

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
EAST PIPELINE TO RIVER - SURFACE

DATE: 6/29/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	356	E	-	551	N	6788	8	8	7	1
2	355	E	-	556	N	6642	8	8	10	2
3	355	E	-	561	N	6704	8	8	6	1
4	354	E	-	566	N	7182	8	8	23	3
5	354	E	-	571	N	6880	7	8	8	1
6	354	E	-	576	N	7812	7	7	11	1
7	353	E	-	581	N	7248	8	8	10	2
8	353	E	-	586	N	7688	8	8	9	2
9	353	E	-	591	N	6672	8	8	10	1
10	352	E	-	596	N	7720	8	8	11	2
11	352	E	-	601	N	8072	8	8	11	1
12	351	E	-	606	N	8576	9	9	10	2
13	351	E	-	611	N	8426	9	9	12	1
14	351	E	-	616	N	8656	9	9	6	2
15	350	E	-	621	N	8516	9	9	11	1
16	350	E	-	626	N	8572	9	9	7	2
17	349	E	-	631	N	8422	9	9	4	2
18	349	E	-	636	N	8750	10	10	4	1
19	349	E	-	641	N	9164	10	10	9	2
20	349	E	-	646	N	8872	9	9	9	1

INSTRUMENTS:		RESULTS IN:	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299		µR/hr	7	2
LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264		CPM	8000	N/A
			Total U	4
			Thorium	1.5
CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR		pCi/g		1

BACKGROUND NOT SUBTRACTED

PAGE 2

FILE: HEASTPIPSURF

W. A. Rogers

DATE: 7-6-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
EAST PIPELINE TO RIVER - SURFACE

DATE: 6/29/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	349	E	-	651	N	9046	9	10	9	1
2	349	E	-	656	N	8892	9	9	10	1
3	349	E	-	661	N	9266	10	10	11	2
4	348	E	-	666	N	9302	10	10	8	2
5	348	E	-	671	N	9078	9	9	14	1
6	348	E	-	676	N	8886	9	9	9	2
7	348	E	-	681	N	9234	10	10	7	2
8	348	E	-	686	N	9078	10	10	7	2
9	348	E	-	691	N	9158	10	10	11	2
10	347	E	-	696	N	9362	9	9	8	1
11	347	E	-	701	N	10116	10	10	6	2
12	347	E	-	706	N	9568	10	10	6	1
13	347	E	-	711	N	9602	10	10	6	2
14	347	E	-	716	N	9174	10	10	12	1
15	347	E	-	721	N	9448	10	10	8	2
16	346	E	-	726	N	9198	9	10	8	1
17	346	E	-	731	N	9560	10	10	10	2
18	346	E	-	736	N	9000	9	10	9	1
19	346	E	-	741	N	9126	9	9	7	1
20	346	E	-	746	N	8886	9	9	9	1

INSTRUMENTS:

RESULTS IN:

BACKGROUND

MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

8000

N/A

Total U

4

10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Thorium

1.5

1

BACKGROUND NOT SUBTRACTED

PAGE 3

FILE: HEASTPIPSURF

W.A. Rye

DATE: 7-6-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
EAST PIPELINE TO RIVER - SURFACE

DATE: 6/29/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	346	E	-	751	N	8688	10	10	9	1
2	346	E	-	756	N	8892	9	9	10	1
3	347	E	-	761	N	8862	9	9	7	1
4	347	E	-	766	N	8730	9	10	10	1
5	347	E	-	771	N	9088	9	10	8	1
6	347	E	-	776	N	8984	10	10	7	1
7	347	E	-	781	N	9136	9	9	6	1
8	348	E	-	786	N	8872	9	9	5	1
9	348	E	-	791	N	9324	10	9	7	1
10	348	E	-	796	N	9196	10	9	6	2
11	348	E	-	801	N	8882	10	10	6	2
12	349	E	-	806	N	8852	10	10	7	2
13	349	E	-	811	N	8906	9	9	9	1
14	350	E	-	816	N	8780	9	9	11	1
15	350	E	-	821	N	8836	10	9	10	1
16	350	E	-	826	N	8920	10	9	7	2
17	350	E	-	831	N	9174	10	10	10	1
18	351	E	-	836	N	8978	9	9	7	1
19	351	E	-	841	N	9248	9	8	9	1
20	352	E	-	846	N	9286	10	9	11	2

INSTRUMENTS:

RESULTS IN:

BACKGROUND

MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

8000

N/A

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Total U	4	10
Thorium	1.5	1

BACKGROUND NOT SUBTRACTED

PAGE 4

FILE: HEASTPIPSURF

W. A. Ryan

DATE: 7-6-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
EAST PIPELINE TO RIVER - SURFACE

DATE: 6/29/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	352	E	-	851	N	9390	10	9	8	2
2	353	E	-	856	N	9298	10	9	11	1
3	353	E	-	861	N	9006	9	9	6	1
4	354	E	-	866	N	9792	9	9	7	1
5	354	E	-	871	N	9706	9	9	6	1
6	355	E	-	876	N	8654	9	8	7	1
7	355	E	-	881	N	8630	9	9	11	1
8	356	E	-	886	N	8456	9	8	11	1
9	356	E	-	891	N	8664	9	9	8	1
10	357	E	-	896	N	8302	9	9	9	1
11	357	E	-	901	N	8214	9	9	12	1
12	358	E	-	906	N	8288	10	9	11	1
13	358	E	-	911	N	8350	10	9	7	1
14	359	E	-	916	N	8286	9	8	7	1
15	359	E	-	921	N	8576	9	9	9	1
16	360	E	-	926	N	8518	9	9	8	1
17	360	E	-	931	N	8580	9	9	6	1
18	361	E	-	936	N	8558	9	8	5	1
19	361	E	-	941	N	8700	9	9	5	2
20	362	E	-	946	N	8712	10	9	11	2

INSTRUMENTS:

RESULTS IN:

BACKGROUND

MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

8000

N/A

Total U

4

10

CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Thorium

1.5

1

BACKGROUND NOT SUBTRACTED

PAGE 5

FILE: HEASTPIPSURF

W. G. Rogers

DATE: 7-6-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
EAST PIPELINE TO RIVER - SURFACE

DATE: 6/29/98

DATE: 5/25/00

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	362	E	-	951	N	8354	10	8	7	2
2	363	E	-	956	N	8194	9	8	10	1
3	363	E	-	961	N	8366	7	8	6	1
4	364	E	-	966	N	7992	9	8	6	1
5	364	E	-	971	N	7534	8	7	9	1
6	365	E	-	976	N	7512	8	8	6	1
7	365	E	-	981	N	7636	9	8	9	1
8	366	E	-	986	N	7762	8	8	7	1
9	366	E	-	991	N	7278	8	8	6	1
10	367	E	-	996	N	7774	8	8	11	1
11	367	E	-	1001	N	7708	9	8	7	1
12	368	E	-	1006	N	7948	10	9	9	1
13	368	E	-	1011	N	8040	9	8	11	1
14	369	E	-	1016	N	7462	9	8	12	1
15	369	E	-	1021	N	8064	9	9	10	1
16	370	E	-	1026	N	8358	9	8	8	1
17	370	E	-	1031	N	8144	9	8	11	1
18	370	E	-	1036	N	8300	8	8	7	1
19	370	E	-	1041	N	8146	9	8	12	1
20	371	E	-	1046	N	7870	8	8	10	1

INSTRUMENTS:

RESULTS IN:

BACKGROUN

MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

µR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

8000

N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Thorium 1.5 1

BACKGROUND NOT SUBTRACTED

PAGE 6

FILE: HEASTPIPSURF

W.A. Rogers

DATE: 7-6-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
EAST PIPELINE TO RIVER - SURFACE

DATE: 6/29/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	371	E	-	1051	N	7634	9	8	7	1
2	371	E	-	1056	N	7516	8	8	11	1
3	371	E	-	1061	N	7810	8	9	9	1
4	372	E	-	1066	N	8534	10	9	7	1
5	374	E	-	1071	N	7710	8	8	7	1
6	376	E	-	1076	N	7734	8	8	7	1
7	377	E	-	1081	N	7410	8	8	7	1
8	379	E	-	1086	N	7774	9	8	6	1
9	381	E	-	1091	N	8018	9	7	8	1
10	383	E	-	1096	N	8110	9	8	4	2
11	385	E	-	1101	N	8124	8	8	12	1
12	386	E	-	1106	N	8336	8	8	9	1
13	388	E	-	1111	N	8226	9	8	9	1
14	390	E	-	1116	N	9172	9	8	5	1
15	390	E	-	1121	N	8076	10	9	9	1
16	390	E	-	1126	N	8176	9	9	7	1
17	390	E	-	1131	N	8504	9	7	7	1
18	390	E	-	1136	N	8428	9	8	8	1
19	390	E	-	1141	N	7722	9	7	5	1
20	390	E	-	1146	N	7790	8	8	6	1

INSTRUMENTS:	RESULTS IN:	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299	µR/hr	7	2
LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264	CPM	8000	N/A
		Total U	4
		Thorium	1.5
CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g		1

BACKGROUND NOT SUBTRACTED

PAGE 7

FILE: HEASTPIPSURF

W.A. Rogers

DATE: 7-6-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
EAST PIPELINE TO RIVER - SURFACE

DATE: 6/29/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	390	E	-	1151	N	7556	8	8	12	1
2	390	E	-	1156	N	7248	8	8	7	1
3	390	E	-	1161	N	6826	7	7	6	1
4	390	E	-	1166	N	6886	7	7	9	1
5	390	E	-	1171	N	6588	7	7	9	1
6	390	E	-	1176	N	6410	7	7	5	1
7	390	E	-	1181	N	7462	8	7	8	1
8	390	E	-	1186	N	7636	8	7	9	1
9		E	-		N					
10		E	-		N					
11		E	-		N					
12		E	-		N					
13		E	-		N					
14		E	-		N					
15		E	-		N					
16		E	-		N					
17		E	-		N					
18		E	-		N					
19		E	-		N					
20		E	-		N					

INSTRUMENTS:

RESULTS IN:

BACKGROUND

MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

8000

N/A

Total U

4

10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Thorium

1.5

1

BACKGROUND NOT SUBTRACTED

PAGE 8

FILE: HEASTPIPSURF

W.A. Boyer

DATE: 7-6-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WP#1 - WP#2 PIPELINE - SURFACE

DATE: 8/12/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	310	E	-	455	N	4488	13	11	9	1
2	315	E	-	456	N	4784	10	11	5	1
3	320	E	-	458	N	4576	12	11	7	1
4	326	E	-	457	N	4680	13	11	8	2
5	326	E	-	460	N	4448	11	12	7	1
6	327	E	-	452	N	4278	11	13	3	1
7	328	E	-	447	N	4432	10	10	8	1
8	329	E	-	437	N	5016	10	11	5	2
9	329	E	-	442	N	4742	11	11	10	1
10	330	E	-	432	N	4384	12	12	4	1
11	331	E	-	427	N	4676	11	11	9	1
12	332	E	-	417	N	5108	12	12	10	1
13	332	E	-	422	N	4768	11	11	7	1
14	333	E	-	412	N	4656	12	10	3	2
15	334	E	-	407	N	5040	11	11	5	2
16	335	E	-	402	N	4548	10	12	6	1
17	336	E	-	401	N	5232	10	9	10	1
18	340	E	-	398	N	5030	13	11	6	2
19	345	E	-	400	N	4910	12	12	7	2
20	350	E	-	401	N	4548	10	11	6	1

INSTRUMENTS:

RESULTS IN:

BACKGROUND

MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

µR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 48395

CPM

4500

N/A

Total U

4.0

4.9

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Thorium

1.5

0.6

BACKGROUND NOT SUBTRACTED

PAGE 1

FILE: HWP1WP2PIPSURF

W. A. Rogers

DATE: 8-12-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WP#1 - WP#2 PIPELINE - SURFACE

DATE: 8/12/98

DATE: 3/12/00

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	355	E	-	403	N	4758	10	10	7	1
2	360	E	-	405	N	4938	12	12	10	1
3	365	E	-	407	N	4786	10	10	3	1
4	370	E	-	409	N	4746	10	11	8	1
5	375	E	-	410	N	4286	11	11	4	2
6	380	E	-	412	N	4360	12	10	8	1
7	385	E	-	414	N	4374	10	10	7	1
8	390	E	-	416	N	2914	8	9	6	1
9	395	E	-	417	N	3794	10	9	6	1
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

INSTRUMENTS:

RESULTS IN:

BACKGROUND

MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 48395

CPM

4500

N/A

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Total U

4.0

4.9

Thorium

1.5

0.6

BACKGROUND NOT SUBTRACTED

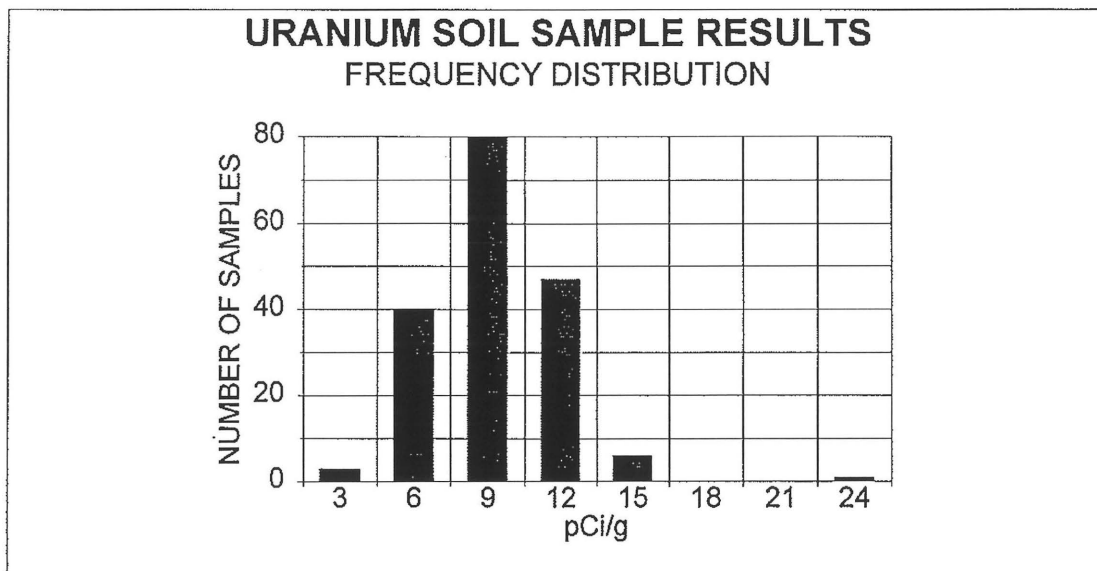
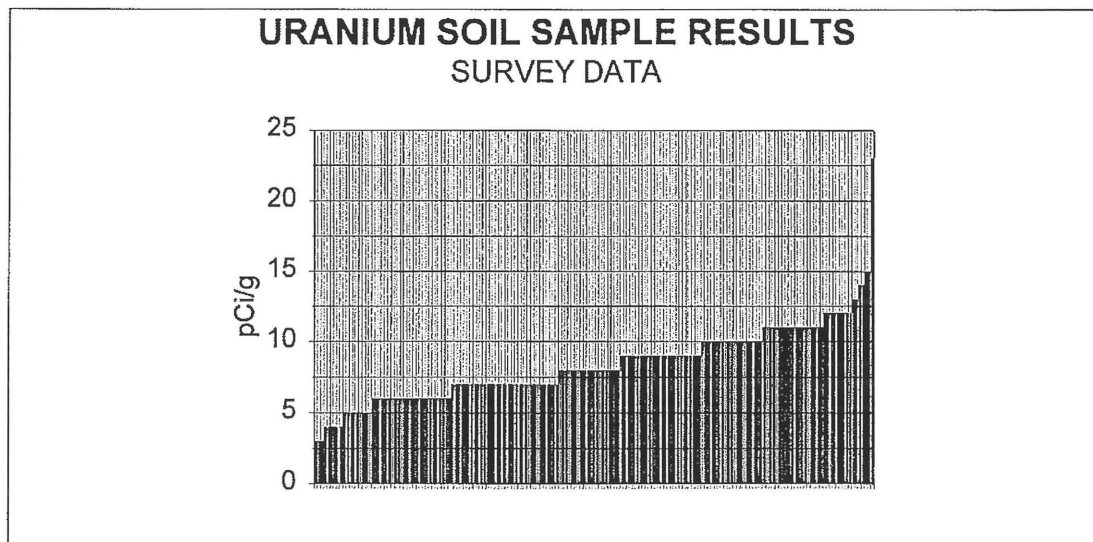
PAGE 2

FILE: HWP1WP2PIPSURF

W. A. Rogers

DATE: 8-12-98

SUB-AREA "H" - SURFACE
EAST PIPELINE TO RIVER & WP1 & WP2
CIMARRON SOIL COUNTER
TOTAL URANIUM SOIL SAMPLE RESULTS
SITE BACKGROUND OF 4 pCi/g BACKGROUND NOT SUBTRACTED
AUGUST 1998



NUMBER OF SAMPLES	177
AVERAGE SAMPLE	8
MINIMUM SAMPLE	3
MAXIMUM SAMPLE	23
STANDARD DEVIATION	3

$$n = \text{pCi/g TOTAL U}$$

Number	n	(n-N)	(n-N) ²
1	12	3.7	13.5
2	10	1.7	2.8
3	11	2.7	7.1
4	11	2.7	7.1
5	13	4.7	21.8
6	12	3.7	13.5
7	15	6.7	44.5
8	7	-1.3	1.8
9	14	5.7	32.2
10	4	-4.3	18.7
11	15	6.7	44.5
12	10	1.7	2.8
13	6	-2.3	5.4
14	8	-0.3	0.1
15	8	-0.3	0.1
16	9	0.7	0.5
17	13	4.7	21.8
18	6	-2.3	5.4
19	8	-0.3	0.1
20	9	0.7	0.5
21	7	-1.3	1.8
22	10	1.7	2.8
23	6	-2.3	5.4
24	23	14.7	215.3
25	8	-0.3	0.1
26	11	2.7	7.1
27	10	1.7	2.8
28	9	0.7	0.5
29	10	1.7	2.8
30	11	2.7	7.1
31	11	2.7	7.1
32	10	1.7	2.8
33	12	3.7	13.5
34	6	-2.3	5.4
35	11	2.7	7.1
36	7	-1.3	1.8
37	4	-4.3	18.7
38	4	-4.3	18.7
39	9	0.7	0.5
40	9	0.7	0.5
41	9	0.7	0.5
42	10	1.7	2.8
43	11	2.7	7.1
44	8	-0.3	0.1
45	14	5.7	32.2
46	9	0.7	0.5
47	7	-1.3	1.8
48	7	-1.3	1.8
49	11	2.7	7.1
50	8	-0.3	0.1
	408.0		196.1
	403.0		218.4
	180.0		189.1
	1474		1223.6
	Sum(n)		Sum(n-N)

No. of Samples (x) : 177

COUNT TIME: 5 MINUTES

Sample Mean (N) = $\text{Sum}(n) \div (x)$

Sample Mean (N) : 8.33

Standard Deviation (Sd) = SQRT [(n-N)² + (x - 1)]

Standard Deviation: 2.64

2 Std Deviations:	5.27
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Degree of Freedom(df).= (x) - 1 Data listed on Table B-1

(df) =	1.656
--------	-------

Area's Average Level ($A\mu$) = (N) + (df) x [(Sd)/SQRT(x)]

$$(A\mu) = \boxed{8.66}$$

GUIDELINE VALUE:

Acceptable Level:

pCi/gU TOTAL U

pCi/gU TOTAL U

pCi/gU TOTAL U

TABLE B - 1

Factors for Comparislon of Survey Data with Guidelines					
(df)	95%	97.5%	(df)	95%	97.5%
1	6.314	12.706	19	1.729	2.093
2	2.92	4.303	20	1.725	2.086
3	2.353	3.182	21	1.721	2.08
4	2.132	2.776	22	1.717	2.074
5	2.015	2.571	23	1.714	2.069
6	1.943	2.447	24	1.711	2.064
7	1.895	2.365	25	1.708	2.06
8	1.86	2.306	26	1.706	2.056
9	1.833	2.262	27	1.703	2.052
10	1.812	2.228	28	1.701	2.048
11	1.796	2.201	29	1.699	2.045
12	1.782	2.179	30	1.697	2.042
13	1.771	2.16	40	1.684	2.021
14	1.761	2.145	60	1.671	2
15	1.753	2.131	120	1.658	1.98
16	1.746	2.12	400	1.649	1.966
17	1.74	2.11	Infinite	1.645	1.96
18	1.734	2.101			

For values of Degrees of Freedom not listed:

Interpolate between the listed values.

