

APPENDIX 4 – UNAFFECTED AREA

CIMARRON CORPORATION
CIMARRON FACILITY
 Sub-Area "G" Unaffected
 Depth Soil Samples

QAQC-15
 REV.1

LN #	GRID NUMBER	3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	pCi/g									
					0 - 6"		6" - 1'		1' - 2'		2' - 3'		3' - 4'	
					Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	540E-725N	8448	14	14	6.4	1.5	6.4	1.2	6	1.2				
2	545E-760N	11020	12	10	9.5	1.5	6.9	1.3	7.7	0.9				
3	550E-695N	8550	13	13	6.9	1.2	6.3	1.2	8	1.3				
4	550E-720N	8626	15	13	5.1	1.2	8.5	1.3	6.2	1.4				
5	550E-745N	8376	14	13	9	1.2	9.9	1.1	7.2	0.5				
6	585E-770N	10802	11	11	9.4	1.5	6.3	1.5	7.5	1.2				
7	590E-765N	11182	12	11	7.9	1.8	7	1.7	7.8	1.3				
8	595E-770N	11018	12	11	5.7	1.7	5.1	1.4	9.1	1.7				
9	740E-680N	7522	8	7	1.8	0.5	4.9	0.8	4.3	0.7	5.0	0.3	3.6	0.4
10	790E-640N	8208	8	8	3.7	0.9	5.4	1.3	7.0	1.4	5.3	1.3	6.7	1.0
11														
12														
13														
14														
15														
16														
17														
18														

INSTRUMENTS:RESULTS INBACKGROUNDMDA

LUDLUM MICRO 'R' METER - 19 S/N 111299 µr/hr

9

2

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

8000

N/A

CIMMARON SOIL COUNTER X" X 4" X 16" NaI DETECTOR pCi/G

Total U 4

5

Th (Nat) 1.5

1

BACKGROUND NOT SUBTRACTED

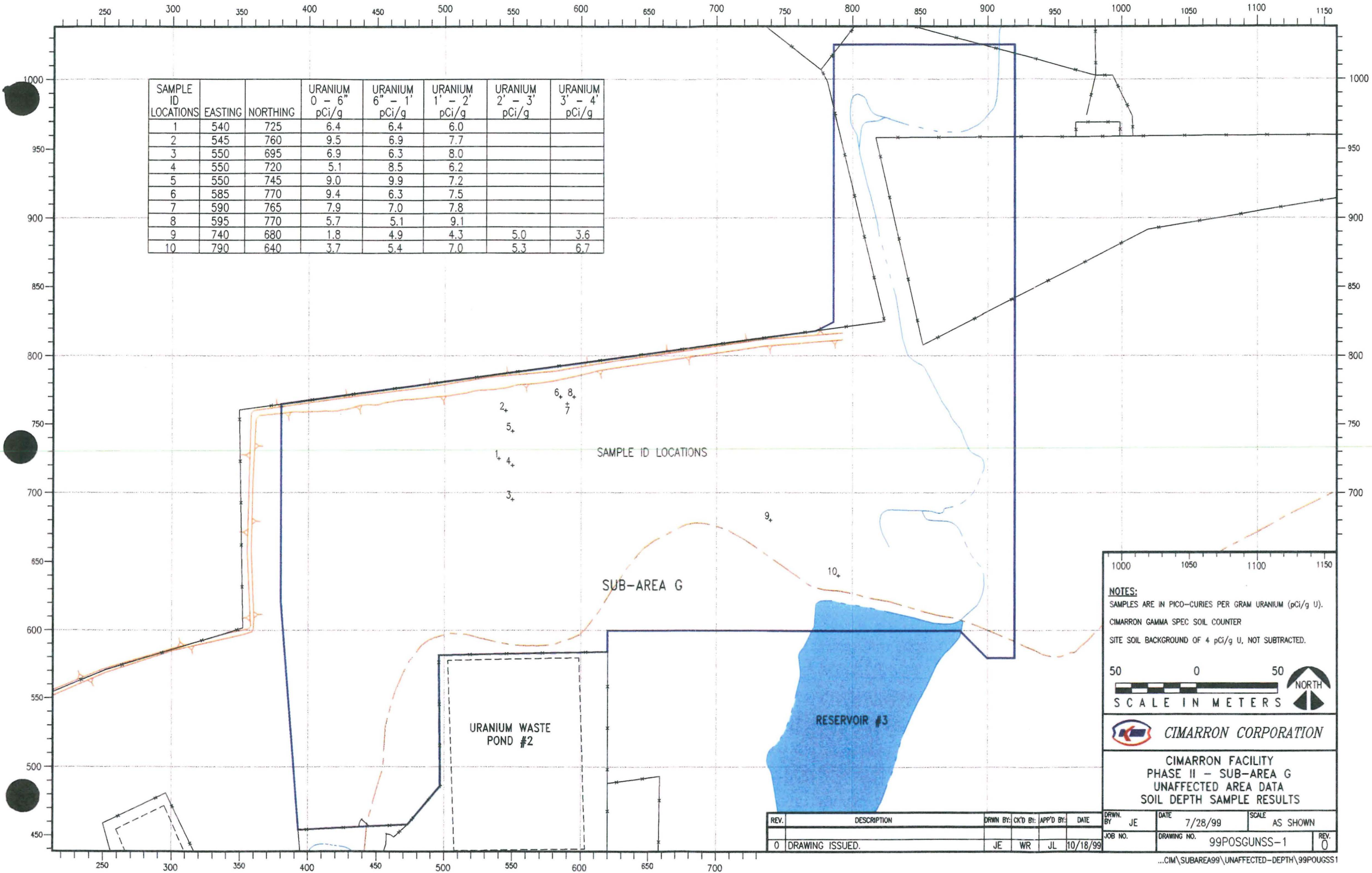
REVIEWED BY:

W. A. Rogers

DATE:

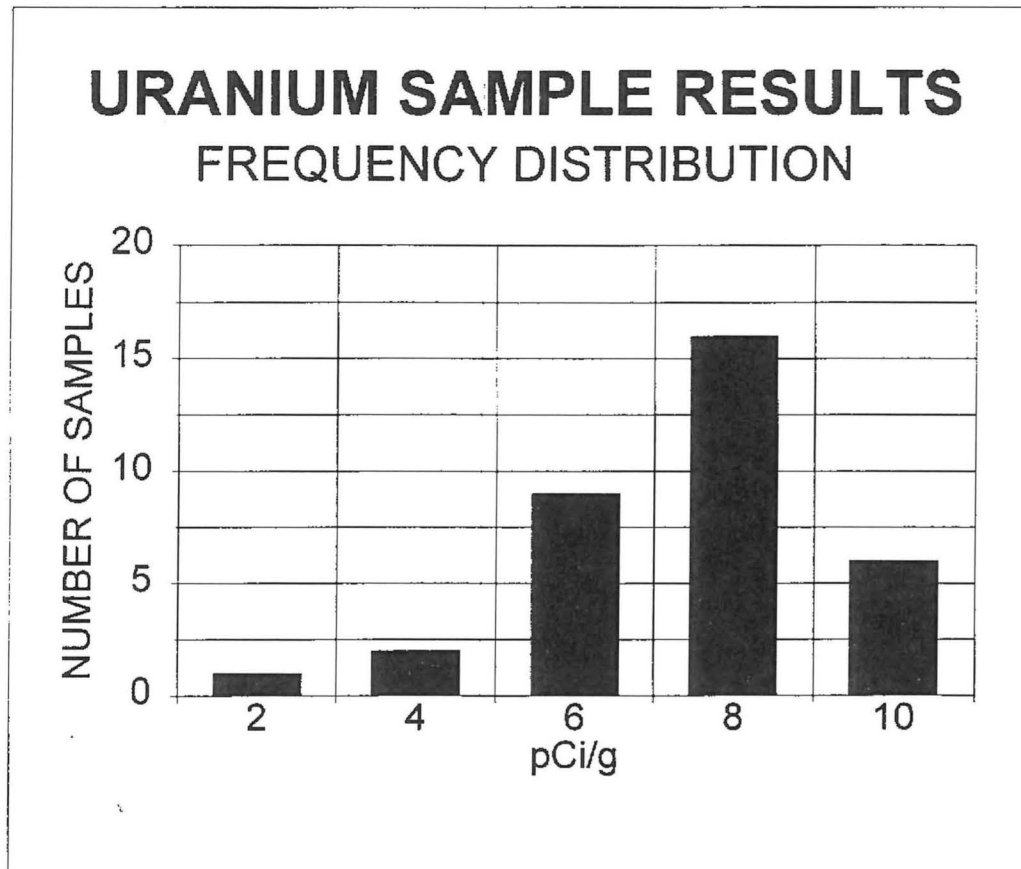
9-14-99

FILE: GUDEPTH



**PHASE II, SUB-AREA "G" - DEPTH
UNAFFECTED AREA
CIMARRON SOIL COUNTER
TOTAL URANIUM SOIL SAMPLE RESULTS
SITE BACKGROUND OF 4 pCi/g NOT SUBTRACTED**

