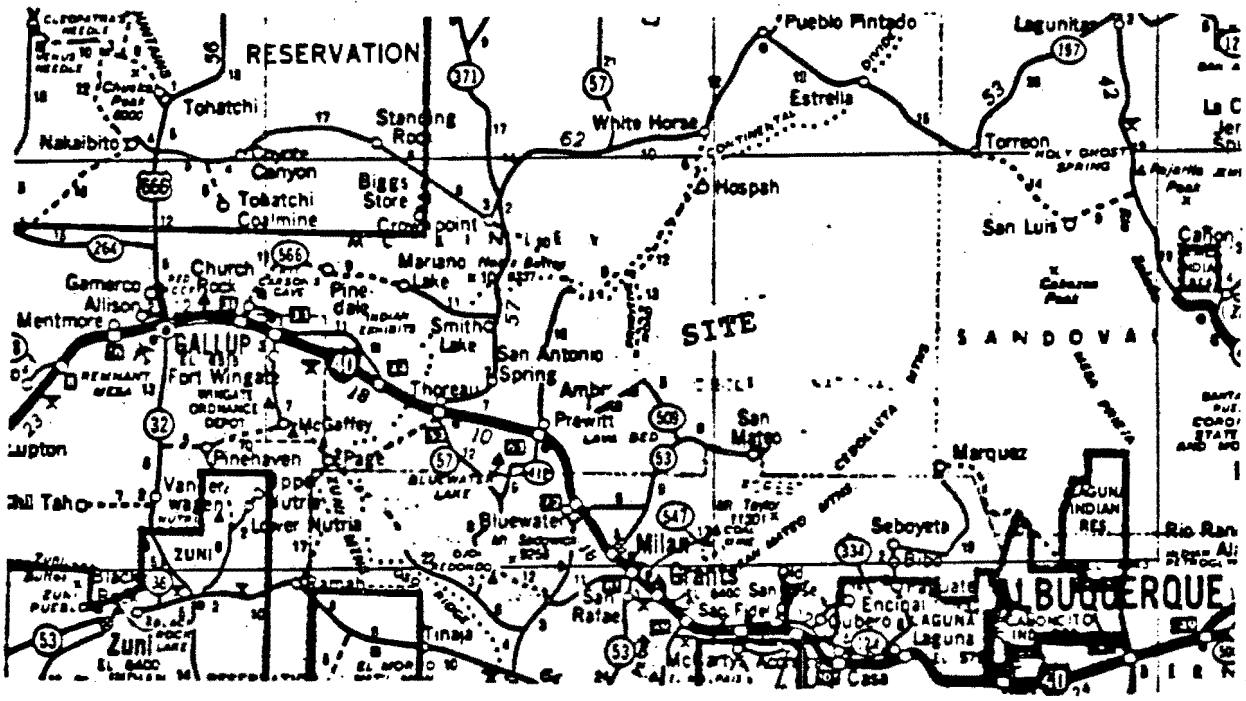


FIGURE # 1 ; REPRINTED BY PERMISSION

NAVAJO SUPERFUND OFFICE

NAVAJO-BROWN VANDEVER URANIUM MINE

JUNE,'90 P. MOLLOY

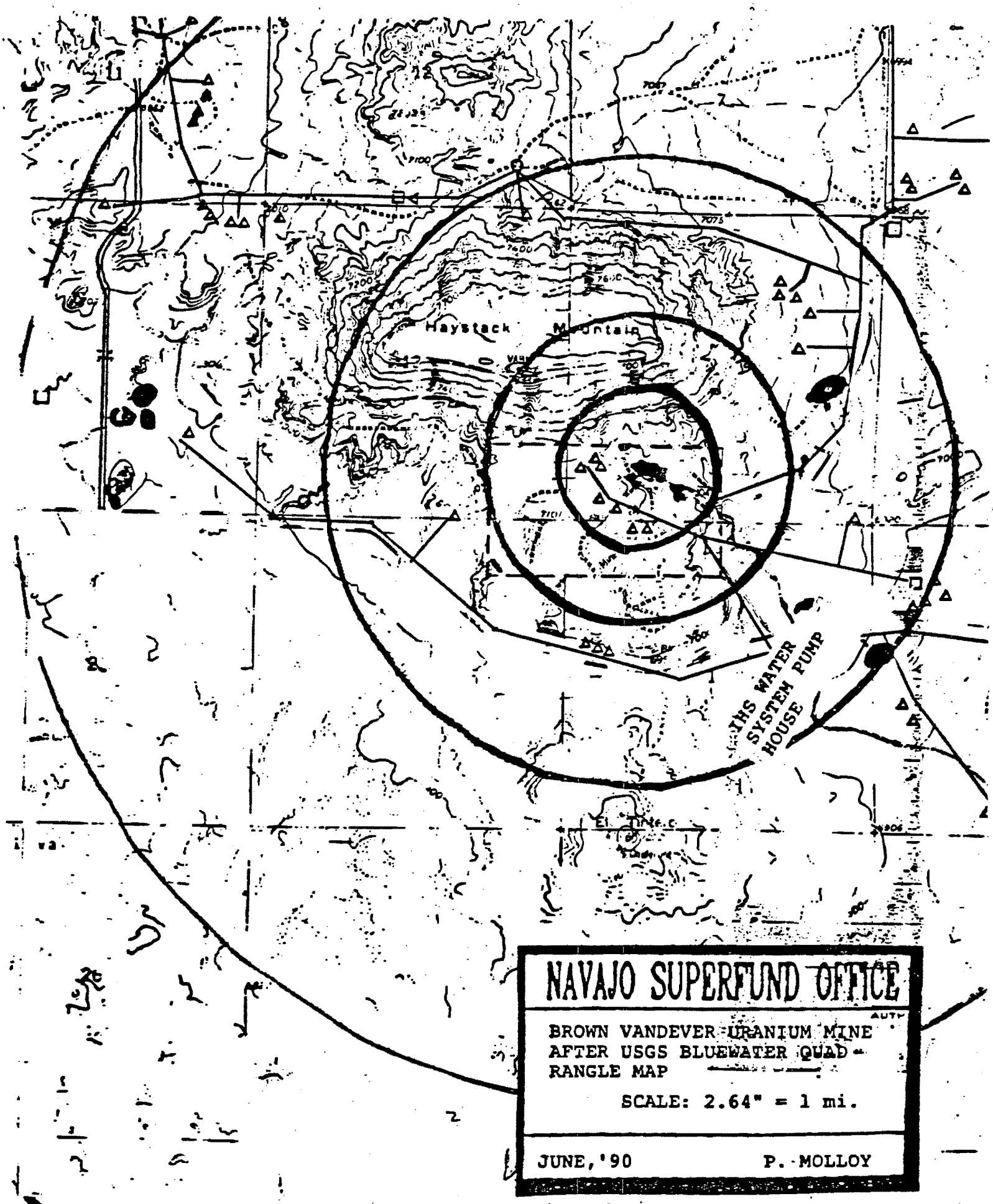
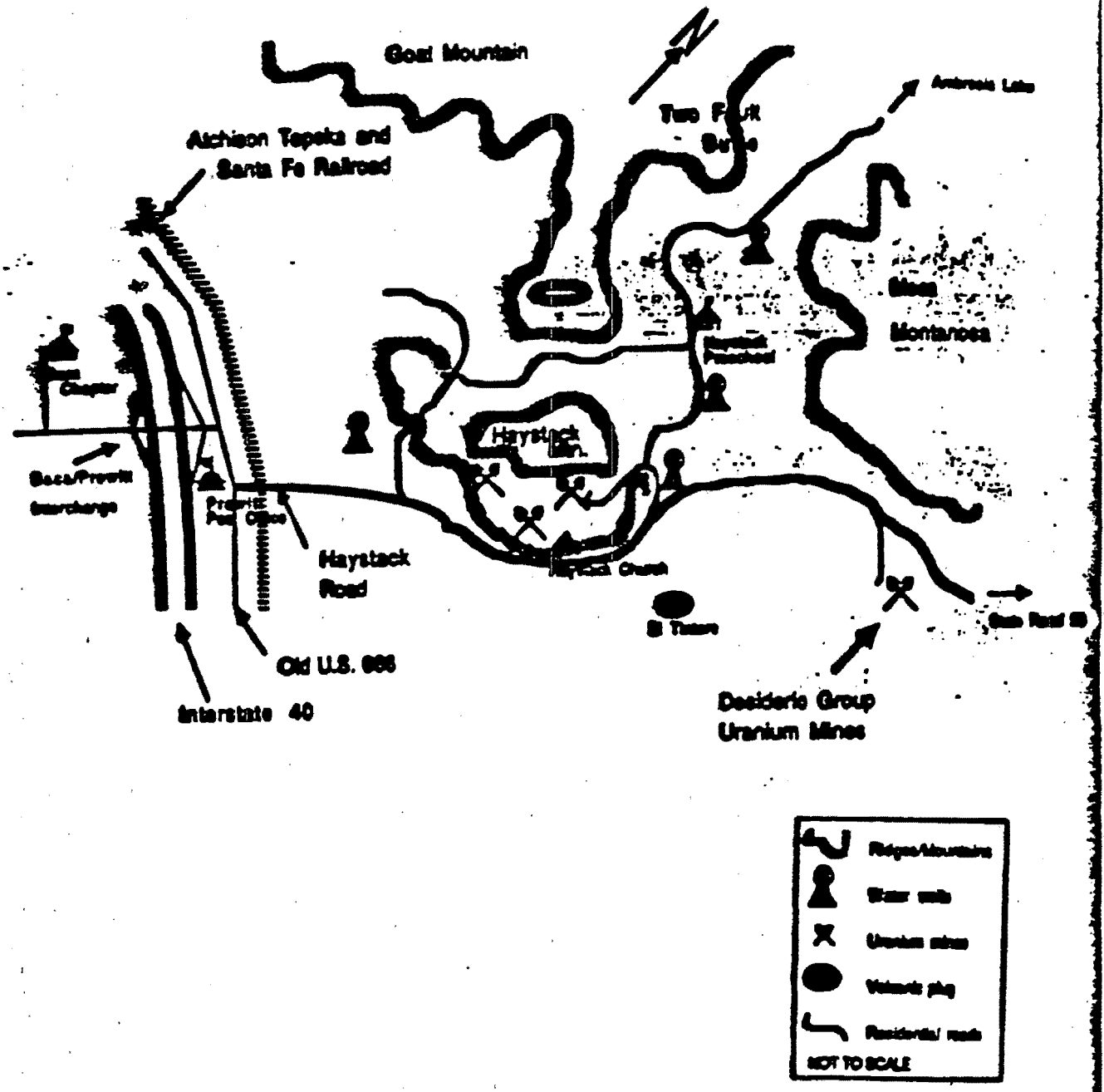


Figure 2. Brown-Vandever Mine Site



NAVAJO SUPERFUND OFFICE

DESIDERIO GROUP MINES

Site location

Figure 3. Desiderio Mine Site

S. EDISON JUNE '90

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)

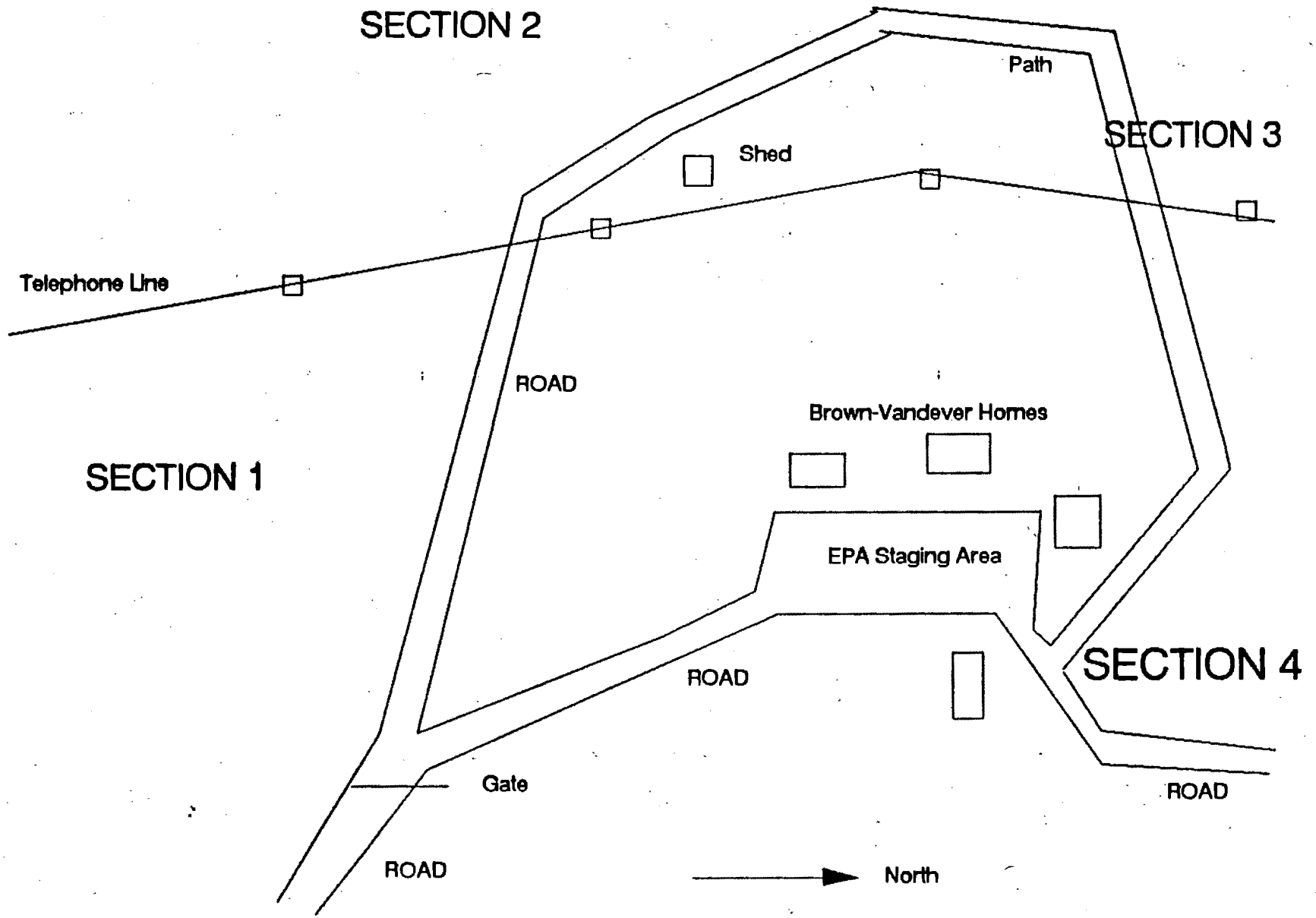
SAMPLING LOCATION	ID#	RADIONUCLIDE	RESULTS	UNITS
Station 11 Section 1 B-V	7A	Ra(226)	260.0 ± 10.0	pCi/g
		Ra(228)	1.0 ± 1.0	
		U(233-4)	290.0 ± 30.0	
		U(235)	20.0 ± 2.0	
		U(238)	310.0 ± 30.0	
Wash Area Near B-V	8A	Ra(226)	1.9 ± 0.2	pCi/g
		Ra(228)	1.0 ± 1.0	
		U(233-4)	1.1 ± 0.1	
		U(235)	00.0 ± 0.1	
		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



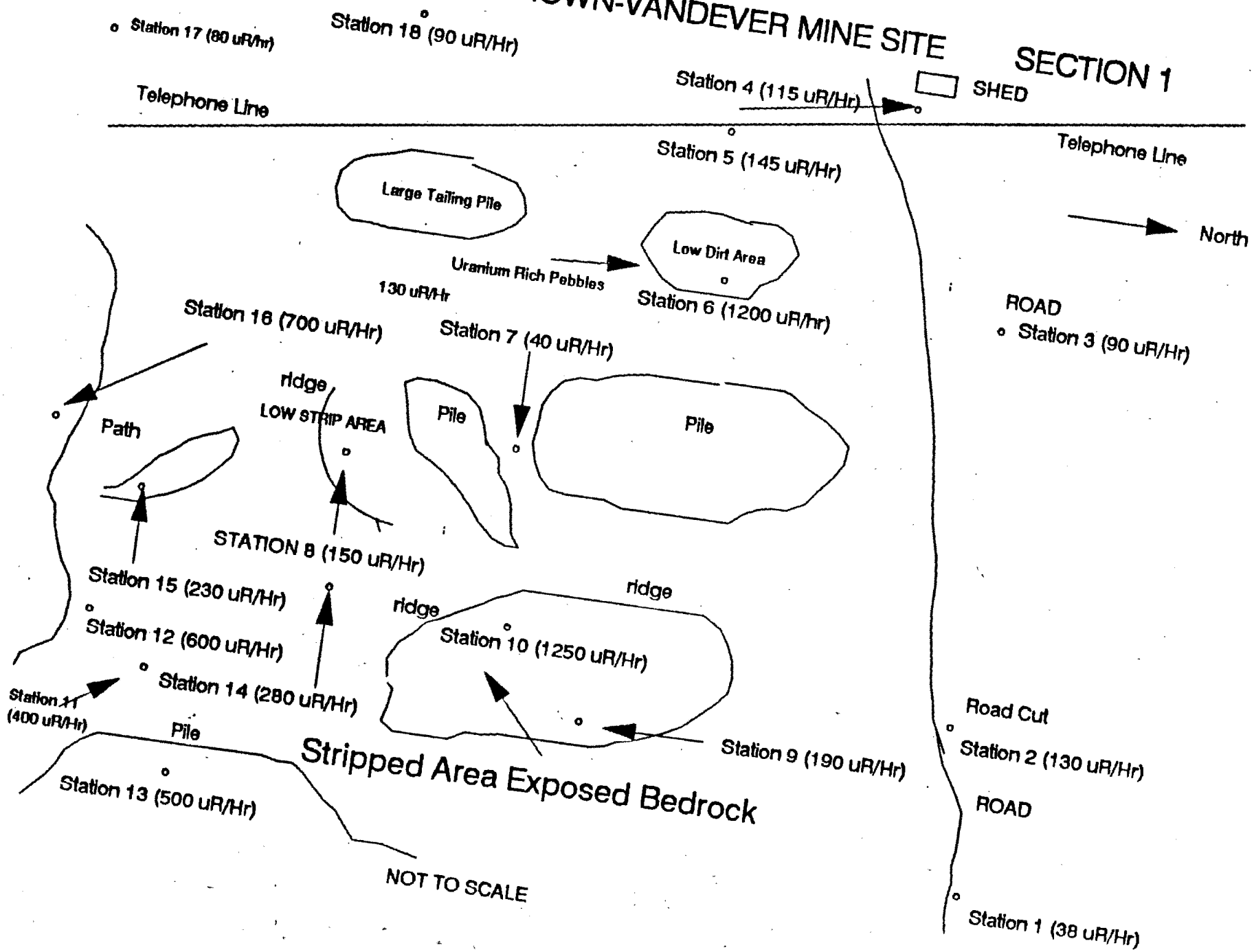
NOT TO SCALE

EPA SURVEY, NOVEMBER 1990

Figure 4. Section Location Map

SAMPLE LOCATIONS, BROWN-VANDEVER MINE SITE

SECTION 1



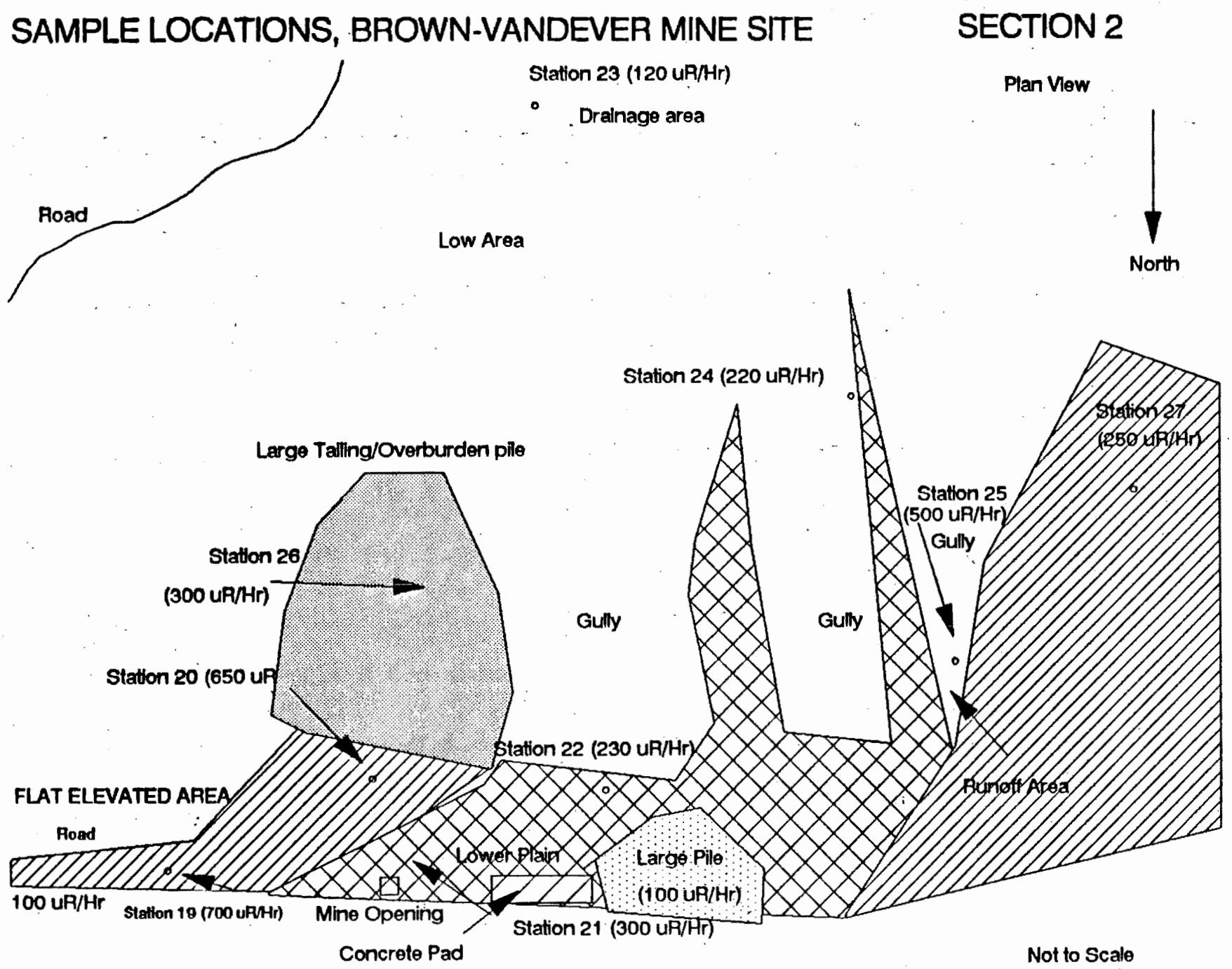


Figure 6. Section 2 B-V.