(df) high value(Z)	400	is (B)	1.649	95%
(df) low value(Y)	120	is (A)	1.658	95%

Desired value(df) (X)	176	Is calculated as follow:
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$$\text{EXP}[(\text{Ln}(B) - \text{Ln}(A)) \div (Z - Y)]^{(X - Y) + \text{Ln}(A)}$$

The (df) value for (X)	176	1.656	95%
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PERFORMED BY: Heanna Hickey

DATE: 8/19/98

REVIEWED BY: W.A. Rogers

DATE: 8-21-98

CIMARRON CORPORATION - CIMARRON FACILITY
TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDENCE
EAST PIPELINE TO RIVER - SURFACE W/ WP1 & WP2 PIPELINE - SURFAC

n = pCi/g TOTAL U

Number	n	(n-N)	(n-N) ²
51	6	-2.33	5.42
52	6	-2.33	5.42
53	6	-2.33	5.42
54	12	3.67	13.49
55	8	-0.33	0.11
56	8	-0.33	0.11
57	10	1.67	2.80
58	9	0.67	0.45
59	7	-1.33	1.76
60	9	0.67	0.45
61	9	0.67	0.45
62	10	1.67	2.80
63	7	-1.33	1.76
64	10	1.67	2.80
65	8	-0.33	0.11
66	7	-1.33	1.76
67	6	-2.33	5.42
68	5	-3.33	11.07
69	7	-1.33	1.76
70	6	-2.33	5.42
71	6	-2.33	5.42
72	7	-1.33	1.76
73	9	0.67	0.45
74	11	2.67	7.14
75	10	1.67	2.80
76	7	-1.33	1.76
77	10	1.67	2.80
78	7	-1.33	1.76
79	9	0.67	0.45
80	11	2.67	7.14
81	8	-0.33	0.11
82	11	2.67	7.14
83	6	-2.33	5.42
84	7	-1.33	1.76
85	6	-2.33	5.42
86	7	-1.33	1.76
87	11	2.67	7.14
88	11	2.67	7.14
89	8	-0.33	0.11
90	9	0.67	0.45
91	12	3.67	13.49
92	11	2.67	7.14
93	7	-1.33	1.76
94	7	-1.33	1.76
95	9	0.67	0.45
96	8	-0.33	0.11
97	6	-2.33	5.42
98	5	-3.33	11.07
99	5	-3.33	11.07
100	11	2.67	7.14
	408.0		196.1
	Sum(n)		Sum(n-N) ²

n = pCi/g TOTAL U

Number	n	(n-N)	(n-N) ²
101	7	-1.33	1.76
102	10	1.67	2.80
103	6	-2.33	5.42
104	6	-2.33	5.42
105	9	0.67	0.45
106	6	-2.33	5.42
107	9	0.67	0.45
108	7	-1.33	1.76
109	6	-2.33	5.42
110	11	2.67	7.14
111	7	-1.33	1.76
112	9	0.67	0.45
113	11	2.67	7.14
114	12	3.67	13.49
115	10	1.67	2.80
116	8	-0.33	0.11
117	11	2.67	7.14
118	7	-1.33	1.76
119	12	3.67	13.49
120	10	1.67	2.80
121	7	-1.33	1.76
122	11	2.67	7.14
123	9	0.67	0.45
124	7	-1.33	1.76
125	7	-1.33	1.76
126	7	-1.33	1.76
127	7	-1.33	1.76
128	6	-2.33	5.42
129	8	-0.33	0.11
130	4	-4.33	18.73
131	12	3.67	13.49
132	9	0.67	0.45
133	9	0.67	0.45
134	5	-3.33	11.07
135	9	0.67	0.45
136	7	-1.33	1.76
137	7	-1.33	1.76
138	8	-0.33	0.11
139	5	-3.33	11.07
140	6	-2.33	5.42
141	12	3.67	13.49
142	7	-1.33	1.76
143	6	-2.33	5.42
144	9	0.67	0.45
145	9	0.67	0.45
146	5	-3.33	11.07
147	8	-0.33	0.11
148	9	0.67	0.45
149	9	0.67	0.45
150	5	-3.33	11.07
	403.0		218.4
	Sum(n)		Sum(n-N) ²

CIMARRON CORPORATION - CIMARRON FACILITY
 TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDENCE
 EAST PIPELINE TO RIVER - SURFACE W/ WP1 & WP2 PIPELINE - SURFACE

n = pCi/g TOTAL U

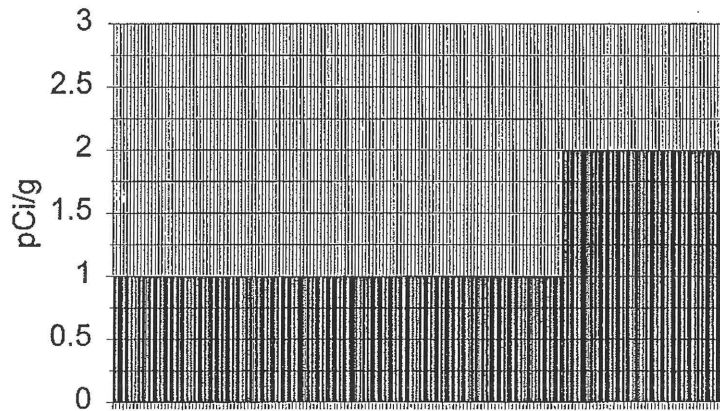
Number	n	(n-N)	(n-N) ²
151	7	-1.33	1.76
152	8	-0.33	0.11
153	7	-1.33	1.76
154	3	-5.33	28.38
155	8	-0.33	0.11
156	5	-3.33	11.07
157	10	1.67	2.80
158	4	-4.33	18.73
159	9	0.67	0.45
160	10	1.67	2.80
161	7	-1.33	1.76
162	3	-5.33	28.38
163	5	-3.33	11.07
164	6	-2.33	5.42
165	10	1.67	2.80
166	6	-2.33	5.42
167	7	-1.33	1.76
168	6	-2.33	5.42
169	7	-1.33	1.76
170	10	1.67	2.80
171	3	-5.33	28.38
172	8	-0.33	0.11
173	4	-4.33	18.73
174	8	-0.33	0.11
175	7	-1.33	1.76
176	6	-2.33	5.42
177	6	-2.33	5.42
178			
179			
180			
181			
182			
183			
184			
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195			
196			
197			
198			
199			
200			
	180.0		194.5
	Sum(n)		Sum(n-N) ²

n = pCi/g TOTAL U

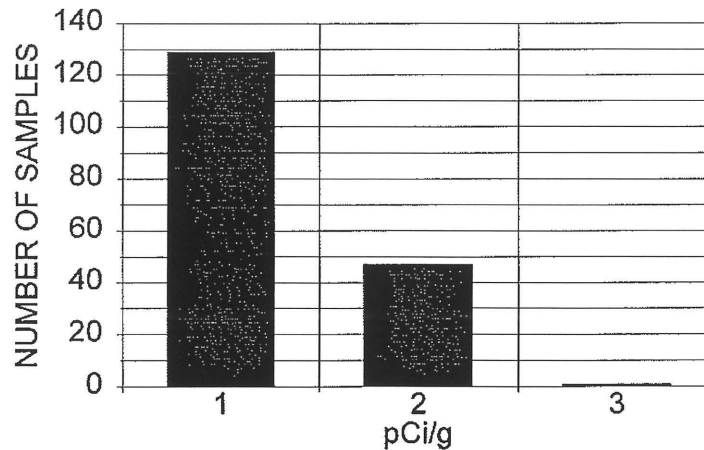
Number	n	(n-N)	(n-N) ²
201			
202			
203			
204			
205			
206			
207			
208			
209			
210			
211			
212			
213			
214			
215			
216			
217			
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233			
234			
235			
236			
237			
238			
239			
240			
241			
242			
243			
244			
245			
246			
247			
248			
249			
250			
	0.0		0.0
	Sum(n)		Sum(n-N) ²

SUB-AREA "H" - SURFACE
EAST PIPELINE TO RIVER & WP1 & WP2
CIMARRON SOIL COUNTER
THORIUM (NAT) SOIL SAMPLE RESULTS
SITE BACKGROUND OF 1.5 pCi/g NOT SUBTRACTED
AUGUST 1998

THORIUM (NATURAL) SAMPLE RESULTS
SURVEY DATA



THORIUM (NATURAL) SAMPLE RESULTS
FREQUENCY DISTRIBUTION



NUMBER OF SAMPLES	177
AVERAGE SAMPLE	1
MINIMUM SAMPLE	1
MAXIMUM SAMPLE	3
STANDARD DEVIATION	0.5

$$n = pCi/q \text{ Th (NAT)}$$

Number	n	(n-N)	(n-N) ²
1	2.0	0.7	0.5
2	2.0	0.7	0.5
3	2.0	0.7	0.5
4	2.0	0.7	0.5
5	2.0	0.7	0.5
6	2.0	0.7	0.5
7	2.0	0.7	0.5
8	1.0	-0.3	0.1
9	1.0	-0.3	0.1
10	1.0	-0.3	0.1
11	2.0	0.7	0.5
12	2.0	0.7	0.5
13	2.0	0.7	0.5
14	1.0	-0.3	0.1
15	1.0	-0.3	0.1
16	1.0	-0.3	0.1
17	1.0	-0.3	0.1
18	1.0	-0.3	0.1
19	2.0	0.7	0.5
20	1.0	-0.3	0.1
21	1.0	-0.3	0.1
22	2.0	0.7	0.5
23	1.0	-0.3	0.1
24	3.0	1.7	3.0
25	1.0	-0.3	0.1
26	1.0	-0.3	0.1
27	2.0	0.7	0.5
28	2.0	0.7	0.5
29	1.0	-0.3	0.1
30	2.0	0.7	0.5
31	1.0	-0.3	0.1
32	2.0	0.7	0.5
33	1.0	-0.3	0.1
34	2.0	0.7	0.5
35	1.0	-0.3	0.1
36	2.0	0.7	0.5
37	2.0	0.7	0.5
38	1.0	-0.3	0.1
39	2.0	0.7	0.5
40	1.0	-0.3	0.1
41	1.0	-0.3	0.1
42	1.0	-0.3	0.1
43	2.0	0.7	0.5
44	2.0	0.7	0.5
45	1.0	-0.3	0.1
46	2.0	0.7	0.5
47	2.0	0.7	0.5
48	2.0	0.7	0.5
49	2.0	0.7	0.5
50	1.0	-0.3	0.1
	62.0		9.2
	52.0		4.7
	34.0		5.2
	226		37.4
	Sum(n)		Sum(n-N) ²

No. of Samples (x) : 177

COUNT TIME: 5 MINUTES

Sample Mean (N) = Sum(n) ÷ (x)

Sample Mean (N) : 1.28

Standard Deviation (Sd) = SQRT [(n-N)² ÷ (x - 1)]

Standard Deviation: 0.46

2 Std Deviations:	0.92
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Degree of Freedom(df),= (x) - 1 Data listed on Table B-1

$$(df) = 1.656$$

Area's Average Level (A_{μ}) = $(N) + (df) \times [(Sd)/SQRT(x)]$

(A_μ) = 1.33 pCi/gTh (NAT)

GUIDELINE VALUE:	10	pCi/gTh (NAT)
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Acceptable Level:	11.5	pCi/gTh (NAT)
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TABLE B - 1

Factors for Comparison of Survey Data with Guidelines					
(df)	95%	97.5%	(df)	95%	97.5%
1	6.314	12.706	19	1.729	2.093
2	2.92	4.303	20	1.725	2.086
3	2.353	3.182	21	1.721	2.08
4	2.132	2.776	22	1.717	2.074
5	2.015	2.571	23	1.714	2.069
6	1.943	2.447	24	1.711	2.064
7	1.895	2.365	25	1.708	2.06
8	1.86	2.306	26	1.706	2.056
9	1.833	2.262	27	1.703	2.052
10	1.812	2.228	28	1.701	2.048
11	1.796	2.201	29	1.699	2.045
12	1.782	2.179	30	1.697	2.042
13	1.771	2.16	40	1.684	2.021
14	1.761	2.145	60	1.671	2
15	1.753	2.131	120	1.658	1.98
16	1.746	2.12	400	1.649	1.966
17	1.74	2.11	Infinite	1.645	1.96
18	1.734	2.101			

For values of Degrees of Freedom not listed:

Interpolate between the listed values.

(df) high value(Z)	400	is (B)	1.649	95%
(df) low value(Y)	120	is (A)	1.658	95%

Desired value(df) (X)	176	Is calculated as follow:
-----------------------	-----	--------------------------

$$\text{EXP}[(\text{Ln}(\text{B}) - \text{Ln}(\text{A})) \div (\text{Z} - \text{Y})] (\text{X} - \text{Y}) + \text{Ln}(\text{A})]$$

The (df) value for (X)	176	1,656	95%
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PERFORMED BY: Deanna Duckett

DATE: 8/19/98

REVIEWED BY: W. A. Rogers

DATE: 8-21-98

CIMARRON CORPORATION - CIMARRON FACILITY
TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDENCE
EAST PIPELINE TO RIVER - SURFACE W/ WP1 & WP2 PIPELINE - SURFACE

n = pCi/g Th (NAT)

Number	n	(n-N)	(n-N) ²
51	2.0	0.72	0.52
52	1.0	-0.28	0.08
53	2.0	0.72	0.52
54	1.0	-0.28	0.08
55	2.0	0.72	0.52
56	1.0	-0.28	0.08
57	2.0	0.72	0.52
58	1.0	-0.28	0.08
59	1.0	-0.28	0.08
60	1.0	-0.28	0.08
61	1.0	-0.28	0.08
62	1.0	-0.28	0.08
63	1.0	-0.28	0.08
64	1.0	-0.28	0.08
65	1.0	-0.28	0.08
66	1.0	-0.28	0.08
67	1.0	-0.28	0.08
68	1.0	-0.28	0.08
69	1.0	-0.28	0.08
70	2.0	0.72	0.52
71	2.0	0.72	0.52
72	2.0	0.72	0.52
73	1.0	-0.28	0.08
74	1.0	-0.28	0.08
75	1.0	-0.28	0.08
76	2.0	0.72	0.52
77	1.0	-0.28	0.08
78	1.0	-0.28	0.08
79	1.0	-0.28	0.08
80	2.0	0.72	0.52
81	2.0	0.72	0.52
82	1.0	-0.28	0.08
83	1.0	-0.28	0.08
84	1.0	-0.28	0.08
85	1.0	-0.28	0.08
86	1.0	-0.28	0.08
87	1.0	-0.28	0.08
88	1.0	-0.28	0.08
89	1.0	-0.28	0.08
90	1.0	-0.28	0.08
91	1.0	-0.28	0.08
92	1.0	-0.28	0.08
93	1.0	-0.28	0.08
94	1.0	-0.28	0.08
95	1.0	-0.28	0.08
96	1.0	-0.28	0.08
97	1.0	-0.28	0.08
98	1.0	-0.28	0.08
99	2.0	0.72	0.52
100	2.0	0.72	0.52
	62.0		9.2
	Sum(n)		Sum(n-N) ²

n = pCi/g Th (NAT)

Number	n	(n-N)	(n-N) ²
101	2.0	0.72	0.52
102	1.0	-0.28	0.08
103	1.0	-0.28	0.08
104	1.0	-0.28	0.08
105	1.0	-0.28	0.08
106	1.0	-0.28	0.08
107	1.0	-0.28	0.08
108	1.0	-0.28	0.08
109	1.0	-0.28	0.08
110	1.0	-0.28	0.08
111	1.0	-0.28	0.08
112	1.0	-0.28	0.08
113	1.0	-0.28	0.08
114	1.0	-0.28	0.08
115	1.0	-0.28	0.08
116	1.0	-0.28	0.08
117	1.0	-0.28	0.08
118	1.0	-0.28	0.08
119	1.0	-0.28	0.08
120	1.0	-0.28	0.08
121	1.0	-0.28	0.08
122	1.0	-0.28	0.08
123	1.0	-0.28	0.08
124	1.0	-0.28	0.08
125	1.0	-0.28	0.08
126	1.0	-0.28	0.08
127	1.0	-0.28	0.08
128	1.0	-0.28	0.08
129	1.0	-0.28	0.08
130	2.0	0.72	0.52
131	1.0	-0.28	0.08
132	1.0	-0.28	0.08
133	1.0	-0.28	0.08
134	1.0	-0.28	0.08
135	1.0	-0.28	0.08
136	1.0	-0.28	0.08
137	1.0	-0.28	0.08
138	1.0	-0.28	0.08
139	1.0	-0.28	0.08
140	1.0	-0.28	0.08
141	1.0	-0.28	0.08
142	1.0	-0.28	0.08
143	1.0	-0.28	0.08
144	1.0	-0.28	0.08
145	1.0	-0.28	0.08
146	1.0	-0.28	0.08
147	1.0	-0.28	0.08
148	1.0	-0.28	0.08
149	1.0	-0.28	0.08
150	1.0	-0.28	0.08
	52.0		4.7
	Sum(n)		Sum(n-N) ²