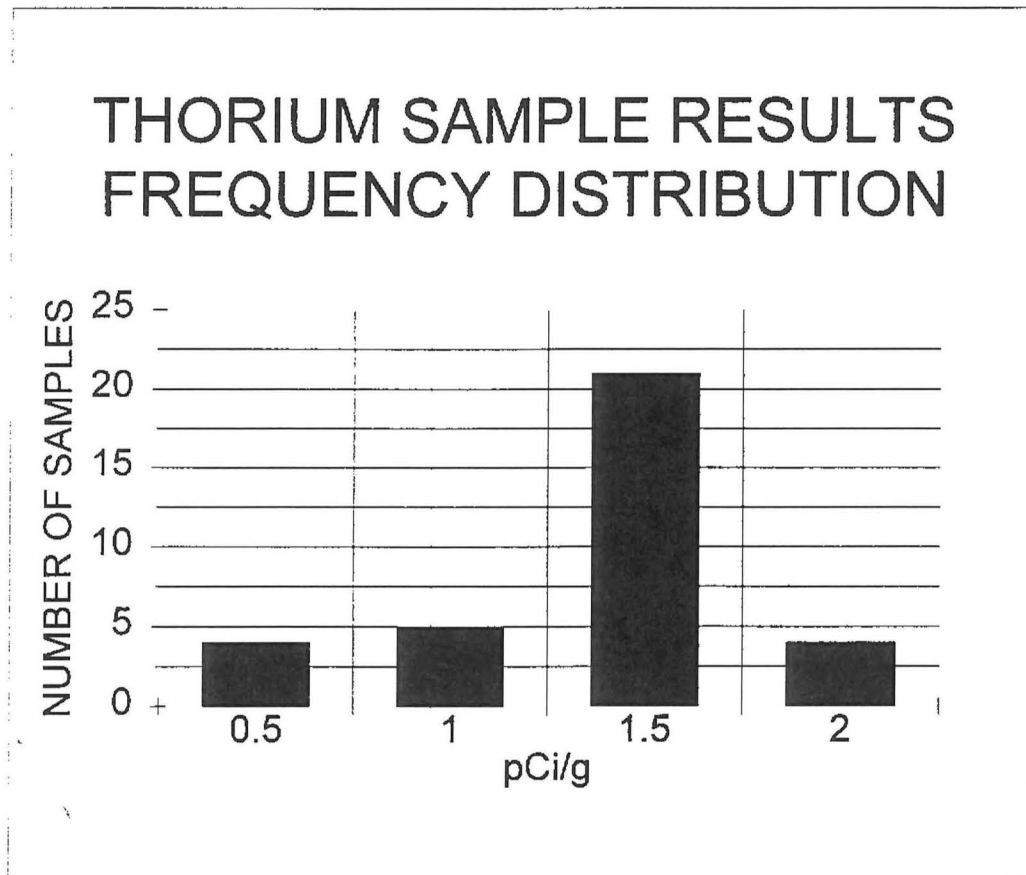
JULY 19,1999



NUMBER OF SAMPLES	34
AVERAGE SAMPLE	6.6
MINIMUM SAMPLE	1.8
MAXIMUM SAMPLE	9.9
STANDARD DEVIATION	1.8

**PHASE II, SUB-AREA "G" - DEPTH
UNAFECTED AREA
CIMARRON SOIL COUNTER
TOTAL THORIUM SOIL SAMPLE RESULTS
SITE BACKGROUND OF 1.5 pCi/g NOT SUBTRACTED**

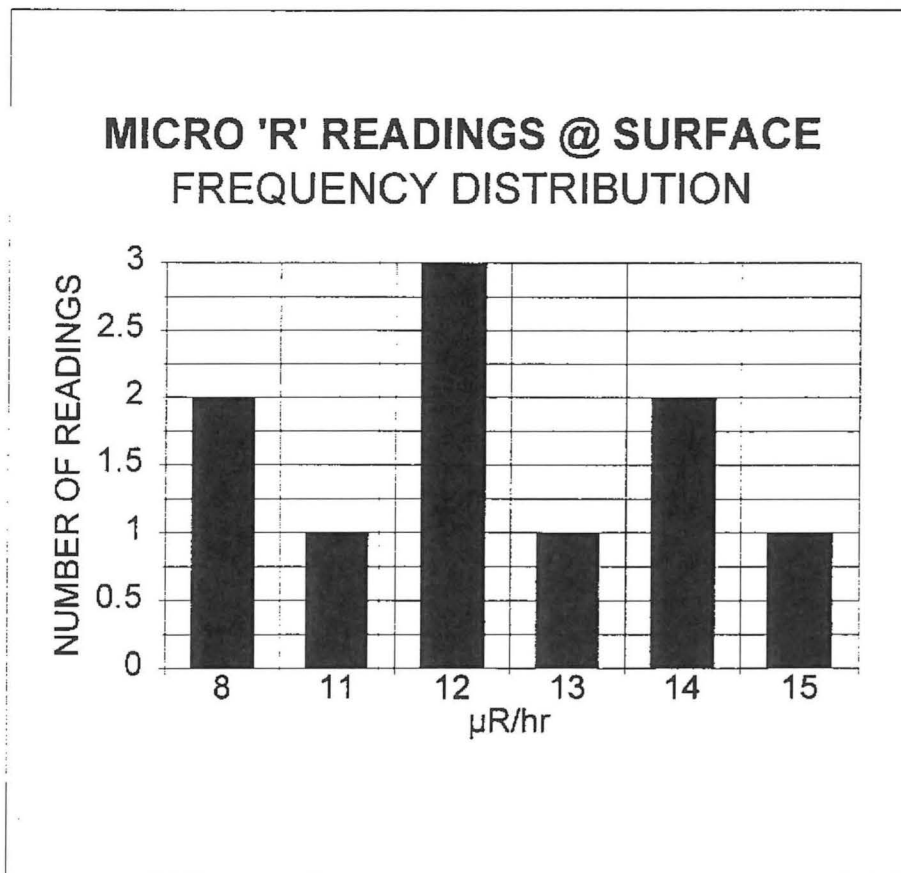
JULY 19,1999



NUMBER OF SAMPLES	34
AVERAGE SAMPLE	1.2
MINIMUM SAMPLE	0.3
MAXIMUM SAMPLE	1.8
STANDARD DEVIATION	0.4

**PHASE II, SUB-AREA "G" - DEPTH
UNAFECTED AREA
MICRO-R METER READINGS AT SURFACE
LUDLUM MODEL 19, S/N 111299
RESULTS IN $\mu\text{R/hr}$**