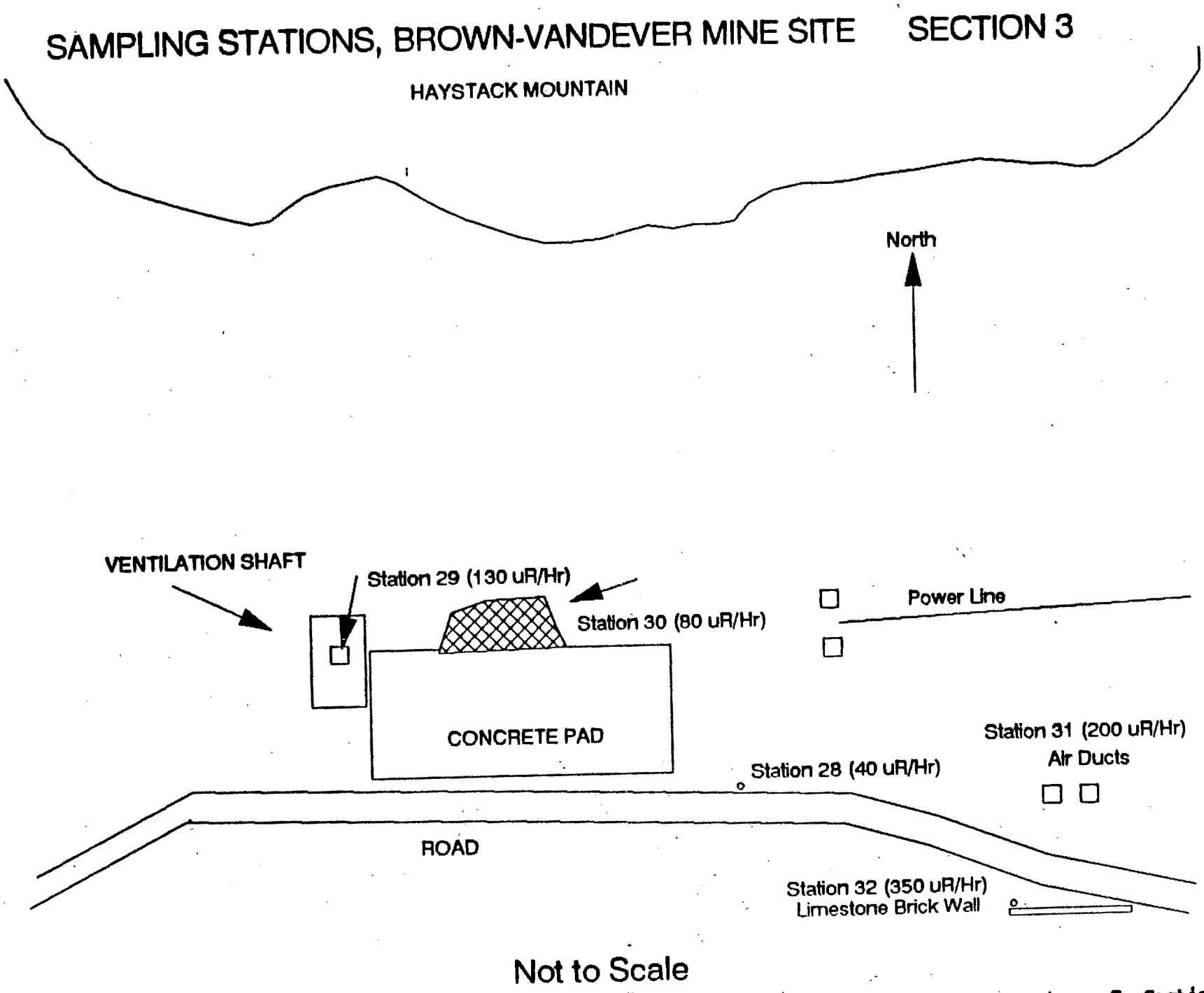
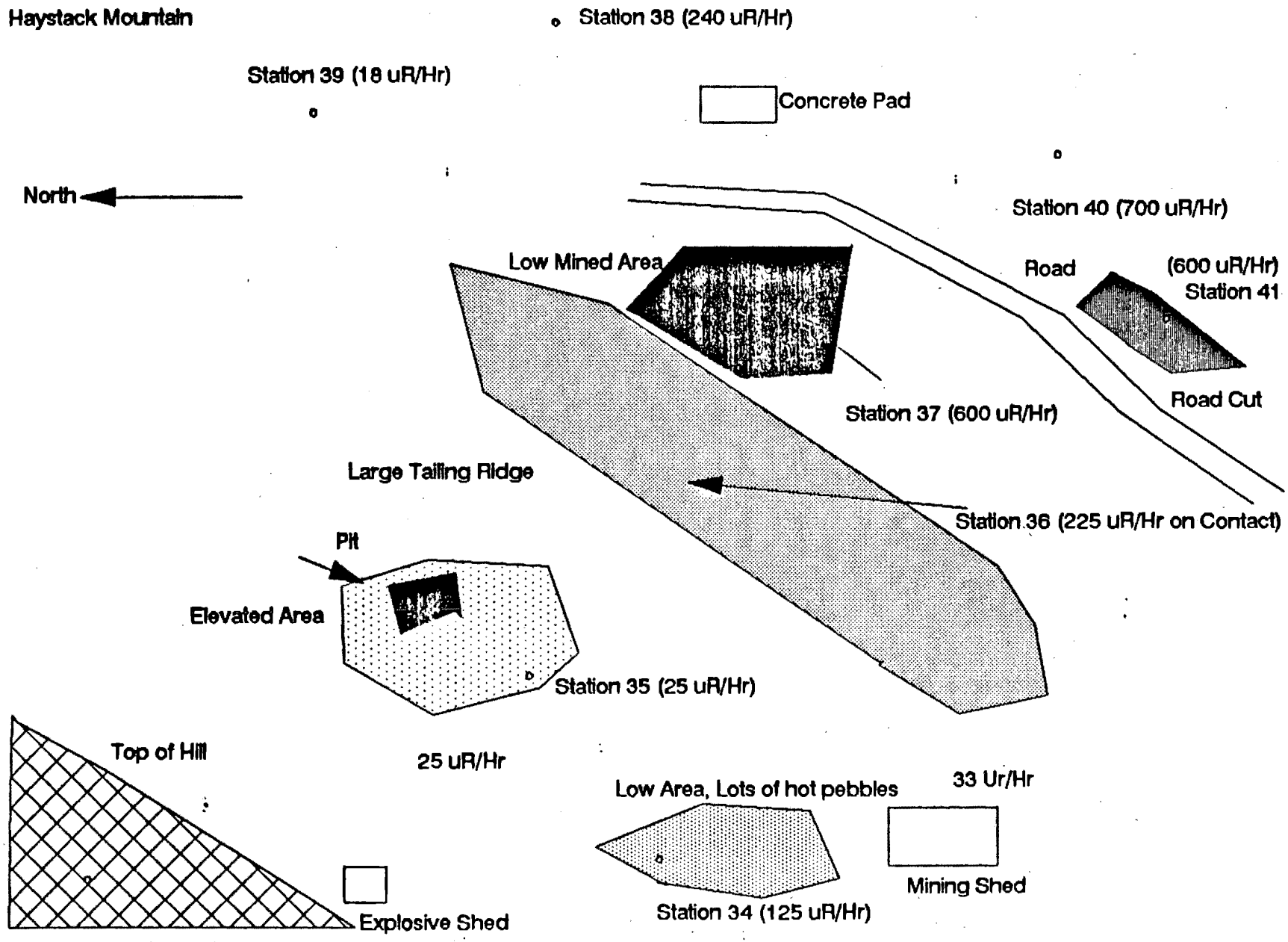
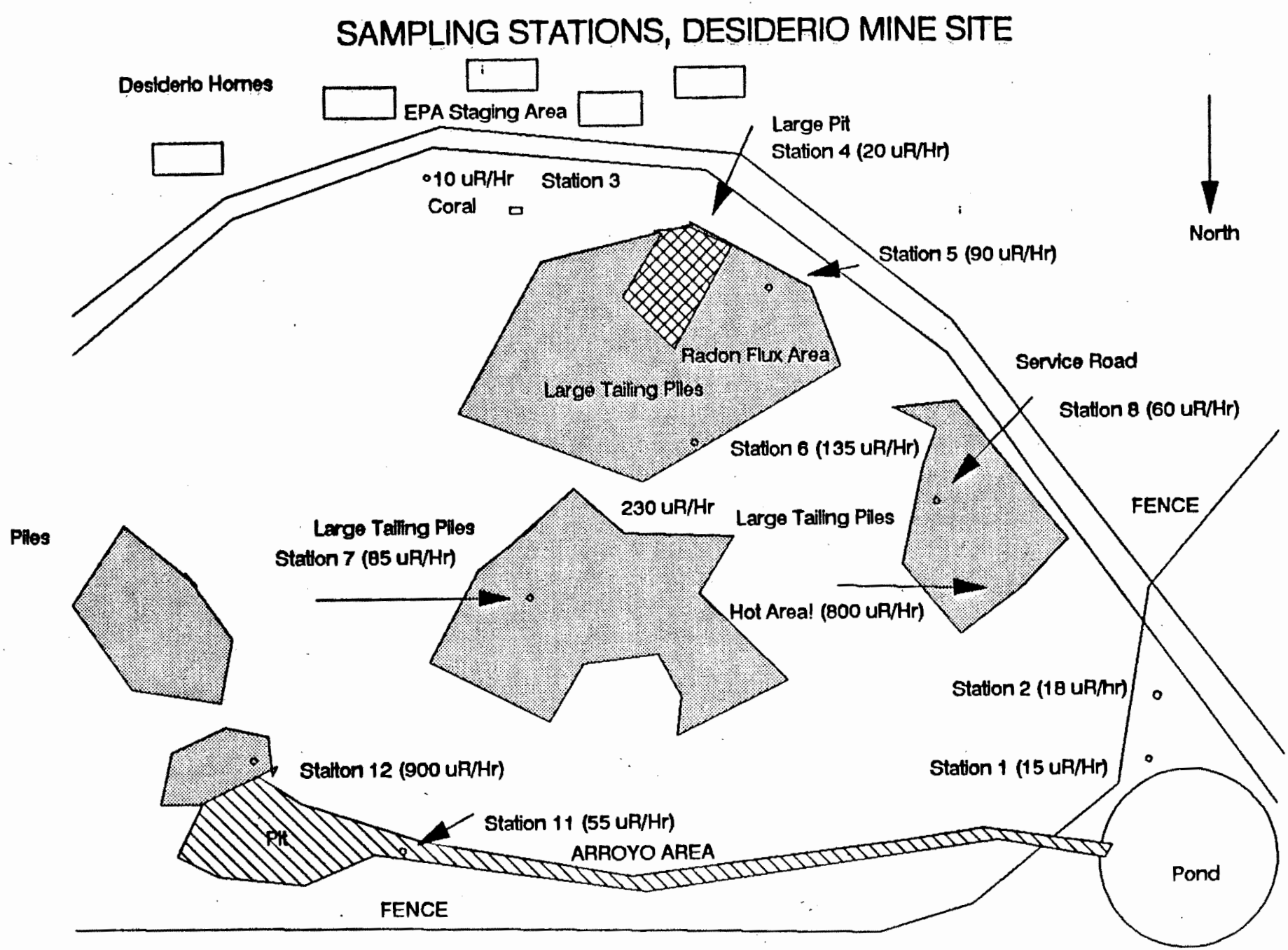


Figure 7. Section 3 B-V.

SAMPLING STATIONS, BROWN-VANDEVER MINE SITE SECTION 4



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



EPA Assessment November 1990

Figure 9. Desiderio Mine Site.

CALIBRATION DATA

INSTRUMENT reuter - stokes PIC

MODEL # RSS-111

EPA # 199133

SOURCE Cs-137

PERFORMED BY: Alex M.

QA BY: Roger Shuman

DATE 10-15-90

CALIBRATION DATA

INSTRUMENT Reuter-Stokes PIC

MODEL # RSS-111

EPA # 199131

SOURCE Cs-137

PERFORMED BY: Alex M.

QA BY: Roger Shum

DATE 10-15-90

CALIBRATION DATA

INSTRUMENT Bicron

MODEL # μ Rem meter

EPA # 825481

SOURCE Cs-137

PERFORMED BY: Alex M.

QA BY: Roger [illegible]

DATE 10-15-90

CALIBRATION DATA

INSTRUMENT Ludlum uR

MODEL # 19

EPA # 452663

SOURCE Ra-226

PERFORMED BY: Alex N.

QA BY: Roger Upson

DATE

CALIBRATION DATA

INSTRUMENT Ludlum μR

MODEL # 19

EPA # 452 485

SOURCE Ra-226

PERFORMED BY: Alex M

QA BY: Roger Shuma

DATE 11-8-90

CALIBRATION DATA

INSTRUMENT Iudlum nR

MODEL # 19

EPA # 952 662

SOURCE Ra-226

PERFORMED BY: Alex M

QA BY: Ron Shum

DATE 11-8-90

CALIBRATION DATA

INSTRUMENT Ludlum mR

MODEL # 19

EPA # 452 099

SOURCE Ra-226

PERFORMED BY: Alex M

QA BY: Roger Thomas

DATE 11-8-90

CALIBRATION DATA

INSTRUMENT Eberline Ion chamber

MODEL # RO-2A

EPA # 190 792

SOURCE Cs-137

PERFORMED BY: Alex M.

QA BY: Roger Shere

DATE 11-8-90

CALIBRATION DATA

INSTRUMENT Eberline Ion chamber

MODEL # RO-2A

EPA # 140 795

SOURCE Cs-137

PERFORMED BY: Alex M.

QA BY: [illegible]

DATE 11-8-90

CALIBRATION DATA

INSTRUMENT Eberline Ion chamber

MODEL # RO-2A

EPA # 140788

SOURCE Cs-137

PERFORMED BY: Alex M.

QA BY: [illegible]

DATE 11-8-90

CALIBRATION DATA

INSTRUMENT Eberline Ion chamber

MODEL # RO-2A

EPA # 140793

SOURCE Cs-137

PERFORMED BY: Alex M

QA BY: Roger [illegible]

DATE 11-8-93

CALIBRATION DATA

INSTRUMENT Ludlum Scaler

MODEL # 2200 - drawer

EPA # 140 820

SOURCE Am-241 RS-2063 32%

Pu-239 RS-977 32%

PERFORMED BY: Roger G

QA BY: Roger Phus

DATE 8-1-90

CALIBRATION DATA

INSTRUMENT Ludlum Scaler

MODEL # 2200

EPA # 190818

SOURCE Th-230 48%

PERFORMED BY: Roger G

QA BY: [illegible]

DATE 11-8-90

CALIBRATION DATA

INSTRUMENT ESP-2

MODEL #

EPA # 825462

SOURCE pancake Pu-239 13 % (105)

SR-90 28 %

Alph Scin 1477 208 Pu-239

PERFORMED BY: Roger G.

QA BY: Roger [illegible]

DATE 11-8-90

CALIBRATION DATA

INSTRUMENT Eberline ESP

MODEL # ESP-2

EPA # 825459

SOURCE HP-270 Cs-137

Alpha scin 1481 Pu-239 2.8

HP-270 206 Cs-137

PERFORMED BY: Roger C

QA BY: Roger [illegible]

DATE 10-15-90

CALIBRATION DATA

INSTRUMENT Eberline ESP

MODEL # ESP-2

EPA # 825463

SOURCE HP-270 204 Cs-137

pancake 104 Pu-239 1290 SR-90 242

Alph Scin 7637 Pu-239-208

PERFORMED BY: Roger C

QA BY: [illegible]

DATE 11-8-90

CALIBRATION DATA

INSTRUMENT Iudlum Rate

MODEL # 12 - pancake 101

EPA # 140 830

SOURCE Pu-239 27%

SR-90 36%

PERFORMED BY: Roger G.

QA BY: Roger Shaw

DATE 11-8-90

CALIBRATION DATA

INSTRUMENT Ludlum Rate

MODEL # 12 - 110 pancake

EPA # 140 837

SOURCE Pu-239 27 %

SR-90 36 %

PERFORMED BY: Roger G.

QA BY: Roger Thurn

DATE 11-8-90

CHAIN OF CUSTODY RECORD

San Francisco, California 94105

PROJ. NO. 2T1091 (092019SAA)

PROJECT NAME NAVAJO DESIDERIO GROUP URANIUM SITE

SAMPLERS: (Signature) [illegible]

TA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Radionuclides	Metals					REMARKS
1A	11/14/90	1435	X		Area 20	2x8oz	X	X					
2A		~~1515~~ 1515 BP			Area 22		X	X					Time: 1515
3A		~~1540~~ 1540 BP			Area 23		X	X					Time: 1530
4A		1540			Area 25		X	X					
5A		1610			Area 6		X	X					
6A		1620			Area 10		X	X					
7A		1625			Area 11		X	X					
8A		1650			Wash Area South of Residences		X	X					
9A	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)
[illegible]	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

Office of Enforcement

CHAIN OF CUSTODY RECORD

San Francisco, California 94105

PROJECT NAME: Navajo Desiderio Emplu Uranium Mine

PROJ. NO.: 091 17019SAA

SAMPLERS: (Signature) Nicki Nadwik

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
6		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

U.S. GOVERNMENT PRINTING OFFICE: 1990—787-494/39099

9 12559

CHAIN OF CUSTODY RECORD

San Francisco, California 94105

PROJ. NO.	PROJECT NAME
ZT1Ø91 EØ92Ø195AA	Navajo Desiderio Group Uranium Site

SAMPLERS: (Signature) Vidi Madrid

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Radionuclides	Metals					REMARKS
10A	11/16/90	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 CDV 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

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:

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

November 19, 1990

Collen Petullo, Health Physicist
Yasmine Khonary
Office of Air and Radiation
P.O. Box 98517
Las Vegas, NV 891093-8517

Dear Mrs. Petullo:

Thank you very much for your support, assistance and cooperation during our preliminary assessment on November 14-16 at the Brown-Vandever and Desiderio uranium sites. Without your support and knowledge, the assessment would have not been as successful. I truely appreciated your input and guidance throughout this project. As you know, we were able to conduct an extensive gamma survey at both sites and collect both water and sediment samples. In addition, as an experiment, we were able to place out over 40 radon flux canisters.

I expect to receive the laboratory data within four weeks. As soon as I receive this information, I will forward you it to you. Enclosed, I have made a copy of our gamma survey notes and rough maps. I hope to make some computer generated maps of the sites and I will forward you them as soon as possible. In addition, I am requesting aerial photos of both sites to assist us in our investigations. At this time, I will be reviewing our gamma survey data and I hope to gain your input as soon as as possible.

Based on the laboratory and survey results, the Emergency Response Section will work closely with your office, the Navajo Superfund Office, and EPA Region 9 Hazardous Waste Management Division in interpreting the data and developing a response. Once again, thank you for your assistance, support and help and I look forward to working with you throughout this project. If you have any questions or concerns, please call me at 415-744-2298.

Sincerely,

Robert Bornstein
On-Scene-Coordinator
Emergency Response Section

Printed on Recycled Paper

LABORATORY SAMPLE ID

Lab Number	Sample Location
	BROWN-VANDEVER
1A	Station 20
2A	Station 22
3A	Station 23
4A	Station 25
5A	Station 6
6A	Station 10
7A	Station 11
8A	Wash near Brown House
	DESIDERIO MINE
9A	Background (BV)
10A	Background (BD)
11A	Station 4
12A	Station 7
13A	Station 7 (dup)
14A	Station 11
15A	Station 12
16A	Station 9
17A	Station 10
	BROWN-VANDEVER
18A	Station 30
19A	Station 36
20A	Station 36 (dup)
21A	Station 40

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 SOIL SAMPLE	1200 uR/hr 800 urem/hr	800 uR/hr 400 urem/hr	In pit zone (5A)
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	

Inst.	Time	Station	Ground	Waist	Comments
1	1055	Station 9	190 uR/hr	170 uR/hr	
2	1057		120 urem/hr	90 urem/hr	
1	1105	Station 10	1250 uR/hr	800 uR/hr	open area
2	1108	SOIL SAMPLE	750 urem/hr	350 urem/hr	(6A)
1	1113	Station 11	400 uR/hr	200 uR/hr	
2	1115	SOIL SAMPLE	300 urem/hr	150 urem/hr	(7A)
1	1118	Station 12	600 uR/hr	500 uR/hr	
2	1120		500 urem/hr	300 urem/hr	
1	1122	Station 13	500 uR/hr	500 uR/hr	
2	1124		250 urem/hr	400 urem/hr	
1	1127	Station 14	600 uR/hr	700 uR/hr	
2	1128		300 urem/hr	300 urem/hr	
1	1134	Station 15	230 uR/hr	280 uR/hr	
2	1136		150 urem/hr	150 urem/hr	
1	1140	Station 16	700 uR/hr	600 uR/hr	
2	1141		300 urem/hr	250 urem/hr	
1	1150	Station 17	80 uR/hr	120 uR/hr	
2	1151		40 urem/hr	35 urem/hr	
1	1155	Station 18	90 uR/hr	65 uR/hr	
2	1156		50 urem/hr	35 urem/hr	
1	1300	Station 19	700 uR/hr	600 uR/hr	
2	1303	**SECTION 2**	450 urem/hr	350 urem/hr	
1	1306	Station 20	900 uR/hr	800 uR/hr	on pad
2	1309	SOIL SAMPLE	650 urem/hr	500 urem/hr	(1A)
1	1314	Station 21	300 uR/hr	230 uR/hr	attic
2	1315		250 urem/hr	150 urem/hr	
1	1320	Station 22	230 uR/hr	210 uR/hr	edge of
2	1321	SOIL SAMPLE	130 urem/hr	100 urem/hr	pile (2A)
1	1330	Station 23	120 uR/hr	50 uR/hr	
2	1334	SOIL SAMPLE	40 urem/hr	40 urem/hr	(3A)

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 SOIL SAMPLE	500 uR/hr 250 urem/hr	400 uR/hr 175 urem/hr	(4A)
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 SOIL SAMPLE	80 uR/hr 50 urem/hr	80 uR/hr 50 urem/hr	lots of stones(18A)
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 SOIL SAMPLE	225 uR/hr* 130 urem/hr	110 uR/hr# 70 urem/hr	on wall face (19A) (20A)
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	

Inst.	Time	Station	Ground	Waist	Comments
1	1440	Station 39	18 uR/hr	18 uR/hr	
2	1443		10 urem/hr	10 urem/hr	
1	1446	Station 40	700 uR/hr	600 uR/hr	
2	1448	SOIL SAMP	600 urem/hr	300 urem/hr	(21A)
1	1452	Station 41	500 uR/hr*	400 uR/hr#	
2	1453		350 urem/hr	250 urem/hr	

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

Soil sample 8A was near Brown house drainage
Soil sample 9A was a background sample