**CIMARRON CORPORATION - CIMARRON FACILITY
TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDENCE
EAST PIPELINE TO RIVER - SURFACE W/ WP1 & WP2 PIPELINE - SURFACE**

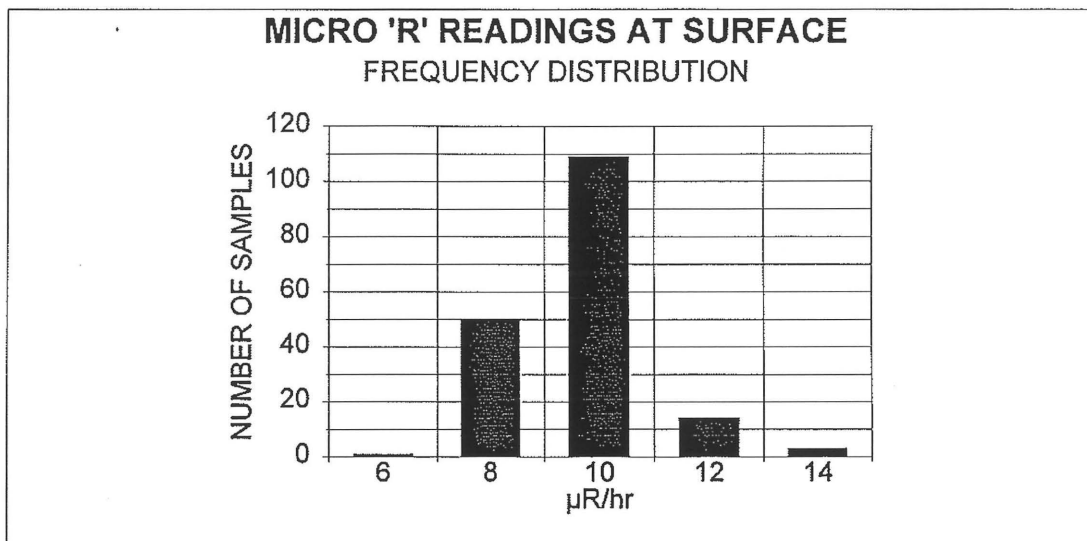
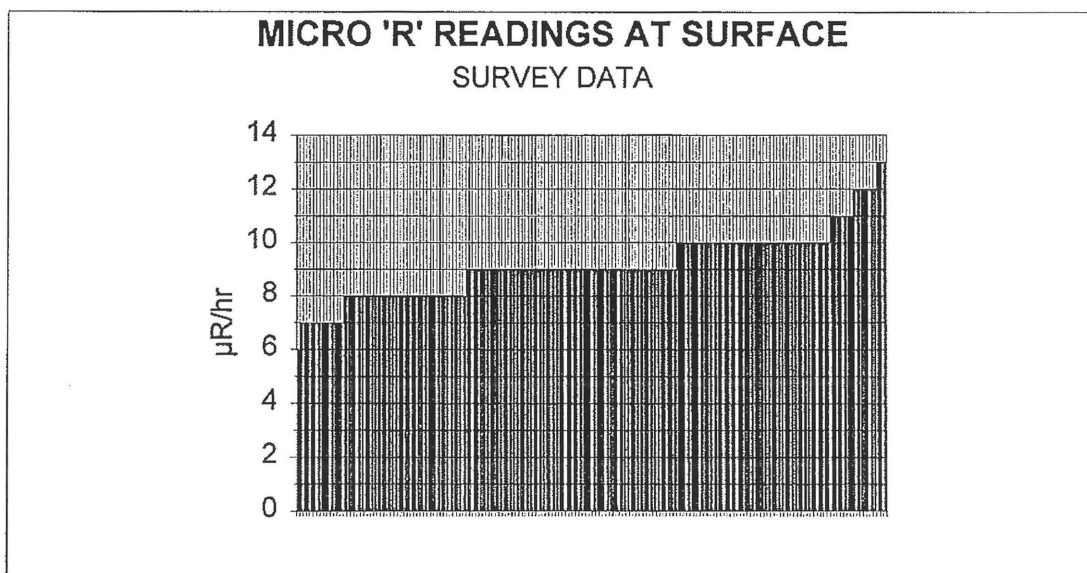
n = pCi/g Th (NAT)

Number	n	(n-N)	(n-N) ²
151	1.0	-0.28	0.08
152	2.0	0.72	0.52
153	1.0	-0.28	0.08
154	1.0	-0.28	0.08
155	1.0	-0.28	0.08
156	2.0	0.72	0.52
157	1.0	-0.28	0.08
158	1.0	-0.28	0.08
159	1.0	-0.28	0.08
160	1.0	-0.28	0.08
161	1.0	-0.28	0.08
162	2.0	0.72	0.52
163	2.0	0.72	0.52
164	1.0	-0.28	0.08
165	1.0	-0.28	0.08
166	2.0	0.72	0.52
167	2.0	0.72	0.52
168	1.0	-0.28	0.08
169	1.0	-0.28	0.08
170	1.0	-0.28	0.08
171	1.0	-0.28	0.08
172	1.0	-0.28	0.08
173	2.0	0.72	0.52
174	1.0	-0.28	0.08
175	1.0	-0.28	0.08
176	1.0	-0.28	0.08
177	1.0	-0.28	0.08
178			
179			
180			
181			
182			
183			
184			
185			
186			
187			
188			
189			
190			
191			
192			
193			
194			
195			
196			
197			
198			
199			
200			
	34.0		5.2
	Sum(n)		Sum(n-N) ²

n = pCi/g Th (NAT)

Number	n	(n-N)	(n-N) ²
201			
202			
203			
204			
205			
206			
207			
208			
209			
210			
211			
212			
213			
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234			
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236			
237			
238			
239			
240			
241			
242			
243			
244			
245			
246			
247			
248			
249			
250			
	0.0		0.0
	Sum(n)		Sum(n-N) ²

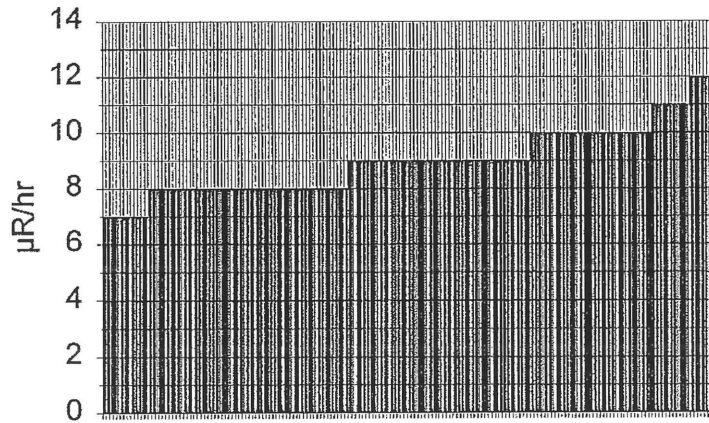
SUB-AREA "H" - SURFACE
EAST PIPELINE TO RIVER & WP1 & WP2
LUDLUM MICRO 'R' METER MODEL 19
MICRO 'R' READINGS AT SURFACE
AUGUST 1998



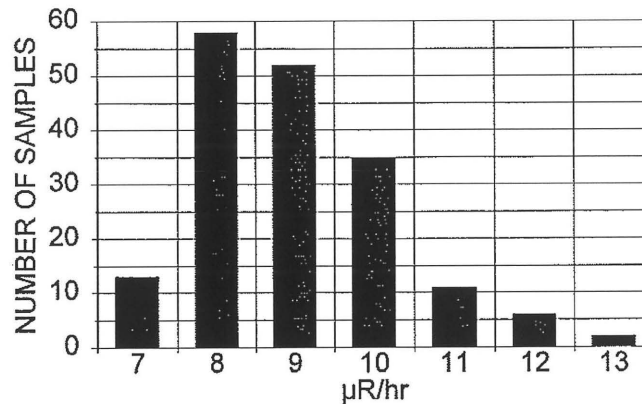
NUMBER OF SAMPLES	177
AVERAGE SAMPLE	9
MINIMUM SAMPLE	6
MAXIMUM SAMPLE	13
STANDARD DEVIATION	1

SUB-AREA "H" - SURFACE
EAST PIPELINE TO RIVER & WP1 & WP2
LUDLUM MICRO 'R' METER MODEL 19 S/N-111299
MICRO 'R' AT 1 METER SAMPLE READINGS
AUGUST 1998

MICRO 'R' READINGS AT 1 METER
SURVEY DATA



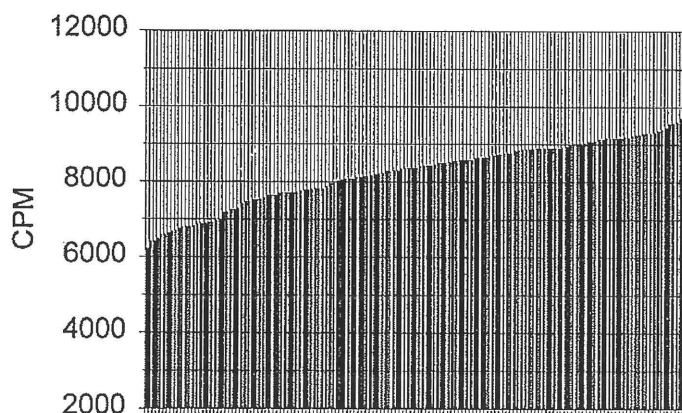
MICRO 'R' READINGS AT 1 METER
FREQUENCY DISTRIBUTION



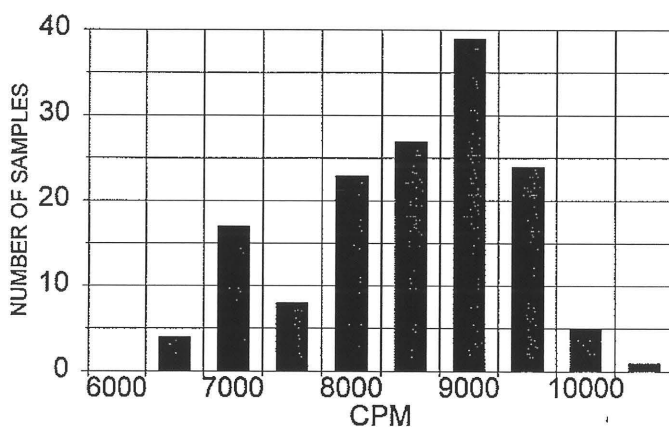
NUMBER OF SAMPLES	177
AVERAGE SAMPLE	9
MINIMUM SAMPLE	7
MAXIMUM SAMPLE	13
STANDARD DEVIATION	1

**SUB-AREA "H" - SURFACE
EAST PIPELINE TO RIVER
LUDLUM 2221 UNSHIELDED 3" X 1/2" NaI DETECTOR S/N-97264
AUGUST 1998**

**3" UNSHIELDED DETECTOR READINGS
SURVEY DATA**



**3" UNSHIELDED DETECTOR READINGS
FREQUENCY DISTRIBUTION**

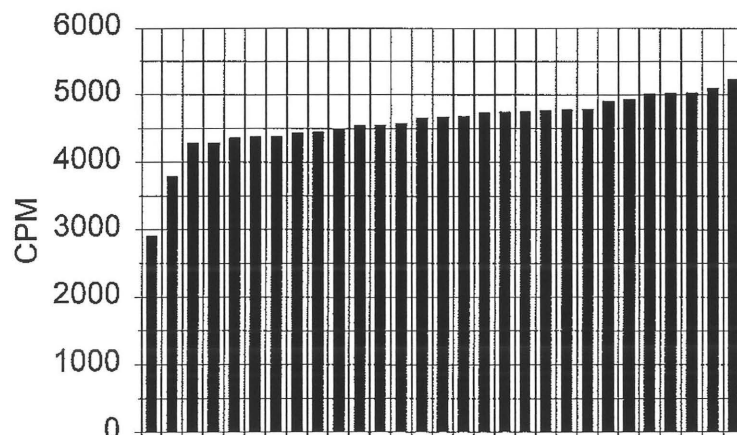


NUMBER OF SAMPLES	148
AVERAGE SAMPLE	8249
MINIMUM SAMPLE	6220
MAXIMUM SAMPLE	10116
STANDARD DEVIATION	865

SUB-AREA "H" - SURFACE
EAST PIPELINE TO RIVER & WP1 & WP2
LUDLUM 2221 SHIELDED 3" X 1/2" NaI DETECTOR S/N-48395
AUGUST 1998

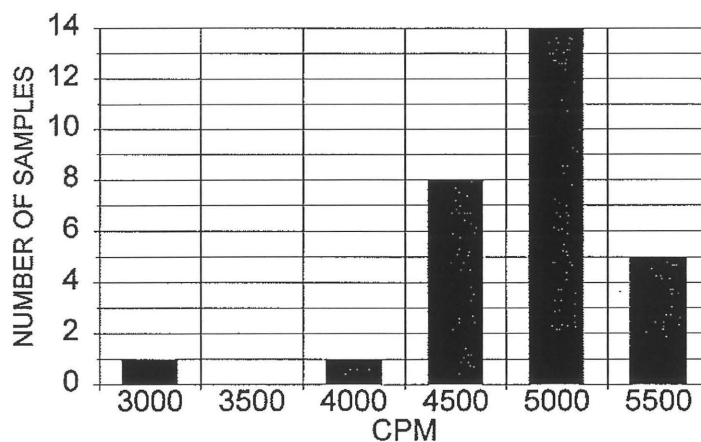
3" SHIELDED DETECTOR READINGS

SURVEY DATA



3" SHIELDED DETECTOR READINGS

FREQUENCY DISTRIBUTION



NUMBER OF SAMPLES	29
AVERAGE SAMPLE	4597
MINIMUM SAMPLE	2914
MAXIMUM SAMPLE	5232
STANDARD DEVIATION	436

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WEST PIPELINE TO RIVER - SURFACE

DATE: 8/12/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
* 1	144	E	-	282	N	4780	15	15	9	1
* 2	142	E	-	287	N	4870	14	13	7	1
* 3	139	E	-	291	N	4290	13	14	5	1
* 4	137	E	-	296	N	4080	15	11	7	1
* 5	135	E	-	300	N	4050	12	12	6	1
* 6	132	E	-	304	N	4930	13	12	14	1
* 7	129	E	-	308	N	4450	12	12	8	1
* 8	127	E	-	313	N	3950	11	12	12	1
* 9	124	E	-	317	N	4190	13	12	10	1
* 10	121	E	-	321	N	4250	12	12	9	1
* 11	118	E	-	325	N	4360	12	12	10	1
12	116	E	-	330	N	7804	9	9	8	2
13	114	E	-	335	N	7424	7	9	9	2
14	112	E	-	340	N	7524	8	8	7	2
15	110	E	-	345	N	7886	8	8	4	1
16	109	E	-	350	N	8154	8	7	6	1
17	109	E	-	355	N	8286	9	8	7	1
18	108	E	-	360	N	7868	8	8	17	2
19	108	E	-	365	N	8304	9	9	13	1
20	107	E	-	370	N	6404	6	7	9	1

INSTRUMENTS:	RESULTS IN:	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299	μR/hr	7	2
LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264	CPM	6750	N/A
*LUDLUM 2220, SHIELDED 3" X 1/2" NaI DETECTOR S/N 48395		4000	N/A
		Total U	4
		Thorium	1.5
CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g		1

BACKGROUND NOT SUBTRACTED

PAGE 1
FILE: HWESTPIPSURF

W.A. Boyer

DATE: 8-12-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WEST PIPELINE TO RIVER - SURFACE

DATE: 8/12/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	107	E	-	375	N	5968	6	6	10	1
2	106	E	-	380	N	4498	5	5	5	1
3	106	E	-	385	N	4268	5	4	5	1
4	105	E	-	390	N	4906	5	6	11	1
5	105	E	-	395	N	4822	5	5	4	1
6	105	E	-	400	N	5102	5	6	21	1
7	105	E	-	405	N	6080	6	6	32	1
8	104	E	-	410	N	5980	7	7	13	1
9	104	E	-	415	N	5392	5	7	9	1
10	104	E	-	420	N	5494	6	5	19	1
11	104	E	-	425	N	5900	7	7	21	1
12	104	E	-	430	N	6142	7	7	18	1
13	103	E	-	435	N	6498	6	6	26	1
14	103	E	-	440	N	7074	9	7	23	1
15	103	E	-	445	N	7850	9	7	17	2
16	103	E	-	450	N	7576	6	8	21	1
17	102	E	-	455	N	7068	7	7	11	1
18	102	E	-	460	N	7218	8	8	6	1
19	102	E	-	465	N	7706	9	8	9	1
20	101	E	-	470	N	8242	9	9	15	1

INSTRUMENTS:

RESULTS IN:

BACKGROUND

MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

µR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

6750

N/A

*LUDLUM 2220, SHIELDED 3" X 1/2" NaI DETECTOR S/N 48395

4000

N/A

Total U 4

10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Thorium 1.5

1

BACKGROUND NOT SUBTRACTED

PAGE 2

W. A. Rogers

DATE: 8-12-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WEST PIPELINE TO RIVER - SURFACE