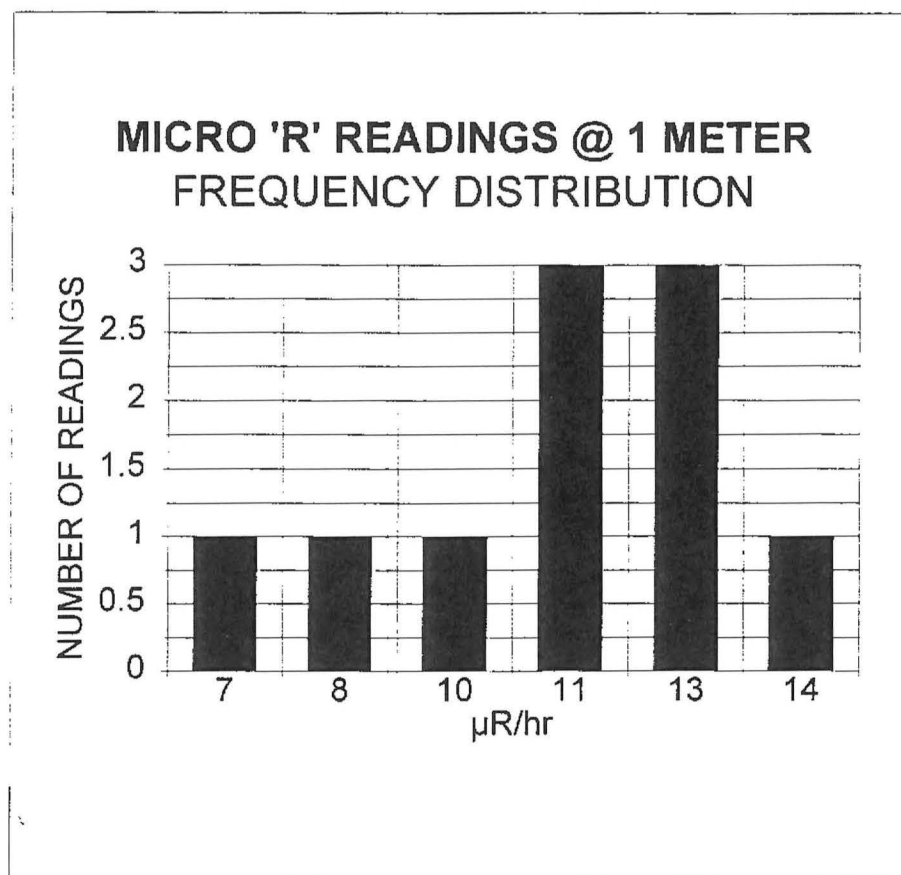
JULY 19, 1999



NUMBER OF SAMPLES	10
AVERAGE SAMPLE	12
MINIMUM SAMPLE	8
MAXIMUM SAMPLE	15
STANDARD DEVIATION	2

**PHASE II, SUB-AREA "G" - DEPTH
UNAFECTED AREA
MICRO-R METER READINGS AT 1 METER ABOVE SURFACE
LUDLUM MODEL 19, S/N 111299
RESULTS IN $\mu\text{R/hr}$**

JULY 19, 1999

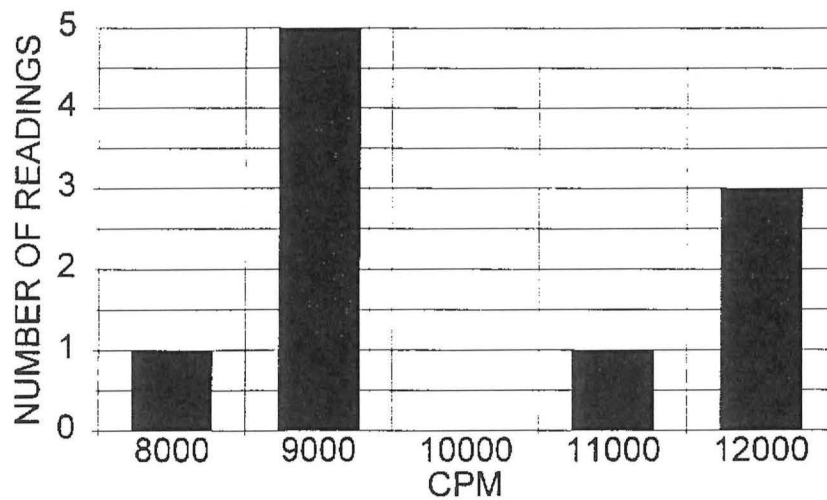


NUMBER OF SAMPLES	10
AVERAGE SAMPLE	11
MINIMUM SAMPLE	7
MAXIMUM SAMPLE	14
STANDARD DEVIATION	2

**PHASE II, SUB-AREA "G" - DEPTH
UNAFECTED AREA
GROSS GAMMA READINGS IN CPM
LUDLUM MODEL 2221, S/N 97264
BACKGROUND AVERAGES: 8000**

JULY 19,1999

**3" NaI DETECTOR READINGS
FREQUENCY DISTRIBUTION**



NUMBER OF SAMPLES	10
AVERAGE SAMPLE	9375
MINIMUM SAMPLE	7522
MAXIMUM SAMPLE	11182
STANDARD DEVIATION	1364

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

Number	n	(n-N)	(n-N) ²
1	6.4	-0.2	0.0
2	9.5	2.9	8.6
3	6.9	0.3	0.1
4	5.1	-1.5	2.2
5	9	2.4	5.9
6	9.4	2.8	8.0
7	7.9	1.3	1.8
8	5.7	-0.9	0.8
9	1.8	-4.8	22.8
10	3.7	-2.9	8.3
11	6.4	-0.2	0.0
12	6.9	0.3	0.1
13	6.3	-0.3	0.1
14	8.5	1.9	3.7
15	9.9	3.3	11.1
16	6.3	-0.3	0.1
17	7	0.4	0.2
18	5.1	-1.5	2.2
19	4.9	-1.7	2.8
20	5.4	-1.2	1.4
21	6	-0.6	0.3
22	7.7	1.1	1.3
23	8	1.4	2.0
24	6.2	-0.4	0.1
25	7.2	0.6	0.4
26	7.5	0.9	0.9
27	7.8	1.2	1.5
28	9.1	2.5	6.4
29	4.3	-2.3	5.2
30	7.0	0.4	0.2
31	5.0	-1.6	2.5
32	5.3	-1.3	1.6
33	3.6	-3.0	8.8
34	6.7	0.1	0.0
35		0.0	0.0
36		0.0	0.0
37		0.0	0.0
38		0.0	0.0
39		0.0	0.0
40		0.0	0.0
41		0.0	0.0
42		0.0	0.0
43		0.0	0.0
44		0.0	0.0
45		0.0	0.0
46		0.0	0.0
47		0.0	0.0
48		0.0	0.0
49		0.0	0.0
50		0.0	0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	223.5		111.1
	Sum(n)		Sum(n-N) ²

No. of Samples (x) : 34

COUNT TIME: 5 MINUTES

Sample Mean (N) = Sum(n) ÷ (x)

Sample Mean (N) : 6.57

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

Standard Deviation: 1.84

2 Std Deviations:	3.67
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Degree of Freedom(df).= (x) - 1 Data listed on Table 8-1

$$(df) = 1.693$$

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

$$(A_{\mu}) = \boxed{7.11}$$

GUIDELINE VALUE:	30
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Acceptable Level:	34.0
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pCi/gU TOTAL U

pCi/gU TOTAL U

pCi/gU TOTAL U

TABLE B-1

(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)	40	is (B)	1.684	95%
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(df) low value(Y)	30	is (A)	1.697	95%
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Desired value(df) (X)	33	is calculated as follow:
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$$\text{EXP}[(\text{Ln}(\text{B})-\text{Ln}(\text{A})) \div (\text{Z}-\text{Y})] (\text{X}-\text{Y}) + \text{Ln}(\text{A})]$$

The (df) value for (X)	33	1.693	95%
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PERFORMED BY: W. a. Rozar

DATE: 7-21-98

REVIEWED BY: K Morgan

DATE: 7-21-99

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

Number	n	$(n-N)$	$(n-N)^2$
1	1.5	0.3	0.1
2	1.5	0.3	0.1
3	1.2	0.0	0.0
4	1.2	0.0	0.0
5	1.2	0.0	0.0
6	1.5	0.3	0.1
7	1.8	0.6	0.4
8	1.7	0.5	0.3
9	0.5	-0.7	0.5
10	0.9	-0.3	0.1
11	1.2	0.0	0.0
12	1.3	0.1	0.0
13	1.2	0.0	0.0
14	1.3	0.1	0.0
15	1.1	-0.1	0.0
16	1.5	0.3	0.1
17	1.7	0.5	0.3
18	1.4	0.2	0.0
19	0.8	-0.4	0.2
20	1.3	0.1	0.0
21	1.2	0.0	0.0
22	0.9	-0.3	0.1
23	1.3	0.1	0.0
24	1.4	0.2	0.0
25	0.5	-0.7	0.5
26	1.2	0.0	0.0
27	1.3	0.1	0.0
28	1.7	0.5	0.3
29	0.7	-0.5	0.2
30	1.4	0.2	0.0
31	0.3	-0.9	0.8
32	1.3	0.1	0.0
33	0.4	-0.8	0.6
34	1.0	-0.2	0.0
35		0.0	0.0
36		0.0	0.0
37		0.0	0.0
38		0.0	0.0
39		0.0	0.0
40		0.0	0.0
41		0.0	0.0
42		0.0	0.0
43		0.0	0.0
44		0.0	0.0
45		0.0	0.0
46		0.0	0.0
47		0.0	0.0
48		0.0	0.0
49		0.0	0.0
50		0.0	0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	40.4		4.7
	Sum(n)		Sum(N-N) ²