GAMMA RADIATION SURVEY DATA

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

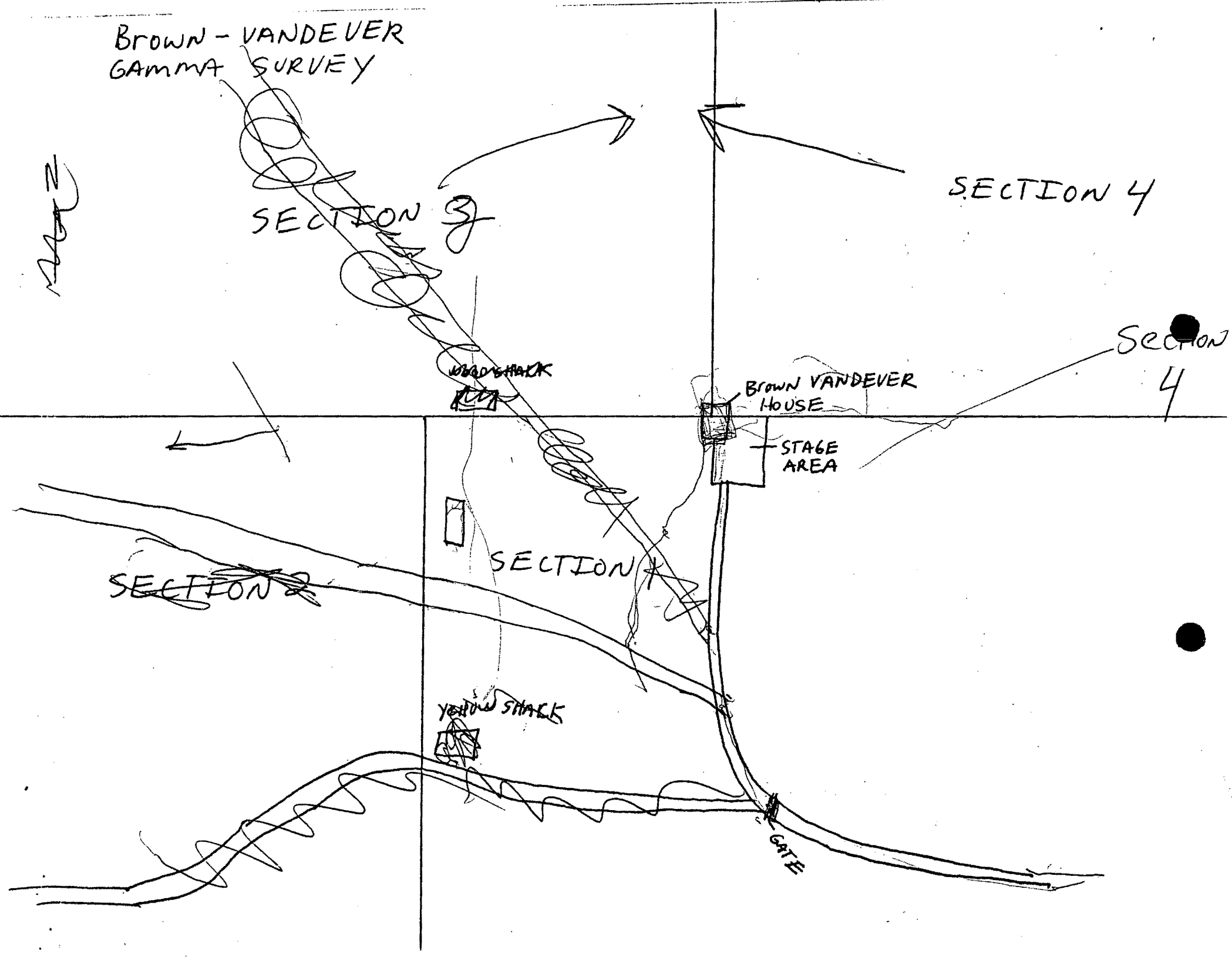
Date 11/15/90 SECTION 1

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 SOIL SAMPLE	20 uR/hr 7 urem/hr	24 uR/hr 7 urem/hr	large pit (11A)
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@ SOIL SAMPLE	85 uR/hr 50 urem/hr	75 uR/hr 40 urem/hr	(12A) (13A) Dup
1 2	1058 1100	Station 8	170 uR/hr 90 urem/hr	120 uR/hr 60 urem/hr	
1 2	1105	Station 9 SOIL SAMPLE			sediment only (16A)

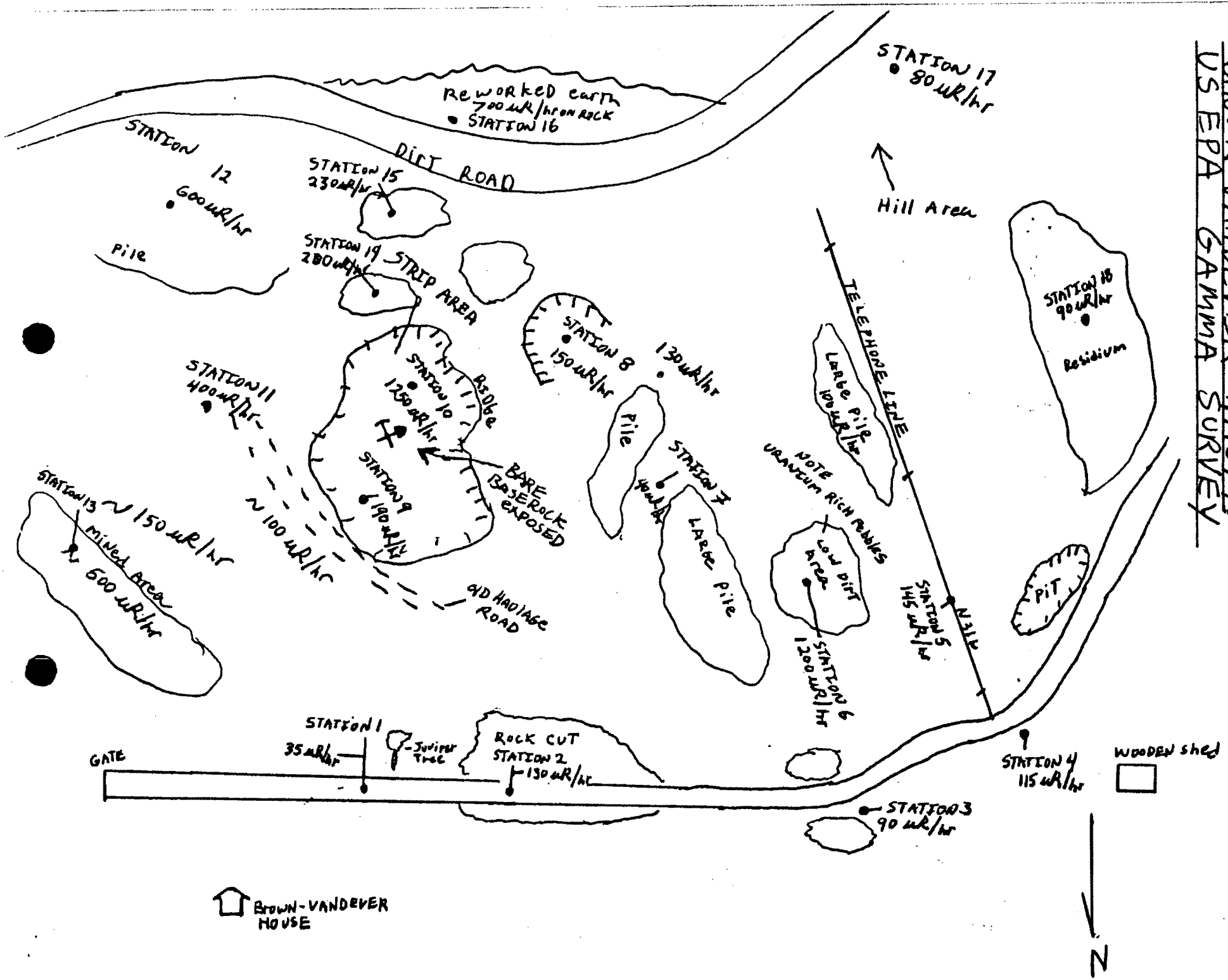
Date 11/15/90 SECTION 1

Inst.	Time	Station	Ground	Waist	Comments
1 2	1107	Station 10 SOIL SAMPLE			sediment only (17A)
1 2	1153 1154	Station 11 SOIL SAMPLE	55 uR/hr 30 urem/hr	55 uR/hr 30 urem/hr	(14A)
1 2	1214 1215	Station 12 SOIL SAMPLE	900 uR/hr 400 urem/hr	400 uR/hr 250 urem/hr	near attic (15A)

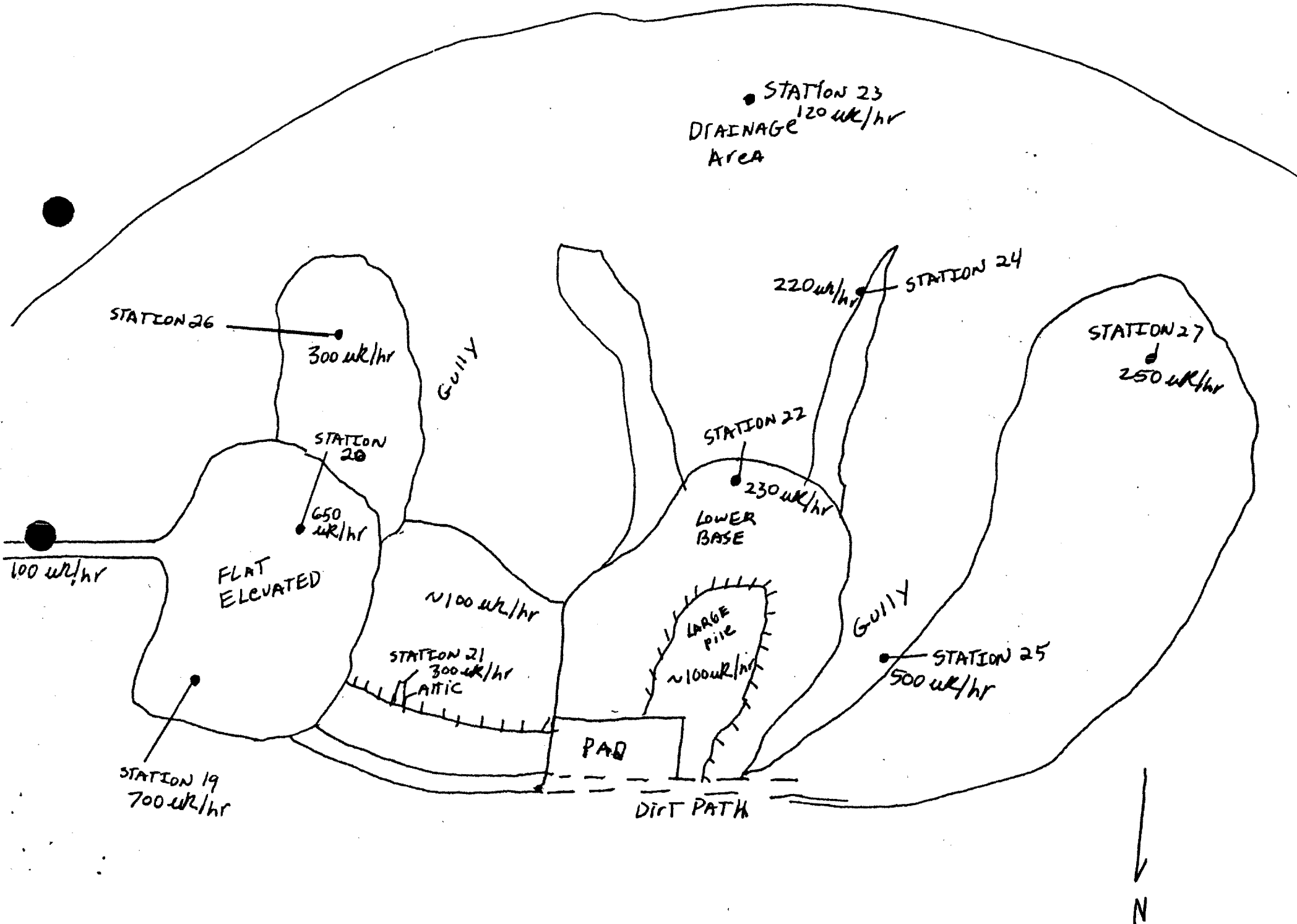
@ radon flux canister area


BROWN - VANDEVER
GAMMA SURVEY
N
SECTION 3
SECTION 4
Section 4
WOODSHACK
BROWN VANDEVER HOUSE
STAGE AREA
SECTION 1
SECTION 2
YELLOW SHACK
GATE

SECTION 1 BV mine
BROWN-VANDEVER 11/15/90
US EPA GAMMA SURVEY

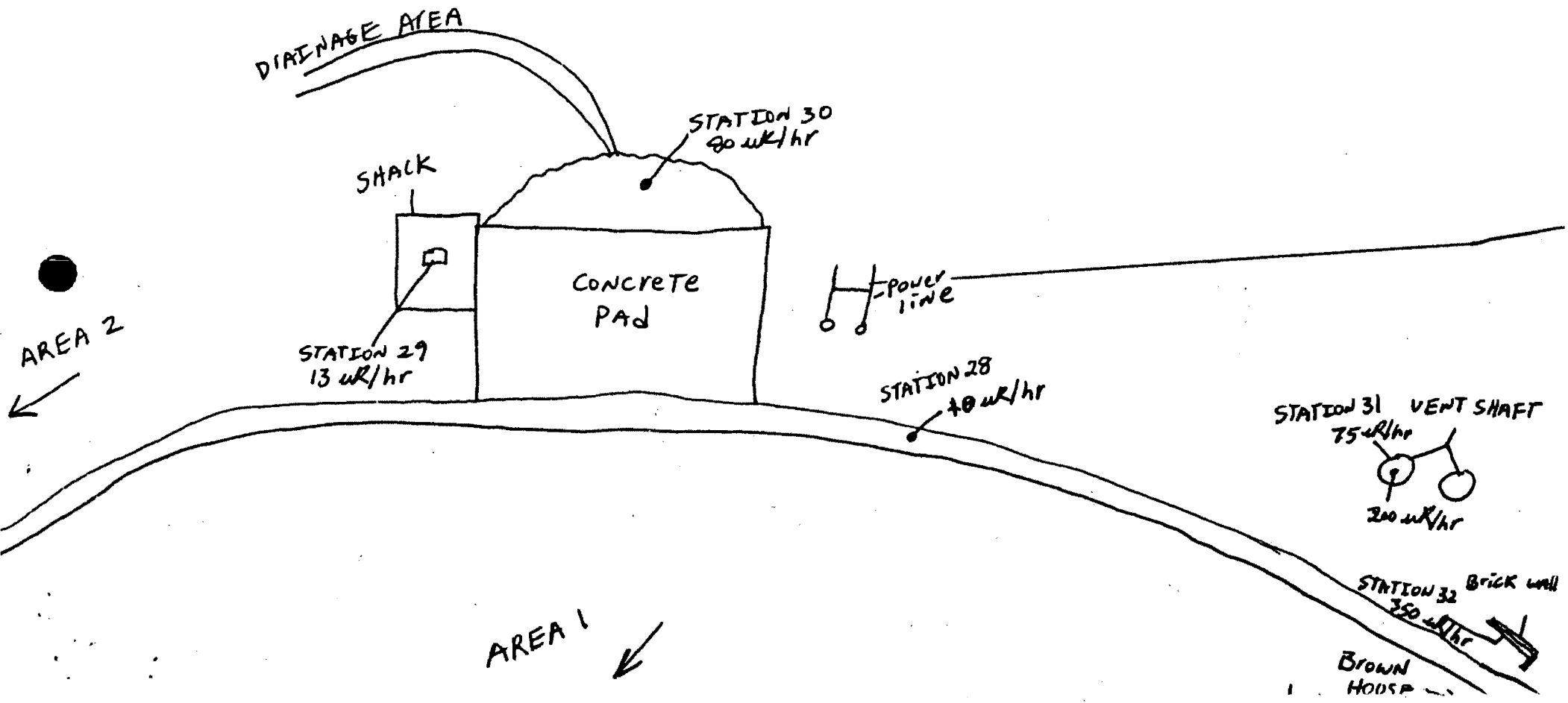


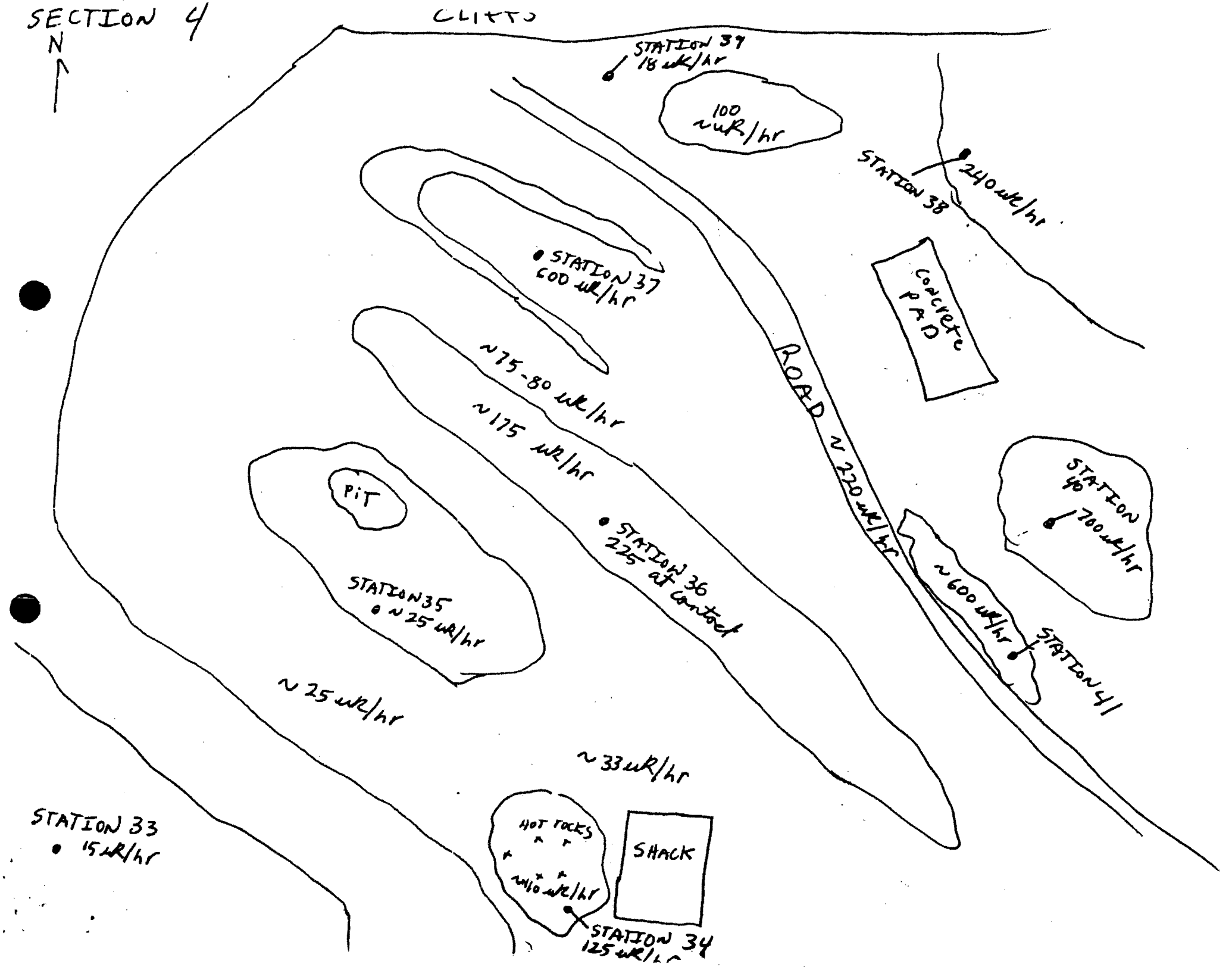
BROWN-VANDEVER
11/15/90

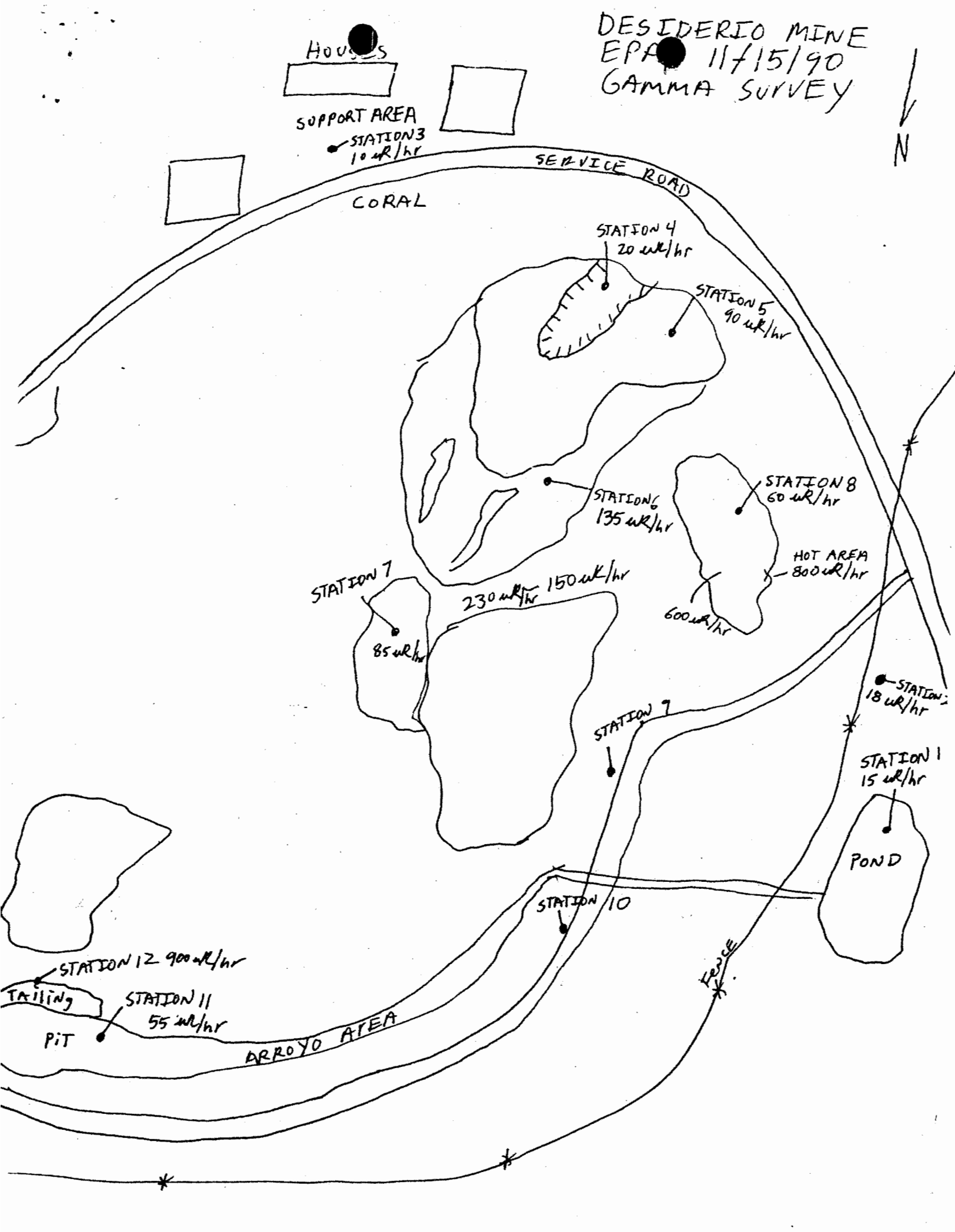


N

SECTION 3
BROWN VANDEVER




SECTION 4
N
CLIFFS
STATION 39
18 uR/hr
100
~uR/hr
STATION 38
240 uR/hr
STATION 37
600 uR/hr
Concrete
PAD
~75-80 uR/hr
~175 uR/hr
ROAD ~220 uR/hr
PIT
STATION 36
225 at contact
STATION
40
700 uR/hr
STATION35
~25 uR/hr
~600 uR/hr
STATION 41
~25 uR/hr
~33 uR/hr
HOT ROCKS
~110 uR/hr
SHACK
STATION 33
15 uR/hr
STATION 34
125 uR/hr


DESIDERIO MINE
EPA 11/15/90
GAMMA SURVEY
N
HOUSES
SUPPORT AREA
STATION 3
10 uR/hr
SERVICE ROAD
CORAL
STATION 4
20 uR/hr
STATION 5
90 uR/hr
STATION 6
135 uR/hr
STATION 8
60 uR/hr
HOT AREA
800 uR/hr
600 uR/hr
STATION 7
85 uR/hr
230 uR/hr
150 uR/hr
STATION 9
18 uR/hr
STATION 1
15 uR/hr
POND
STATION 10
STATION 12 900 uR/hr
TAILING
STATION 11
55 uR/hr
PIT
ARROYO AREA
FENCE

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.

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

SCIENTIFIC ANALYSIS, INC.

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

6012 E SHIRLEY LANE ◻ POST OFFICE BOX 3112 ◻ MONTGOMERY, ALABAMA 36109 ◻ (205) 271-0643

SCIENTIFIC ANALYSIS, INC.

U.S. EPA LISTED
RADON LABORATORY

SUMMARY OF RADON FLUX COMPUTATIONS
TABLE 7d. 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

6012 E SHIRLEY LANE ▫ POST OFFICE BOX 3112 ▫ MONTGOMERY, ALABAMA 36109 ▫ (205) 271-0643

SCIENTIFIC ANALYSIS, INC.