DATE: 8/12/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	101	E	-	475	N	8098	8	8	10	2
2	101	E	-	480	N	7956	9	7	10	1
3	101	E	-	485	N	7874	8	8	7	1
4	100	E	-	490	N	7762	10	8	9	1
5	100	E	-	495	N	7902	7	8	17	1
6	100	E	-	500	N	7820	8	8	14	1
7	99	E	-	505	N	7872	8	8	11	2
8	98	E	-	510	N	8110	8	7	13	1
9	97	E	-	515	N	7806	9	8	15	2
10	96	E	-	520	N	8140	9	9	13	1
11	95	E	-	525	N	7912	9	8	10	2
12	94	E	-	530	N	8276	9	7	15	1
13	93	E	-	535	N	8148	9	7	12	1
14	92	E	-	540	N	8058	10	9	11	2
15	91	E	-	545	N	8186	8	8	7	2
16	90	E	-	550	N	8136	8	9	5	1
17	89	E	-	555	N	7746	7	7	11	1
18	88	E	-	560	N	7800	10	9	11	1
19	87	E	-	565	N	7898	9	9	12	1
20	86	E	-	570	N	7820	7	6	10	1

INSTRUMENTS:

RESULTS IN:

BACKGROUND

MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

6750

N/A

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Total U

4

10

Thorium

1.5

1

BACKGROUND NOT SUBTRACTED

PAGE 3

FILE: HWESTPIPSURF

W. Q. Rogers

DATE: 8-12-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WEST PIPELINE TO RIVER - SURFACE

DATE: 8/12/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	85	E	-	575	N	7672	8	9	14	1
2	84	E	-	580	N	7864	9	8	10	1
3	83	E	-	585	N	7820	7	7	8	1
4	82	E	-	590	N	8046	10	9	6	1
5	81	E	-	595	N	8590	8	8	8	2
6	80	E	-	600	N	8724	10	10	8	1
7	79	E	-	605	N	8804	10	9	10	2
8	78	E	-	610	N	8926	10	9	10	2
9	77	E	-	615	N	8988	10	12	4	1
10	76	E	-	620	N	8294	11	9	6	2
11	75	E	-	625	N	8906	10	9	5	2
12	74	E	-	630	N	8694	10	10	8	1
13	73	E	-	635	N	8832	8	8	5	1
14	72	E	-	640	N	8952	10	10	8	1
15	71	E	-	645	N	8628	9	10	6	2
16	70	E	-	650	N	8680	10	9	7	2
17	69	E	-	655	N	8286	9	9	13	1
18	68	E	-	660	N	7978	9	9	7	1
19	67	E	-	665	N	7716	8	8	8	1
20	66	E	-	670	N	7736	8	9	6	1

INSTRUMENTS:

RESULTS IN:

BACKGROUND

MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

µR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

6750

N/A

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Total U

4

10

Thorium

1.5

1

BACKGROUND NOT SUBTRACTED

PAGE 4

FILE: HWESTPIPSURF

W.A. Rogers

DATE: 8-12-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WEST PIPELINE TO RIVER - SURFACE

DATE: 8/12/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	65	E	-	675	N	7764	7	8	12	1
2	64	E	-	680	N	8524	10	9	9	1
3	63	E	-	685	N	8254	9	8	7	1
4	62	E	-	690	N	8298	9	9	8	1
5	61	E	-	695	N	8218	8	8	7	1
6	60	E	-	700	N	8384	8	8	8	1
7	59	E	-	705	N	8894	9	9	8	2
8	58	E	-	710	N	8254	9	9	9	1
9	57	E	-	715	N	7542	7	8	9	1
10	56	E	-	720	N	7894	8	8	6	1
11	55	E	-	725	N	7684	9	9	7	1
12	54	E	-	730	N	8004	10	9	7	1
13	53	E	-	735	N	7774	10	10	7	1
14	52	E	-	740	N	7622	8	8	5	1
15	51	E	-	745	N	8224	9	8	8	1
16	50	E	-	750	N	8088	8	7	5	1
17	49	E	-	755	N	7562	8	7	8	1
18	48	E	-	760	N	8196	8	8	10	1
19	47	E	-	765	N	7154	7	8	4	1
20	46	E	-	770	N	7020	8	8	4	1

INSTRUMENTS:

RESULTS IN:

BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

6750

N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Thorium 1.5 1

BACKGROUND NOT SUBTRACTED

PAGE 5

FILE: HWESTPIPSURF

W.A. Rogers

DATE: 8-12-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WEST PIPELINE TO RIVER - SURFACE

DATE: 8/12/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	45	E	-	775	N	7140	9	8	6	1
2	44	E	-	780	N	7780	8	8	9	1
3	43	E	-	785	N	6542	7	7	7	1
4	42	E	-	790	N	6492	8	8	4	1
5	41	E	-	795	N	6582	9	7	5	1
6	40	E	-	800	N	6282	6	7	7	1
7	39	E	-	805	N	5880	6	7	6	1
8	38	E	-	810	N	5880	6	6	9	1
9	37	E	-	815	N	5492	6	7	7	1
10	36	E	-	820	N	5340	6	7	6	1
11	35	E	-	825	N	5420	7	7	8	1
12	34	E	-	830	N	5270	7	7	9	1
13	33	E	-	835	N	5490	6	7	10	1
14	32	E	-	840	N	5422	6	6	6	1
15	31	E	-	845	N	5346	7	6	6	1
16	30	E	-	850	N	5494	7	6	9	1
17	29	E	-	855	N	5224	6	7	5	1
18	28	E	-	860	N	5170	5	5	10	1
19	27	E	-	865	N	5318	7	6	5	1
20	26	E	-	870	N	5568	6	5	7	1

INSTRUMENTS:

RESULTS IN:

BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

6750

N/A

CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Total U	4	10
Thorium	1.5	1

BACKGROUND NOT SUBTRACTED

PAGE 6

FILE: HWESTPIPSURF

W. a. Rogers

DATE: 8-12-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WEST PIPELINE TO RIVER - SURFACE

DATE: 8/12/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	25	E	-	875	N	5458	7	5	5	1
2	24	E	-	880	N	5646	7	6	5	1
3	23	E	-	885	N	6018	8	6	13	1
4	22	E	-	890	N	5894	7	7	7	1
5	21	E	-	895	N	6050	7	7	4	1
6	20	E	-	900	N	6064	7	7	9	1
7	19	E	-	905	N	5986	6	7	10	1
8	18	E	-	910	N	5898	8	6	7	1
9	17	E	-	915	N	6078	6	5	4	1
10	16	E	-	920	N	5718	7	6	7	1
11	15	E	-	925	N	5730	7	7	7	1
12	14	E	-	930	N	5808	7	6	8	1
13	13	E	-	935	N	5568	7	6	6	1
14	12	E	-	940	N	5682	6	5	6	1
15	11	E	-	945	N	5400	6	6	5	1
16	10	E	-	950	N	5000	6	6	8	1
17	9	E	-	955	N	4934	6	6	5	1
18	8	E	-	960	N	5048	6	6	8	1
19	7	E	-	965	N	5066	7	6	6	1
20	6	E	-	970	N	5344	7	6	6	1

INSTRUMENTS:

RESULTS IN:

BACKGROUND

MDA

LUDDLUM MICRO 'R' METER - MODEL 19 S/N 111299

µR/hr

7

2

LUDDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

6750

N/A

Total U

4

10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Thorium

1.5

1

BACKGROUND NOT SUBTRACTED

PAGE 7

FILE: HWESTPIPSURF

W. A. Rogers

DATE: 8-12-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WEST PIPELINE TO RIVER - SURFACE

DATE: 8/12/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	5	E	-	975	N	5160	6	6	7	1
2	4	E	-	980	N	4996	6	5	12	1
3	3	E	-	985	N	4800	6	6	14	1
4	2	E	-	990	N	4748	5	5	14	1
5	1	E	-	995	N	5952	5	5	8	1
6	0	E	-	1000	N	6048	8	7	9	1
7	1	W	-	1005	N	5004	6	5	7	1
8	2	W	-	1010	N	5176	5	5	5	1
9	3	W	-	1015	N	4760	5	5	6	1
10	4	W	-	1020	N	5280	7	6	8	1
11	5	W	-	1025	N	5166	6	6	15	1
12	6	W	-	1030	N	4936	6	5	7	1
13	7	W	-	1035	N	5176	5	6	12	1
14	8	W	-	1040	N	4788	5	5	4	1
15	9	W	-	1045	N	5058	5	5	10	1
16	10	W	-	1050	N	4864	6	5	10	1
17	11	W	-	1055	N	5320	5	5	13	1
18	12	W	-	1060	N	5026	6	5	7	1
19	13	W	-	1065	N	5298	6	6	5	1
20	14	W	-	1070	N	5642	7	6	8	1

INSTRUMENTS:

RESULTS IN:

BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

6750

N/A

*LUDLUM 2220, SHIELDED 3" X 1/2" NaI DETECTOR S/N 48395

4000

N/A

CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Total U	4	10
Thorium	1.5	1

BACKGROUND NOT SUBTRACTED

PAGE 8

W. A. Rogers

DATE: 8-12-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WEST PIPELINE TO RIVER - SURFACE

DATE: 8/12/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	15	W	-	1075	N	5402	7	5	7	1
2	16	W	-	1080	N	6034	5	5	6	1
3	17	W	-	1085	N	6122	6	5	7	1
4	18	W	-	1090	N	5828	5	6	9	1
5	19	W	-	1095	N	6852	6	6	8	1
6	20	W	-	1100	N	6844	6	7	8	1
7	21	W	-	1105	N	6856	7	7	8	1
8	22	W	-	1110	N	5978	8	7	7	1
9	23	W	-	1115	N	6138	8	6	7	1
10	24	W	-	1120	N	6088	7	7	10	1
11	25	W	-	1125	N	6678	8	7	9	1
12	26	W	-	1130	N	6434	7	7	6	1
13	27	W	-	1135	N	6010	7	7	9	1
14	28	W	-	1140	N	6158	8	8	6	1
15	29	W	-	1145	N	5360	6	6	7	1
16	30	W	-	1150	N	6656	7	7	5	1
17										
18										
19										
20										

INSTRUMENTS:

RESULTS IN:

BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

µR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

6750

N/A

*LUDLUM 2220, SHIELDED 3" X 1/2" NaI DETECTOR S/N 48395

4000

N/A

Total U 4 10

Thorium 1.5 1

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

BACKGROUND NOT SUBTRACTED

PAGE 9

W.A. Rogers

DATE: 8-12-98

CIMARRON CORPORATION
CIMARRON FACILITY
SUB-AREA "H" AFFECTED
WEST PIPELINE TO RIVER - SURFACE

DATE: 8/12/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	16	W	-	1129	N	6302	7	6	6	1
2	10	W	-	1129	N	6694	8	7	7	1
3	5	W	-	1130	N	6338	7	7	7	1
4	0	E	-	1130	N	5056	7	5	7	1
5	5	E	-	1131	N	5262	8	7	6	1
6	10	E	-	1131	N	6234	7	7	6	1
7	20	E	-	1132	N	5908	6	6	6	1
8	25	E	-	1133	N	5666	7	5	5	1
9	30	E	-	1133	N	5978	5	6	6	1
10	35	E	-	1134	N	6020	7	6	6	1
11	40	E	-	1134	N	6078	7	7	7	1
12	45	E	-	1135	N	5848	6	6	6	1
13	50	E	-	1140	N	5640	6	6	4	1
14	55	E	-	1145	N	5360	6	6	7	1
15	57	E	-	1150	N	5662	7	6	3	1
16	58	E	-	1155	N	6140	6	6	7	1
17	66	E	-	1158	N	6190	7	7	3	1
18										
19										
20										

INSTRUMENTS:

RESULTS IN:

BACKGROUN

MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

6750

N/A

Total U

4

10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Thorium

1.5

1

BACKGROUND NOT SUBTRACTED

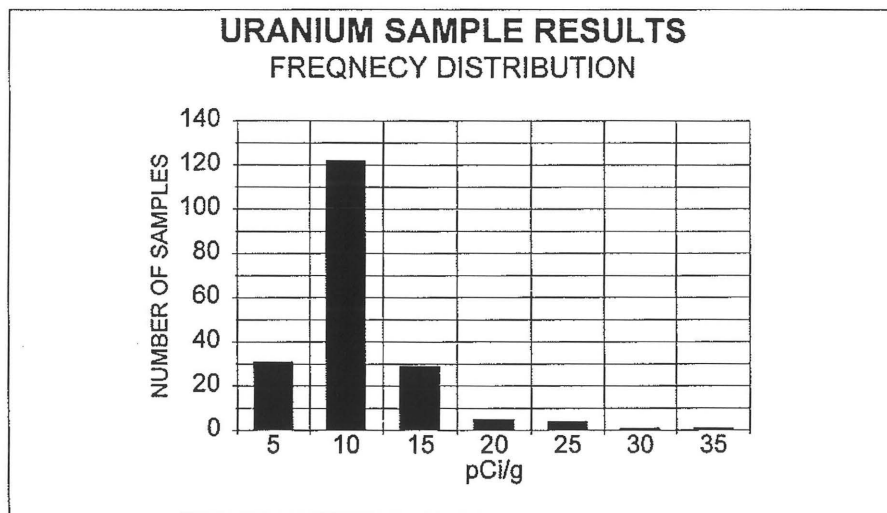
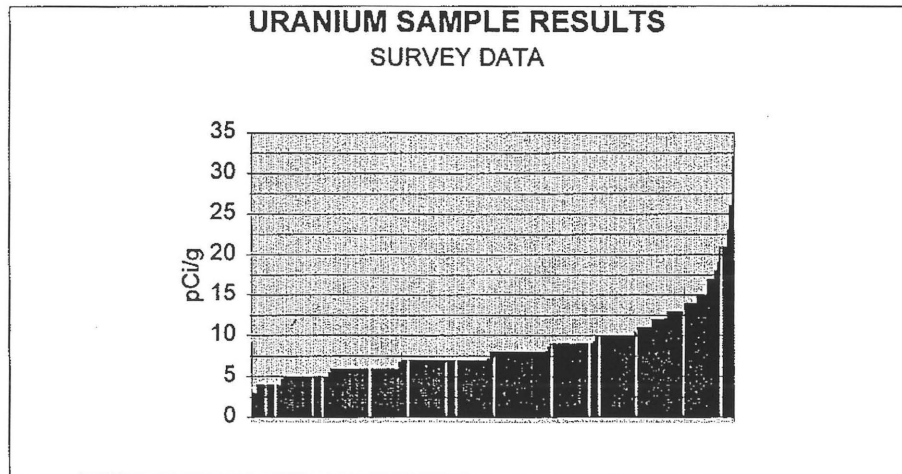
PAGE 10

FILE: HWESTPIPSURF

W.A. Argen

DATE: 8-12-98

SUB-AREA "H" - SURFACE
WEST PIPELINE TO RIVER
CIMARRON SOIL COUNTER
TOTAL URANIUM SOIL SAMPLE RESULTS
SITE BACKGROUND OF 4 pCi/g NOT SUBTRACTED
AUGUST 1998



NUMBER OF SAMPLES	193
AVERAGE SAMPLE	9
MINIMUM SAMPLE	3
MAXIMUM SAMPLE	32
STANDARD DEVIATION	4

$$n = pCi/g \text{ TOTAL U}$$
No. of Samples (x) : 193

Sample Mean (N) = $\frac{\text{Sum}(n)}{n} + (x)$

Sample Mean (N) : 8.69

Standard Deviation (Sd) = SQRT [(n-N)² + (x - 1)]

Standard Deviation: 4.16

2 Std Deviations:	8.32
-------------------	------

Degree of Freedom(df).= (x) - 1 **Data listed on Table B-1**

 $(df) = 1.656$

Area's Average Level (A_{μ}) = $(N) + (df) \times [(Sd)/SQRT(x)]$

$$(A\mu) = \boxed{9.18}$$

pCl/gU TOTAL U

GUIDELINE VALUE:

pCl/gU	TOTAL U
0.00	0.00
0.01	0.01
0.02	0.02
0.03	0.03
0.04	0.04
0.05	0.05
0.06	0.06
0.07	0.07
0.08	0.08
0.09	0.09
0.10	0.10
0.11	0.11
0.12	0.12
0.13	0.13
0.14	0.14
0.15	0.15
0.16	0.16
0.17	0.17
0.18	0.18
0.19	0.19
0.20	0.20
0.21	0.21
0.22	0.22
0.23	0.23
0.24	0.24
0.25	0.25
0.26	0.26
0.27	0.27
0.28	0.28
0.29	0.29
0.30	0.30
0.31	0.31
0.32	0.32
0.33	0.33
0.34	0.34
0.35	0.35
0.36	0.36
0.37	0.37
0.38	0.38
0.39	0.39
0.40	0.40
0.41	0.41
0.42	0.42
0.43	0.43
0.44	0.44
0.45	0.45
0.46	0.46
0.47	0.47
0.48	0.48
0.49	0.49
0.50	0.50
0.51	0.51
0.52	0.52
0.53	0.53
0.54	0.54
0.55	0.55
0.56	0.56
0.57	0.57
0.58	0.58
0.59	0.59
0.60	0.60
0.61	0.61
0.62	0.62
0.63	0.63
0.64	0.64
0.65	0.65
0.66	0.66
0.67	0.67
0.68	0.68
0.69	0.69
0.70	0.70
0.71	0.71
0.72	0.72
0.73	0.73
0.74	0.74
0.75	0.75
0.76	0.76
0.77	0.77
0.78	0.78
0.79	0.79
0.80	0.80
0.81	0.81
0.82	0.82
0.83	0.83
0.84	0.84
0.85	0.85
0.86	0.86
0.87	0.87
0.88	0.88
0.89	0.89
0.90	0.90
0.91	0.91
0.92	0.92
0.93	0.93
0.94	0.94
0.95	0.95
0.96	0.96
0.97	0.97
0.98	0.98
0.99	0.99
1.00	1.00

Acceptable Level:

34.0	pCl/gU	TOTAL U
------	--------	---------

TABLE B-1

For values of Degrees of Freedom not listed:

Interpolate between the listed values.