No. of Samples (x) : 34

COUNT TIME: 5 MINUTES

Sample Mean (N) = Sum(n) + (x)

Sample Mean (N) : 1.19

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

Standard Deviation: 0.38

2 Std Deviations:	0.76
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Degree of Freedom(df).= (x) - 1 Data listed on Table B-1

$$(df) = 1.693$$

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

(A _μ) =	1.30	pCi/gTh (NAT)
GUIDELINE VALUE:	10	pCi/gTh (NAT)
Acceptable Level:	4.0	pCi/gTh (NAT)

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)	40	is (B)	1.684	95%
(df) low value(Y)	30	is (A)	1.697	95%

Desired value(df) (X)	33	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)	33	1.693	95%
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PERFORMED BY: W. A. Rosen

DATE: 7-21-99

REVIEWED BY: K Morgan

DATE: 7-21-99

Tuesday, September 14, 1999

**CIMARRON CORPORATION
CIMARRON FACILITY
Sub-Area "G" Unaffected
Surface Soil Samples**

DATE: 4/23/98

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	-	490	N	7830	8	8	5.9	1.1
2	390	E	-	540	N	6434	7	7	7.1	0.9
3	390	E	-	590	N	6402	7	7	4.6	0.8
4	390	E	-	640	N	8418	9	9	5.5	1
5	390	E	-	762	N	7756	11	11	5.5	0.5
6	395	E	-	640	N	8726	10	9	7.9	1.6
7	400	E	-	640	N	8400	9	9	4.5	0.9
8	405	E	-	640	N	9332	10	9	10	1.2
9	410	E	-	640	N	9652	10	9	8	1.1
10	415	E	-	640	N	9428	10	10	10	1
11	420	E	-	640	N	9844	10	10	4.6	1.3
12	425	E	-	640	N	9868	10	11	4	1.3
13	430	E	-	640	N	10050	11	10	3.3	1.4
14	435	E	-	640	N	9934	10	10	6.6	1.2
15	440	E	-	480	N	9368	9	8	7.3	1.5
16	440	E	-	530	N	9338	10	8	4.7	1.8
17	440	E	-	580	N	9982	9	9	5.2	1.5
18	440	E	-	630	N	7260	8	8	6.2	1.3
19	440	E	-	640	N	10040	11	10	7.4	1.3
20	440	E	-	769	N	8684	12	12	6.3	0.7

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

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

μR/hr 9 2

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

CPM 7800 N/A

Total U 4 10

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

pCi/g Th(Nat) 1.5 1

BACKGROUND NOT SUBTRACTED

PAGE 1

FILE: GUSS

W. A. Rogers

DATE: 9-14-99

Tuesday, September 14, 1999

**CIMARRON CORPORATION
CIMARRON FACILITY
Sub-Area "G" Unaffected
Surface Soil Samples**

DATE: 4/23/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	445	E	-	640	N	9842	10	10	6.2	1.1
2	450	E	-	640	N	9694	10	9	10.5	0.8
3	455	E	-	640	N	9704	10	10	7.8	0.9
4	460	E	-	640	N	9612	11	10	10.7	0.6
5	465	E	-	645	N	9490	10	9	9.7	0.8
6	470	E	-	650	N	9582	10	10	6.5	1
7	475	E	-	655	N	9814	11	10	5.7	1.3
8	480	E	-	655	N	10384	10	11	7	1.2
9	485	E	-	660	N	10368	10	11	6.8	1.3
10	490	E	-	490	N	7848	9	9	5.3	1.3
11	490	E	-	540	N	6632	6	6	6.8	1.3
12	490	E	-	665	N	10210	10	10	4.5	1.5
13	490	E	-	775	N	8150	12	12	4.2	0.7
14	495	E	-	670	N	10072	10	10	7.8	1.1
15	500	E	-	675	N	10212	10	9	4.5	1.4
16	505	E	-	675	N	10380	10	10	5.2	0.9
17	510	E	-	680	N	9934	10	11	5.6	1.2
18	515	E	-	680	N	9484	8	9	5.3	0.9
19	520	E	-	680	N	7650	9	9	4.4	1
20	525	E	-	680	N	7920	9	8	5.7	0.8

INSTRUMENTS:

RESULTS IN: BACKGROUN MDA

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

μR/hr 9 2

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

CPM 7800 N/A

Total U 4 10

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

pCi/g Th(Nat) 1.5 1

BACKGROUND NOT SUBTRACTED

PAGE 2

FILE: GUSS

W.A. Rogers

DATE: 9-14-99

CIMARRON CORPORATION
CIMARRON FACILITY
Sub-Area "G" Unaffected
Surface Soil Samples

DATE: 4/23/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	530	E	-	680	N	8408	8	8	5.3	0.8
2	535	E	-	680	N	9028	9	9	3.9	1.1
3	540	E	-	680	N	8882	14	14	5	1.4
4	540	E	-	685	N	8630	12	13	6.7	1.3
5	540	E	-	690	N	8876	13	13	7	1.2
6	540	E	-	695	N	8592	12	13	5.8	0.9
7	540	E	-	700	N	8748	14	13	6.1	1
8	540	E	-	705	N	8916	14	14	5.3	1.1
9	540	E	-	710	N	8942	13	14	6.2	1.1
10	540	E	-	715	N	8836	12	13	7.4	1.1
11	540	E	-	720	N	8570	13	12	6	0.9
12	540	E	-	725	N	8534	13	13	10.4	1.1
13	540	E	-	730	N	8674	14	13	8.6	0.8
14	540	E	-	735	N	8582	13	12	8.2	1.1
15	540	E	-	740	N	8626	13	14	11.4	1.1
16	540	E	-	745	N	8688	13	13	10.7	1.3
17	540	E	-	750	N	8558	14	13	8.8	1.1
18	540	E	-	783	N	8444	13	12	7.1	0.9
19	590	E	-	630	N	9502	9	9	7.4	1.8
20	590	E	-	680	N	7390	7	7	4	1.1

INSTRUMENTS:

RESULTS IN: BACKGROUND

MDA

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

μR/hr

9

2

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

CPM

7800

N/A

Total U

4

10

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

pCi/g

Th(Nat)

1.5

1

BACKGROUND NOT SUBTRACTED

PAGE 3

FILE: GUSS

W.C. Rogers

DATE: 9-14-99

CIMARRON CORPORATION
CIMARRON FACILITY
Sub-Area "G" Unaffected
Surface Soil Samples

DATE: 4/23/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	590	E	-	730	N	10546	11	10	11.1	1.8
2	590	E	-	760	N	9880	12	12	6.9	1.3
3	590	E	-	788	N	9006	12	12	5.1	1.2
4	640	E	-	620	N	9280	9	9	7.1	1.7
5	640	E	-	670	N	8486	8	8	6.7	1.4
6	640	E	-	720	N	7210	8	7	3.2	1
7	640	E	-	770	N	9744	11	10	8.7	1.8
8	640	E	-	780	N	8912	12	13	6.3	1.2
9	640	E	-	796	N	8554	11	12	5.4	0.9
10	690	E	-	610	N	9215	8	8	8.6	1.4
11	690	E	-	660	N	8430	8	8	6.5	1.6
12	690	E	-	710	N	8546	9	7	5.5	1.3
13	690	E	-	760	N	8200	9	7	4.1	1.1
14	690	E	-	790	N	7842	11	11	5.7	1.1
15	690	E	-	803	N	8420	11	11	3	1.1
16	740	E	-	630	N	7732	7	7	4.7	1
17	740	E	-	680	N	3466	6	6	1.8	0.5
18	740	E	-	730	N	8364	9	8	6.2	1.4
19	740	E	-	780	N	7970	8	8	7.1	1.4
20	740	E	-	800	N	7238	10	10	6	1

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

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

μR/hr 9 2

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

CPM 7800 N/A

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

Total U	4	10
Th(Nat)	1.5	1

BACKGROUND NOT SUBTRACTED

PAGE 4

FILE: GUSS

W. a. Rogers

DATE: 9-14-99

CIMARRON CORPORATION
CIMARRON FACILITY
Sub-Area "G" Unaffected
Surface Soil Samples