U.S. EPA LISTED
RADON LABORATORY

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
WU5-20404	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

6012 E SHIRLEY LANE ▫ POST OFFICE BOX 3112 ▫ MONTGOMERY, ALABAMA 36109 ▫ (205) 271-0643

SCIENTIFIC ANALYSIS, INC.

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
NU6-20405	11/15/90	12:05 pm	11/16/90	10:23 am	11/20/90	01:41 pm	0.1659	18532	616	17.9
NU6-20406	11/15/90	12:03 pm	11/16/90	10:23 am	11/20/90	01:52 pm	0.1659	65963	616	65.2
NU6-20407	11/15/90	12:00 pm	11/16/90	10:23 am	11/20/90	02:03 pm	0.1659	88587	616	87.7
NU6-20408	11/15/90	12:01 pm	11/16/90	10:25 am	11/20/90	02:14 pm	0.1659	58818	616	58.1
NU6-20409	11/15/90	12:07 pm	11/16/90	10:27 am	11/20/90	02:25 pm	0.1659	45538	616	45.0
NU6-20410	11/15/90	12:06 pm	11/16/90	10:28 am	11/20/90	09:03 am	0.1638	43613	618	41.8
NU6-20411	11/15/90	12:02 pm	11/16/90	10:26 am	11/20/90	09:14 am	0.1638	84389	618	81.5
NU6-20412	11/15/90	12:04 pm	11/16/90	10:29 am	11/20/90	09:26 am	0.1638	62770	618	60.5
NU6-20413	11/15/90	11:59 am	11/16/90	10:30 am	11/20/90	09:46 am	0.1638	46518	618	44.6
NU6-20414	11/15/90	12:07 pm	11/16/90	10:31 am	11/20/90	09:58 am	0.1638	46848	618	45.2
NU6-20415	11/15/90	12:10 pm	11/16/90	10:28 am	11/20/90	10:09 am	0.1638	57169	618	55.6
NU6-20416	11/15/90	11:55 am	11/16/90	10:25 am	11/20/90	10:20 am	0.1638	57660	618	55.7
NU6-20417	11/15/90	11:58 am	11/16/90	10:25 am	11/20/90	10:31 am	0.1638	146693	618	143
NU6-20418	11/15/90	11:57 am	11/16/90	10:25 am	11/20/90	10:42 am	0.1638	124072	618	121
NU6-20419	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

6012 E SHIRLEY LANE ▫ POST OFFICE BOX 3112 ▫ MONTGOMERY, ALABAMA 36109 ▫ (205) 271-0643

SCIENTIFIC ANALYSIS, INC.

U.S. EPA LISTED
RADON LABORATORY

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
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

6012 E SHIRLEY LANE ▫ POST OFFICE BOX 3112 ▫ MONTGOMERY, ALABAMA 36109 ▫ (205) 271-0643

SCIENTIFIC ANALYSIS, INC.

U.S. EPA LISTED
RADON LABORATORY

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

6012 E SHIRLEY LANE ▫ POST OFFICE BOX 3112 ▫ MONTGOMERY, ALABAMA 36109 ▫ (205) 271-0643

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
MU7-20421	11/15/90	12:14 pm	11/16/90	10:29 am	11/20/90	11:18 am	0.1638	40588	618	39.7
MU7-20422	11/15/90	12:16 pm	11/16/90	10:29 am	11/20/90	11:31 am	0.1638	67549	618	66.7
MU7-20423	11/15/90	12:18 pm	11/16/90	10:30 am	11/20/90	11:50 am	0.1638	53832	618	53.2
MU7-20424	11/15/90	12:22 pm	11/16/90	10:30 am	11/20/90	12:01 pm	0.1638	29053	618	28.6
MU7-20425	11/15/90	12:22 pm	11/16/90	10:30 am	11/20/90	12:13 pm	0.1638	37118	618	36.7
MU7-20426	11/15/90	12:19 pm	11/16/90	10:30 am	11/20/90	12:26 pm	0.1638	37697	618	37.3
MU7-20427	11/15/90	12:15 pm	11/16/90	10:30 am	11/20/90	12:39 pm	0.1638	42691	618	42.2
MU7-20428	11/15/90	12:18 pm	11/16/90	10:33 am	11/20/90	12:56 pm	0.1638	55381	618	55.1
MU7-20429	11/15/90	12:20 pm	11/16/90	10:34 am	11/20/90	01:06 pm	0.1638	39554	618	39.2
MU7-20430	11/15/90	12:12 pm	11/16/90	10:35 am	11/20/90	01:18 pm	0.1638	41457	618	41.0
MU7-20431	11/15/90	12:24 pm	11/16/90	10:34 am	11/20/90	01:30 pm	0.1638	46276	618	46.3
MU7-20432	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

SCIENTIFIC ANALYSIS, INC.

U.S. EPA LISTED
RADON LABORATORY

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
NU7-20430	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

6012 E SHIRLEY LANE ▫ POST OFFICE BOX 3112 ▫ MONTGOMERY, ALABAMA 36109 ▫ (205) 271-0643

SCIENTIFIC ANALYSIS, INC.

U.S. EPA LISTED
RADON LABORATORY

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

6012 E SHIRLEY LANE ▫ POST OFFICE BOX 3112 ▫ MONTGOMERY, ALABAMA 36109 ▫ (205) 271-0643

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
Faith Ann McWhorter

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

Relinquished By (Name and Signature):

Date/Time:

Received By (Name and Signature):

Date/Time:

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

Received: 12/06/90

TMA Inc. REPORT

01/21/91 15:49:23

Work Order # A0-12-025

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

ATTEN: Rick Haaker

CLIENT: TMA EBERLINE SAMPLES 28
COMPANY: TMA Eberline Corporation
FACILITY: 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

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

Received: 12/06/90

TMA Inc. REPORT
01/21/91 15:49:23

Work Order # A0-12-025

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

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

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

TMA Inc. REPORT

Results by Sample

Work Order # A0-12-025

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

A

Received: 12/06/90

TMA Inc. REPORT

Results by Sample

Work Order # A0-12-025

SAMPLE ID 16A

FRACTION 16A 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	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

A

Received: 12/06/90

TMA Inc. REPORT

Results by Sample

Work Order # A0-12-025

SAMPLE ID 17A

FRACTION 17A 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	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: 12/06/90

TMA Inc. REPORT

Results by Sample

Work Order # A0-12-025

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: 12/06/90

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

Results by Sample

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 REM 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

A

Received: 12/06/90

TMA Inc. REPORT
Results by Sample

Work Order # A0-12-025

SAMPLE ID 21A

FRACTION 21A 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	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

A

Received: 12/05/90

TMA Inc. REPORT

Results by Sample

Work Order # A0-12-025

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: 12/06/90

TMA Inc. REPORT

Results by Sample

Work Order # A0-12-025

SAMPLE ID W1 Dulpicate

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: 12/06/90

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

Results by Sample

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: 12/06/90

TMA Inc. REPORT

Results by Sample

Work Order # A0-12-025

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: 12/06/90

TMA Inc. REPORT
Results by Sample

Work Order # A0-12-025

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: 12/06/90

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

Results by Sample

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

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

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: 12/06/90

TMA Inc. REPORT
Results by Sample

Work Order # A0-12-025

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: 12/06/90

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

Results by Sample

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: 12/06/90

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

Results by Sample

SAMPLE ID W7

FRACTION 28A 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	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

01A	I	3050IC	AS_SED	MPREPS
01B	I	3050IC	AS_SED	MPREPS
01C	I	3050IC	AS_SED	MPREPS
01D	I	3050IC	AS_SED	MPREPS
02A	I	3050IC	AS_SED	MPREPS
03A	I	3050IC	AS_SED	MPREPS
04A	I	3050IC	AS_SED	MPREPS
05A	I	3050IC	AS_SED	MPREPS
[illegible]	I	3050IC	AS_SED	MPREPS
07A	I	3050IC	AS_SED	MPREPS
08A	I	3050IC	AS_SED	MPREPS
09A	I	3050IC	AS_SED	MPREPS
10A	I	3050IC	AS_SED	MPREPS
11A	I	3050IC	AS_SED	MPREPS
12A	I	3050IC	AS_SED	MPREPS
13A	I	3050IC	AS_SED	MPREPS
14A	I	3050IC	AS_SED	MPREPS
15A	I	3050IC	AS_SED	MPREPS
16A	I	3050IC	AS_SED	MPREPS
17A	I	3050IC	AS_SED	MPREPS
18A	I	3050IC	AS_SED	MPREPS
19A	I	3050IC	AS_SED	MPREPS
20A	I	3050IC	AS_SED	MPREPS
21A	I	3050IC	AS_SED	MPREPS
[illegible]	I	3010	AS_SED	MPREPW
[illegible]	I	3010	AS_SED	MPREPW
22C	I	3010	AS_SED	MPREPW
22D	I	3010	AS_SED	MPREPW
23A	I	3010	AS_SED	MPREPW
24A	I	3010	AS_SED	MPREPW
25A	I	3010	AS_SED	MPREPW
26A	I	3010	AS_SED	MPREPW
27A	I	3010	AS_SED	MPREPW
28A	I	3010	AS_SED	MPREPW

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 E & E Contact _____
Date Shipped 12/4/90 Contact M.S. Philips Date Due 12/27/90
Assigned to ALI 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 Rus.		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	Mine pit near Corrals		BKG	S	1005 11-15-90										
12A	Radar cartridge areas		BKG	S	1125 11-15-90										
13A	Radar 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:
*RM145

Item/Reason	Relinquished By	Received By	Date	Time	Item/Reason	Relinquished By	Received By	Date	Time
		[illegible]	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	Desiderio Stockpond		BKG	W	0935 11-16-90										
W6	Desiderio Tap Water		BKG	W	0955 11-16-90										
W7	Preschool well	V	BKG	W	1105 11-16-90		V								

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
		Daniel Weller	12/6/90						

APPENDIX C

Laboratory Preliminary Results

TMA
Thermo Analytical Inc.

TMA/Eberline Albuquerque Laboratory
7021 Pan American Hwy. NE
Albuquerque, NM 87109
(505) 345-3461 • FAX (505) 761-5416

FACSIMILE COVER SHEET

To:

Name: Robert Bernstein Date: 1-14-91
Company: EPA Fax No.: 415-744-1916
Location: Verification No.:

From:

Name: ART REUST
Site: LAB
No. Pages: 4 (INCLUDING COVER SHEET)

Ra^{226} for the water and all of the soil will be ready 1-15-91.
Sorry for the delay!

TKS
Art Reust

TMA
Thermo Analytical Inc.

TMA/Eberline Albuquerque Laboratory
7021 Pan American Hwy. NE
Albuquerque, NM 87109
(505) 345-3461 • FAX (505) 761-5416

FACSIMILE COVER SHEET

To:

Name: Robert Bernstein Date: 1-16-91
Company: EPA Fax No.: 415-744-1916
Location: Verification No.:

From:

Name: ART REUST
Site: LAB
No. Pages: 9 (INCLUDING COVER SHEET)

ALBUQUERQUE LABORATORY

PRELIMINARY DATA REPORT

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

CUST. P.O. NO. Pros # ZT1091 E0970195 AA

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

E2732

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

LAB NO.	CUSTOMER IDENTIFICATION	CONTAINER	DATE					
E500	B-V Livestock well	W1	0820 11-16-90	Ra^{226}	3839.3 ml			0.8±0.1
				Ra^{228}	3840			0±5
				$U^{238/4}$				2.0±0.4
				U^{235}				0.3±0.1
				U^{238}				0.4±0.2
01	B-U Livestock well	W2	0835 11-16-90	Ra^{226}	2708.3			0.2±0.1
				Ra^{228}	2710			0±5
				$U^{238/4}$				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
				$U^{238/4}$				2.1±0.5
				U^{235}			1.0 ~~0.9~~ ±0.3	
				U^{238}				0.8±0.3
RTP	acidified + filtered 11/16/90							

* INSERT UNITS

P. Fox 1-4-91 Need Ra226 (To E&E Also EPA)

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

BY Paul Kuhl DATE 11/16/90

PF 12-7-90

ALBUQUERQUE LABORATORY

CUSTOMER Ecology & Environment

ADDRESS

CITY

CUST. P.O. No.

PRELIMINARY DATA REPORT

E2732

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS

LAB NO.	CUSTOMER IDENTIFICATION	Matrix Code	Date Sampled	Analysis	Result				Precision
E503	B-V Well	W4	1P-16-90 0955	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	11-16-90 0935	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	11-16-90 0955	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
PHONE (505) 345-3461

BY

11/16/90
DATE

ALBUQUERQUE LABORATORY

CUSTOMER Ecology & Environment

ADDRESS

CITY

CUST. PO/NO.

PRELIMINARY DATA REPORT

E2132

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS

LAB. NO.	CUSTOMER IDENTIFICATION	SAMPLE MATRIX	DATE SAMPLED	TYPE OF ANALYSIS	METHOD			
E506	Preschool Well	W7	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

PRELIMINARY DATA REPORT

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

CUST. P.O. NO.
PROJ # ZT1091 E0970195AA - Project Name: Navajo Decision Tree - uranium site
ATTN: Mary Sue Philp

E2808

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

LAB NO.	CUSTOMER IDENTIFICATION	BLANKS	DATE	PARAMETER	*			*
E948	1A	Area 20	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 ± 20
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 ± 0.2
				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 ± 0.1
				U^{238}				20 ± 2

* INSERT UNITS

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

12-4-90

BY Paul Kirkland

12/4/90
DATE

ALBUQUERQUE LABORATORY

CUSTOMER Ecology & Environment

ADDRESS

CITY

CUST. P.O. NO. CUST. S.O. NO.

TOTAL NO. OF SAMPLES

PRELIMINARY DATA REPORT

E2808

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS

LAB NO.	CUSTOMER IDENTIFICATION	SAMPLE SOURCE	DATE COLLECTED	ANALYSIS	[illegible]	[illegible]	[illegible]	[illegible]	RESULT
E951	4A	Area 25	1548 11-14-90	Ra^{226}	478/439				4.7 ± 0.5
				Ra^{228}					0 ± 1
				$U^{234/4}$					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
				$U^{234/4}$					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
				$U^{234/4}$					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
PHONE (505) 345-3461

BY

12/4/90
DATE

ALBUQUERQUE LABORATORY

PRELIMINARY DATA REPORT

CUSTOMER Ecology & Environment

ADDRESS

CITY

CUST. P.O. NO.

TOTAL NO. OF SAMPLES

E2808

ITEM	NO. OF SAMPLES	TYPE AND TYPE

LAB. NO.	CUSTOMER IDENTIFICATION	LOCATION	DATE COLLECTED	ANALYSIS				RESULTS
E954	7A	Area 11	1625 11-14-90	Ra^{226}	612/610			260 ± 30
				Ra^{228}				1 ± 1
				U^{234}				290 ± 30
				U^{235}				20 ± 2
				U^{238}				310 ± 30
55	8A	Washburn S. of Res.	1650 11-14-90	Ra^{226}	522/497			1.9 ± 0.2
				Ra^{228}				1 ± 1
				U^{234}				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^{234}				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
PHONE (505) 345-3461

BY PDK

DATE 12/4/90

ALBUQUERQUE LABORATORY

CUSTOMER Ecology & Environment

ADDRESS

CITY

CUST. P.O. NO.

PRELIMINARY DATA REPORT

E2808

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS

LAB. NO.	CUSTOMER IDENTIFICATION	SAMPLE DESCRIPTION	SAMPLE DATE	ISOTOPE	[illegible]	[illegible]	[illegible]	[illegible]
E957	DA	on Rd 40 Dwiderio	0830 11-15-90	Ra^{226}	430/			1.3±0.1
				Ra^{228}	/343			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/			34±3
				Ra^{228}	/454			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/			30±3
				Ra^{228}	/474			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.
ALBUQUERQUE, NEW MEXICO 87109
PHONE (505) 345-3461

BY PDK

DATE 12/4/90

ALBUQUERQUE LABORATORY

CUSTOMER Ecology & Environment

ADDRESS

CITY

CUST. P.O. NO.

PRELIMINARY DATA REPORT

TOTAL NO. OF SAMPLES

E2808

ITEM	NO. OF SAMPLES	TYPE OF ANALYSIS

LAB NO.	CUSTOMER IDENTIFICATION	[illegible]	DATE COLLECTED	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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
PHONE (505) 345-3461

BY

12/4/90
DATE

ALBUQUERQUE LABORATORY

PRELIMINARY DATA REPORT

CUSTOMER. Ecology & Environment

ADDRESS

CITY

CUST. P.O. NO.

E2808

ITEM	NO. OF SAMPLES	TYPE ANALYSIS

LAB. NO.	CUSTOMER IDENTIFICATION	SAMPLE SOURCE	DATE COLLECTED	ANALYSIS	RESULT			*
E963	19A	Sta. 10	1515 11-15-90	Ra^{226}	551/533			20±2
				Ra^{228}				0±1
				$U^{234/4}$				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
				$U^{234/4}$				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
				$U^{234/4}$				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
PHONE (505) 346-3461

BY DDK

DATE 12/4/90

ALBUQUERQUE LABORATORY

PRELIMINARY DATA REPORT

CUSTOMER Ecology and Environment
ADDRESS 1600 Spear Street #930
CITY San Francisco Ca. 94105

PROJ. E.O. NO. Proj # ZT1091 E0970195 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	SOURCE	DATE	ITEM	pCi/l			pCi/l
E500	B-V Livestock Well	W1	0835 11-16-90	Ra^{226}	3839.3 ml			
				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 Livestock well	W2	0835 11-16-90	Ra^{226}	2708.3			
				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			
				Ra^{228}	3960			0±5
				$U^{233/4}$				2.1±0.5
				U^{235}			1.0 1-14-91	~~0.9~~ ±0.3
				U^{238}				0.8±0.3

RTP acidified & filtered 11/16/90

* INSERT UNITS

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

12-7-90

BY Paul Kurl

11/16/90
DATE

ALBUQUERQUE LABORATORY

CUSTOMER Ecology & Environment

ADDRESS

CITY

PRELIMINARY DATA REPORT

E2732

ITEM	NO. OF SAMPLES	TYPE OF SAMPLE

LAB. NO.	CUSTOMER IDENTIFICATION	SAMPLE NO.	DATE COLLECTED	ANALYSIS	RESULTS				
E503	B-V Well	W4	11-16-90	Ra^{226}	3865.1				
				Ra^{228}	3870				0 ± 5
				$U^{234/4}$					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				
				Ra^{228}	3890				0 ± 5
				$U^{234/4}$					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				
				Ra^{228}	4050				0 ± 5
				$U^{234/4}$					1.2 ± 0.3
				U^{235}					0.0 ± 0.2
				U^{238}					0.2 ± 0.1

* INSERT UNITS

11/16/90

BY DATE

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

ALBUQUERQUE LABORATORY

CUSTOMER Ecology & Environment

ADDRESS

CITY

CUST. P.O. NO.

PRELIMINARY DATA REPORT

TOTAL NO. OF SAMPLES

E2132

ITEM	NO. OF SAMPLES	DESCRIPTION

LAB. NO.	CUSTOMER IDENTIFICATION	CUSTOMER SAMPLE NO.	DATE COLLECTED	ANALYSIS	RESULT		*	±
E5506	Preschool Well	W7	11-16-90	Ra^{226}	3690.1			
				Ra^{226}	3690			22 ± 6
				$U^{234/4}$				130 ± 10
				U^{235}				3.0 ± 0.5
				U^{238}				74 ± 7
T 5708	Dup.			Ra^{226}				
				Ra^{228}				
				$U^{234/4}$				
				U^{235}				
				U^{238}				
T 09	Blank			Ra^{226}				
				Ra^{228}				
				$U^{234/4}$				
				U^{235}				
				U^{238}				
T 10	Spike			Ra^{226}				
				Ra^{228}				
				$U^{234/4}$				
				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

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: Bill Nelson, Regional Coordinator
ATSDR

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.

As you are aware, 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 yourself.

Printed on Recycled Paper

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.

ATSDR Assistance

We are requesting ATSDR 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 EPA 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, you (ATSDR) must determine what steps need to be undertaken in response to your Health Advisory based on what EPA will do at these sites.

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

RADIOANALYTICAL EQUIPMENT

Type	No.	Yr-Bought
Gross Alpha Counters 40 - Berthold LB-770 (20-2" & 20-1") 7 - Eberline Sac-4	47	1984-1990
Gross Beta Counters ** 40 - Berthold LB-770 (20-2" & 20-1")	40	1984-1990 **
Liquid Scintillation 1 - Packard 1900CA	1	1990
Ge Detectors	6	1988-1990
Canberra - Nuclear Data Accu Spec/B Data Acquisition/Reduction System	1	1990
Alpha Spectroscopy Detectors ***	48	1989-1990 ***
Canberra - Nuclear Data System 100 Data Acquisition/Reduction System	1	1990
X-Ray Spectroscopy Bicron 1" x 0.05" NaI detectors	2	1986
Gross Alpha Gas Counters (Rn-222 detectors) Eberline Model SAC R5 & MS-2	16	1975-1990 *
Specialized Detectors	7	various
Total Detectors	167	

General Laboratory Equipment

Ball mills	2
Fume Hoods	13
Centrifuge	9
Canopies	5
Balances	7
Drying Ovens	6
Ashing Furnaces	7
Pressure Filtrators	2
Vacuum Filtrators	8
Hot Plates	13
Heat Lamps	2
Electroplaters	45
Stirrers	34
Burrell Shaker	8

* Used for Ra-226 via Rn-222 de-emanation

** Used for Ra-228 via Ac-228 Beta emissions

*** Used for U alpha Spectrometry

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 29 1991

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Bluewater Uranium Mine
Preliminary Assessment Data

FROM: Bruce Engelbert, Chief
Response Operations Branch

TO: Donald C. White, Chief
Field Operations Branch

The purpose of this memorandum is respond to your memorandum dated January 29, 1991 and to inform you that the Office of Radiation Programs (RAD) has performed a preliminary assessment of the data provided by the Navajo Superfund Office and the Agency for Toxic Substances and Disease Registry (ATSDR).

There are several questions, as outlined in the attached memorandum from RAD, that remain unanswered. The EPA Las Vegas Laboratory has been tasked to develop a sampling and data analysis workplan for the assessment of radionuclides releases into pathways that have not been evaluated. The assessment is also outlined in the RAD memorandum.

Let me assure you that, Karen (Tomi) Tomimatsu of my staff will be working you and the RAD representatives to resolve the problems at this site.

Should you have any questions regarding this, please call "Tomi" at FTS 475-9861.

Enclosure

cc:
Steve Luftig (OS-210)
Anthony Wolbarst (ANR-461)
Michael Bandrowski, Reg. 9
Bob Bornstein, Reg. 9
Gregg Dempsey, ORP/LVF
Colleen Petull, ORP/LVF

Printed on Recycled Paper

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 29 1991

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Resource Allocations for the Zone II Technical Assistance Team (TAT) Contracts 68-WO-0036 with Roy F. Weston and 68-W0-0037 with Ecology and Environment, Inc.

FROM: David Lopez, Section Chief
Emergency Response Division
Western Operations Section (OS-210)

Mark Mjoness, Section Chief
Emergency Response Division
Eastern Operations Section (OS-210)

TO: Robin Richardson, Acting Chief
Resources Management Section (OS-240)

The purpose of this memorandum is to inform you that specific EPA Regions will be reducing their 4th Quarter Advice of Allowance (AOA) as follows:

REGION	REDUCTION	Revised 4th Qtr. AOA
4	$175,000	$2,925,000
6	$372,000	1,488,000
8	$228,000	912,000
9	$150,000	1,130,000
10	$100,000	680,000

It is requested that the dollar reduction for each specific Region be moved into the Emergency Response Division's Contract Support Area account and the account number be specified in order for us to add these funds to the TAT contracts.