(df) high value(Z)	400	is (B)	1.649	95%
(df) low value(Y)	120	is (A)	1.658	95%
Desired value(df) (X)	192	is calculated as follow:		
$\text{EXP}[(\text{Ln}(B)-\text{Ln}(A)) + (Z-Y) \times (X-Y) + \text{Ln}(A)]$				
The (df) value for (X)	192	1.656	95%	

The (df) value for (X)	192	1.656
------------------------	-----	-------

PERFORMED BY: Deanna Huckey

DATE: 8/18/98

REVIEWED BY: W.A. Rogers

DATE: 8-21-98

CIMARRON CORPORATION - CIMARRON FACILITY
TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDENCE
WEST PIPELINE TO RIVER - SURFACE

n = pCi/g TOTAL U

Number	n	(n-N)	(n-N) ²
51	10	1.31	1.72
52	15	6.31	39.83
53	12	3.31	10.96
54	11	2.31	5.34
55	7	-1.69	2.85
56	5	-3.69	13.61
57	11	2.31	5.34
58	11	2.31	5.34
59	12	3.31	10.96
60	10	1.31	1.72
61	14	5.31	28.21
62	10	1.31	1.72
63	8	-0.69	0.47
64	6	-2.69	7.23
65	8	-0.69	0.47
66	8	-0.69	0.47
67	10	1.31	1.72
68	10	1.31	1.72
69	4	-4.69	21.99
70	6	-2.69	7.23
71	5	-3.69	13.61
72	8	-0.69	0.47
73	5	-3.69	13.61
74	8	-0.69	0.47
75	6	-2.69	7.23
76	7	-1.69	2.85
77	13	4.31	18.58
78	7	-1.69	2.85
79	8	-0.69	0.47
80	6	-2.69	7.23
81	12	3.31	10.96
82	9	0.31	0.10
83	7	-1.69	2.85
84	8	-0.69	0.47
85	7	-1.69	2.85
86	8	-0.69	0.47
87	8	-0.69	0.47
88	9	0.31	0.10
89	9	0.31	0.10
90	6	-2.69	7.23
91	7	-1.69	2.85
92	7	-1.69	2.85
93	7	-1.69	2.85
94	5	-3.69	13.61
95	8	-0.69	0.47
96	5	-3.69	13.61
97	8	-0.69	0.47
98	10	1.31	1.72
99	4	-4.69	21.99
100	4	-4.69	21.99
	409.0		344.3
	Sum(n)		Sum(n-N) ²

n = pCi/g TOTAL U

Number	n	(n-N)	(n-N) ²
101	6	-2.69	7.23
102	9	0.31	0.10
103	7	-1.69	2.85
104	4	-4.69	21.99
105	5	-3.69	13.61
106	7	-1.69	2.85
107	6	-2.69	7.23
108	9	0.31	0.10
109	7	-1.69	2.85
110	6	-2.69	7.23
111	8	-0.69	0.47
112	9	0.31	0.10
113	10	1.31	1.72
114	6	-2.69	7.23
115	6	-2.69	7.23
116	9	0.31	0.10
117	5	-3.69	13.61
118	10	1.31	1.72
119	5	-3.69	13.61
120	7	-1.69	2.85
121	5	-3.69	13.61
122	5	-3.69	13.61
123	13	4.31	18.58
124	7	-1.69	2.85
125	4	-4.69	21.99
126	9	0.31	0.10
127	10	1.31	1.72
128	7	-1.69	2.85
129	4	-4.69	21.99
130	7	-1.69	2.85
131	7	-1.69	2.85
132	8	-0.69	0.47
133	6	-2.69	7.23
134	6	-2.69	7.23
135	5	-3.69	13.61
136	8	-0.69	0.47
137	5	-3.69	13.61
138	8	-0.69	0.47
139	6	-2.69	7.23
140	6	-2.69	7.23
141	7	-1.69	2.85
142	12	3.31	10.96
143	14	5.31	28.21
144	14	5.31	28.21
145	8	-0.69	0.47
146	9	0.31	0.10
147	7	-1.69	2.85
148	5	-3.69	13.61
149	6	-2.69	7.23
150	8	-0.69	0.47
	367.0		370.2
	Sum(n)		Sum(n-N) ²

CIMARRON CORPORATION - CIMARRON FACILITY
TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDENCE
WEST PIPELINE TO RIVER - SURFACE

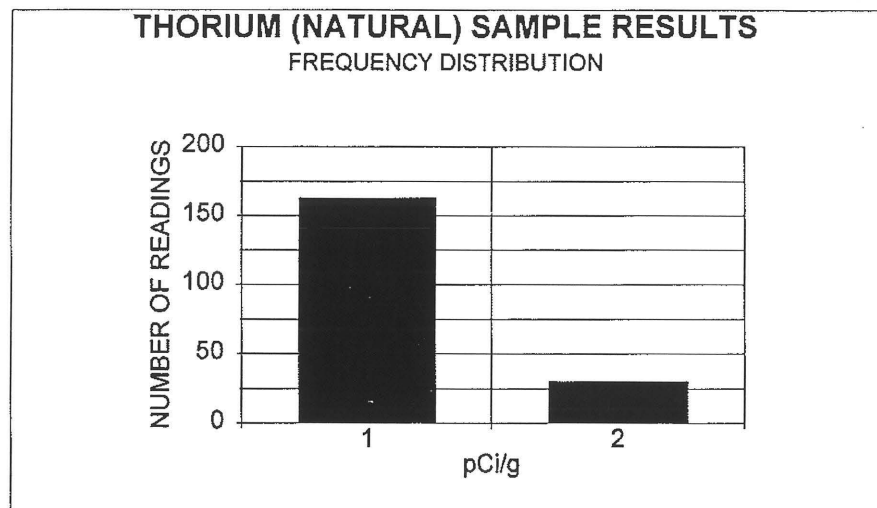
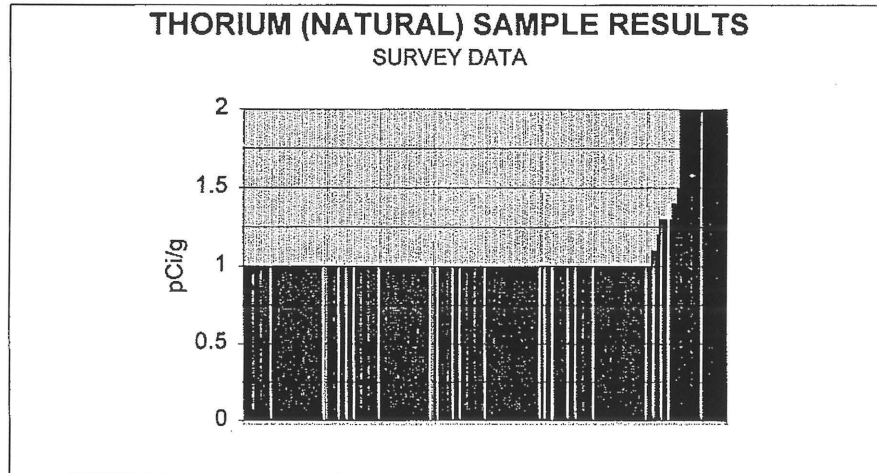
n = pCi/g TOTAL U

Number	n	(n-N)	(n-N) ²
151	15	6.31	39.83
152	7	-1.69	2.85
153	12	3.31	10.96
154	4	-4.69	21.99
155	10	1.31	1.72
156	10	1.31	1.72
157	13	4.31	18.58
158	7	-1.69	2.85
159	5	-3.69	13.61
160	8	-0.69	0.47
161	7	-1.69	2.85
162	6	-2.69	7.23
163	7	-1.69	2.85
164	9	0.31	0.10
165	8	-0.69	0.47
166	8	-0.69	0.47
167	8	-0.69	0.47
168	7	-1.69	2.85
169	7	-1.69	2.85
170	10	1.31	1.72
171	9	0.31	0.10
172	6	-2.69	7.23
173	9	0.31	0.10
174	6	-2.69	7.23
175	7	-1.69	2.85
176	5	-3.69	13.61
177	6	-2.69	7.23
178	7	-1.69	2.85
179	7	-1.69	2.85
180	7	-1.69	2.85
181	6	-2.69	7.23
182	6	-2.69	7.23
183	6	-2.69	7.23
184	5	-3.69	13.61
185	6	-2.69	7.23
186	6	-2.69	7.23
187	7	-1.69	2.85
188	6	-2.69	7.23
189	4	-4.69	21.99
190	7	-1.69	2.85
191	3	-5.69	32.37
192	7	-1.69	2.85
193	3	-5.69	32.37
194			
195			
196			
197			
198			
199			
200			
	309.0		335.7
	Sum(n)		Sum(n-N) ²

n = pCi/g TOTAL U

Number	n	(n-N)	(n-N) ²
201			
202			
203			
204			
205			
206			
207			
208			
209			
210			
211			
212			
213			
214			
215			
216			
217			
218			
219			
220			
221			
222			
223			
224			
225			
226			
227			
228			
229			
230			
231			
232			
233			
234			
235			
236			
237			
238			
239			
240			
241			
242			
243			
244			
245			
246			
247			
248			
249			
250			
	0.0		0.0
	Sum(n)		Sum(n-N) ²

SUB-AREA "H" - SURFACE
WEST PIPELINE TO RIVER
CIMARRON SOIL COUNTER
THORIUM (NAT) SOIL SAMPLE RESULTS
SITE BACKGROUND OF 1.5 pCi/g NOT SUBTRACTED
AUGUST 1998



NUMBER OF READINGS	193
AVERAGE READING	1.1
MINIMUM READING	1
MAXIMUM READING	2
STANDARD DEVIATION	0.5

$$n = pCi/q \text{ Th (NAT)}$$

No. of Samples (x) : 193

Sample Mean (N) = Sum(n) ÷ (x)

Sample Mean (N) : 1.10

Standard Deviation (Sd) = $\text{SQRT} [(n-N)^2 \div (x - 1)]$

Standard Deviation: 0.30

2 Std Deviations:	0.60
-------------------	------

Degree of Freedom(df).= (x) - 1 Data listed on Table B-1

 $(df) = 1.656$

Area's Average Level (A_{μ}) = (N) + (df) x [(Sd)/SQRT(x)]

$$(A\mu) = \boxed{1.13} \text{ pCi/gTh (NAT)}$$

GUIDELINE VALUE:	10	pCi/gTh (NAT)
------------------	----	---------------

Acceptable Level:	11.5	pCi/gTh (NAT)
-------------------	------	---------------

(df)	95%	97.5%	(df)	95%	97.5%
1	6.314	12.706	19	1.729	2.093
2	2.92	4.303	20	1.725	2.086
3	2.353	3.182	21	1.721	2.08
4	2.132	2.776	22	1.717	2.074
5	2.015	2.571	23	1.714	2.069
6	1.943	2.447	24	1.711	2.064
7	1.895	2.365	25	1.708	2.06
8	1.86	2.306	26	1.706	2.056
9	1.833	2.262	27	1.703	2.052
10	1.812	2.228	28	1.701	2.048
11	1.796	2.201	29	1.699	2.045
12	1.782	2.179	30	1.697	2.042
13	1.771	2.16	40	1.684	2.021
14	1.761	2.145	60	1.671	2
15	1.753	2.131	120	1.658	1.98
16	1.746	2.12	400	1.649	1.966
17	1.74	2.11	Infinit	1.645	1.96
18	1.734	2.101			

For values of Degrees of Freedom not listed:

Interpolate between the listed values.

(df) high value(Z)	400	is (B)	1.649	95%
(df) low value(Y)	120	is (A)	1.658	95%

Desired value(df) (X)	192	Is calculated as follow:
-----------------------	-----	--------------------------

$$\text{EXP}[(\text{Ln}(B) - \text{Ln}(A)) + (Z - Y)] (X - Y) + \text{Ln}(A)]$$

The (df) value for (X)	192	1.656	95%
------------------------	-----	-------	-----

PERFORMED BY: Danna Hickey

DATE: 8/19/98

REVIEWED BY: W. a. Rogers

DATE: 8-21-98

CIMARRON CORPORATION - CIMARRON FACILITY
TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDENCE
WEST PIPELINE TO RIVER - SURFACE

n = pCi/g Th (NAT)

Number	n	(n-N)	(n-N) ²
51	2.0	0.90	0.81
52	1.0	-0.10	0.01
53	1.0	-0.10	0.01
54	2.0	0.90	0.81
55	2.0	0.90	0.81
56	1.0	-0.10	0.01
57	1.0	-0.10	0.01
58	1.0	-0.10	0.01
59	1.0	-0.10	0.01
60	1.0	-0.10	0.01
61	1.0	-0.10	0.01
62	1.0	-0.10	0.01
63	1.0	-0.10	0.01
64	1.0	-0.10	0.01
65	2.0	0.90	0.81
66	1.0	-0.10	0.01
67	2.0	0.90	0.81
68	2.0	0.90	0.81
69	1.0	-0.10	0.01
70	2.0	0.90	0.81
71	2.0	0.90	0.81
72	1.0	-0.10	0.01
73	1.0	-0.10	0.01
74	1.0	-0.10	0.01
75	2.0	0.90	0.81
76	2.0	0.90	0.81
77	1.0	-0.10	0.01
78	1.0	-0.10	0.01
79	1.0	-0.10	0.01
80	1.0	-0.10	0.01
81	1.0	-0.10	0.01
82	1.0	-0.10	0.01
83	1.0	-0.10	0.01
84	1.0	-0.10	0.01
85	1.0	-0.10	0.01
86	1.0	-0.10	0.01
87	2.0	0.90	0.81
88	1.0	-0.10	0.01
89	1.0	-0.10	0.01
90	1.0	-0.10	0.01
91	1.0	-0.10	0.01
92	1.0	-0.10	0.01
93	1.0	-0.10	0.01
94	1.0	-0.10	0.01
95	1.0	-0.10	0.01
96	1.0	-0.10	0.01
97	1.0	-0.10	0.01
98	1.0	-0.10	0.01
99	1.0	-0.10	0.01
100	1.0	-0.10	0.01
	61.0		9.3
	Sum(n)		Sum(n-N) ²

n = pCi/g Th (NAT)

Number	n	(n-N)	(n-N) ²
101	1.0	-0.10	0.01
102	1.0	-0.10	0.01
103	1.0	-0.10	0.01
104	1.0	-0.10	0.01
105	1.0	-0.10	0.01
106	1.0	-0.10	0.01
107	1.0	-0.10	0.01
108	1.0	-0.10	0.01
109	1.0	-0.10	0.01
110	1.0	-0.10	0.01
111	1.0	-0.10	0.01
112	1.0	-0.10	0.01
113	1.0	-0.10	0.01
114	1.0	-0.10	0.01
115	1.0	-0.10	0.01
116	1.0	-0.10	0.01
117	1.0	-0.10	0.01
118	1.0	-0.10	0.01
119	1.0	-0.10	0.01
120	1.0	-0.10	0.01
121	1.0	-0.10	0.01
122	1.0	-0.10	0.01
123	1.0	-0.10	0.01
124	1.0	-0.10	0.01
125	1.0	-0.10	0.01
126	1.0	-0.10	0.01
127	1.0	-0.10	0.01
128	1.0	-0.10	0.01
129	1.0	-0.10	0.01
130	1.0	-0.10	0.01
131	1.0	-0.10	0.01
132	1.0	-0.10	0.01
133	1.0	-0.10	0.01
134	1.0	-0.10	0.01
135	1.0	-0.10	0.01
136	1.0	-0.10	0.01
137	1.0	-0.10	0.01
138	1.0	-0.10	0.01
139	1.0	-0.10	0.01
140	1.0	-0.10	0.01
141	1.0	-0.10	0.01
142	1.0	-0.10	0.01
143	1.0	-0.10	0.01
144	1.0	-0.10	0.01
145	1.0	-0.10	0.01
146	1.0	-0.10	0.01
147	1.0	-0.10	0.01
148	1.0	-0.10	0.01
149	1.0	-0.10	0.01
150	1.0	-0.10	0.01
	50.0		0.5
	Sum(n)		Sum(n-N) ²

**CIMARRON CORPORATION - CIMARRON FACILITY
TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDENCE
WEST PIPELINE TO RIVER - SURFACE**

n = pCi/g Th (NAT)

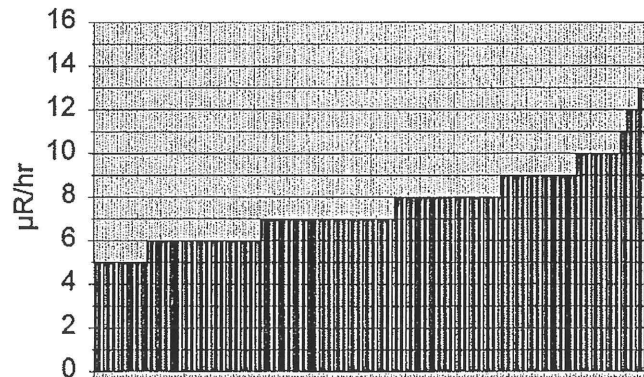
Number	n	(n-N)	(n-N) ²
151	1.0	-0.10	0.01
152	1.0	-0.10	0.01
153	1.0	-0.10	0.01
154	1.0	-0.10	0.01
155	1.0	-0.10	0.01
156	1.0	-0.10	0.01
157	1.0	-0.10	0.01
158	1.0	-0.10	0.01
159	1.0	-0.10	0.01
160	1.0	-0.10	0.01
161	1.0	-0.10	0.01
162	1.0	-0.10	0.01
163	1.0	-0.10	0.01
164	1.0	-0.10	0.01
165	1.0	-0.10	0.01
166	1.0	-0.10	0.01
167	1.0	-0.10	0.01
168	1.0	-0.10	0.01
169	1.0	-0.10	0.01
170	1.0	-0.10	0.01
171	1.0	-0.10	0.01
172	1.0	-0.10	0.01
173	1.0	-0.10	0.01
174	1.0	-0.10	0.01
175	1.0	-0.10	0.01
176	1.0	-0.10	0.01
177	1.0	-0.10	0.01
178	1.0	-0.10	0.01
179	1.0	-0.10	0.01
180	1.0	-0.10	0.01
181	1.0	-0.10	0.01
182	1.0	-0.10	0.01
183	1.0	-0.10	0.01
184	1.0	-0.10	0.01
185	1.0	-0.10	0.01
186	1.0	-0.10	0.01
187	1.0	-0.10	0.01
188	1.0	-0.10	0.01
189	1.0	-0.10	0.01
190	1.0	-0.10	0.01
191	1.0	-0.10	0.01
192	1.0	-0.10	0.01
193	1.0	-0.10	0.01
194			
195			
196			
197			
198			
199			
200			
	43.0		0.4
	Sum(n)		Sum(n-N) ²

n = pCi/g Th (NAT)