DATE: 4/23/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	DATE: 12/20/00	
									0-6" Sample	
									Total-U	Th (Nat)
1	740	E	-	810	N	7524	10	10	2.4	0.8
2	790	E	-	690	N	8438	9	8	6.2	1.6
3	790	E	-	740	N	8488	8	7	6.6	1.5
4	790	E	-	790	N	7486	8	7	5	1.4
5	790	E	-	814	N	7150	11	10	4.2	1.1
6	790	E	-	840	N	9196	9	9	6.1	1.6
7	790	E	-	890	N	8452	8	8	7.1	1.3
8	790	E	-	940	N	7918	8	9	7.9	1.2
9	790	E	-	990	N	8636	9	9	6.5	1
10	816	E	-	810	N	5510	9	9	2	0.6
11	840	E	-	670	N	6574	7	7	5.2	0.9
12	840	E	-	720	N	8726	8	7	6.5	1.2
13	840	E	-	770	N	9006	9	9	6.7	1.1
14	840	E	-	870	N	7632	8	8	5.2	1.1
15	840	E	-	920	N	9176	8	8	7	1.4
16	840	E	-	1010	N	7614	8	7	7	0.8
17	890	E	-	620	N	5620	6	6	10.7	1.4
18	890	E	-	670	N	7636	10	8	4.6	1.5
19	890	E	-	770	N	8868	10	9	3.9	1.3
20	890	E	-	820	N	8478	8	8	6.5	0.9

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

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

μR/hr

9

2

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

CPM

7800

N/A

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

pCi/g

Total U

4

10

Th(Nat)

1.5

1

BACKGROUND NOT SUBTRACTED

PAGE 5

FILE: GUSS

W.A. Rogers

DATE: 9-14-99

Tuesday, September 14, 1999

CIMARRON CORPORATION
CIMARRON FACILITY
Sub-Area "G" Unaffected
Surface Soil Samples

DATE: 4/23/98

LN #	GRID NUMBER					3" DETECT C.P.M.	MICRO R' SURF	MICRO R' 1 METER	0-6" Sample	
									Total-U	Th (Nat)
1	890	E	-	870	N	7576	8	8	5.6	1.3
2	890	E	-	920	N	8362	8	8	6.8	1.5
3	890	E	-	1020	N	8716	8	8	7.4	1
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

INSTRUMENTS:

RESULTS IN: BACKGROUND MDA

LUDLUM MICRO 'R' METER - MODEL 19 S/N111299

µR/hr

9

2

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

CPM

7800

N/A

Total U

4

10

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

pCi/g

Th(Nat)

1.5

1

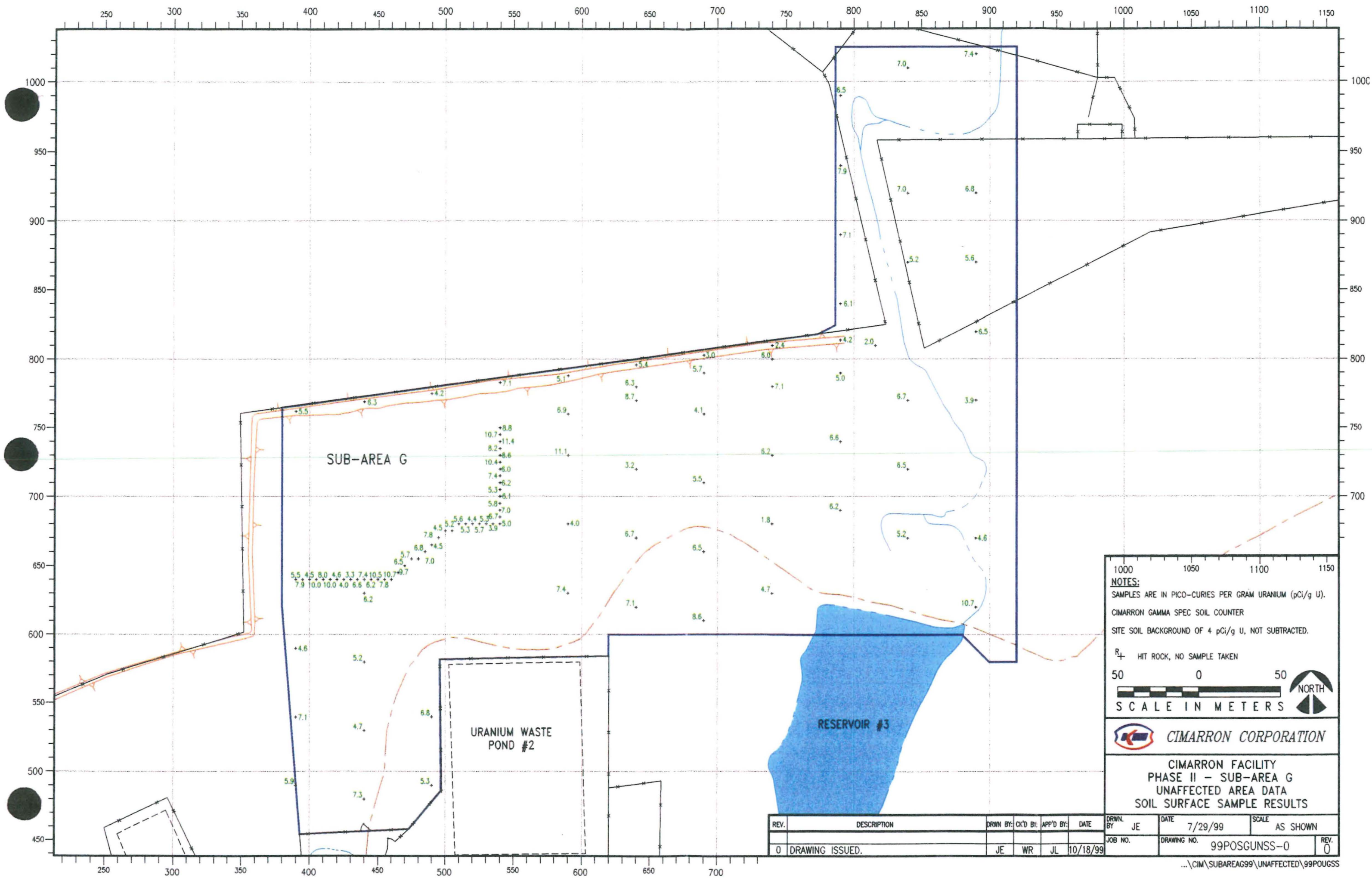
BACKGROUND NOT SUBTRACTED

PAGE 6

FILE: GUSS

W. A. Rogers

DATE: 9-14-99



NOTES:
SAMPLES ARE IN PICO-CURIES PER GRAM URANIUM (pCi/g U).
CIMARRON GAMMA SPEC SOIL COUNTER
SITE SOIL BACKGROUND OF 4 pCi/g U, NOT SUBTRACTED.

R₊ HIT ROCK, NO SAMPLE TAKEN

50 0 50
SCALE IN METERS

CIMARRON CORPORATION

**CIMARRON FACILITY
PHASE II - SUB-AREA G
UNAFFECTED AREA DATA
SOIL SURFACE SAMPLE RESULTS**

REV.	DESCRIPTION	DRWN BY:	CHK'D BY:	APP'D BY:	DATE	DRWN BY:	DATE	SCALE
0	DRAWING ISSUED.	JE	WR	JL	10/18/99	JE	7/29/99	AS SHOWN