Should you have any questions regarding this request, please contact Karen (Tomi) Tomimatsu at 475-9861.

Printed on Recycled Paper

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Health Services Administration

Navajo Area
Indian Health Service
P. O. Box G
Window Rock, Arizona 86515

May 09, 1991

Rosita Loretta
Baca Chapter Coordinator
P.O. Box 127
Prewitt, New Mexico 87045

Dear Ms. Loretto:

Per request, on February 25, 1991, radiochemistry water quality samples were taken from the livestock windmill well number 16T521 next to the Head Start School in Haystack.

Analytical results of the samples are attached and are summarized below:

Analysis	Results	Max Allowable
Ra-226/228	0 pCi/L	5 pCi/L
G-Alpha	15.5 pCi/L	15 pCi/L

The Radium results are well below EPA drinking water standards, however, the Gamma-Alpha results are slightly above the standard. Additionally, the water from this well is not treated in any way for bacteria or other contaminants. While this water may be suitable for livestock, it is unsuitable for humans. Therefore, it is recommended that chapter members not use the water from this well for human consumption.

We have notified Water Resources in Crownpoint and requested they re-paint clearly the "LIVESTOCK USE ONLY" sign on the water storage tank.

Please communicate the contents of this letter to all chapter members. If you have any questions regarding this matter, please call Mr. Peter Fant or Thomas Hill at 505/786-5291, extension 403. Your cooperation is appreciated.

Respectfully,

Charles O. Dowell
Director, OEHE

xc: CHR/Baca
Crownpoint WRD
Fort Defiance WRD
Gallup District

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196-4700 [505]-841-2500
RADIOCHEMISTRY SECTION [505]-841-2574

area OF 11 copy 4/15/91

April 15, 1991

Request ID No. 012140

ANALYTICAL REPORT
SLD Accession No. RC-91-0037

Distribution
(_) User 81230
(■) Submitter 310
(※) SLD Files

To: Harry A. Doutt
U.S.PHS; Navajo Area IHS-OEH/
Sanitation Facilities Construction
P. O. Box 648
Ft. Defiance, AZ 86504

From: Radiochemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: A water sample submitted to this laboratory on February 25, 1991

DEMOGRAPHIC DATA

COLLECTION		LOCATION
On: 20-Feb-91	By: Fan . . .	Well 16T521
At: 12:00 hrs.	In/Near: McKinley County	

ANALYTICAL RESULTS

Analysis	Value	Sigma	D. Lmt.	Units	Analyst
G-Alpha w/ Am-241 ref.	40.00	3.00	0.70	pCi/L	Maloy
G-Alpha w/ U-nat ref.	47.00	4.00	1.10	pCi/L	Maloy
G-Beta w/ Cs-137 ref.	13.60	2.30	1.30	pCi/L	Maloy
G-Beta w/ Sr/Y90 ref.	13.20	2.20	1.30	pCi/L	Maloy
U--Chem, Fluoro, uG/L	35.00	7.00	5.00	uG/L	Bitner
assuming U-nat conversion	24.50	4.90	3.50	*pCi/L*	*(calculated)*
Ra-226, SDWA Method. .	-0.01	0.04	0.03	pCi/L	Maloy

Notations & Comments:

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error.

Small negative or positive values which are less than two(2) standard deviations should be interpreted as: including 'zero'; as 'not detected'; as 'less than the detection limit (<D. Lmt.)' when reported; or 'less than twice the standard deviation'.

Reviewed By: Loren A. Berge
Loren A. Berge, Ph.D. 04/15/91
Supervisor, Radiochemistry Section

RECEIVED APR 18 1991 SUPPORT CENTER

RECEIVED APR 19 91 EHS-OEHME

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION PROGRAMS-LAS VEGAS FACILITY
P.O. BOX 98517
LAS VEGAS, NEVADA 89193-8517
(702/798-2476 - FTS 545-2476)

AUG 5 1991

MEMORANDUM

SUBJECT: Time-Use Data for the Navajo Brown-Vandever and Desiderio Sites (Bluewater NM)

FROM: Yasmine Khonsary Yasmine Khonsary
Environmental Protection Specialist

TO: Gregg Dempsey, Chief
Field Studies Branch

Throughout the months of April and May, I worked with Dr. Rajen and Patrick Antonio of the Navajo Superfund Office, Window Rock, AZ, to develop "Time Use Data" for the Navajo Indians residing on the Brown-Vandever and Desiderio sites. These calculations were shared with the ORP Headquarters as well as Sharon Seidel, the Region 9 Toxicologist who developed a risk assessment for Robert Bornstein, the On-Scene Coordinator (letter dated May 30, 1991).

This letter is to inform you that these calculations (attached) were not used in the "Request for Concurrence on Proposed Nationally Significant Action Memorandum" dated May 17 and the Amendment dated June 7, 1991. Not using this data does not change the necessary outcome, that of a removal action. I urge future caution in reviewing any of the data/documents of this project as the information may not concur with the true and representative scenarios developed with the on scene Navajo Representatives.

Attachment

c 5 May 1991

EXPOSURES DUE TO RADON IN HOMES CAN NOT BE CALCULATED
FURTHER STUDY IS REQUIRED TO GATHER RELEVANT DATA
THESE CALCULATIONS SUPERSEDE THOSE OF MARCH 5, 1991, DUE TO MORE SPECIFIC DATA RECIEVED FROM THE NAVAJO NATION.

DIRECT EXTERNAL EXPOSURE ON THE NAVAJO BROWN VANDEVAR SITE
USING SITE SPECIFIC TIME USE DATA PROVIDED BY THE NAVAJO NATION.
(The figures are in mili rem per year)

	TRADITIONAL FAMILY	CONTEMPORARY FAMILY
ADULT MALE	351.135	168.300
ADULT FEMALE	232.101	137.700
TEENAGER **	264.308	216.878
CHILD **	240.593	205.097
PRE SCHOOL CHILD	267.750	267.750

DIRECT EXTERNAL EXPOSURE ON THE NAVAJO DESIDERIO SITE
USING SITE SPECIFIC TIME USE DATA PROVIDED BY THE NAVAJO NATION.
(The figures are in mili rem per year)

	TRADITIONAL FAMILY	CONTEMPORARY FAMILY
ADULT MALE	117.045	56.100
ADULT FEMALE	77.367	45.900
TEENAGER **	88.103	72.293
CHILD **	80.198	68.366
PRE SCHOOL CHILD	89.250	89.250

FACTS
=====
- AN AVERAGE EXPOSURE RATE OF 153 MICRO REM PER HOUR WAS CALCULATED FOR THE BROWN VANDEVER SITE
- AN AVERAGE EXPOSURE RATE OF 51 MICRO REM PER HOUR WAS CALCULATED FOR THE DESIDERIO SITE

ASSUMPTIONS
=========
- 50 WEEKS PER YEAR SPENT ON SITE
2 WEEKS PER YEAR SPENT ON VACATION, AWAY FROM THEIR HOME AND LAND

** In the event that a child and a teen exist in the same family, it is assumed that the herding chore is split, therefore, doses for the teen and the child would be halved.

·T========

23-May-91

RESULTS SENT BY THE NAVAJO NATION'S SITE SURVEYS

NUMBER OF HOURS PER YEAR SPENT INSIDE THE HOME

	TRADITIONAL FAMILY	%	CONTEMPORARY FAMILY	%
ADULT MALE	5505	63%	4800	55%
ADULT FEMALE	6283	72%	5000	57%
TEENAGER	4746.5	54%	4934.5	56%
CHILD	4901.5	56%	5011.5	57%
PRE SCHOOL CHILD	6475	74%	5650	65%

NUMBER OF HOURS PER YEAR SPENT IN THE VISCINITY OF THE HOME

	TRADITIONAL FAMILY	%	CONTEMPORARY FAMILY	%
ADULT MALE	2295	26%	1100	13%
ADULT FEMALE	1517	17%	900	10%
TEENAGER	1727.5	20%	1417.5	16%
CHILD	1572.5	18%	1340.5	15%
PRE SCHOOL CHILD	1750	20%	1750	20%

NO OF HRS/YR AWAY FROM HOME AND LAND (INCLUDING 2 WKS VACATION)

	TRADITIONAL FAMILY	%	CONTEMPORARY FAMILY	%
ADULT MALE	936	11%	2836	32%
ADULT FEMALE	936	11%	2836	32%
TEENAGER	2262	26%	2384	27%
CHILD	2262	26%	2384	27%
PRE SCHOOL CHILD	511	6%	1336	15%

ASSUMPTIONS

- summer vacation lasts 12 weeks, (minus one week for vacation) = 11 weeks/yr
- school year lasts 40 weeks, (minus one week vacation) = 39 weeks/yr

22-May-91

RESULTS SENT BY THE NAVAJO NATION'S SITE SURVEYS
NUMBER OF HOURS PER WEEK

NUMBER OF HOURS PER WEEK SPENT INSIDE THE HOME

	SCHOOL YEAR		SUMMER VACATIONS	
	TRADITIONAL	CONTEMPORARY	TRADITIONAL	CONTEMPORARY
ADULT MALE	109	96	114	96
ADULT FEMALE	125	100	128	100
TEENAGER	93.5	95.5	100	110
CHILD	95.5	95.5	107	117
PRE SCHOOL CHILD	129.5	113	129.5	113

NUMBER OF HOURS PER WEEK SPENT IN THE VISCINITY OF THE HOME

	SCHOOL YEAR		SUMMER VACATIONS	
	TRADITIONAL	CONTEMPORARY	TRADITIONAL	CONTEMPORARY
ADULT MALE	47	22	42	22
ADULT FEMALE	31	18	28	18
TEENAGER	28.5	24.5	56	42
CHILD	26.5	24.5	49	35
PRE SCHOOL CHILD	35	35	35	35

NUMBER OF HOURS PER WEEK SPENT AWAY FROM THEIR HOME AND LAND

	SCHOOL YEAR		SUMMER VACATIONS	
	TRADITIONAL	CONTEMPORARY	TRADITIONAL	CONTEMPORARY
ADULT MALE	12	50	12	50
ADULT FEMALE	12	50	12	50
TEENAGER	46	48	12	16
CHILD	46	48	12	16
PRE SCHOOL CHILD	3.5	20	3.5	20

22-May-91

RESULTS SENT BY THE NAVAJO NATION'S SITE SURVEYS
SUMMER VACATIONS

NUMBER OF HOURS PER DAY SPENT INSIDE THE HOME

SUMMER	TRADITIONAL FAMILY		CONTEMPORARY FAMILY	
	WKDAY	WKEND	WKDAY	WKEND
ADULT MALE	18	12	12	18
ADULT FEMALE	20	14	12	20
TEENAGER	14.8	13	16.4	14
CHILD	15.8	14	17.4	15
PRE SCHOOL CHILD	18.5	18.5	16.6	15

NUMBER OF HOURS PER DAY SPENT IN THE VISCINITY OF THE HOME

SUMMER	TRADITIONAL FAMILY		CONTEMPORARY FAMILY	
	WKDAY	WKEND	WKDAY	WKEND
ADULT MALE	6	6	2	6
ADULT FEMALE	4	4	2	4
TEENAGER	8	8	6	6
CHILD	7	7	5	5
PRE SCHOOL CHILD	5	5	5	5

NUMBER OF HOURS PER DAY SPENT AWAY FROM THEIR HOME AND LAND

SUMMER	TRADITIONAL FAMILY		CONTEMPORARY FAMILY	
	WKDAY	WKEND	WKDAY	WKEND
ADULT MALE	0	6	10	0
ADULT FEMALE	0	6	10	0
TEENAGER	1.2	3	1.6	4
CHILD	1.2	3	1.6	4
PRE SCHOOL CHILD	0.5	0.5	2.4	4

ASSUMPTIONS

- Parents do not herd during the summer.
- During the summer, parents have the children do all the herding. Child assumed to herd daily. Teen also assumed to herd daily. In the event that child and teen exists in same family, they would logically split the chore of herding. Must include in dose section: since they split chore in 1/2, therefore doses would be halved.

22-May-91

RESULTS SENT BY THE NAVAJO NATION'S SITE SURVEYS
SCHOOL YEAR

NUMBER OF HOURS PER DAY SPENT INSIDE THE HOME

SCHOOL YEAR	TRADITIONAL FAMILY		CONTEMPORARY FAMILY	
	WKDAY	WKEND	WKDAY	WKEND
ADULT MALE	17	12	12	18
ADULT FEMALE	20	calculate	12	20
TEENAGER	13.5	13	13.5	14
CHILD	13.5	14	13.5	14
PRE SCHOOL CHILD	18.5	18.5	16.6	15

NUMBER OF HOURS PER DAY SPENT IN THE VISCINITY OF THE HOME

SCHOOL YEAR	TRADITIONAL FAMILY		CONTEMPORARY FAMILY	
	WKDAY	WKEND	WKDAY	WKEND
ADULT MALE	7	6	2	6
ADULT FEMALE	4	4WD,7HERD	2	4
TEENAGER	2.5	8	2.5	6
CHILD	2.5	7	2.5	6
PRE SCHOOL CHILD	5	5	5	5

NUMBER OF HOURS PER DAY SPENT AWAY FROM THEIR HOME AND LAND

SCHOOL YEAR	TRADITIONAL FAMILY		CONTEMPORARY FAMILY	
	WKDAY	WKEND	WKDAY	WKEND
ADULT MALE	0	6	10	0
ADULT FEMALE	0	6	10	0
TEENAGER	8	3	8	4
CHILD	8	3	8	4
PRE SCHOOL CHILD	0.5	0.5	2.4	4

ASSUMPTIONS

- Male herd sheep 5 days/wk
- Female herd sheep 1 day/wk
- Teen/child herd sheep 1 day/wk
- Assume that family does not contain a teen and a child.
- NOTE: have combined sheep herder scenario into trad. scen. from Rajen.

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

December 20, 1991

MEMORANDUM

SUBJECT: Bluewater Uranium Mine Site Soil Samples Data

FROM: Steve M. Dean SMDean
Environmental Scientist, (A-1-1)

TO: Robert Bornstein
Environmental Scientist, (H-8-3)

Listed below are the total uranium and radium 226 results for the 10 composite soil samples collected from the Bluewater Uranium Mine Site. The values listed are in picoCuries per gram (pCi/g) for dry weight of soil:

SAMPLE ID	Total Uranium	Radium 226
BV24A	7.0	3.7
BV24B	3.6	3.2
BV24C	3.2	2.9
BV24D (Background)	0.55/0.64*	0.73/0.90*
BV18A	1.5	0.94
BV18B (Background)	0.97	0.93
DES1	2.9	1.8
DES2	3.5	3.6
DES3	2.3	1.7
DES4 (Background)	2.2	2.4

* Analysed twice as a duplicate sample.

Since Sample BV24A was the highest in uranium and radium 226, I used its concentrations to perform a soil exposure risk assessment using Superfund's Risk Assessment Guidance, Human Health Evaluation Manual Part B. This assessment took into account all four possible pathways from soil exposure; ingestion, particulate inhalation, volatiles, and external gamma. I also used an exposure scenario of 8 hours per day, 50 weeks per year for one year. Based on the above concentrations and this scenario, the total risk for uranium is 1.6

Printed on Recycled Paper

in 10 million and total risk for radium 226 is 1.4 in 10 million. Combined total risk from both metals at this location, (BV24A), is 3.0 in 10 million.

I hope this information is useful to you, if you have any questions or need any further assistance please contact me at X4-1049. Thank you.

Attachments

cc: Mike Bandrowski, (A-1-1)

RADIONUCLIDE RISK ASSESSMENT
in CONTAMINATED SOIL

RADIONUCLIDE OF CONCERN? u234 SAMPLE BU24 A.
ENTER THE INGESTION SLOPE FACTOR? 1.4E-10
NOW ENTER THE INHALATION SLOPE FACTOR? 2.7E-8
ENTER THE EXTERNAL EXPOSURE SLOPE FACTOR? 5.7E-14
ENTER RADIONUCLIDE CONCENTRATION (in pCi/gram)? 3.385
NUMBER OF HOURS PER DAY OF EXPOSURE? 8
ENTER NUMBER OF WEEKS PER YEAR OF EXPOSURE? 50
ENTER NUMBER OF YEARS OF EXPOSURE? 1
INGESTION RISK = 4.730863E-12
VOLATILE RISK = 1.892345E-27
PARTICULATES RISK = 3.639125E-14
EXTERNAL EXPOSURE RISK = 1.804036E-08
TOTAL RISK = 1.804513E-08

PRESS S FOR RECALCULATING THE SAME RADIONUCLIDE?

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF 9KEY 0SCREEN

RADIONUCLIDE RISK ASSESSMENT
in CONTAMINATED SOIL

SAMPLE BV24A.

RADIONUCLIDE OF CONCERN? U235
ENTER THE INGESTION SLOPE FACTOR? 1.3E-10
NOW ENTER THE INHALATION SLOPE FACTOR? 2.5E-8
ENTER THE EXTERNAL EXPOSURE SLOPE FACTOR? 9.6E-12
ENTER RADIONUCLIDE CONCENTRATION (in pCi/gram)? .1388
NUMBER OF HOURS PER DAY OF EXPOSURE? 8
ENTER NUMBER OF WEEKS PER YEAR OF EXPOSURE? 50
ENTER NUMBER OF YEARS OF EXPOSURE? 1
INGESTION RISK = 3.267138E-11
VOLATILE RISK = 1.306855E-26
PARTICULATES RISK = 2.513183E-13
EXTERNAL EXPOSURE RISK = 1.245869E-07
TOTAL RISK = 1.246198E-07

PRESS S FOR RECALCULATING THE SAME RADIONUCLIDE?

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF 9KEY 0SCREEN

RADIONUCLIDE RISK ASSESSMENT
in CONTAMINATED SOIL

SAMPLE BU24A.

RADIONUCLIDE OF CONCERN? U238
ENTER THE INGESTION SLOPE FACTOR? 1.3E-10
NOW ENTER THE INHALATION SLOPE FACTOR? 2.4E-8
ENTER THE EXTERNAL EXPOSURE SLOPE FACTOR? 4.6E-14
ENTER RADIONUCLIDE CONCENTRATION (in pCi/gram)? 3.524
NUMBER OF HOURS PER DAY OF EXPOSURE? 8
ENTER NUMBER OF WEEKS PER YEAR OF EXPOSURE? 50
ENTER NUMBER OF YEARS OF EXPOSURE? 1
INGESTION RISK = 3.974666E-12
VOLATILE RISK = 1.589866E-27
PARTICULATES RISK = 3.057435E-14
EXTERNAL EXPOSURE RISK = 1.515672E-08
TOTAL RISK = 1.516073E-08

PRESS S FOR RECALCULATING THE SAME RADIONUCLIDE?

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF 9KEY 0SCREEN

RADIONUCLIDE RISK ASSESSMENT
in CONTAMINATED SOIL

SAMPLE BV24A.

RADIONUCLIDE OF CONCERN? RA226
ENTER THE INGESTION SLOPE FACTOR? 1.2e-10
NOW ENTER THE INHALATION SLOPE FACTOR? 3e-9
ENTER THE EXTERNAL EXPOSURE SLOPE FACTOR? 4.2e-13
ENTER RADIONUCLIDE CONCENTRATION (in pCi/gram)? 3.7
NUMBER OF HOURS PER DAY OF EXPOSURE? 8
ENTER NUMBER OF WEEKS PER YEAR OF EXPOSURE? 50
ENTER NUMBER OF YEARS OF EXPOSURE? 1
INGESTION RISK = 3.810288E-11
VOLATILE RISK = 1.524116E-26
PARTICULATES RISK = 2.930991E-13
EXTERNAL EXPOSURE RISK = 1.45299E-07
TOTAL RISK = 1.453374E-07

PRESS S FOR RECALCULATING THE SAME RADIONUCLIDE?

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF 9KEY 0SCREEN

Sample ID R9S 91.07507
Sample type SOIL
Collection date, time 9/19/91 0:00
Location NM:PREWITT
Other ID's BV24A
Comments BLUEWATER U MINE SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	3.7700E+00	2.20 %	PCI/GASH	9/19/91
RA-226	3.5300E+00	2.20 %	PCI/GWET	9/19/91
RA-226	3.7000E+00	2.20 %	PCI/GDRY	9/19/91

Sample ID R9S 91.07508
Sample type SOIL
Collection date, time 9/19/91 0:00
Location NM:PREWITT
Other ID's BV24B
Comments BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	3.2600E+00	2.36 %	PCI/GASH	9/19/91
RA-226	3.0700E+00	2.36 %	PCI/GWET	9/19/91
RA-226	3.2200E+00	2.36 %	PCI/GDRY	9/19/91

Sample ID R9S 91.07509
Sample type SOIL
Collection date, time 9/19/91 0:00
Location NM:PREWITT
Other ID's BV24C
Comments BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	2.9500E+00	2.49 %	PCI/GASH	9/19/91
RA-226	2.8200E+00	2.49 %	PCI/GWET	9/19/91
RA-226	2.9100E+00	2.49 %	PCI/GDRY	9/19/91

Sample ID	R9S 91.07510
Sample type	SOIL
Collection date, time	9/19/91 0:00
Location	NM:PREWITT
Other ID's	BV24D
Comments	BLUEWATER MINING U SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	7.5000E-01	4.93 %	PCI/GASH	9/19/91
RA-226	7.2000E-01	4.93 %	PCI/GWET	9/19/91
RA-226	7.3000E-01	4.93 %	PCI/GDRY	9/19/91

Sample ID	R9S 91.07510X
Sample type	SOIL
Collection date, time	9/19/91 0:00
Location	NM:PREWITT
Other ID's	BV24D
Comments	BLUEWATER MINING U SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	9.2000E-01	4.57 %	PCI/GASH	9/19/91
RA-226	8.8000E-01	4.57 %	PCI/GWET	9/19/91
RA-226	9.0000E-01	4.57 %	PCI/GDRY	9/19/91

Sample ID	R9S 91.07511
Sample type	SOIL
Collection date, time	9/19/91 0:00
Location	NM:PREWITT
Other ID's	BV18A
Comments	BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	9.5000E-01	4.60 %	PCI/GASH	9/19/91
RA-226	9.2000E-01	4.60 %	PCI/GWET	9/19/91
RA-226	9.4000E-01	4.60 %	PCI/GDRY	9/19/91

Sample ID R9S 91.07512
Sample type SOIL
Collection date, time 9/19/91 0:00
Location NM:PREWITT
Other ID's BV18B
Comments BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	9.4000E-01	4.45 %	PCI/GASH	9/19/91
RA-226	9.0000E-01	4.45 %	PCI/GWET	9/19/91
RA-226	9.3000E-01	4.45 %	PCI/GDRY	9/19/91

Sample ID R9S 91.07513
Sample type SOIL
Collection date, time 9/19/91 0:00
Location NM:PREWITT
Other ID's DES1
Comments BLUEWATER U MINING SITES
Report to GERRY LUSTER

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	2.0000E+00	3.21 %	PCI/GASH	9/19/91
RA-226	1.7800E+00	3.21 %	PCI/GWET	9/19/91
RA-226	1.8100E+00	3.21 %	PCI/GDRY	9/19/91

Sample ID R9S 91.07514
Sample type SOIL
Collection date, time 9/19/91 0:00

Location NM:PREWITT
Other ID's DES2
Comments BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	3.6600E+00	2.26 %	PCI/GASH	9/19/91
RA-226	3.5300E+00	2.26 %	PCI/GWET	9/19/91
RA-226	3.6100E+00	2.26 %	PCI/GDRY	9/19/91

Sample ID R95 91.07515
Sample type SOIL
Collection date, time 9/18/91 0:00
Location NM:PREWITT
Other ID's DES3
Comments BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