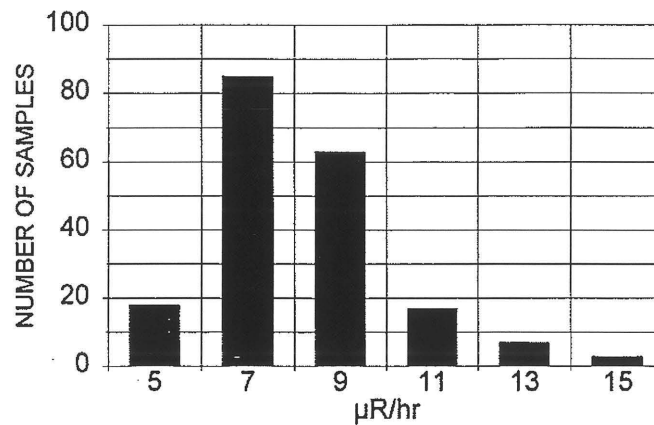
Number	n	(n-N)	(n-N) ²
201			
202			
203			
204			
205			
206			
207			
208			
209			
210			
211			
212			
213			
214			
215			
216			
217			
218			
219			
220			
221			
222			
223			
224			
225			
226			
227			
228			
229			
230			
231			
232			
233			
234			
235			
236			
237			
238			
239			
240			
241			
242			
243			
244			
245			
246			
247			
248			
249			
250			
	0.0		0.0
	Sum(n)		Sum(n-N) ²

'SUB-AREA "H" - SURFACE
'WEST PIPELINE TO RIVER
'LUDLUM MICRO 'R' METER MODEL 19
'MICRO 'R' READINGS AT SURFACE
'AUGUST 1998

MICRO 'R' SURFACE SAMPLE RESULTS
 SURVEY DATA

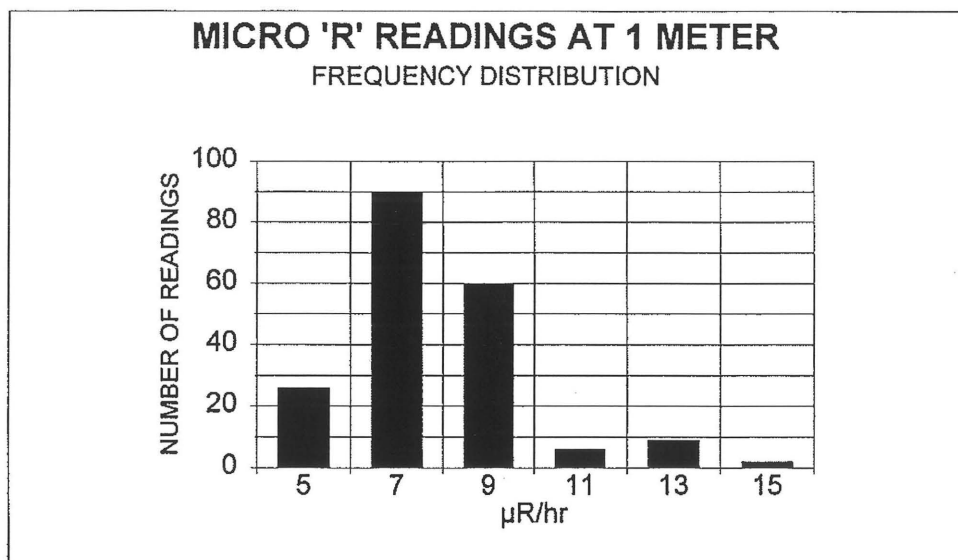
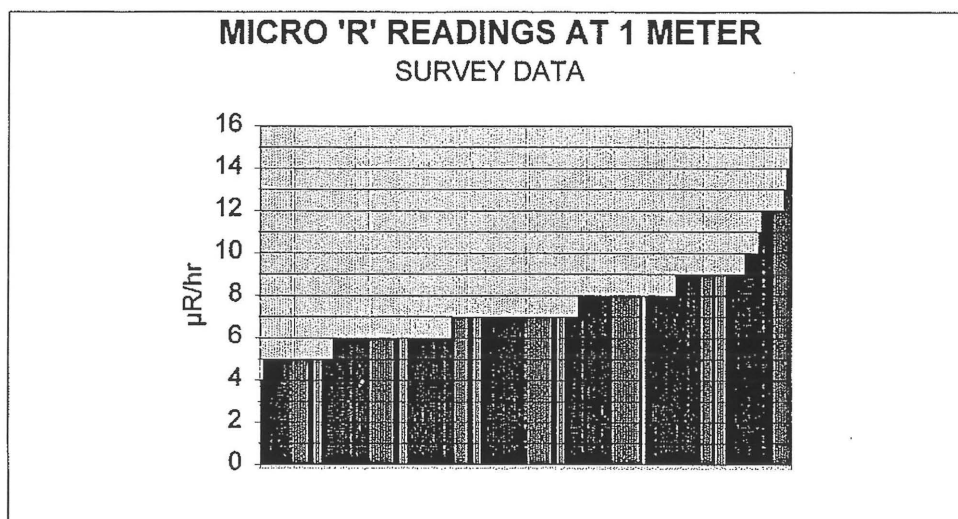


MICRO 'R' SURFACE SAMPLE RESULTS
 FREQUENCY DISTRIBUTION



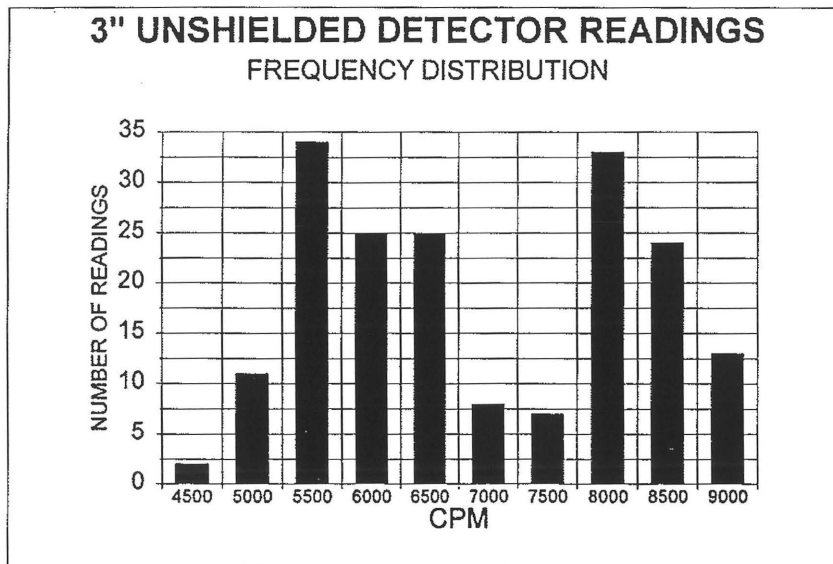
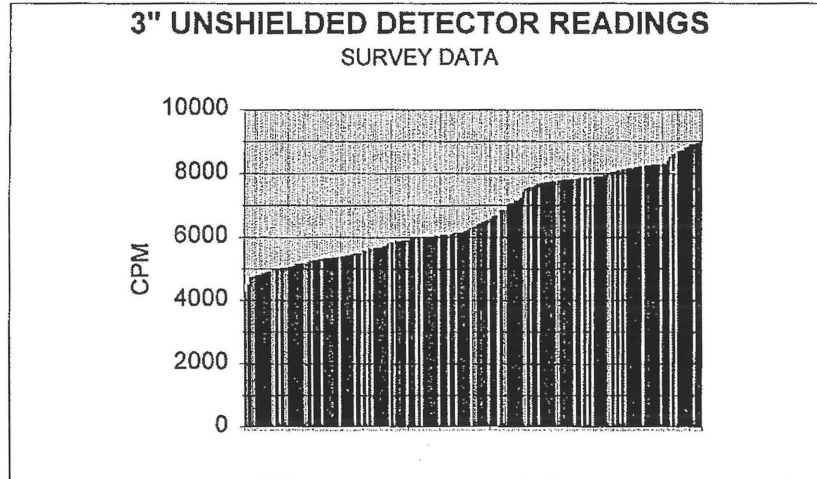
NUMBER OF SAMPLES	193
AVERAGE SAMPLES	8
MINIMUM SAMPLE	5
MAXIMUM SAMPLE	15
STANDARD DEVIATION	2

'SUB-AREA "H" - SURFACE
'WEST PIPELINE TO RIVER
'LUDLUM MICRO 'R' METER MODEL 19
'MICRO 'R' READINGS AT 1 METER
'AUGUST 1998



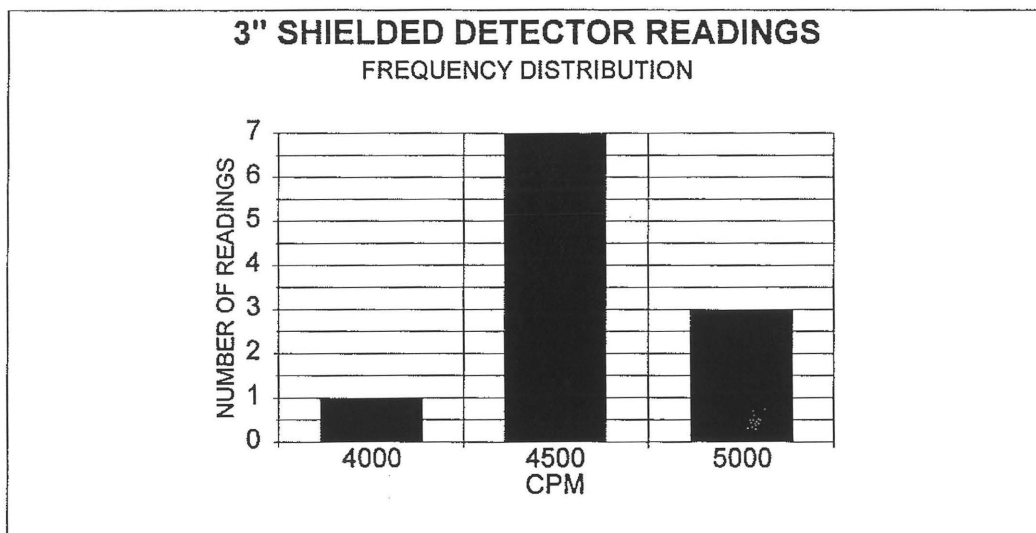
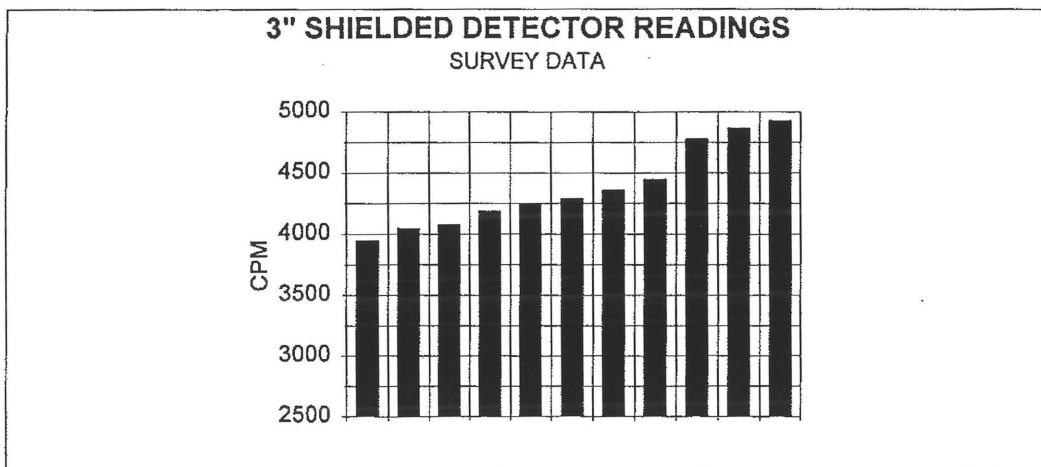
NUMBER OF READINGS	193
AVERAGE READING	7
MINIMUM READING	4
MAXIMUM READING	15
STANDARD DEVIATION	2

**PHASE II, SUB-AREA "H" - SURFACE
'WEST PIPELINE TO RIVER
'LUDLUM MICRO 'R' METER MODEL 19
3" UNSHIELDED DETECTOR READINGS
AUGUST 1998**

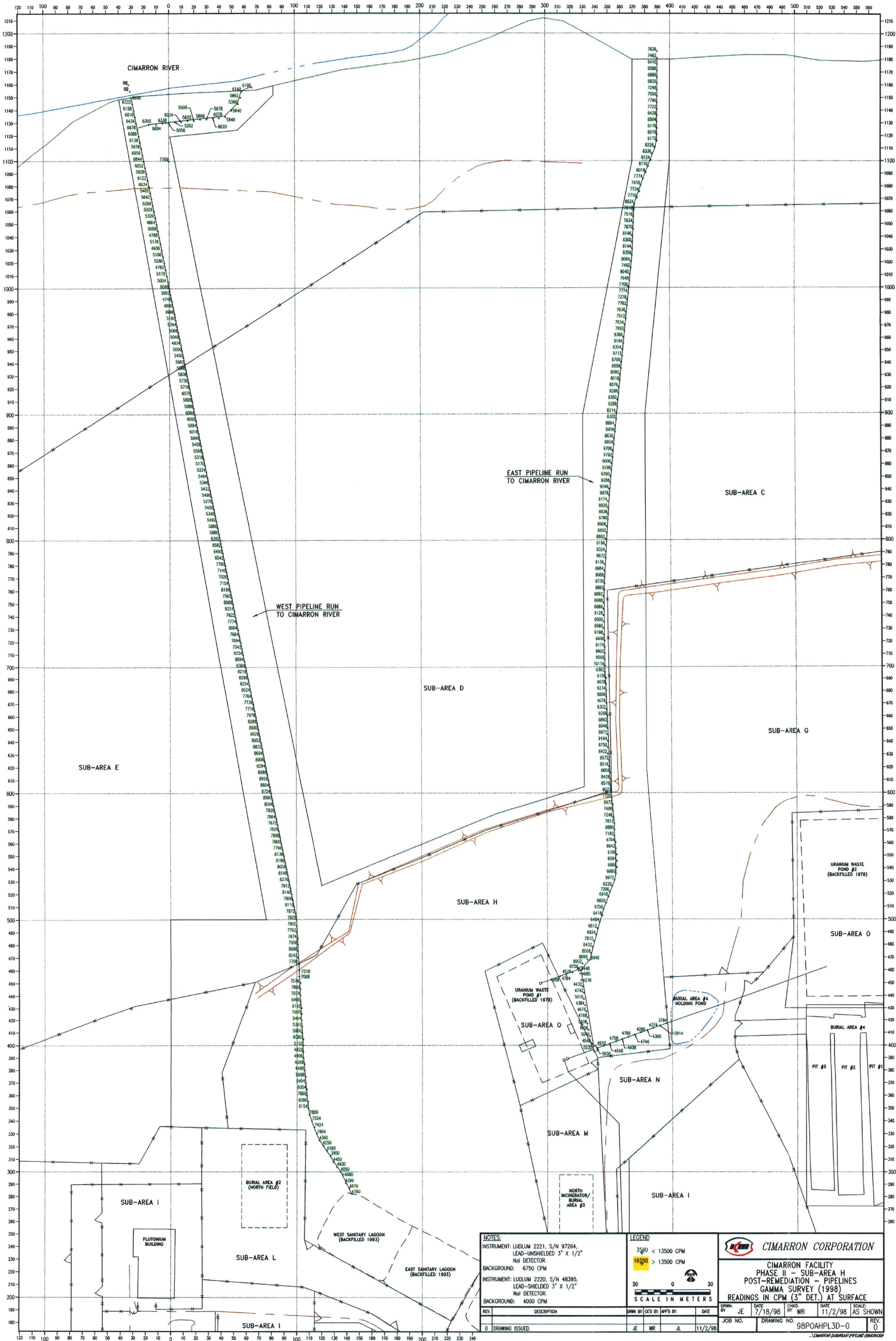


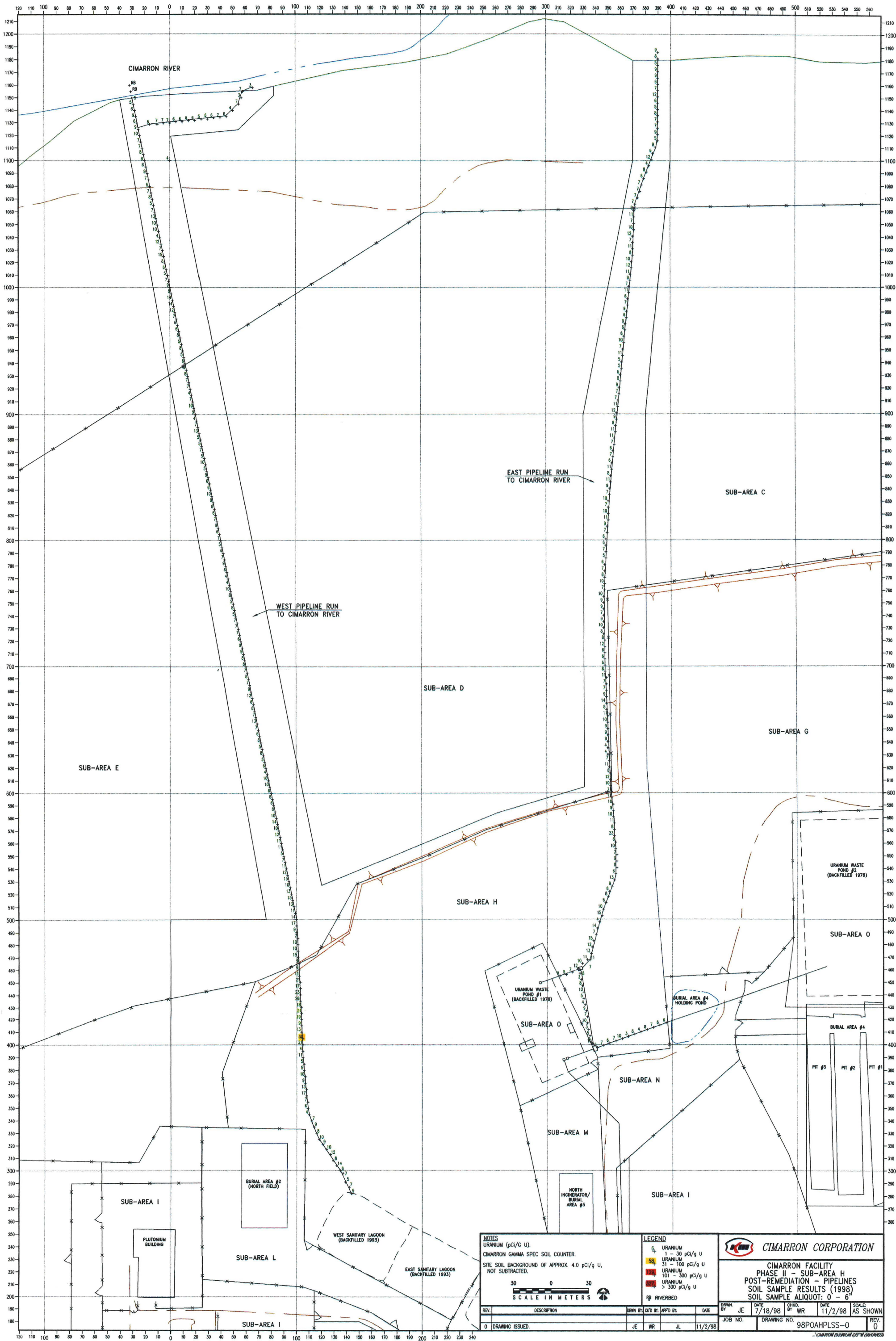
NUMBER OF SAMPLES	182
AVERAGE SAMPLE	6664
MINIMUM SAMPLE	4268
MAXIMUM SAMPLE	8988
STANDARD DEVIATION	1275