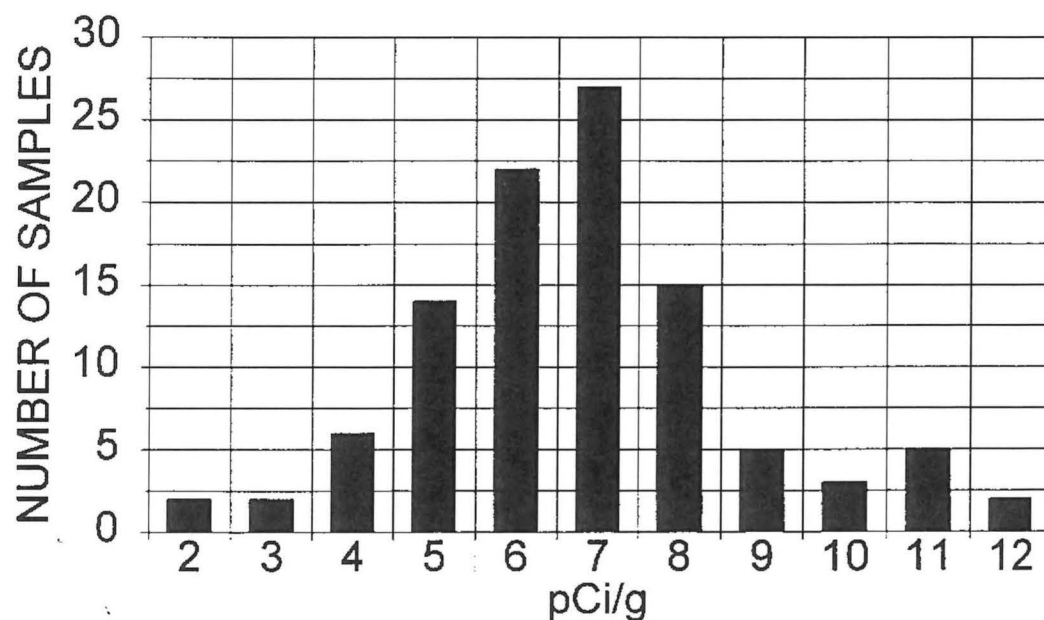
JOB NO. DRAWING NO. 99POSGUNSS-0 REV. 0

**PHASE II, SUB-AREA "G" - SURFACE
UNAFFECTED AREA
CIMARRON SOIL COUNTER
TOTAL URANIUM SOIL SAMPLE RESULTS
SITE BACKGROUND OF 4 pCi/g NOT SUBTRACTED**

SEPTEMBER 13, 1999

URANIUM SAMPLE DATA

FREQUENCY DISTRIBUTION

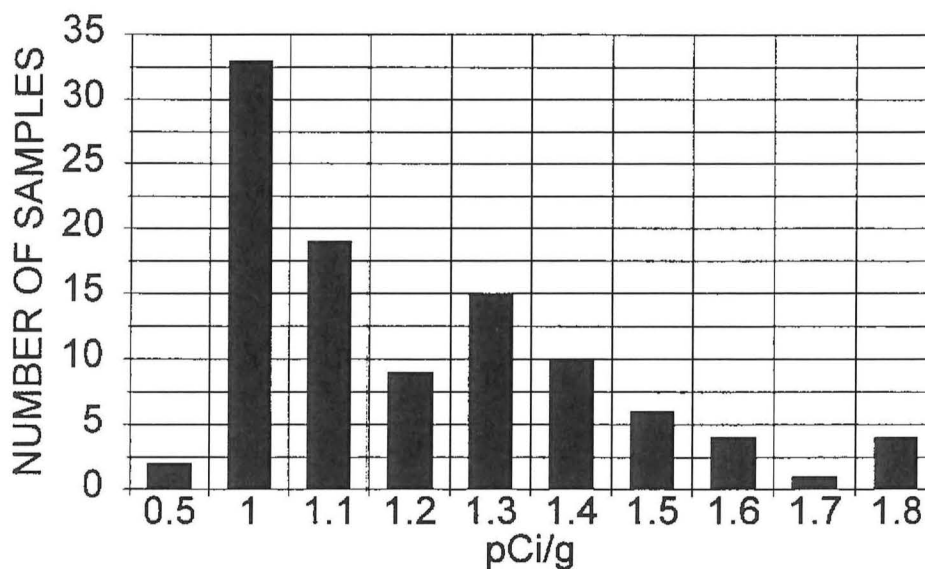


NUMBER OF SAMPLES	103
AVERAGE SAMPLE	6.3
MINIMUM SAMPLE	1.8
MAXIMUM SAMPLE	11.4
STANDARD DEVIATION	2

**PHASE II, SUB-AREA "G" - SURFACE
UNAFECTED AREA
CIMARRON SOIL COUNTER
TOTAL THORIUM SOIL SAMPLE RESULTS
SITE BACKGROUND OF 1.5 pCi/g NOT SUBTRACTED**

SEPTEMBER 13, 1999

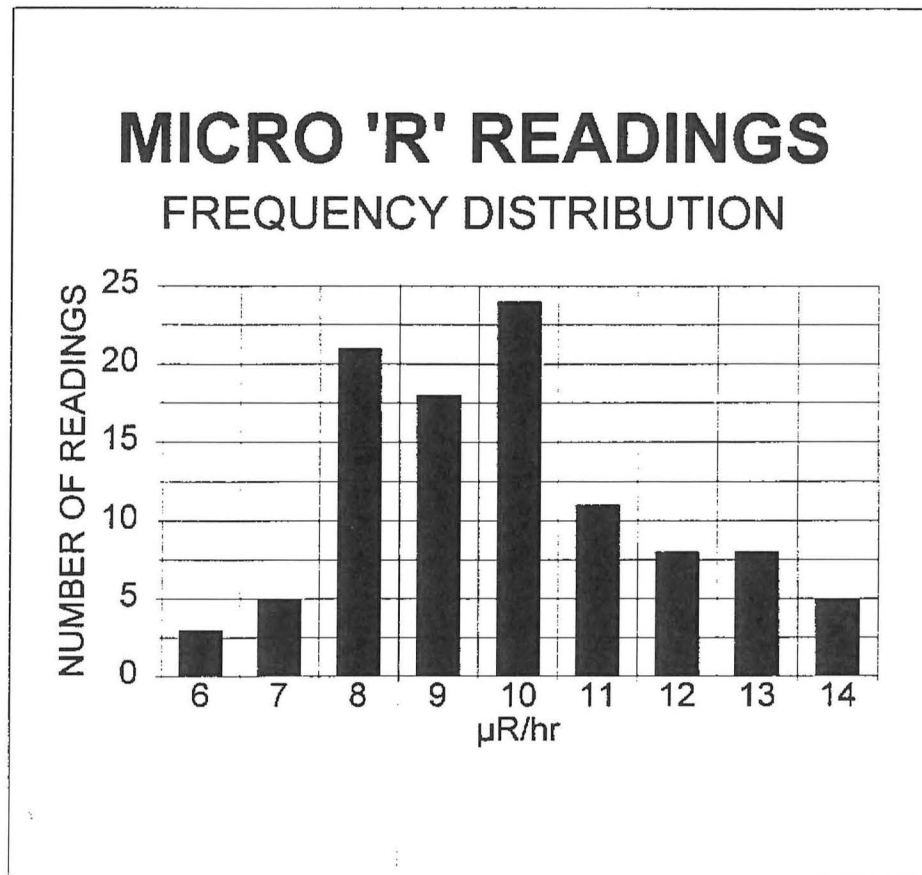
**THORIUM SAMPLE RESULTS
FREQUENCY DISTRIBUTION**



NUMBER OF SAMPLES	103
AVERAGE SAMPLE	1.2
MINIMUM SAMPLE	0.5
MAXIMUM SAMPLE	1.8
STANDARD DEVIATION	0.3

**PHASE II, SUB-AREA "G" - SURFACE
UNAFFECTED AREA
MICRO-R METER READINGS AT SURFACE
LUDLUM MODEL 19, S/N 111299
RESULTS IN $\mu\text{R/hr}$**