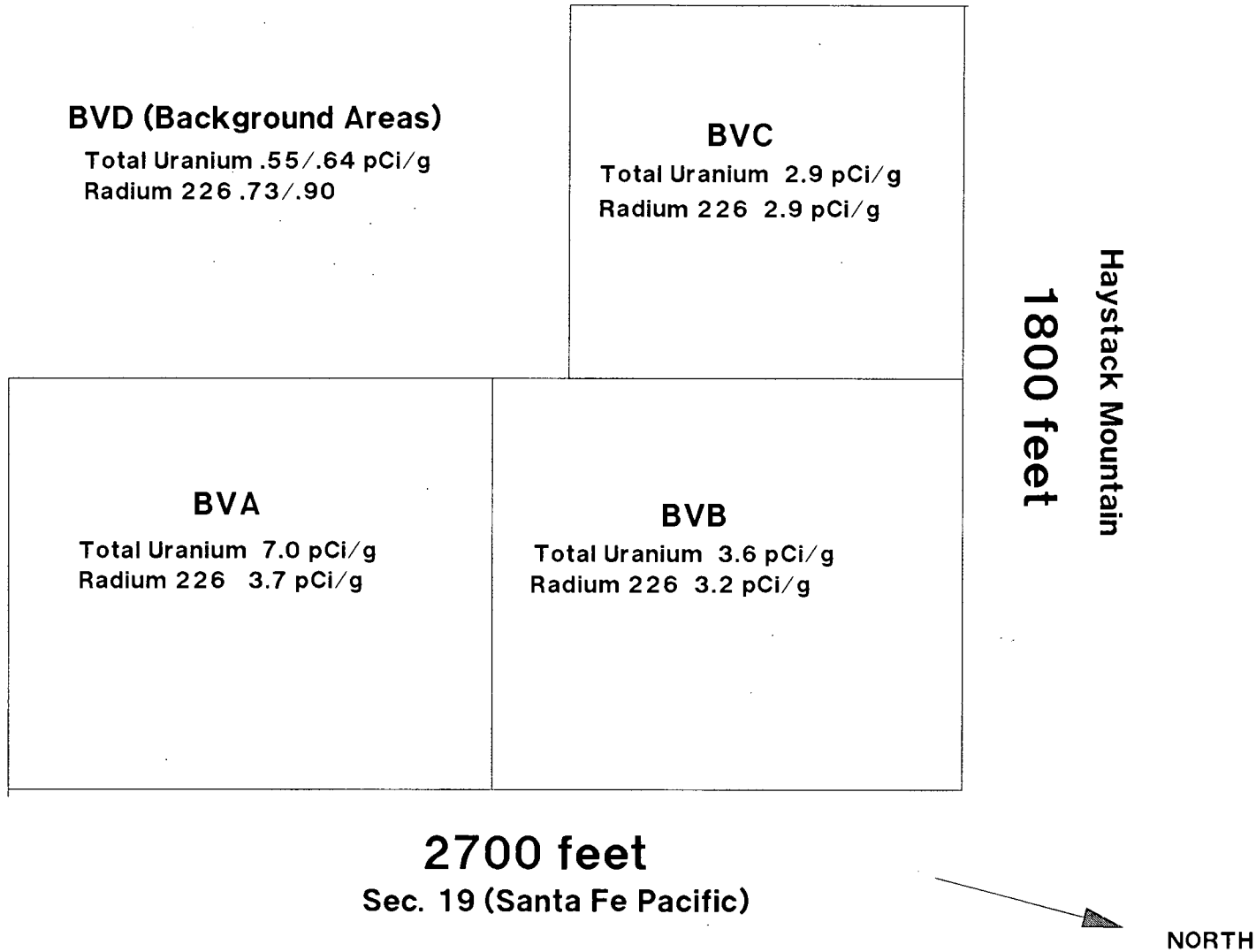
NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	1.8000E+00	3.38 %	PCI/GASH	9/19/91
RA-226	1.1000E+00	3.38 %	PCI/GWET	9/19/91
RA-226	1.7600E+00	3.38 %	PCI/GDRY	9/19/91

Sample ID R95 91.07516
Sample type SOIL
Collection date, time 9/18/91 0:00
Location NM:PREWITT
Other ID's DES4
Comments BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	2.4700E+00	2.71 %	PCI/GASH	9/19/91
RA-226	2.3400E+00	2.71 %	PCI/GWET	9/19/91
RA-226	2.3800E+00	2.71 %	PCI/GDRY	9/19/91

POST REMOVAL URANIUM/RADIUM SOIL SAMPLING
BROWN-VANDEVER SEC. 24, T13N, R11W



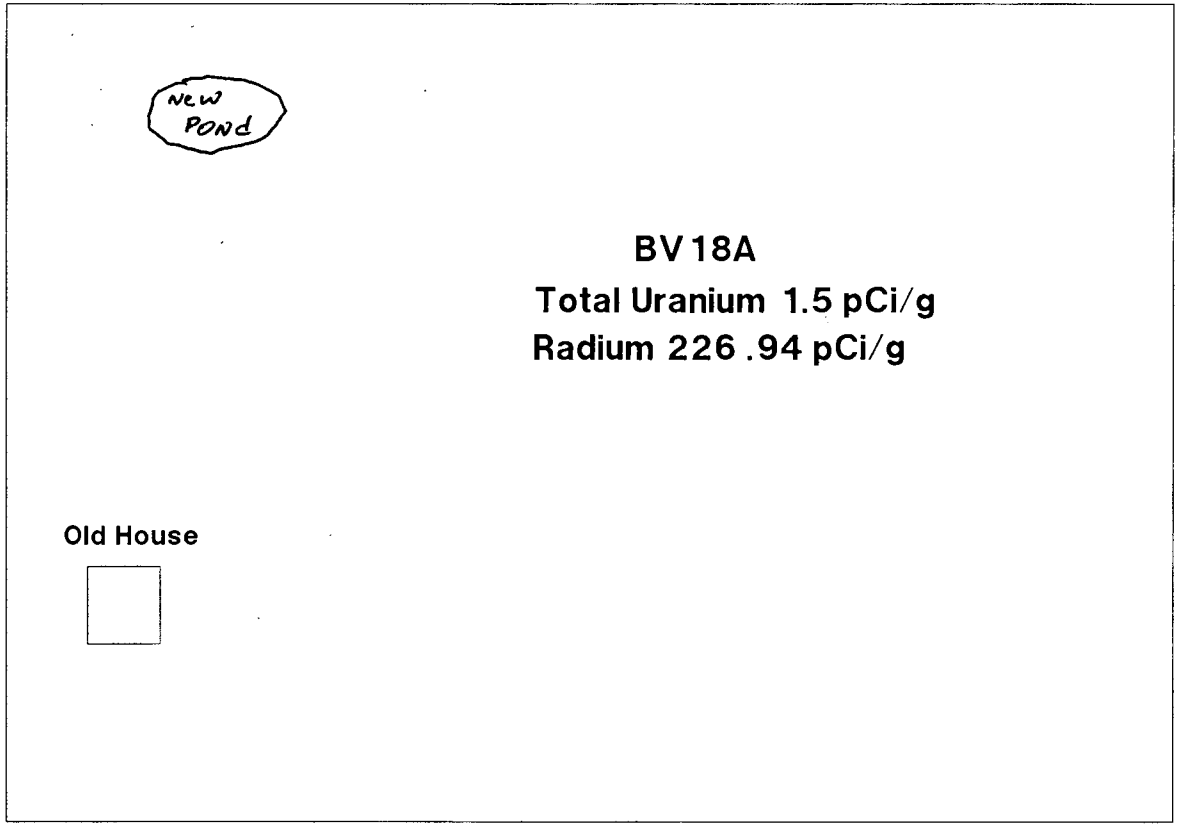
Not to Scale

Figure A

POST REMOVAL URANIUM/RADIUM SOIL SAMPLING
BROWN-VANDEVER SEC. 18, T 13N, R 10W

North

Haystack Mountain
BV 18B (BACKGROUND)
Total Uranium .97 pCi/g
Radium 226 .93 pCi/g



NOT TO Scale
Figure B

POST REMOVAL URANIUM/RADIUM SOIL SAMPLING
DESIDERIO MINE SITE

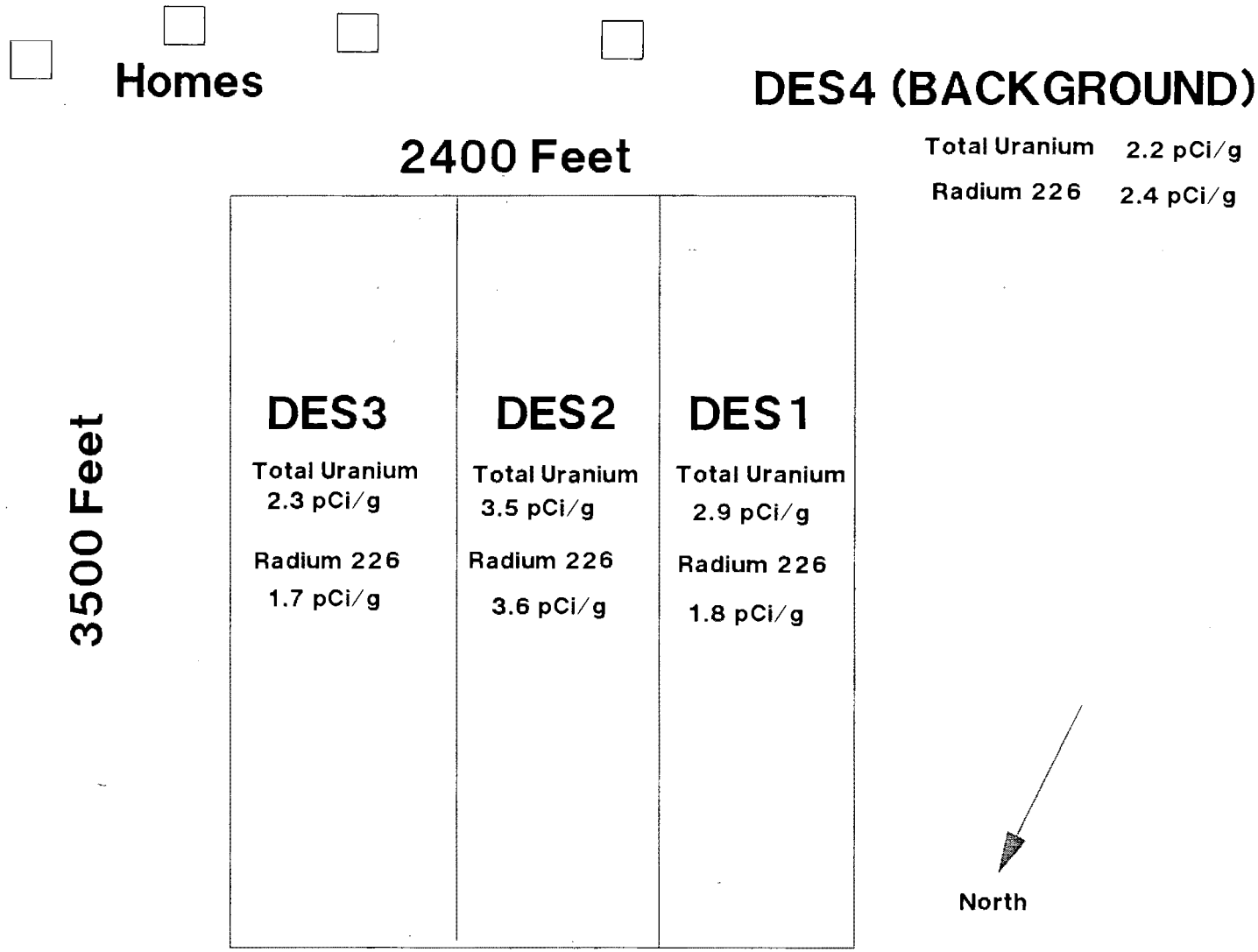


Figure C
NOT TO Scale

*** MANUAL Uranium Calculations from Program Asu ***

This listing was created 12/03/91 at 08:25 by CRIKNG.

Sample Id: R95 91.07507 BU24A

Counting system	AS 1 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/27/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.213		
Sample size	0.5201 GASH		
Factor # 1	0.9370 GWET		
Factor # 2	0.9820 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	884.	6.	3.447E+00	5.535E-02	11.34%	3.909E-01
	U-235	36.	0.	1.413E-01	1.064E-02	34.55%	4.883E-02
	U-238	917.	3.	3.588E+00	4.226E-02	11.25%	4.035E-01

TOTAL U 7.2

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	884.	6.	3.230E+00	5.535E-02	11.34%	3.662E-01
	U-235	36.	0.	1.324E-01	1.064E-02	34.55%	4.575E-02
	U-238	917.	3.	3.362E+00	4.226E-02	11.25%	3.781E-01

TOTAL U 6.7

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	884.	6.	3.385E+00	5.535E-02	11.34%	3.838E-01
	U-235	36.	0.	1.388E-01	1.064E-02	34.55%	4.795E-02
	U-238	917.	3.	3.524E+00	4.226E-02	11.25%	3.963E-01

TOTAL U 7.0

****
******** Recalculated and Written To Database ********
****

*** MANUAL Uranium Calculations from Program Asu ***

This listing was created 12/03/91 at 08:26 by CRIKNG.

Sample Id: R9S 91.07508 BV248

Counting system	AS 2 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/27/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.206		
Sample size	0.5025 GASH		
Factor # 1	0.9430 GWET		
Factor # 2	0.9540 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	424.	5.	1.879E+00	5.878E-02	13.63%	2.560E-01
	U-235	17.	1.	7.175E-02	3.300E-02	53.86%	3.864E-02
	U-238	406.	4.	1.803E+00	5.385E-02	13.76%	2.481E-01

TOTAL U 3.8

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	424.	5.	1.772E+00	5.878E-02	13.63%	2.414E-01
	U-235	17.	1.	6.766E-02	3.300E-02	53.86%	3.644E-02
	U-238	406.	4.	1.700E+00	5.385E-02	13.76%	2.340E-01

TOTAL U 3.5

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	424.	5.	1.792E+00	5.878E-02	13.63%	2.443E-01
	U-235	17.	1.	6.845E-02	3.300E-02	53.86%	3.686E-02
	U-238	406.	4.	1.720E+00	5.385E-02	13.76%	2.367E-01

TOTAL U 3.6

****
******** Recalculated and Written To Database ********
****

*** Enriched Uranium Calculations from Program Asu ***

This listing was created 12/04/91 at 07:46 by CRIKNG,

Sample Id: R95 91.07509 BV24C

Counting system	AS 1 - Shelf A	Prep Date	11/26/91
Date, Time counted	12/02/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.213		
Sample size	0.5170 GASH		
Factor # 1	0.9558 GWET		
Factor # 2	0.9880 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	5.	1.566E+00	5.549E-02	14.01%	2.194E-01
375.	U-235	0.	8.043E-02	1.147E-02	46.80%	3.764E-02
	U-238	2.	1.579E+00	3.931E-02	13.92%	2.197E-01

TOTAL U 3.2

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	5.	1.497E+00	5.549E-02	14.01%	2.097E-01
375.	U-235	0.	7.688E-02	1.147E-02	46.80%	3.598E-02
	U-238	2.	1.509E+00	3.931E-02	13.92%	2.100E-01

TOTAL U 3.1

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	5.	1.547E+00	5.549E-02	14.01%	2.168E-01
375.	U-235	0.	7.947E-02	1.147E-02	46.80%	3.719E-02
	U-238	2.	1.560E+00	3.931E-02	13.92%	2.171E-01

TOTAL U 3.2

****
******** Recalculated and Written To Database ********
****

** MANUAL Uranium Calculations from Program Asu ***

his listing was created 12/03/91 at 08:29 by CRIKNG.

ample Id: R98 91.07510 BV24D

ounting system	AS 4 - Shelf A	Prep Date	11/26/91
ate, Time counted	11/27/91 14:05	Bkg Date	11/22/91
ype Analysis	U prep by AS	Eff Date	12/19/90
ength of count	1000.0 Min	Std Date	10/09/91
etector efficiency	0.236		
ample size	0.5073 GASH		
actor # 1	0.9560 GWET		
actor # 2	0.9800 GDRY		

QWIKS

ross cnts:	Isotope	Bkg	PCI/GASH		MDA	2 Sigma error in %	Absolute
U-234	94.	20.	2.834E-01		9.001E-02	30.15%	8.544E-02
U-235	3.	2.	3.830E-03	=<MDA	3.556E-02	447.30%	1.713E-02
U-238	71.	0.	2.719E-01		1.038E-02	25.29%	6.877E-02

TOTAL U 0.56

ross cnts:	Isotope	Bkg	PCI/GWET		MDA	2 Sigma error in %	Absolute
U-234	94.	20.	2.709E-01		9.001E-02	30.15%	8.168E-02
U-235	3.	2.	3.661E-03	=<MDA	3.556E-02	447.30%	1.638E-02
U-238	71.	0.	2.599E-01		1.038E-02	25.29%	6.574E-02

TOTAL U 0.53

ross cnts:	Isotope	Bkg	PCI/GDRY		MDA	2 Sigma error in %	Absolute
U-234	94.	20.	2.777E-01		9.001E-02	30.15%	8.373E-02
U-235	3.	2.	3.753E-03	=<MDA	3.556E-02	447.30%	1.679E-02
U-238	71.	0.	2.665E-01		1.038E-02	25.29%	6.739E-02

TOTAL U 0.55

****
****** Recalculated and Written To Database ********
****

*** Manual Uranium Calculations from Program Asu ***

This listing was created 12/03/91 at 08:29 by CRIKNG.

Sample Id: R9S 91.07510X BV24D

Counting system	AS 5 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/27/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.206		
Sample size	0.5094 GASH		
Factor # 1	0.9560 GWET		
Factor # 2	0.9800 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH		MDA	2 Sigma error in %	Absolute
	U-234	62.	7.	2.460E-01		6.714E-02	31.64%	7.781E-02
	U-235	1.	0.	4.472E-03	=<MDA	1.212E-02	200.22%	8.954E-03
	U-238	91.	1.	4.025E-01		3.291E-02	23.30%	9.377E-02

TOTAL U 0.65

Gross cnts:	Isotope	Bkg	PCI/GWET		MDA	2 Sigma error in %	Absolute
	U-234	62.	7.	2.351E-01		6.714E-02	31.64%	7.439E-02
	U-235	1.	0.	4.275E-03	=<MDA	1.212E-02	200.22%	8.560E-03
	U-238	91.	1.	3.848E-01		3.291E-02	23.30%	8.964E-02

TOTAL U 0.62

Gross cnts:	Isotope	Bkg	PCI/GDRY		MDA	2 Sigma error in %	Absolute
	U-234	62.	7.	2.410E-01		6.714E-02	31.64%	7.626E-02
	U-235	1.	0.	4.383E-03	=<MDA	1.212E-02	200.22%	8.775E-03
	U-238	91.	1.	3.944E-01		3.291E-02	23.30%	9.189E-02

TOTAL U 0.64

****
******** Recalculated and Written To Database ********
****

*** MANUAL Uranium Calculations from Program Asu ***

This listing was created 12/04/91 at 07:47 by CRIKNG.

Sample Id: R9S 91.07511 BV18A

Counting system	AS 2 - Shelf A	Prep Date	11/26/91
Date, Time counted	12/02/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.206		
Sample size	0.5130 GASH		
Factor # 1	0.9730 GWET		
Factor # 2	0.9958 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	180.	4.	7.534E-01	5.141E-02	18.01%	1.357E-01
	U-235	13.	0.	5.565E-02	1.160E-02	56.25%	3.130E-02
	U-238	158.	3.	6.635E-01	4.608E-02	18.84%	1.250E-01

TOTAL U 1.5

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	180.	4.	7.330E-01	5.141E-02	18.01%	1.320E-01
	U-235	13.	0.	5.414E-02	1.160E-02	56.25%	3.046E-02
	U-238	158.	3.	6.456E-01	4.608E-02	18.84%	1.216E-01

TOTAL U 1.4

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	180.	4.	7.502E-01	5.141E-02	18.01%	1.351E-01
	U-235	13.	0.	5.541E-02	1.160E-02	56.25%	3.117E-02
	U-238	158.	3.	6.607E-01	4.608E-02	18.84%	1.245E-01

TOTAL U 1.5

****
******* Recalculated and Written To Database ********
****

*** MANUAL Uranium Calculations from Program Asu ***

This listing was created 12/03/91 at 08:30 by CRIKNG.

Sample Id: R98 91.07512 BV18B

Counting system	AS 7 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/27/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.211		
Sample size	0.5064 GASH		
Factor # 1	0.9540 GWET		
Factor # 2	0.9840 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH		MDA	2 Sigma error in %	Absolute
	U-234	113.	5.	5.042E-01		6.119E-02	22.22%	1.120E-01
	U-235	2.	2.	0.000E+00	=<MDA	4.335E-02	0.00%	1.867E-02
	U-238	104.	1.	4.808E-01		3.436E-02	22.02%	1.059E-01

TOTAL U 0.98

Gross cnts:	Isotope	Bkg	PCI/GWET		MDA	2 Sigma error in %	Absolute
	U-234	113.	5.	4.810E-01		6.119E-02	22.22%	1.069E-01
	U-235	2.	2.	0.000E+00	=<MDA	4.335E-02	0.00%	1.781E-02
	U-238	104.	1.	4.587E-01		3.436E-02	22.02%	1.010E-01

TOTAL U 0.94

Gross cnts:	Isotope	Bkg	PCI/GDRY		MDA	2 Sigma error in %	Absolute
	U-234	113.	5.	4.961E-01		6.119E-02	22.22%	1.102E-01
	U-235	2.	2.	0.000E+00	=<MDA	4.335E-02	0.00%	1.837E-02
	U-238	104.	1.	4.731E-01		3.436E-02	22.02%	1.042E-01

TOTAL U 0.97

****
******** Recalculated and Written To Database ********
****

This listing was created 12/04/91 at 12:56 by CHIKNG.

Sample Id: R9S 91.07513 DES1

Counting system	AS 3 - Shelf A	Prep Date	11/26/91
Date, Time counted	12/02/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.251		
Sample size	0.5073 GASH		
Factor # 1	0.8890 GWET		
Factor # 2	0.9074 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	406.	9.	1.578E+00	6.622E-02	13.44%	2.122E-01
	U-235	17.	2.	5.963E-02	3.691E-02	58.76%	3.504E-02
	U-238	386.	0.	1.534E+00	1.077E-02	13.38%	2.053E-01

TOTAL U 3.2

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	406.	9.	1.403E+00	6.622E-02	13.44%	1.886E-01
	U-235	17.	2.	5.301E-02	3.691E-02	58.76%	3.115E-02
	U-238	386.	0.	1.364E+00	1.077E-02	13.38%	1.825E-01

TOTAL U 2.8

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	406.	9.	1.432E+00	6.622E-02	13.44%	1.925E-01
	U-235	17.	2.	5.410E-02	3.691E-02	58.76%	3.179E-02
	U-238	386.	0.	1.392E+00	1.077E-02	13.38%	1.863E-01

TOTAL U 2.9

****
******* Recalculated and written To Database ********
****

12/11/1991 14:27 USEPA NAREL MONT. ALA.

*** Manual Uranium Calculations from Program Asu ***

This listing was created 12/03/91 at 08:22 by CRIKNG.