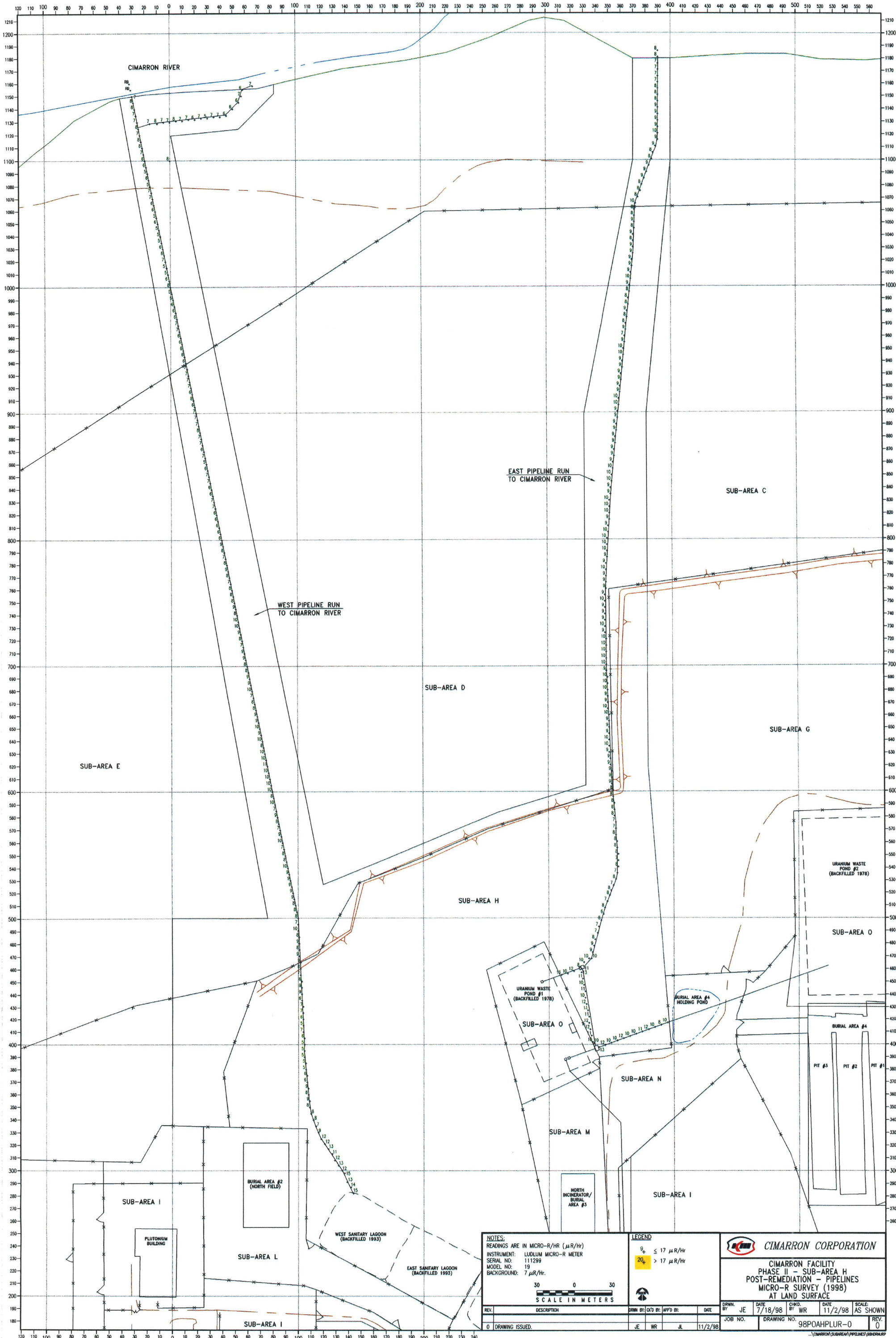
**PHASE II, SUB-AREA "H" - SURFACE
'WEST PIPELINE TO RIVER
'LUDLUM MICRO 'R' METER MODEL 19
3" SHIELDED DETECTOR READINGS
AUGUST 1998**

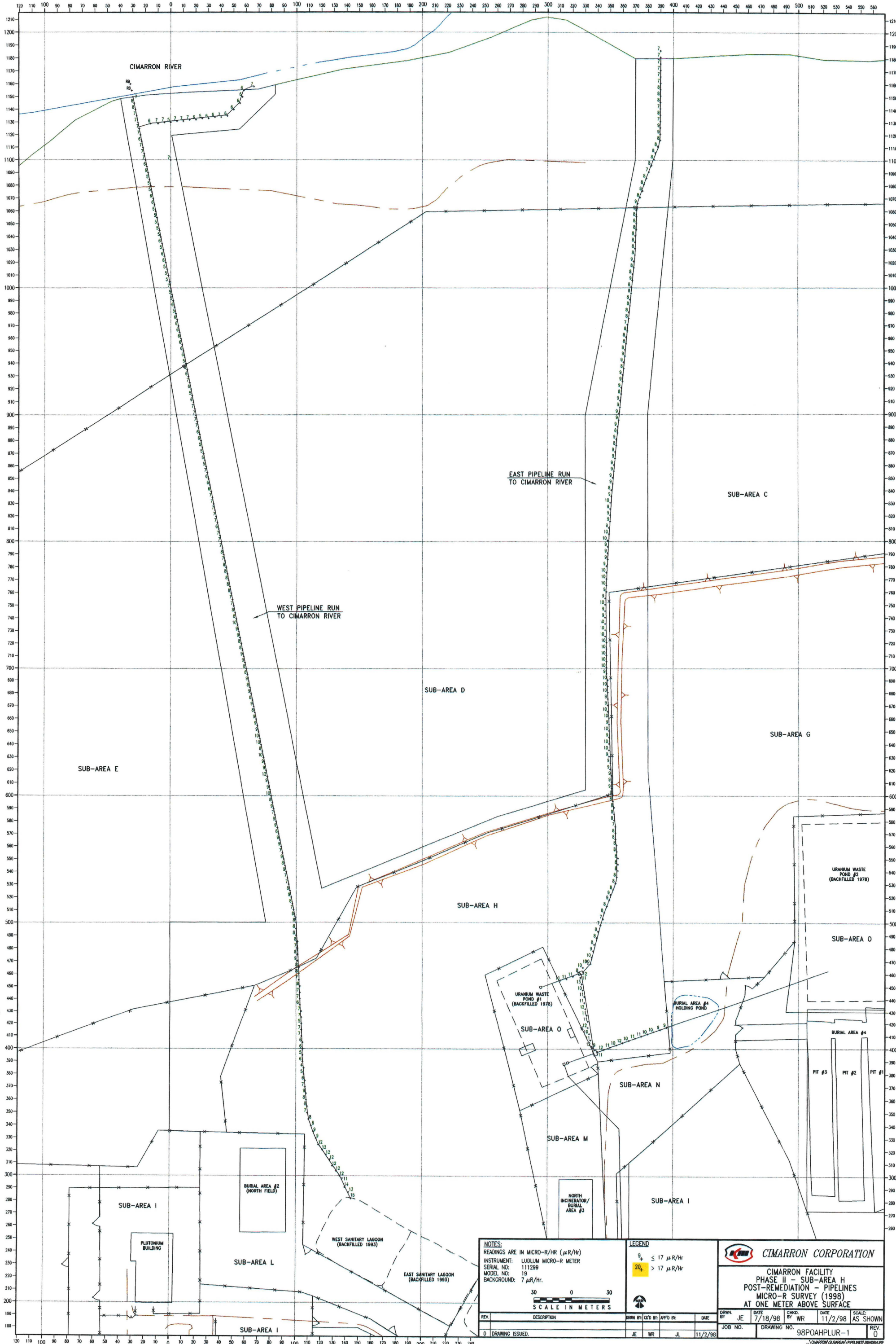


NUMBER OF READINGS	11
AVERAGE READING	4382
MINIMUM READING	3950
MAXIMUM READING	4930
STANDARD DEVIATION	324









CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H"
EAST DRAINAGE WAY

DATE: 06/25/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	391	E	-	400	N	6874	7	6	8	1
2	391	E	-	405	N	6258	7	7	10	1
3	392	E	-	410	N	6614	6	6	ROCK	ROCK
4	392	E	-	415	N	5916	7	6	ROCK	ROCK
5	392	E	-	420	N	5426	7	6	6	1
6	390	E	-	425	N	5624	6	6	4	1
7	389	E	-	430	N	6424	6	7	12	1
8	390	E	-	435	N	5562	7	6	5	1
9	391	E	-	440	N	6480	8	7	9	2
10	387	E	-	445	N	5860	6	6	14	2
11	386	E	-	450	N	5546	6	6	8	1
12	375	E	-	455	N	WATER	WATER	WATER	2	1
13	380	E	-	455	N	WATER	WATER	WATER	6	1
14	380	E	-	460	N	4952	5	6	8	1
15	381	E	-	465	N	5374	6	6	ROCK	ROCK
16	381	E	-	470	N	4772	5	5	ROCK	ROCK
17	380	E	-	475	N	5260	6	6	ROCK	ROCK
18	380	E	-	480	N	6542	6	6	7	1
19	380	E	-	485	N	5906	7	7	ROCK	ROCK
20	375	E	-	487	N	WATER	WATER	WATER	6	1
21	370	E	-	490	N	5806	6	5	13	1
22	371	E	-	495	N	6626	7	6	7	1

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUOLUM MICRO 'R' METER - MODEL 19 S/N 111299

µR/hr 7 2

LUOLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 1
FILE : PHIIHEDW

W.A. Rogers

DATE: 7-7-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H"
EAST DRAINAGE WAY

DATE: 06/25/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	368	E	-	500	N	6640	7	6	7	1
2	368	E	-	505	N	5944	7	7	6	1
3	370	E	-	510	N	6010	6	6	5	1
4	369	E	-	515	N	6690	7	7	15	1
5	367	E	-	520	N	6508	7	7	6	1
6	365	E	-	525	N	8026	8	8	11	1
7	365	E	-	530	N	6364	7	7	8	1
8	365	E	-	535	N	7060	7	8	11	1
9	363	E	-	540	N	6668	7	7	9	1
10	362	E	-	545	N	7904	8	7	10	1
11	362	E	-	550	N	6364	6	7	12	1
12	356	E	-	555	N	6894	8	8	8	1
13	355	E	-	560	N	6246	7	6	10	1
14	359	E	-	565	N	6294	7	7	10	1
15	360	E	-	570	N	WATER	WATER	WATER	9	1
16	360	E	-	575	N	WATER	WATER	WATER	4	1
17	361	E	-	580	N	WATER	WATER	WATER	4	1
18	362	E	-	585	N	WATER	WATER	WATER	8	1
19	364	E	-	590	N	WATER	WATER	WATER	7	1
20	361	E	-	595	N	WATER	WATER	WATER	7	1

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

Total U 4 10
pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 2

FILE : PHIIHEDW

W. A. Rogers

DATE: 6-25-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H"
MIDDLE DRAINAGE WAY

DATE:06/25/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	312	E	-	175	N	6582	8	8	8	1
2	308	E	-	180	N	7022	8	7	6	1
3	304	E	-	185	N	6682	7	7	7	1
4	304	E	-	190	N	6248	6	7	7	1
5	304	E	-	195	N	6046	5	5	1	1
6	303	E	-	200	N	6572	7	7	9	1
7	301	E	-	205	N	5836	6	8	7	1
8	304	E	-	210	N	6354	7	7	10	1
9	301	E	-	215	N	5064	5	6	13	1
10	300	E	-	220	N	6036	7	7	9	1
11	297	E	-	225	N	5606	5	5	11	1
12	297	E	-	230	N	6142	7	7	9	1
13	294	E	-	235	N	6470	7	7	9	1
14	289	E	-	240	N	7126	7	7	11	1
15	287	E	-	245	N	6570	7	7	15	1
16	285	E	-	250	N	6376	7	7	9	1
17	284	E	-	255	N	6848	8	8	8	1
18	281	E	-	260	N	6686	7	7	6	1
19	277	E	-	265	N	6142	7	7	7	1
20	274	E	-	270	N	6746	7	7	8	1

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 1
FILE : PHIIHMDW

W. A. Rogers

DATE: 6-25-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H"
MIDDLE DRAINAGE WAY

DATE: 06/25/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	275	E	-	275	N	6676	7	7	14	1
2	270	E	-	279	N	WATER	WATER	WATER	7	1
3	267	E	-	280	N	6224	7	7	7	1
4	262	E	-	284	N	WATER	WATER	WATER	4	1
5	260	E	-	285	N	6672	7	7	17	1
6	258	E	-	290	N	6638	7	7	14	1
7	255	E	-	295	N	6130	7	7	8	1
8	253	E	-	300	N	6350	6	7	12	1
9	250	E	-	305	N	6700	8	8	11	1
10	251	E	-	310	N	6950	8	8	10	1
11	248	E	-	315	N	6620	7	7	15	1
12	246	E	-	320	N	7026	8	8	12	1
13	240	E	-	323	N	WATER	WATER	WATER	8	1
14	236	E	-	325	N	6680	7	7	13	1
15	235	E	-	330	N	7082	7	8	17	1
16	220	E	-	335	N	7222	8	8	20	1
17	225	E	-	335	N	7238	7	7	11	1
18	230	E	-	335	N	7202	8	8	5	1
19	220	E	-	340	N	7068	7	7	11	2
20	225	E	-	340	N	7292	8	8	10	1

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μ R/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 2

FILE : PHIIHMDW

W. a. Rogers

DATE: 6-25-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H"
MIDDLE DRAINAGE WAY

DATE: 06/25/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	205	E	-	345	N	8174	9	8	14	1
2	210	E	-	345	N	7862	9	8	12	1
3	215	E	-	345	N	7016	7	7	17	1
4	220	E	-	345	N	7100	7	7	6	1
5	225	E	-	345	N	6838	7	7	9	1
6	200	E	-	350	N	8614	8	8	9	1
7	205	E	-	350	N	7898	7	8	11	2
8	210	E	-	350	N	7646	7	7	13	2
9	215	E	-	350	N	7654	7	8	14	2
10	220	E	-	350	N	7488	8	8	5	1
11	200	E	-	355	N	9278	10	9	21	2
12	205	E	-	355	N	7892	8	8	9	1
13	210	E	-	355	N	7610	7	8	18	2
14	215	E	-	355	N	7154	8	8	10	2
15	220	E	-	355	N	7166	7	8	6	2
16	200	E	-	360	N	8660	9	9	15	1
17	205	E	-	360	N	9290	8	8	20	2
18	210	E	-	360	N	8350	9	8	15	2
19	215	E	-	360	N	8482	9	7	15	1
20	205	E	-	365	N	8494	10	9	10	1

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 3

FILE : PHIIHMDW

W. A. Rogers

DATE: 6-25-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H"
MIDDLE DRAINAGE WAY

DATE: 06/25/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	210	E	-	365	N	9280	10	9	10	2
2	215	E	-	365	N	8600	9	9	8	1
3	205	E	-	370	N	10282	11	11	5	2
4	204	E	-	375	N	WATER	WATER	WATER	9	1
5	202	E	-	380	N	9626	10	10	10	2
6	200	E	-	378	N	12620	12	12	7	2
7	195	E	-	376	N	9934	10	11	7	2
8	190	E	-	374	N	7012	8	8	ROCK	ROCK
9	190	E	-	375	N	5798	5	6	ROCK	ROCK
10	185	E	-	375	N	8810	10	8	10	1
11	180	E	-	375	N	8950	8	9	11	2
12	177	E	-	380	N	8682	10	10	13	1
13	174	E	-	385	N	8524	10	10	13	1
14	165	E	-	390	N	8924	10	10	9	2
15	160	E	-	395	N	8356	8	8	17	2
16	151	E	-	400	N	8218	8	8	11	2
17	145	E	-	405	N	8202	7	8	15	1
18	140	E	-	410	N	8716	8	8	12	1
19	135	E	-	415	N	8482	9	9	12	1
20	129	E	-	417	N	WATER	WATER	WATER	6	1

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDDLUM MICRO 'R' METER - MODEL 19 S/N 111299

µR/hr 7 2

LUDDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 4

FILE : PHIIHMDW

W. Q. Rogers

DATE: 6-25-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H"
MIDDLE DRAINAGE WAY

DATE: 06/25/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	124	E	-	418	N	WATER	WATER	WATER	7	1
2	120	E	-	420	N	9288	10	10	12	1
3	115	E	-	425	N	8930	9	10	11	1
4	113	E	-	430	N	8528	10	10	9	1
5	110	E	-	435	N	9096	9	9	14	1
6	105	E	-	440	N	8424	10	8	10	1
7	102	E	-	445	N	8156	10	10	10	2
8		E	-		N					
9		E	-		N					
10		E	-		N					
11		E	-		N					
12		E	-		N					
13		E	-		N					
14		E	-		N					
15		E	-		N					
16		E	-		N					
17		E	-		N					
18		E	-		N					
19		E	-		N					
20		E	-		N					

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 5

FILE : PHIIHMDW

W.A. Rogers

DATE: 7-7-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H" DRAINAGE WAY

DATE: 06/26/98

DATE: 06/20/50

LN #	GRID NUMBER				3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample		
								Total-U	Th (Nat)	
1	59	E	-	340	N	8048	8	8	10	2
2	60	E	-	335	N	8114	10	8	12	2
3	61	E	-	345	N	9090	10	9	13	1
4	64	E	-	350	N	7054	8	9	4	2
5	64	E	-	355	N	WATER	WATER	WATER	4	2
6	65	E	-	361	N	WATER	WATER	WATER	5	1
7	65	E	-	365	N	7956	8	8	11	1
8	65	E	-	390	N	7064	7	7	11	1
9	65	E	-	435	N	7660	8	8	7	1
10	65	E	-	440	N	7142	8	8	7	2
11	66	E	-	370	N	WATER	WATER	WATER	6	1
12	66	E	-	375	N	8398	8	9	14	1
13	66	E	-	385	N	7270	6	8	12	1
14	67	E	-	380	N	7544	8	8	14	1
15	67	E	-	395	N	7244	7	7	9	1
16	70	E	-	430	N	9340	9	10	24	2
17	70	E	-	435	N	8918	9	8	16	1
18	70	E	-	440	N	8906	8	8	30	2
19	71	E	-	400	N	8366	8	8	13	1
20	72	E	-	405	N	7030	8	9	13	1

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A.