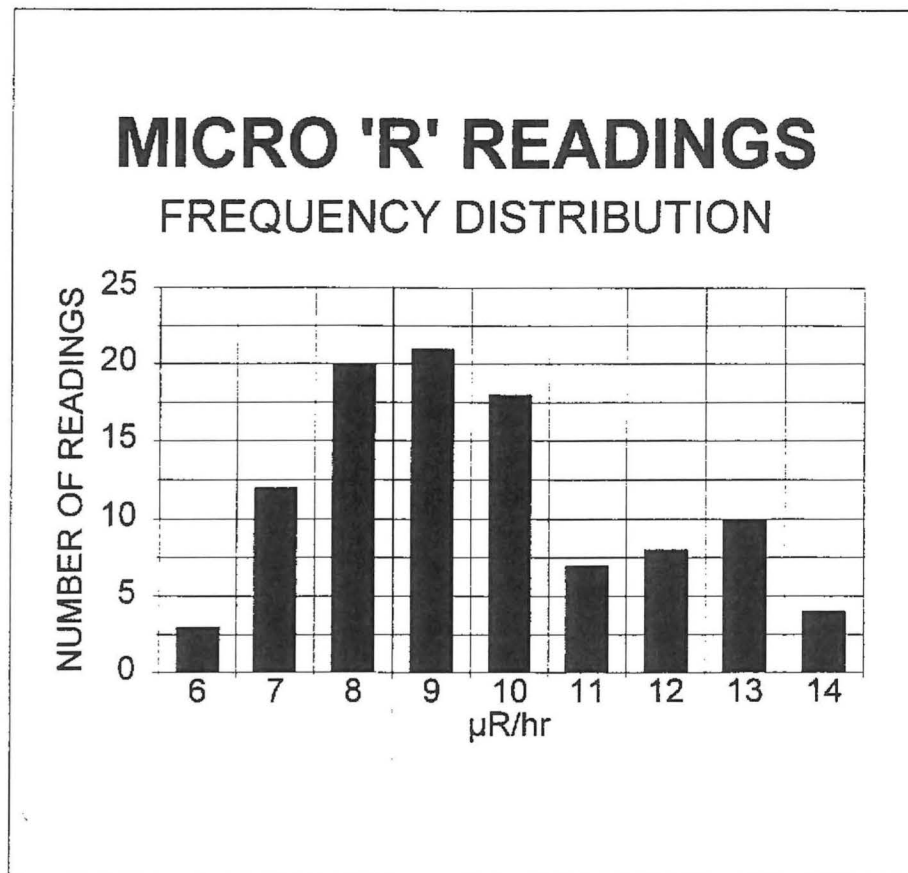
SEPTEMBER 13, 1999



NUMBER OF SAMPLES	103
AVERAGE SAMPLE	10
MINIMUM SAMPLE	6
MAXIMUM SAMPLE	14
STANDARD DEVIATION	2

**PHASE II, SUB-AREA "G" - SURFACE
UNAFFECTED AREA
MICRO-R METER READINGS AT 1 METER ABOVE SURFACE
LUDLUM MODEL 19, S/N 111299
RESULTS IN $\mu\text{R/hr}$**

SEPTEMBER 13, 1999

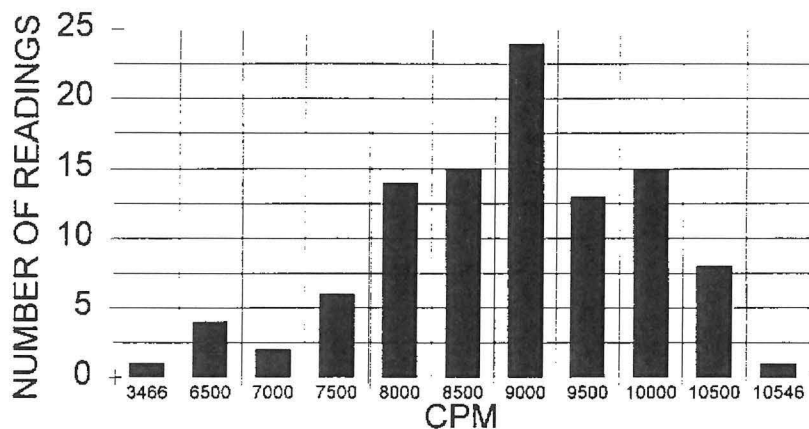


NUMBER OF SAMPLES	103
AVERAGE SAMPLE	10
MINIMUM SAMPLE	6
MAXIMUM SAMPLE	14
STANDARD DEVIATION	2

**PHASE II, SUB-AREA "G" - SURFACE
UNAFFECTED AREA
GROSS GAMMA READINGS IN CPM
LUDLUM MODEL 2221, S/N 97264
BACKGROUND AVERAGES: 7800**

SEPTEMBER 13, 1999

**3" NaI DETECTOR READINGS
FREQUENCY DISTRIBUTION**



NUMBER OF SAMPLES	103
AVERAGE SAMPLE	8611
MINIMUM SAMPLE	3466
MAXIMUM SAMPLE	10546
STANDARD DEVIATION	1150

CIMARRON CORPORATION - CIMARRON FACILITY
TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDENCE
AREA 'G' UNAFFECTED - SURFACE

n = pCi/g TOTAL U

Number	n	(n-N)	(n-N) ²
1	5.9	-0.4	0.2
2	7.1	0.8	0.6
3	4.6	-1.7	3.0
4	5.5	-0.8	0.7
5	5.5	-0.8	0.7
6	7.9	1.6	2.4
7	4.5	-1.8	3.4
8	10	3.7	13.4
9	8	1.7	2.8
10	10	3.7	13.4
11	4.6	-1.7	3.0
12	4	-2.3	5.5
13	3.3	-3.0	9.2
14	6.6	0.3	0.1
15	7.3	1.0	0.9
16	4.7	-1.6	2.7
17	5.2	-1.1	1.3
18	6.2	-0.1	0.0
19	7.4	1.1	1.1
20	6.3	-0.0	0.0
21	6.2	-0.1	0.0
22	10.5	4.2	17.3
23	7.8	1.5	2.1
24	10.7	4.4	19.0
25	9.7	3.4	11.3
26	6.5	0.2	0.0
27	5.7	-0.6	0.4
28	7	0.7	0.4
29	6.8	0.5	0.2
30	5.3	-1.0	1.1
31	6.8	0.5	0.2
32	4.5	-1.8	3.4
33	4.2	-2.1	4.6
34	7.8	1.5	2.1
35	4.5	-1.8	3.4
36	5.2	-1.1	1.3
37	5.6	-0.7	0.5
38	5.3	-1.0	1.1
39	4.4	-1.9	3.8
40	5.7	-0.6	0.4
41	5.3	-1.0	1.1
42	3.9	-2.4	5.9
43	5	-1.3	1.8
44	6.7	0.4	0.1
45	7	0.7	0.4
46	5.8	-0.5	0.3
47	6.1	-0.2	0.1
48	5.3	-1.0	1.1
49	6.2	-0.1	0.0
50	7.4	1.1	1.1
	319.6		246.5
	19.8		1.9
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	652.9		397.5
	Sum(n)		Sum(n-N) ²

No. of Samples (x) : **103**

COUNT TIME: 5 MINUTES

Sample Mean (N) = Sum(n) + (x)

Sample Mean (N) : **6.34**

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

Standard Deviation: **1.97**

2 Std Deviations: **3.95**

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

(df) = **1.662**

Area's Average Level (Aμ) = (N) + (df) x [(Sd)/SQRT(x)]

(Aμ) = **6.66** pCi/gU TOTAL U

GUIDELINE VALUE: **30** pCi/gU TOTAL U

Acceptable Level: **34.0** pCi/gU TOTAL U

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)	120	is (B)	1.658	95%
(df) low value(Y)	60	is (A)	1.671	95%

Desired value(df) (X) 102 is calculated as follow:

EXP[(Ln(B)-Ln(A)) + (Z-Y) (X-Y) + Ln(A)]

The (df) value for (X) 102 1.662 95%

PERFORMED BY: *James H. Hegin*

DATE: *9-14-99*

REVIEWED BY: *W. A. Rozen*

DATE: *9-14-99*

CIMARRON CORPORATION - CIMARRON FACILITY
TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDEN
AREA 'G' UNAFFECTED - SURFACE

n = pCi/g TOTAL U

Number	n	(n-N)	(n-N) ²
51	6	0.01	0.00
52	10.4	4.41	19.45
53	8.6	2.61	6.81
54	8.2	2.21	4.88
55	11.4	5.41	29.27
56	10.7	4.71	22.18
57	3.8	2.81	7.90
58	7.1	1.11	1.23
59	7.4	1.41	1.99
60	4	-1.99	3.96
61	11.1	5.11	26.11
62	6.9	0.91	0.83
63	5.1	-0.89	0.79
64	7.1	1.11	1.23
65	6.7	0.71	0.50
66	3.2	-2.79	7.78
67	8.7	2.71	7.34
68	6.3	0.31	0.10
69	5.4	-0.59	0.35
70	8.6	2.61	6.81
71	6.5	0.51	0.26
72	5.5	-0.49	0.24
73	4.1	-1.89	3.57
74	5.7	-0.29	0.08
75	3	-2.99	8.94
76	4.7	-1.29	1.66
77	1.8	-4.19	17.56
78	6.2	0.21	0.04
79	7.1	1.11	1.23
80	6	0.01	0.00
81	2.4	-3.59	12.89
82	6.2	0.21	0.04
83	6.6	0.61	0.37
84	5	-0.99	0.98
85	4.2	-1.79	3.20
86	6.1	0.11	0.01
87	7.1	1.11	1.23
88	7.9	1.91	3.65
89	6.5	0.51	0.26
90	2	-3.99	15.92
91	5.2	-0.79	0.62
92	6.5	0.51	0.26
93	6.7	0.71	0.50
94	5.2	-0.79	0.62
95	7	1.01	1.02
96	7	1.01	1.02
97	10.7	4.71	22.18
98	4.6	-1.39	1.93
99	3.9	-2.09	4.37
100	6.5	0.51	0.26
	319.6		254.5
	Sum(n)		Sum(n-N) ²