Sample Id: R9S 91.07514 DES2

Counting system	AS 8 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/29/91 12:33	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.208		
Sample size	0.5000 GASH		
Factor # 1	0.9669 GWET		
Factor # 2	0.9871 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	Absolute
	U-234	396.	9.	1.683E+00	7.246E-02	13.94%	2.346E-01
	U-235	34.	0.	1.479E-01	1.179E-02	35.53%	5.254E-02
	U-238	388.	3.	1.675E+00	4.682E-02	13.84%	2.317E-01

TOTAL U 3.5

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	Absolute
	U-234	396.	9.	1.628E+00	7.246E-02	13.94%	2.268E-01
	U-235	34.	0.	1.430E-01	1.179E-02	35.53%	5.081E-02
	U-238	388.	3.	1.619E+00	4.682E-02	13.84%	2.241E-01

TOTAL U 3.4

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	Absolute
	U-234	396.	9.	1.662E+00	7.246E-02	13.94%	2.315E-01
	U-235	34.	0.	1.460E-01	1.179E-02	35.53%	5.187E-02
	U-238	388.	3.	1.653E+00	4.682E-02	13.84%	2.288E-01

TOTAL U 3.5

****
******* Recalculated and Written To Database ********
****

Gamma Calculations from Program Asu

This listing was created 12/04/91 at 07:49 by CRIKNG.

Sample Id: R9S 91.07515 DES3

Counting system	AS 4 - Shelf A	Prep Date	11/26/91
Date, Time counted	12/02/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.236		
Sample size	0.5012 GASH		
Factor # 1	0.6123 GWET		
Factor # 2	0.9800 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH		MDA	2 Sigma error in %	Absolute
	U-234	229.	1.210E+00		8.184E-02	16.83%	2.036E-01
	U-235	11.	3.816E-02	=<MDA	6.547E-02	111.07%	4.238E-02
	U-238	202.	1.090E+00		5.062E-02	17.19%	1.874E-01

TOTAL U 2.3

Gross cnts:	Isotope	Bkg	PCI/GWET		MDA	2 Sigma error in %	Absolute
	U-234	229.	7.410E-01		8.184E-02	16.83%	1.247E-01
	U-235	11.	2.336E-02	=<MDA	6.547E-02	111.07%	2.595E-02
	U-238	202.	6.675E-01		5.062E-02	17.19%	1.148E-01

TOTAL U 1.4

Gross cnts:	Isotope	Bkg	PCI/GDRY		MDA	2 Sigma error in %	Absolute
	U-234	229.	1.186E+00		8.184E-02	16.83%	1.995E-01
	U-235	11.	3.739E-02	=<MDA	6.547E-02	111.07%	4.153E-02
	U-238	202.	1.068E+00		5.062E-02	17.19%	1.837E-01

TOTAL U 2.3

****
******** Recalculated and Written To Database ********
****

This listing was creat[redacted] 12/03/91 at 08:23 by CKTK[redacted].

Sample Id: B9S 91.07516 D6S4

Counting system	AS 9 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/29/91 12:33	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.213		
Sample size	0.5043 GASH		
Factor # 1	0.9469 GWET		
Factor # 2	0.9642 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
U-234	307.	7.	1.137E+00	5.665E-02	14.81%	1.676E-01
U-235	19.	0.	7.169E-02	1.023E-02	46.74%	3.351E-02
U-238	303.	3.	1.132E+00	4.062E-02	14.69%	1.663E-01

TOTAL U 2.3

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
U-234	307.	7.	1.072E+00	5.665E-02	14.81%	1.587E-01
U-235	19.	0.	6.789E-02	1.023E-02	46.74%	3.173E-02
U-238	303.	3.	1.072E+00	4.062E-02	14.69%	1.574E-01

TOTAL U 2.2

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
U-234	307.	7.	1.091E+00	5.665E-02	14.81%	1.616E-01
U-235	19.	0.	6.913E-02	1.023E-02	46.74%	3.231E-02
U-238	303.	3.	1.091E+00	4.062E-02	14.69%	1.603E-01

TOTAL U 2.2

****
******** Recalculated and Written To Database ********
****

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

Printed on Recycled Paper

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).

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

Printed on Recycled Paper

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).

in 10 million and total risk for radium 226 is 1.4 in 10 million. Combined total risk from both metals at this location, (BV24A), is 3.0 in 10 million.

I hope this information is useful to you, if you have any questions or need any further assistance please contact me at X4-1049. Thank you.

Attachments

cc: Mike Bandrowski, (A-1-1)

RADIONUCLIDE RISK ASSESSMENT
in CONTAMINATED SOIL

SAMPLE BV24A.

RADIONUCLIDE OF CONCERN? U235
ENTER THE INGESTION SLOPE FACTOR? 1.3E-10
NOW ENTER THE INHALATION SLOPE FACTOR? 2.5E-8
ENTER THE EXTERNAL EXPOSURE SLOPE FACTOR? 9.6E-12
ENTER RADIONUCLIDE CONCENTRATION (in pCi/gram)? .1388
NUMBER OF HOURS PER DAY OF EXPOSURE? 8
ENTER NUMBER OF WEEKS PER YEAR OF EXPOSURE? 50
ENTER NUMBER OF YEARS OF EXPOSURE? 1
INGESTION RISK = 3.267138E-11
VOLATILE RISK = 1.306855E-26
PARTICULATES RISK = 2.513183E-13
EXTERNAL EXPOSURE RISK = 1.245869E-07
TOTAL RISK = 1.246198E-07

PRESS S FOR RECALCULATING THE SAME RADIONUCLIDE?

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF 9KEY 0SCREEN

RADIONUCLIDE RISK ASSESSMENT
in CONTAMINATED SOIL

SAMPLE BV24A.

RADIONUCLIDE OF CONCERN? RA226
ENTER THE INGESTION SLOPE FACTOR? 1.2e-10
NOW ENTER THE INHALATION SLOPE FACTOR? 3e-9
ENTER THE EXTERNAL EXPOSURE SLOPE FACTOR? 4.2e-13
ENTER RADIONUCLIDE CONCENTRATION (in pCi/gram)? 3.7
NUMBER OF HOURS PER DAY OF EXPOSURE? 8
ENTER NUMBER OF WEEKS PER YEAR OF EXPOSURE? 50
ENTER NUMBER OF YEARS OF EXPOSURE? 1
INGESTION RISK = 3.810288E-11
VOLATILE RISK = 1.524116E-26
PARTICULATES RISK = 2.930991E-13
EXTERNAL EXPOSURE RISK = 1.45299E-07
TOTAL RISK = 1.453374E-07

PRESS S FOR RECALCULATING THE SAME RADIONUCLIDE?

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF 9KEY 0SCREEN

*** MANUAL Uranium Calculations from Program Asu ***

This listing was created 12/03/91 at 08:25 by CRIKNG.

Sample Id: R98 91.07507 BU24A

Counting system	AS 1 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/27/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.213		
Sample size	0.5201 GASH		
Factor # 1	0.9370 GWET		
Factor # 2	0.9820 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	884.	6.	3.447E+00	5.535E-02	11.34%	3.909E-01
	U-235	36.	0.	1.413E-01	1.064E-02	34.55%	4.883E-02
	U-238	917.	3.	3.588E+00	4.226E-02	11.25%	4.035E-01

TOTAL U 7.2

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	884.	6.	3.230E+00	5.535E-02	11.34%	3.662E-01
	U-235	36.	0.	1.324E-01	1.064E-02	34.55%	4.575E-02
	U-238	917.	3.	3.362E+00	4.226E-02	11.25%	3.781E-01

TOTAL U 6.7

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	884.	6.	3.385E+00	5.535E-02	11.34%	3.838E-01
	U-235	36.	0.	1.388E-01	1.064E-02	34.55%	4.795E-02
	U-238	917.	3.	3.524E+00	4.226E-02	11.25%	3.963E-01

TOTAL U 7.0

****
******** Recalculated and Written To Database ********
****

*** MANUAL Uranium Calculations from Program Asu ***

This listing was created 12/03/91 at 08:26 by CRIKNG.

Sample Id: R9S 91.07508 BV248

Counting system	AS 2 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/27/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.206		
Sample size	0.5025 GASH		
Factor # 1	0.9430 GWET		
Factor # 2	0.9540 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	424.	5.	1.879E+00	5.878E-02	13.63%	2.560E-01
	U-235	17.	1.	7.175E-02	3.300E-02	53.86%	3.864E-02
	U-238	406.	4.	1.803E+00	5.385E-02	13.76%	2.481E-01

TOTAL U 3.8

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	424.	5.	1.772E+00	5.878E-02	13.63%	2.414E-01
	U-235	17.	1.	6.766E-02	3.300E-02	53.86%	3.644E-02
	U-238	406.	4.	1.700E+00	5.385E-02	13.76%	2.340E-01

TOTAL U 3.5

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	424.	5.	1.792E+00	5.878E-02	13.63%	2.443E-01
	U-235	17.	1.	6.845E-02	3.300E-02	53.86%	3.686E-02
	U-238	406.	4.	1.720E+00	5.385E-02	13.76%	2.367E-01

TOTAL U 3.6

****
******** Recalculated and Written To Database ********
****

*** Gross Uranium Calculations from Program Asu ***

This listing was created 12/04/91 at 07:46 by CRIKNG.

Sample Id: R95 91.07509 BV24C

Counting system	AS 1 - Shelf A	Prep Date	11/26/91
Date, Time counted	12/02/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.213		
Sample size	0.5170 GASH		
Factor # 1	0.9558 GWET		
Factor # 2	0.9880 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	5.	1.566E+00	5.549E-02	14.01%	2.194E-01
	U-235	0.	8.043E-02	1.147E-02	46.80%	3.764E-02
	U-238	2.	1.579E+00	3.931E-02	13.92%	2.197E-01
375.						
19.						
375.						

TOTAL U 3.2

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	5.	1.497E+00	5.549E-02	14.01%	2.097E-01
	U-235	0.	7.688E-02	1.147E-02	46.80%	3.598E-02
	U-238	2.	1.509E+00	3.931E-02	13.92%	2.100E-01
375.						
19.						
375.						

TOTAL U 3.1

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	5.	1.547E+00	5.549E-02	14.01%	2.168E-01
	U-235	0.	7.947E-02	1.147E-02	46.80%	3.719E-02
	U-238	2.	1.560E+00	3.931E-02	13.92%	2.171E-01
375.						
19.						
375.						

TOTAL U 3.2

****
******** Recalculated and Written To Database ********
****

12/11/1991 14:24 USEPA NAREL MONT. ALA.

*** MANUAL Uranium Calculations from Program Asu ***

This listing was created 12/03/91 at 08:29 by CRIKNG.

Sample Id: R98 91.07510 BV24D

Counting system	AS 4 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/27/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.236		
Sample size	0.5073 GASH		
Factor # 1	0.9560 GWET		
Factor # 2	0.9800 GDRY		

BW 1/13

Gross cnts:	Isotope	Bkg	PCI/GASH		MDA	2 Sigma error in %	Absolute
	U-234	94.	2.834E-01		9.001E-02	30.15%	8.544E-02
	U-235	3.	3.830E-03	=<MDA	3.556E-02	447.30%	1.713E-02
	U-238	71.	2.719E-01		1.038E-02	25.29%	6.877E-02

TOTAL U 0.56

Gross cnts:	Isotope	Bkg	PCI/GWET		MDA	2 Sigma error in %	Absolute
	U-234	94.	2.709E-01		9.001E-02	30.15%	8.168E-02
	U-235	3.	3.661E-03	=<MDA	3.556E-02	447.30%	1.638E-02
	U-238	71.	2.599E-01		1.038E-02	25.29%	6.574E-02

TOTAL U 0.53

Gross cnts:	Isotope	Bkg	PCI/GDRY		MDA	2 Sigma error in %	Absolute
	U-234	94.	2.777E-01		9.001E-02	30.15%	8.373E-02
	U-235	3.	3.753E-03	=<MDA	3.556E-02	447.30%	1.679E-02
	U-238	71.	2.665E-01		1.038E-02	25.29%	6.739E-02

TOTAL U 0.55

****
****** Recalculated and Written To Database ********
****

*** Manual Uranium Calculations from Program Asu ***

This listing was created 12/03/91 at 08:29 by CRIKNG.

Sample Id: R9S 91.07510X BV24D

Counting system	AS 5 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/27/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.206		
Sample size	0.5094 GASH		
Factor # 1	0.9560 GWET		
Factor # 2	0.9800 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH		MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	62.	7.	2.460E-01		6.714E-02	31.64%	7.781E-02
	U-235	1.	0.	4.472E-03	=<MDA	1.212E-02	200.22%	8.954E-03
	U-238	91.	1.	4.025E-01		3.291E-02	23.30%	9.377E-02

TOTAL U 0.65

Gross cnts:	Isotope	Bkg	PCI/GWET		MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	62.	7.	2.351E-01		6.714E-02	31.64%	7.439E-02
	U-235	1.	0.	4.275E-03	=<MDA	1.212E-02	200.22%	8.560E-03
	U-238	91.	1.	3.848E-01		3.291E-02	23.30%	8.964E-02

TOTAL U 0.62

Gross cnts:	Isotope	Bkg	PCI/GDRY		MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	62.	7.	2.410E-01		6.714E-02	31.64%	7.626E-02
	U-235	1.	0.	4.383E-03	=<MDA	1.212E-02	200.22%	8.775E-03
	U-238	91.	1.	3.944E-01		3.291E-02	23.30%	9.189E-02

TOTAL U 0.64

****
******** Recalculated and Written To Database ********
****

*** MANUAL Uranium Calculations from Program Asu ***

This listing was created 12/04/91 at 07:47 by CRIKNG.

Sample Id: R9S 91.07511 BV18A

Counting system	AS 2 - Shelf A	Prep Date	11/26/91
Date, Time counted	12/02/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.206		
Sample size	0.5130 GASH		
Factor # 1	0.9730 GWET		
Factor # 2	0.9958 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	180.	4.	7.534E-01	5.141E-02	18.01%	1.357E-01
	U-235	13.	0.	5.565E-02	1.160E-02	56.25%	3.130E-02
	U-238	158.	3.	6.635E-01	4.608E-02	18.84%	1.250E-01

TOTAL U 1.5

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	180.	4.	7.330E-01	5.141E-02	18.01%	1.320E-01
	U-235	13.	0.	5.414E-02	1.160E-02	56.25%	3.046E-02
	U-238	158.	3.	6.456E-01	4.608E-02	18.84%	1.216E-01

TOTAL U 1.4

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	180.	4.	7.502E-01	5.141E-02	18.01%	1.351E-01
	U-235	13.	0.	5.541E-02	1.160E-02	56.25%	3.117E-02
	U-238	158.	3.	6.607E-01	4.608E-02	18.84%	1.245E-01

TOTAL U 1.5

****
******* Recalculated and Written To Database ********
****

*** MANUAL Uranium Calculations from Program Asu ***

This listing was created 12/03/91 at 08:30 by CRIKNG.

Sample Id: R98 91.07512 BV18B

Counting system	AS 7 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/27/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.211		
Sample size	0.5064 GASH		
Factor # 1	0.9540 GWET		
Factor # 2	0.9840 GDRY		

BV17

Gross cnts:	Isotope	Bkg	PCI/GASH		MDA	2 Sigma error in %	Absolute
	U-234	113.	5.	5.042E-01		6.119E-02	22.22%	1.120E-01
	U-235	2.	2.	0.000E+00	=<MDA	4.335E-02	0.00%	1.867E-02
	U-238	104.	1.	4.808E-01		3.436E-02	22.02%	1.059E-01

TOTAL U 0.98

Gross cnts:	Isotope	Bkg	PCI/GWET		MDA	2 Sigma error in %	Absolute
	U-234	113.	5.	4.810E-01		6.119E-02	22.22%	1.069E-01
	U-235	2.	2.	0.000E+00	=<MDA	4.335E-02	0.00%	1.781E-02
	U-238	104.	1.	4.587E-01		3.436E-02	22.02%	1.010E-01

TOTAL U 0.94

Gross cnts:	Isotope	Bkg	PCI/GDRY		MDA	2 Sigma error in %	Absolute
	U-234	113.	5.	4.961E-01		6.119E-02	22.22%	1.102E-01
	U-235	2.	2.	0.000E+00	=<MDA	4.335E-02	0.00%	1.837E-02
	U-238	104.	1.	4.731E-01		3.436E-02	22.02%	1.042E-01

TOTAL U 0.97

****
******** Recalculated and Written To Database ********
****

This listing was created 12/04/91 at 12:56 by CRIKNG.

Sample Id: R9S 91.07513 DES1

Counting system	AS 3 - Shelf A	Prep Date	11/26/91
Date, Time counted	12/02/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.251		
Sample size	0.5073 GASH		
Factor # 1	0.8890 GWET		
Factor # 2	0.9074 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	Absolute
U-234	406.	9.	1.578E+00	6.622E-02	13.44%	2.122E-01
U-235	17.	2.	5.963E-02	3.691E-02	58.76%	3.504E-02
U-238	386.	0.	1.534E+00	1.077E-02	13.38%	2.053E-01

TOTAL U 3.2

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	Absolute
U-234	406.	9.	1.403E+00	6.622E-02	13.44%	1.886E-01
U-235	17.	2.	5.301E-02	3.691E-02	58.76%	3.115E-02
U-238	386.	0.	1.364E+00	1.077E-02	13.38%	1.825E-01

TOTAL U 2.8

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	Absolute
U-234	406.	9.	1.432E+00	6.622E-02	13.44%	1.925E-01
U-235	17.	2.	5.410E-02	3.691E-02	58.76%	3.179E-02
U-238	386.	0.	1.392E+00	1.077E-02	13.38%	1.863E-01

TOTAL U 2.9

****
******* Recalculated and written To Database ********
****

12/11/1991 14:27 USEPA NAREL MONT. ALA.

*** Manual Uranium Calculations from Program Asu ***

This listing was created 12/03/91 at 08:22 by CRIKNG.

Sample Id: R9S 91.07514 DES2

Counting system	AS 8 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/29/91 12:33	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.208		
Sample size	0.5000 GASH		
Factor # 1	0.9669 GWET		
Factor # 2	0.9871 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	396.	9.	1.683E+00	7.246E-02	13.94%	2.346E-01
	U-235	34.	0.	1.479E-01	1.179E-02	35.53%	5.254E-02
	U-238	388.	3.	1.675E+00	4.682E-02	13.84%	2.317E-01

TOTAL U 3.5

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	396.	9.	1.628E+00	7.246E-02	13.94%	2.268E-01
	U-235	34.	0.	1.430E-01	1.179E-02	35.53%	5.081E-02
	U-238	388.	3.	1.619E+00	4.682E-02	13.84%	2.241E-01

TOTAL U 3.4

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
	U-234	396.	9.	1.662E+00	7.246E-02	13.94%	2.315E-01
	U-235	34.	0.	1.460E-01	1.179E-02	35.53%	5.187E-02
	U-238	388.	3.	1.653E+00	4.682E-02	13.84%	2.288E-01

TOTAL U 3.5

****
****** Recalculated and Written To Database ********
****

*** Gamma Calculations from Program Asu ***

This listing was created 12/04/91 at 07:49 by CRIKNG.

Sample Id: R95 91.07515 DES3

Counting system	AS 4 - Shelf A	Prep Date	11/26/91
Date, Time counted	12/02/91 14:05	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.236		
Sample size	0.5012 GASH		
Factor # 1	0.6123 GWET		
Factor # 2	0.9800 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH		MDA	2 Sigma error in %	Absolute
U-234	229.	7.	1.210E+00		8.184E-02	16.83%	2.036E-01
U-235	11.	4.	3.816E-02	=<MDA	6.547E-02	111.07%	4.238E-02
U-238	202.	2.	1.090E+00		5.062E-02	17.19%	1.874E-01

TOTAL U 2.3

Gross cnts:	Isotope	Bkg	PCI/GWET		MDA	2 Sigma error in %	Absolute
U-234	229.	7.	7.410E-01		8.184E-02	16.83%	1.247E-01
U-235	11.	4.	2.336E-02	=<MDA	6.547E-02	111.07%	2.595E-02
U-238	202.	2.	6.675E-01		5.062E-02	17.19%	1.148E-01

TOTAL U 1.4

Gross cnts:	Isotope	Bkg	PCI/GDRY		MDA	2 Sigma error in %	Absolute
U-234	229.	7.	1.186E+00		8.184E-02	16.83%	1.995E-01
U-235	11.	4.	3.739E-02	=<MDA	6.547E-02	111.07%	4.153E-02
U-238	202.	2.	1.068E+00		5.062E-02	17.19%	1.837E-01

TOTAL U 2.3

****
******** Recalculated and Written To Database ********
****

12/11/1991 14:28 USEPA NAREL MONT. ALA.

This listing was created 12/03/91 at 08:23 by CHIKNG.