Total U 4 10

CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 1
FILE : PHIIHDW

W. A. Rogers

DATE: 6-26-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H" DRAINAGE WAY

DATE: 06/26/98

LN #	GRID NUMBER				3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
								Total-U	Th (Nat)
1	73	E -	410	N	7694	8	10	11	1
2	75	E -	415	N	7742	8	8	12	1
3	75	E -	420	N	8220	8	8	24	1
4	75	E -	425	N	8686	8	9	20	2
5	75	E -	430	N	9016	10	10	20	2
6	75	E -	435	N	7940	8	8	18	1
7	75	E -	440	N	8934	10	10	26	2
8	75	E -	445	N	8460	9	9	14	1
9	80	E -	420	N	9134	9	10	24	2
10	80	E -	425	N	6958	7	8	15	1
11	80	E -	430	N	8576	8	9	27	2
12	80	E -	435	N	7824	8	8	13	1
13	80	E -	440	N	8724	8	10	22	1
14	80	E -	445	N	7948	9	9	21	1
15	84	E -	450	N	9898	8	8	23	1
16	85	E -	425	N	8488	8	8	10	1
17	85	E -	430	N	8046	7	8	13	1
18	85	E -	435	N	7784	8	9	22	1
19	85	E -	440	N	7978	8	8	13	1
20	85	E -	445	N	8846	10	10	22	1
21	85	E -	449	N	8588	8	8	21	1
22	85	E -	450	N	8800	8	8	32	2
23	85	E -	451	N	8668	9	8	11	1
24	86	E -	450	N	9434	10	9	20	1

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 2

FILE : PHIIHDW

W.A. Boyer

DATE: 7-7-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H" DRAINAGE WAY

DATE: 06/26/98

LN #	GRID NUMBER				3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER			
								0-6" Sample		
								Total-U	Th (Nat)	
1	90	E	-	435	N	8830	10	8	9	1
2	90	E	-	444	N	7954	8	7	18	1
3	90	E	-	445	N	8320	8	8	27	1
4	90	E	-	450	N	8236	8	8	20	1
5	95	E	-	445	N	9458	10	10	26	2
6	95	E	-	450	N	8964	8	8	15	1
7	96	E	-	450	N	8142	9	10	14	1
8	100	E	-	454	N	8386	9	9	14	1
9	105	E	-	458	N	7986	8	8	15	1
10	110	E	-	462	N	7638	9	9	14	1
11	112	E	-	460	N	8196	9	8	16	1
12	117	E	-	462	N	7840	7	7	9	1
13	123	E	-	466	N	7590	8	8	10	1
14	128	E	-	470	N	8756	9	9	10	1
15	133	E	-	472	N	8288	9	9	9	2
16	138	E	-	477	N	8208	10	9	12	1
17	143	E	-	483	N	8998	10	9	13	1
18	146	E	-	491	N	8448	8	8	9	1
19	146	E	-	496	N	7590	9	8	12	1
20		E	-		N					

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 3

FILE : PHIIHDW

W. a. Rogers

DATE: 7-7-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H" DRAINAGE WAY

DATE: 06/26/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	148	E	-	501	N	8110	9	9	16	1
2	150	E	-	500	N	7906	8	8	13	1
3	150	E	-	505	N	8848	9	10	14	1
4	150	E	-	510	N	8636	9	9	14	1
5	150	E	-	515	N	8668	10	9	12	1
6	150	E	-	520	N	8746	9	9	8	1
7	155	E	-	505	N	7148	7	8	7	2
8	155	E	-	510	N	8074	8	8	18	1
9	155	E	-	515	N	8784	9	9	13	1
10	155	E	-	520	N	8918	10	9	11	1
11	160	E	-	510	N	8310	8	8	17	1
12	160	E	-	515	N	8184	9	9	18	1
13	160	E	-	520	N	7990	8	8	17	1
14	165	E	-	510	N	7374	8	9	8	1
15	165	E	-	515	N	8836	10	9	13	2
16	165	E	-	520	N	8664	9	9	17	1
17	165	E	-	525	N	8744	9	9	12	2
18	170	E	-	515	N	9306	9	9	15	2
19	170	E	-	520	N	9004	9	9	13	1
20	170	E	-	525	N	9186	9	9	12	2

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr 7 2

LUDDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 4

FILE : PHIIHDW

W.A. Rogers

DATE: 7-7-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H" DRAINAGE WAY

DATE: 06/26/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER		
									0-6" Sample	
									Total-U	Th (Nat)
1	175	E	-	520	N	9120	10	10	16	1
2	175	E	-	525	N	9020	9	9	17	2
3	175	E	-	530	N	9040	9	9	13	1
3	180	E	-	520	N	9350	10	10	13	1
4	180	E	-	525	N	9428	10	9	16	1
5	180	E	-	530	N	9316	9	9	11	1
6	185	E	-	525	N	9060	10	9	15	2
7	185	E	-	530	N	9644	9	9	20	2
8	190	E	-	525	N	9214	10	9	17	2
9	190	E	-	530	N	9170	10	10	14	1
10	190	E	-	535	N	9518	10	10	14	2
11	195	E	-	530	N	8712	9	8	5	1
12	195	E	-	535	N	9536	9	9	11	1
13	200	E	-	530	N	9260	10	9	10	2
14	200	E	-	535	N	9326	10	9	13	1
15	200	E	-	540	N	9526	9	9	11	2
16	205	E	-	535	N	9270	10	10	9	2
17	205	E	-	540	N	8380	10	9	10	1
18	210	E	-	535	N	9552	10	9	10	2
19	210	E	-	540	N	9602	10	9	18	2
20	210	E	-	545	N	9594	10	9	12	2

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 5

FILE : PHIIHDW

W.A. Rogers

DATE: 7-7-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H" DRAINAGE WAY

DATE: 06/26/98

LN #	GRID NUMBER				3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	DATE: 05/26/00		
								0-6" Sample		
								Total-U	Th (Nat)	
1	215	E	-	535	N	9264	10	9	6	2
2	215	E	-	540	N	9932	10	10	11	2
3	215	E	-	545	N	9574	10	10	13	1
4	220	E	-	540	N	9806	11	10	6	2
5	220	E	-	545	N	9540	10	10	12	1
6	225	E	-	540	N	9746	10	10	8	2
7	225	E	-	545	N	9870	11	10	17	2
8	225	E	-	550	N	10172	11	10	18	1
9	230	E	-	545	N	10200	10	10	6	1
10	230	E	-	550	N	9748	10	10	11	1
11	235	E	-	545	N	9822	10	9	6	2
12	235	E	-	550	N	10622	10	10	12	1
13	235	E	-	555	N	10324	11	10	12	1
14	240	E	-	550	N	10322	10	10	10	1
15	240	E	-	555	N	10034	10	10	10	2
16	245	E	-	550	N	9912	11	10	18	1
17	245	E	-	555	N	10102	10	10	17	2
18	250	E	-	555	N	10350	10	10	16	1
19	250	E	-	560	N	10174	10	10	18	2
20	255	E	-	555	N	10792	11	11	20	2
21	255	E	-	560	N	9880	10	10	7	2

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 6

FILE : PHIIHDW

W. A. Rogers

DATE: 6-26-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H" DRAINAGE WAY

DATE: 06/26/98

DATE: 05/20/00

LN #	GRID NUMBER				3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample		
								Total-U	Th (Nat)	
1	260	E	-	560	N	10000	9	10	16	2
2	260	E	-	565	N	10046	11	11	16	1
3	265	E	-	560	N	10054	10	10	17	2
4	265	E	-	565	N	10248	10	10	9	1
5	270	E	-	560	N	10610	10	10	6	2
6	270	E	-	565	N	9782	10	10	19	2
7	270	E	-	570	N	10064	11	10	14	1
8	275	E	-	565	N	10146	10	10	20	1
9	275	E	-	570	N	10240	11	11	18	2
10	280	E	-	565	N	10446	11	10	15	3
11	280	E	-	570	N	10128	11	11	16	2
12	285	E	-	570	N	9778	10	9	7	2
13	285	E	-	575	N	10302	11	10	13	2
14	290	E	-	570	N	9868	10	10	10	2
15	290	E	-	575	N	10092	10	10	17	2
16	295	E	-	575	N	10134	10	10	14	2
17	295	E	-	580	N	10134	10	10	11	2
18	300	E	-	575	N	9792	11	10	13	2
19	300	E	-	580	N	10274	11	10	19	2
20	305	E	-	575	N	10154	10	10	8	1
21	305	E	-	580	N	9946	11	10	11	2

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

6244

N/A

Total U

4

10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Th(Nat)

1

1

BACKGROUND NOT SUBTRACTED

PAGE 7

FILE : PHIIHDW

W. A. Rogers

DATE: 6-26-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H" DRAINAGE WAY

DATE: 06/26/98

DATE: 05/20/98

LN #	GRID NUMBER				3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample		
								Total-U	Th (Nat)	
1	310	E	-	580	N	10052	11	10	12	2
2	310	E	-	585	N	10236	10	10	10	2
3	315	E	-	580	N	9672	10	10	9	2
4	315	E	-	585	N	10070	11	10	14	2
5	320	E	-	580	N	9736	10	10	18	2
6	320	E	-	585	N	9412	10	10	14	2
7	320	E	-	590	N	10036	10	10	18	2
8	325	E	-	585	N	9982	10	10	14	2
9	325	E	-	590	N	9878	10	10	15	2
10	330	E	-	585	N	10204	10	10	14	2
11	330	E	-	590	N	9274	10	10	13	2
12	335	E	-	585	N	9204	10	10	12	2
13	335	E	-	590	N	9438	10	10	15	2
14	340	E	-	585	N	9162	10	10	16	2
15	340	E	-	590	N	9268	10	10	7	2
16	345	E	-	590	N	8276	9	8	12	2
17	350	E	-	590	N	8336	9	9	8	1
18	355	E	-	590	N	8366	9	9	10	2
19	355	E	-	595	N	7650	8	8	8	1
20	360	E	-	595	N	6412	7	7	9	1

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

μR/hr

7

2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM

6244

N/A

Total U

4

10

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g

Th(Nat)

1

1

BACKGROUND NOT SUBTRACTED

PAGE 8

FILE : PHIIHDW

W. A. Rogers

DATE: 6-26-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H" DRAINAGE WAY

DATE: 06/26/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	364	E	-	670	N	9640	10	8	14	2
2	364	E	-	675	N	9640	10	9	9	2
3	364	E	-	720	N	10138	11	10	6	2
4	365	E	-	615	N	WATER	WATER	WATER	4	1
5	365	E	-	665	N	9540	9	9	9	1
6	365	E	-	680	N	9678	10	9	14	2
7	365	E	-	685	N	9658	10	9	8	2
8	365	E	-	690	N	9608	9	9	10	1
9	365	E	-	715	N	9560	9	9	10	2
10	365	E	-	740	N	10040	10	10	7	1
11	366	E	-	600	N	WATER	WATER	WATER	5	1
12	366	E	-	655	N	7920	8	8	12	1
13	366	E	-	660	N	8776	8	8	7	1
14	366	E	-	695	N	9622	10	10	8	2
15	366	E	-	710	N	9614	9	9	17	1
16	366	E	-	725	N	9718	11	10	8	2
17	366	E	-	730	N	10108	10	9	9	2
18	367	E	-	635	N	7286	8	8	5	1
19	367	E	-	640	N	7902	8	8	5	1
20	367	E	-	645	N	7284	8	8	5	1
21	367	E	-	650	N	7154	8	8	9	1

INSTRUMENTS:

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

RESULTS IN: BACKGROUND MDA

μR/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

Total U 4 10

CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

pCi/g Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED

PAGE 9

FILE : PHIIHDW

W.A. Rogers

DATE: 7-21-98

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE II, AREA "H" DRAINAGE WAY

DATE: 06/26/98

DATE: 06/20/98

LN #	GRID NUMBER				3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample		
								Total-U	Th (Nat)	
1	367	E	-	700	N	9310	9	9	7	2
2	367	E	-	705	N	9718	10	9	10	2
3	367	E	-	735	N	9620	10	10	10	1
4	369	E	-	605	N	WATER	WATER	WATER	5	1
5	370	E	-	610	N	WATER	WATER	WATER	7	1
6	370	E	-	630	N	6110	7	7	4	1
7	370	E	-	745	N	10038	10	10	13	2
8	371	E	-	620	N	WATER	WATER	WATER	8	1
9	373	E	-	625	N	7172	7	7	10	1
10	375	E	-	487	N	WATER	WATER	WATER	6	1
11	375	E	-	745	N	10216	10	11	10	2
12	380	E	-	745	N	10760	11	11	10	2
13		E	-		N					
14		E	-		N					
15		E	-		N					
16		E	-		N					
17		E	-		N					
18		E	-		N					
15		E	-		N					
16		E	-		N					
17		E	-		N					
18		E	-		N					
19		E	-		N					
20		E	-		N					
21		E	-		N					

INSTRUMENTS:

LUDLUM MICRO 'R' METER - MODEL 19 S/N 111299

RESULTS IN: BACKGROUND MDA

μR/hr 7 2

LUDLUM 2221, UNSHIELDED 3" X 1/2" NaI DETECTOR S/N 97264

CPM 6244 N/A

CIMMARON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR

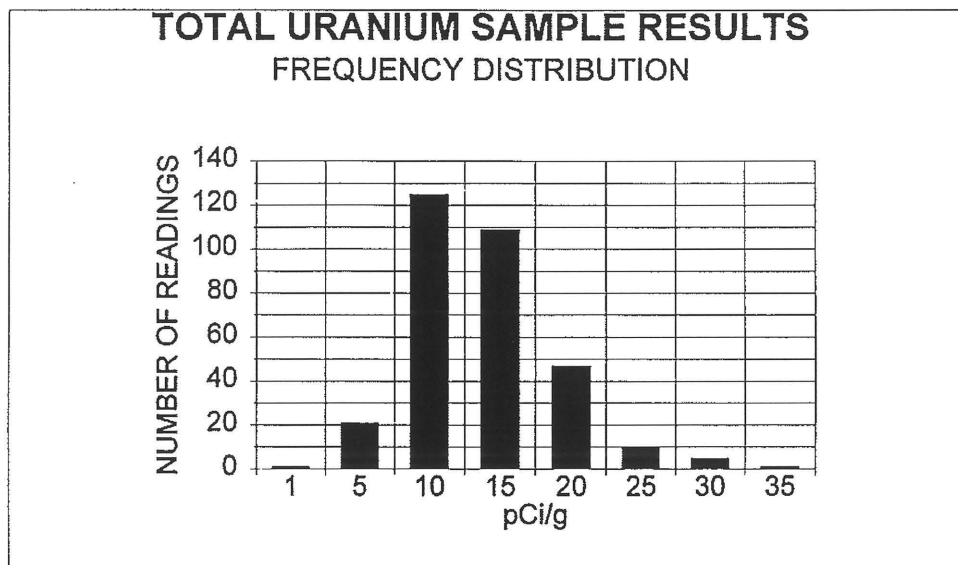
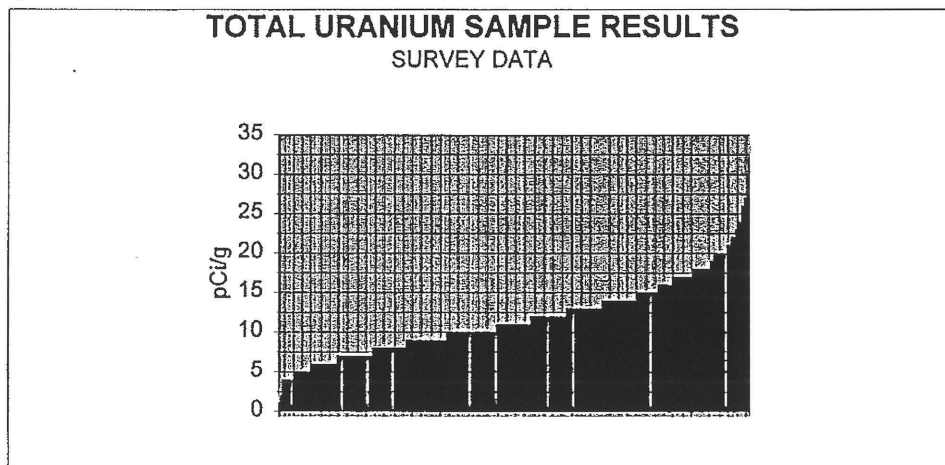
pCi/g Total U 4 10
Th(Nat) 1 1

BACKGROUND NOT SUBTRACTED
PAGE 10
FILE : PHIIHDW

W.A. Rogers

DATE: 6-26-98

**PHASE II, SUB-AREA "H" - SURFACE
 DRAINAGE WAY
 CIMARRON SOIL COUNTER
 TOTAL URANIUM SAMPLE RESULTS
 SITE BACKGROUND OF 4 pCi/g NOT SUBTRACTED
 SEPTEMBER 1998**



NUMBER OF READINGS	319
AVERAGE SAMPLE	12
MINIMUM SAMPLE	1
MAXIMUM SAMPLE	32
STANDARD DEVIATION	5