n = pCi/g TOTAL

Number	n	(n-N)	(n-N) ²
101	5.6	-0.39	0.15
102	6.8	0.81	0.66
103	7.4	1.41	1.99
104		0.00	0.00
105		0.00	0.00
106		0.00	0.00
107		0.00	0.00
108		0.00	0.00
109		0.00	0.00
110		0.00	0.00
111		0.00	0.00
112		0.00	0.00
113		0.00	0.00
114		0.00	0.00
115		0.00	0.00
116		0.00	0.00
117		0.00	0.00
118		0.00	0.00
119		0.00	0.00
120		0.00	0.00
121		0.00	0.00
122		0.00	0.00
123		0.00	0.00
124		0.00	0.00
125		0.00	0.00
126		0.00	0.00
127		0.00	0.00
128		0.00	0.00
129		0.00	0.00
130		0.00	0.00
131		0.00	0.00
132		0.00	0.00
133		0.00	0.00
134		0.00	0.00
135		0.00	0.00
136		0.00	0.00
137		0.00	0.00
138		0.00	0.00
139		0.00	0.00
140		0.00	0.00
141		0.00	0.00
142		0.00	0.00
143		0.00	0.00
144		0.00	0.00
145		0.00	0.00
146		0.00	0.00
147		0.00	0.00
148		0.00	0.00
149		0.00	0.00
150		0.00	0.00
	19.8		2.8
	Sum(n)		Sum(n-N) ²

CIMARRON CORPORATION - CIMARRON FACILITY
TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDENCE
AREA 'G' UNAFFECTED - SURFACE

n = pCi/g Th (NAT)

Number	n	(n-N)	(n-N) ²
1	1.1	-0.1	0.0
2	0.9	-0.3	0.1
3	0.8	-0.4	0.1
4	1	-0.2	0.0
5	0.5	-0.7	0.4
6	1.6	0.4	0.2
7	0.9	-0.3	0.1
8	1.2	0.0	0.0
9	1.1	-0.1	0.0
10	1	-0.2	0.0
11	1.3	0.1	0.0
12	1.3	0.1	0.0
13	1.4	0.2	0.1
14	1.2	0.0	0.0
15	1.5	0.3	0.1
16	1.8	0.6	0.4
17	1.5	0.3	0.1
18	1.3	0.1	0.0
19	1.3	0.1	0.0
20	0.7	-0.5	0.2
21	1.1	-0.1	0.0
22	0.8	-0.4	0.1
23	0.9	-0.3	0.1
24	0.6	-0.6	0.3
25	0.8	-0.4	0.1
26	1	-0.2	0.0
27	1.3	0.1	0.0
28	1.2	0.0	0.0
29	1.3	0.1	0.0
30	1.3	0.1	0.0
31	1.3	0.1	0.0
32	1.5	0.3	0.1
33	0.7	-0.5	0.2
34	1.1	-0.1	0.0
35	1.4	0.2	0.1
36	0.9	-0.3	0.1
37	1.2	0.0	0.0
38	0.9	-0.3	0.1
39	1	-0.2	0.0
40	0.8	-0.4	0.1
41	0.8	-0.4	0.1
42	1.1	-0.1	0.0
43	1.4	0.2	0.1
44	1.3	0.1	0.0
45	1.2	0.0	0.0
46	0.9	-0.3	0.1
47	1	-0.2	0.0
48	1.1	-0.1	0.0
49	1.1	-0.1	0.0
50	1.1	-0.1	0.0
	60.1		4.5
	3.8		0.2
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	0.0		0.0
	119.4		8.3
	Sum(n)		Sum(n-N) ²

No. of Samples (x) : **103**

COUNT TIME: 5 MINUTES

Sample Mean (N) = Sum(n) ÷ (x)

Sample Mean (N) : **1.16**

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

Standard Deviation: **0.29**

2 Std Deviations: **0.57**

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

(df) = **1.662**

Area's Average Level (Aμ) = (N) + (df) x [(Sd)/SQRT(x)]

(Aμ) = **1.21** pCi/gTh (NAT)

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

Acceptable Level: **4.0** pCi/gTh (NAT)

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) **120** is (B) **1.658** 95%

(df) low value(Y) **60** is (A) **1.671** 95%

Desired value(df) (X) **102** is calculated as follow:

EXP[(Ln(B)-Ln(A)) ÷ (Z-Y) × (X-Y) + Ln(A)]

The (df) value for (X) **102** **1.662** 95%

PERFORMED BY: *Swan P. Kojin*

DATE: *9-14-99*

REVIEWED BY: *W. A. Rogers*

DATE: *9-14-99*

CIMARRON CORPORATION - CIMARRON FACILITY
TRUE MEAN ACTIVITY VS. GUIDELINE VALUE AT 95% CONFIDENCE
AREA 'G' UNAFFECTED - SURFACE

n = pCi/g Th (NAT)

Number	n	(n-N)	(n-N) ²
51	0.9	-0.20	0.04
52	1.1	0.00	0.00
53	0.8	-0.30	0.09
54	1.1	0.00	0.00
55	1.1	0.00	0.00
56	1.3	0.20	0.04
57	1.1	0.00	0.00
58	0.9	-0.20	0.04
59	1.8	0.70	0.50
60	1.1	0.00	0.00
61	1.8	0.70	0.50
62	1.3	0.20	0.04
63	1.2	0.10	0.01
64	1.7	0.60	0.37
65	1.4	0.30	0.09
66	1	-0.10	0.01
67	1.8	0.70	0.50
68	1.2	0.10	0.01
69	0.9	-0.20	0.04
70	1.4	0.30	0.09
71	1.6	0.50	0.25
72	1.3	0.20	0.04
73	1.1	0.00	0.00
74	1.1	0.00	0.00
75	1.1	0.00	0.00
76	1	-0.10	0.01
77	0.5	-0.60	0.35
78	1.4	0.30	0.09
79	1.4	0.30	0.09
80	1	-0.10	0.01
81	0.8	-0.30	0.09
82	1.6	0.50	0.25
83	1.5	0.40	0.16
84	1.4	0.30	0.09
85	1.1	0.00	0.00
86	1.6	0.50	0.25
87	1.3	0.20	0.04
88	1.2	0.10	0.01
89	1	-0.10	0.01
90	0.6	-0.50	0.25
91	0.9	-0.20	0.04
92	1.2	0.10	0.01
93	1.1	0.00	0.00
94	1.1	0.00	0.00
95	1.4	0.30	0.09
96	0.8	-0.30	0.09
97	1.4	0.30	0.09
98	1.5	0.40	0.16
99	1.3	0.20	0.04
100	0.9	-0.20	0.04
	60.1		4.9
	Sum(n)		Sum(n-N) ²

n = pCi/g Th (NAT)

Number	n	(n-N)	(n-N) ²
101	1.3	0.20	0.04
102	1.5	0.40	0.16
103	1	-0.10	0.01
104		0.00	0.00
105		0.00	0.00
106		0.00	0.00
107		0.00	0.00
108		0.00	0.00
109		0.00	0.00
110		0.00	0.00
111		0.00	0.00
112		0.00	0.00
113		0.00	0.00
114		0.00	0.00
115		0.00	0.00
116		0.00	0.00
117		0.00	0.00
118		0.00	0.00
119		0.00	0.00
120		0.00	0.00
121		0.00	0.00
122		0.00	0.00
123		0.00	0.00
124		0.00	0.00
125		0.00	0.00
126		0.00	0.00
127		0.00	0.00
128		0.00	0.00
129		0.00	0.00
130		0.00	0.00
131		0.00	0.00
132		0.00	0.00
133		0.00	0.00
134		0.00	0.00
135		0.00	0.00
136		0.00	0.00
137		0.00	0.00
138		0.00	0.00
139		0.00	0.00
140		0.00	0.00
141		0.00	0.00
142		0.00	0.00
143		0.00	0.00
144		0.00	0.00
145		0.00	0.00
146		0.00	0.00
147		0.00	0.00
148		0.00	0.00
149		0.00	0.00
150		0.00	0.00
	3.8		0.2
	Sum(n)		Sum(n-N) ²