Sample Id: N9S 91.07516 DGS4

Counting system	AS 9 - Shelf A	Prep Date	11/26/91
Date, Time counted	11/29/91 12:33	Bkg Date	11/22/91
Type Analysis	U prep by AS	Eff Date	12/19/90
Length of count	1000.0 Min	Std Date	10/09/91
Detector efficiency	0.213		
Sample size	0.5043 GASH		
Factor # 1	0.9469 GWET		
Factor # 2	0.9642 GDRY		

Gross cnts:	Isotope	Bkg	PCI/GASH	MDA	2 Sigma error in %	2 Sigma error Absolute
U-234	307.	7.	1.137E+00	5.665E-02	14.81%	1.676E-01
U-235	19.	0.	7.169E-02	1.023E-02	46.74%	3.351E-02
U-238	303.	3.	1.137E+00	4.062E-02	14.69%	1.663E-01

TOTAL U 2.3

Gross cnts:	Isotope	Bkg	PCI/GWET	MDA	2 Sigma error in %	2 Sigma error Absolute
U-234	307.	7.	1.072E+00	5.665E-02	14.81%	1.587E-01
U-235	19.	0.	6.769E-02	1.023E-02	46.74%	3.173E-02
U-238	303.	3.	1.072E+00	4.062E-02	14.69%	1.574E-01

TOTAL U 2.2

Gross cnts:	Isotope	Bkg	PCI/GDRY	MDA	2 Sigma error in %	2 Sigma error Absolute
U-234	307.	7.	1.091E+00	5.665E-02	14.81%	1.616E-01
U-235	19.	0.	6.913E-02	1.023E-02	46.74%	3.231E-02
U-238	303.	3.	1.091E+00	4.062E-02	14.69%	1.603E-01

TOTAL U 2.2

****
******** Recalculated and Written To Database ********
****

Sample ID R95 91.07507
Sample type SOIL
Collection date, time 9/19/91 0:00
Location NM;PREWITT
Other ID's BV24A
Comments BLUEWATER U MINE SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	3.7700E+00	2.20 %	PCI/GASH	9/19/91
RA-226	3.5300E+00	2.20 %	PCI/GWET	9/19/91
RA-226	3.7000E+00	2.20 %	PCI/GDRY	9/19/91

Sample ID R95 91.07508
Sample type SOIL
Collection date, time 9/19/91 0:00
Location NM;PREWITT
Other ID's BV24B
Comments BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	3.2600E+00	2.36 %	PCI/GASH	9/19/91
RA-226	3.0700E+00	2.36 %	PCI/GWET	9/19/91
RA-226	3.2200E+00	2.36 %	PCI/GDRY	9/19/91

Sample ID R95 91.07509
Sample type SOIL
Collection date, time 9/19/91 0:00
Location NM;PREWITT
Other ID's BV24C
Comments BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	2.9500E+00	2.49 %	PCI/GASH	9/19/91
RA-226	2.8200E+00	2.49 %	PCI/GWET	9/19/91
RA-226	2.9100E+00	2.49 %	PCI/GDRY	9/19/91

Sample ID	R9S 91.07510
Sample type	SOIL
Collection date, time	9/19/91 0:00
Location	NM:PREWITT
Other ID's	BV24D
Comments	BLUEWATER MINING U SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	7.5000E-01	4.93 %	PCI/GASH	9/19/91
RA-226	7.2000E-01	4.93 %	PCI/GWET	9/19/91
RA-226	7.3000E-01	4.93 %	PCI/GDRY	9/19/91

Sample ID	R9S 91.07510X
Sample type	SOIL
Collection date, time	9/19/91 0:00
Location	NM:PREWITT
Other ID's	BV24D
Comments	BLUEWATER MINING U SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	9.2000E-01	4.57 %	PCI/GASH	9/19/91
RA-226	8.8000E-01	4.57 %	PCI/GWET	9/19/91
RA-226	9.0000E-01	4.57 %	PCI/GDRY	9/19/91

Sample ID	R9S 91.07511
Sample type	SOIL
Collection date, time	9/19/91 0:00
Location	NM:PREWITT
Other ID's	BV18A
Comments	BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	9.5000E-01	4.60 %	PCI/GASH	9/19/91
RA-226	9.2000E-01	4.60 %	PCI/GWET	9/19/91
RA-226	9.4000E-01	4.60 %	PCI/GDRY	9/19/91

Sample ID R9S 91.07512
Sample type SOIL
Collection date, time 9/19/91 0:00
Location NM:PREWITT
Other ID's BV18B
Comments BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	9.4000E-01	4.45 %	PCI/GASH	9/19/91
RA-226	9.0000E-01	4.45 %	PCI/GWET	9/19/91
RA-226	9.3000E-01	4.45 %	PCI/GDRY	9/19/91

Sample ID R9S 91.07513
Sample type SOIL
Collection date, time 9/19/91 0:00
Location NM:PREWITT
Other ID's DES1
Comments BLUEWATER U MINING SITES
Report to GERRY LUSTER

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	2.0000E+00	3.21 %	PCI/GASH	9/19/91
RA-226	1.7800E+00	3.21 %	PCI/GWET	9/19/91
RA-226	1.8100E+00	3.21 %	PCI/GDRY	9/19/91

Sample ID R9S 91.07514
Sample type SOIL
Collection date, time 9/19/91 0:00

Location NM:PREWITT
Other ID's DES2
Comments BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	3.6600E+00	2.26 %	PCI/GASH	9/19/91
RA-226	3.5300E+00	2.26 %	PCI/GWET	9/19/91
RA-226	3.6100E+00	2.26 %	PCI/GDRY	9/19/91

Sample ID	R95 91.07515
Sample type	SOIL
Collection date, time	9/18/91 0:00
Location	NM:PREWITT
Other ID's	DES3
Comments	BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

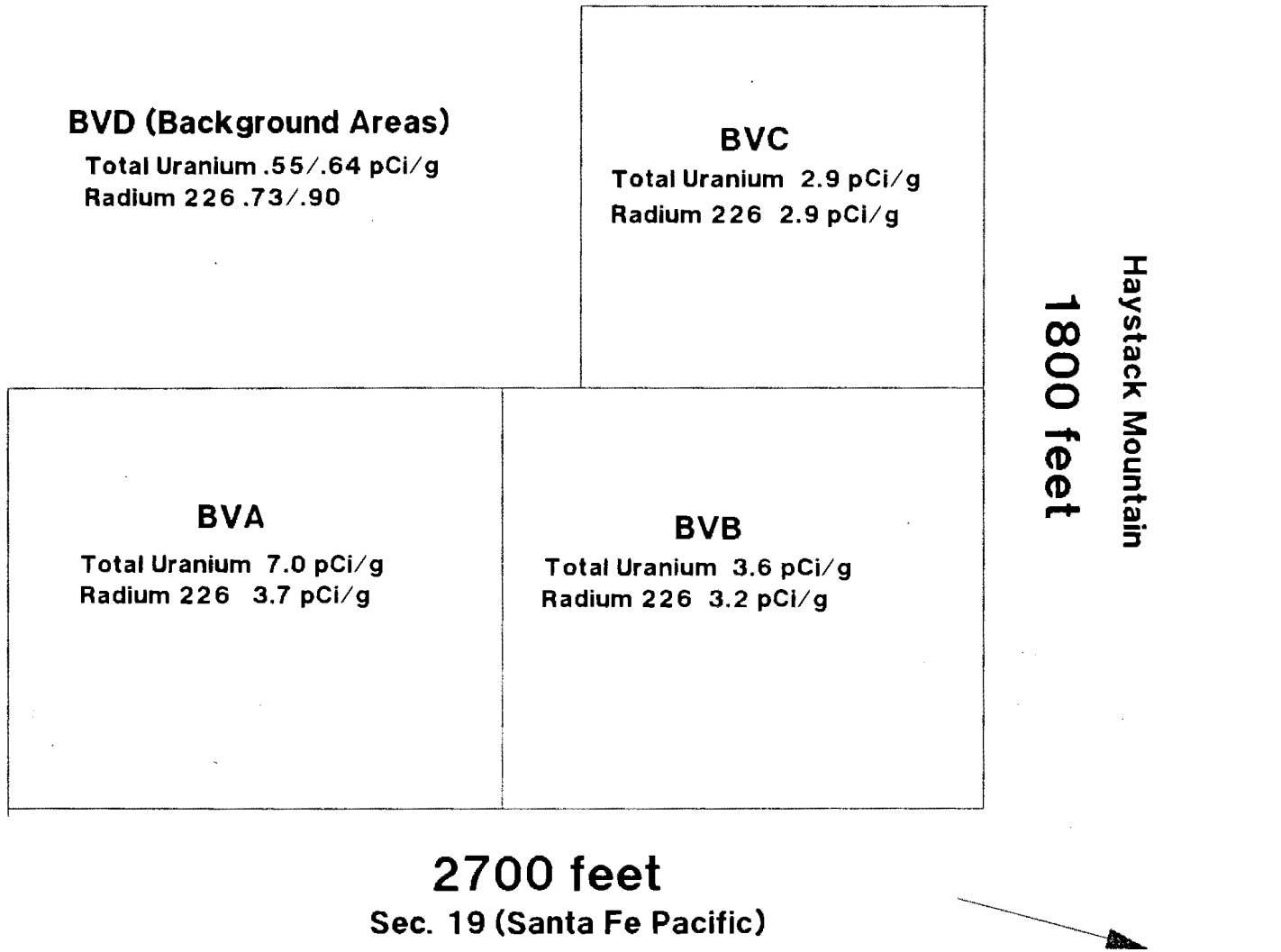
NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	1.8000E+00	3.38 %	PCI/GASH	9/19/91
RA-226	1.1000E+00	3.38 %	PCI/GWET	9/19/91
RA-226	1.7600E+00	3.38 %	PCI/GDRY	9/19/91

Sample ID	R95 91.07516
Sample type	SOIL
Collection date, time	9/18/91 0:00
Location	NM:PREWITT
Other ID's	DES4
Comments	BLUEWATER U MINING SITES

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	2.4700E+00	2.71 %	PCI/GASH	9/19/91
RA-226	2.3400E+00	2.71 %	PCI/GWET	9/19/91
RA-226	2.3800E+00	2.71 %	PCI/GDRY	9/19/91

POST REMOVAL URANIUM/RADIUM SOIL SAMPLING
BROWN-VANDEVER SEC. 24, T13N, R11W



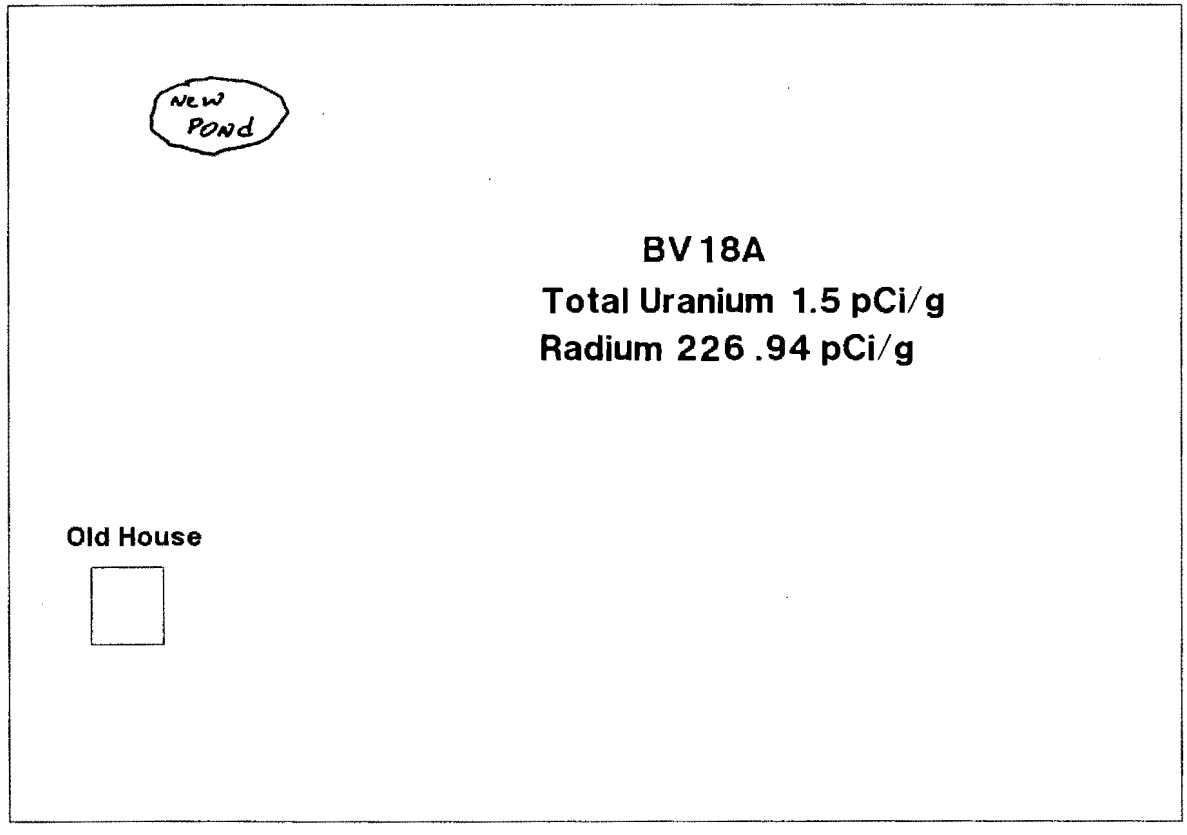
Not to Scale

Figure A

POST REMOVAL URANIUM/RADIUM SOIL SAMPLING
BROWN-VANDEVER SEC. 18, T13N, R10W

North

Haystack Mountain
BV 18B (BACKGROUND)
Total Uranium .97 pCi/g
Radium 226 .93 pCi/g



NOT TO Scale
Figure B

POST REMOVAL URANIUM/RADIUM SOIL SAMPLING
DESIDERIO MINE SITE

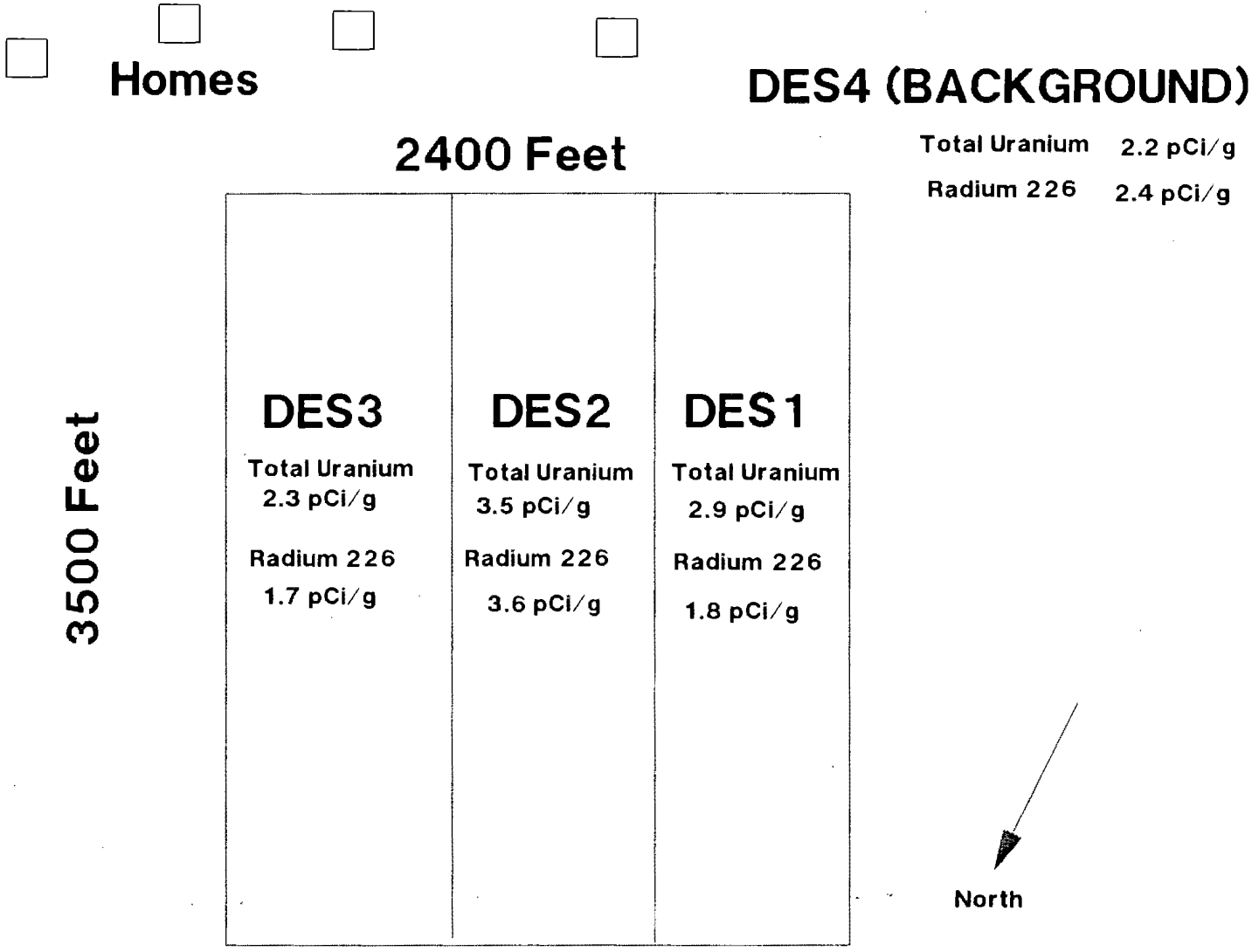


Figure C
NOT TO Scale

EPA

U.S. Environmental Protection Agency
Region IX

ROBERT E. BORNSTEIN
On-Scene-Coordinator

FAX (415) 744-1916

Emergency Response Section (H-8-3)
75 Hawthorne Street
San Francisco, CA 94105

(415) 744-2298
FTS 484-2298

11-27-92

Rob -

Hope the FAX was readable.
If not, this should help.

Hope you had a good Turkey-Day.
Mine was almost as good as Turkey-Fest.
More later.

Jerry

WESTON
MANAGERS DESIGNERS/CONSULTANTS

SHEET 1 of ___

CLIENT/SUBJECT U.S. EPA / ERT, Bluewater Uranium W.O. NO. 4547

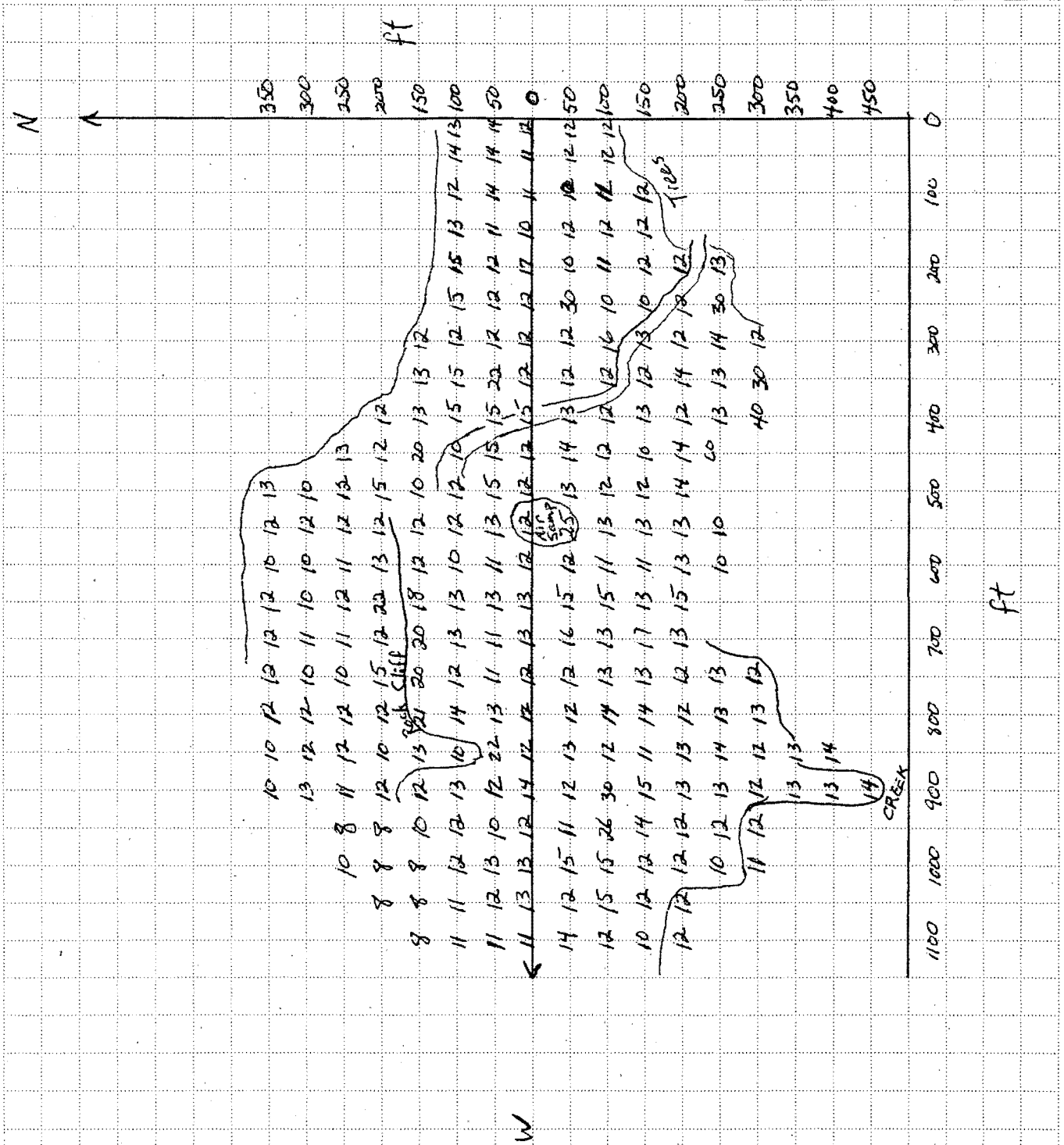
TASK DESCRIPTION Gamma Survey, 50' x 50' Grid, 1m height TASK NO. ___

PREPARED BY G. L. Gels DEPT REAC DATE 11/23-24/92

MATH CHECK BY ___ DEPT ___ DATE ___

METHOD REV. BY ___ DEPT ___ DATE ___

APPROVED BY ___ DEPT ___ DATE ___



RFW 10-05-003/A-5/85
512-5643

Draft AGENDA
Navajo Nation Environmental Protection Agency
Site Visits With
U.S. EPA Region 9 Superfund Division

August 25, 2004
Meeting Location: East side Denny's parking lot off Interstate 40
Gallup, New Mexico

8:30 A.M.	Safety briefing for site visits. Depart for Hood's residences 15 miles northeast of Gallup, NM.
9:00 A.M.	Hood's residential area. Site observations and discussions.
9:45 A.M.	Depart from the Hood's. Travel to Black Jack No. #1, 27 miles north on Indian Route 49.
10:45 A.M.	Black Jack No. #1 mine. Site observation and discussions.
11:30 A.M.	Depart from Black Jack No. #1. Travel Smith Lake Trading Post, 2 miles.
11:45 P.M.	Lunch on your own Smith Lake Trading Post
1:00 P.M.	Travel to Brown Vandever allotment located in Haystack community, 37 miles north of Smith Lake Trading Post
2:00 P.M.	Brown Vandever's Allotment. Site observation and discussions.
2:30 P.M.	Depart from Brown Vandever. Travel to Febco Uranium Mine site located 4 miles north of the Brown Vandever site.
2:45 P.M.	Febco Uranium Mine. Sites observation and discussions.
3:00 PM	Final Comments/Wrap Up Adjourn

Note: Wear sturdy shoes, a hat, sunscreen, and insect repellant. Bring your own water.

Hood's Residence
Water Pond Road, Church Rock Chapter, New Mexico

Site Description: The Hood's residences are located approximately 12 miles north of the Church Rock Chapter. Up gradient from the Hood's residences is a huge uranium waste ore pile that is located on private and New Mexico state land. The uranium waste ore pile is associated with previous United Nuclear Corporation mining and milling activities. Run-offs from surface water migration and wind blown soil/particles have impacted the Hood's residences based on joint preliminary radiological surveys conducted by the U.S. EPA Environmental Monitoring Service, Las Vegas, Nevada.

The uranium waste ore pile is readily accessible and is approximately 80 feet high and is situated adjacent the Navajo Nation boundary. Riles and gullies are apparent on the north surface of the pile that empty into a waterway at the base of the pile that enters Navajo land at the Hood's residences. The residents are also exposed to downgradient windblown soil/particulates from the pile.

Mr. Arthur Hood is concerned about his health and the health of his relatives. He is also concerned about the transport of radioactive contaminants via wind and surface water runoffs that have impacted their residential area. He is also concerned about the impacts to groundwater contamination at the UNC uranium milling tailings ponds.

Bluewater Uranium Mine sites – Brown Vandever site
Haystack community, New Mexico

Site Description: The Navajo-Brown Vandever and the Navajo-Desiderio are reclaimed uranium mining sites located on Indian allotment lands in the Baca/Prewitt Chapter area. In the early 1990s, the U.S. EPA Emergency Response Branch completed site reclamation in response to an ATSDR Health Advisory for these mining sites. Both mining sites were mined for uranium ore in the 1940s and 1950s via conventional mining shafts and open pits. The uranium ore was transported to nearby uranium milling facilities for further processing.

The Baca Chapter officials have stated that the reclaimed mining areas are subsiding in several areas. The Vandever and Desiderio residences are concerned that children and local livestock may injury themselves or fall and disappear into these subsidence areas. These subsidence areas are also exposed areas for elevated radiation, radon gas, and heavy metals contaminants. Transport of radioactive contaminants is highly possible via wind and surface runoffs.

Black Jack #1 Uranium Mine
Smith Lake community, New Mexico

The Black Jack No. #1 Mine is an abandoned uranium mine located on Navajo Allotted trust lands 2 miles west of the Smith Lake Chapter. The Smith Lake community is downgradient of the site, the nearest residents are located within a half-mile and a water well is located 2 miles downgradient. The unreclaimed mine is fenced and a New Mexico report stated there was "widespread surface contamination" with radiological measurements ranging from 900-1,000 ?R/hr in and around the waste piles (64 times above a background of 12-14 ?R/hr. Cement foundation and other associated rumble are also present at the site. Sediment samples ranged from 28 –320 ?g/g.

The mine was active from 1959 to 1970 under the ownership of Lance Corp, Homestake and United Nuclear Corporation and conventional shaft mining techniques was used to mine the uranium ore.

The Smith Lake Chapter officials stated that four water wells had to be shut down due to radioactive contamination. Transport of radioactive contaminants are highly possible via wind and surface runoffs. Although the site is fenced off it is accessible to livestock and people.

Febco Uranium Mine (Small Stake Mine)
Haystack Community, New Mexico

Site Description: The site consists of abandoned uranium mines located on New Mexico state land and is located 11 miles north-northeast of the Baca/Prewitt Chapter. The mines were active in 1952 under the ownership of Duane Berryhill and L. Elkins. There are three adits that have collapsed and several large mine waste piles. Surface water runoffs from the piles enter drainages that enter Navajo land and have the potential to impact local Navajo residents.