



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064**

November 24, 2000

Mr. S. Jess Larsen, Vice President
Cimarron Corporation
Kerr-McGee Center
P.O. Box 25861
Oklahoma City, Oklahoma 73125

SUBJECT: NRC INSPECTION REPORT 70-925/00-01

Dear Mr. Larsen:

On July 11-13 and August 15, 2000, the Nuclear Regulatory Commission (NRC) concluded the onsite portions of an inspection of the Cimarron site near Crescent, Oklahoma. On October 26, 2000, the NRC held a telephonic exit briefing with you and members of your staff concerning the results of the inspection and NRC analysis of confirmatory samples obtained during the inspection. The enclosed report presents the scope and results of the inspection.

The purpose of this inspection was to perform confirmatory surveys and sampling in Sub-Areas H, I, and M to confirm that the NRC Branch Technical Position (BTP) Option 1 release criteria had been met. Exposure-rate measurements and smear and soil samples were collected from various locations for analysis by the NRC. The results of these measurements and samples were compared with the results of your final status survey data and the BTP Option 1 release criteria. The data indicated that the BTP Option 1 release criteria had been met in Sub-Areas H, I, and M.

Soil sampling activities in Pit 3 were also observed. Twenty-four soil samples were collected from Pit 3, Lift 5 for analysis by the NRC. The results of these samples were compared with the results of the soil samples collected at the same locations by your staff. The NRC analysis was consistent with the results obtained by your staff and confirmed that the soil in Pit 3, Lift 5 met the NRC Branch Technical Position Option 2 release criteria.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the *Publicly Available Records (PARS) component of NRC's document system (ADAMS)*. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html> (the Public Electronic Reading Room)."

Cimarron Corporation

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Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

/RA/

Dwight D. Chamberlain, Director
Division of Nuclear Materials Safety

Docket No.: 70-925
License No.: SNM-928

Enclosure:
NRC Inspection Report
70-925/00-01

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ENCLOSURE

U. S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket No.:	70-925
License No.:	SNM-928
Report No.:	70-925/00-01
Licensee:	Cimarron Corporation Kerr-McGee Center Oklahoma City, Oklahoma 73125
Facility:	Cimarron Site
Location:	Crescent, Oklahoma
Dates:	July 11-13 and August 15, 2000
Inspectors:	Danny L. Rice, Health Physicist, CHP Robert J. Evans, Health Physicist, PE, CHP Louis C. Carson II, Senior Health Physicist
Accompanied By:	Kenneth M. Kalman, Project Manager, HQ Jon M. Peckenpaugh, Groundwater Hydrologist, HQ
Approved By:	D. Blair Spitzberg, Ph.D., Chief Fuel Cycle & Decommissioning Branch
Attachment:	Supplemental Information and Data Tables

EXECUTIVE SUMMARY

Cimarron Corporation, Cimarron Site
NRC Inspection Report 70-925/00-01

Cimarron was conducting site remediation activities in preparation for the termination of Special Nuclear Material License SNM-928. Decommissioning inspections and radiological surveys had been conducted by the NRC at Cimarron as part of the overall confirmatory survey process. This inspection was a continuation of that process. The licensee was authorized to bury soil contaminated with residual low-enriched uranium at the Cimarron site if the soil met the criteria of the NRC branch technical position (BTP) for soil. This inspection included reviewing final status survey records, performing exposure-rate and direct alpha and beta contamination measurements and collecting smear and soil samples from various locations within Sub-Areas H, I, and M to confirm compliance with the BTP Option 1 unrestricted release criteria. This inspection also included reviewing final status survey records and collecting soil samples from Pit 3, Lift 5 to confirm compliance and the buried soil release criteria in BTP Option 2.

Decommissioning, Closeout Survey, and Site Status

- Site decommissioning activities were conducted in accordance with applicable license conditions and regulatory requirements. Site fences were in good condition and perimeter postings were appropriate. No health or safety hazards were identified (Section 1).
- Exposure-rate measurements, direct measurements of total alpha and beta contamination, smears and soil samples were collected from various locations within Sub-Areas H, I, and M. NRC confirmatory measurement results confirmed that these areas met the approved release criteria for BTP Option 1 (Section 1).
- Soil samples were collected from Pit 3, Lift 5 during this inspection. Samples were collected from the same locations by both the NRC and the licensee. Analysis of the samples confirmed uranium and thorium levels were less than the BTP Option 2 and licensed limits for soil. No significant bias or statistical errors between the licensee's soil results and the NRC's results were identified. Licensee soil measurement methods and counting times were found to be acceptable (Section 1).
- Ambient gamma exposure rates on Lift 5 were measured and found to be less than the License Condition 27 release limit of 10 $\mu\text{R/hr}$ above background (Section 1).

Report Details

1 Closeout Inspection and Survey (83890)

1.1 Inspection Scope

The site status and decommissioning activities were reviewed to determine if activities were being conducted in accordance with the license, regulatory requirements and the Cimarron decommissioning plan. The Cimarron decommissioning plan committed to the recommendations in NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination." Confirmatory measurements were conducted during this inspection and included exposure-rate measurements, direct measurements of total alpha and beta contamination, smears and soil samples in Sub-Areas H, I, and M. Soil samples were also collected from Pit 3, Lift 5.

Release criteria approved for the Cimarron site were provided in Options 1 and 2 of the NRC Branch Technical Position (BTP), "Disposal or Onsite Storage of Thorium and Uranium Wastes from Past Operations," 46 *FR* 52061, October 23, 1981. Under the Option 1 soil limits of the BTP, the licensee may dispose of wastes containing natural thorium, depleted and enriched uranium and natural uranium without restrictions for burial method or post-termination land use. Under Option 2, higher concentrations of natural thorium and depleted or enriched uranium are allowed without requiring land use restrictions after license termination when buried under prescribed conditions. Limits for Options 1 and 2 are provided in attachment 2 to this report as Table 1 "Release Criteria."

1.2 Observation and Findings

a. Site Status

The licensee's decommissioning plan was submitted to the NRC in April 1995 and approved in August 1999. The licensee had completed 99 percent of their remediation activities and was in the process of conducting soil sampling, radiation surveys and groundwater remediation to support license termination.

A site tour was conducted to verify that activities were being conducted in accordance with applicable regulations and license conditions. During the tour, buildings, fences, gates and operating equipment were observed. Security was maintained by site security personnel to prevent unauthorized access to the site. This included locked gates at entrances to the site property and visitor check-in at the main office. The inspectors determined that licensed material was secure within the site property as required by 10 CFR 20.1801.

b. Sub-Areas H, I & M and Building Confirmatory Surveys

Uranium levels in soil for areas released for unrestricted use were required to meet Option 1 limits in the BTP. Option 1 established an acceptable release limit of 30 pCi/gm above background for uranium in soil. In addition to the uranium limits, the licensee was required to meet the release criteria in NMSS Policy and Guidance Directive FC 83-23 for smearable and fixed uranium contamination. These limits are provided in the attached "Table 1: Release Criteria." The limits apply to the average alpha, beta and gamma levels. Maximum levels of 3 times these values are allowed for areas not to exceed 100 cm².

The licensee's procedures for collecting and preparing soil samples were reviewed, including observation of the licensee staff during collection and preparation of samples. Sample techniques were found to be acceptable. Soil samples from Sub-Areas H, I, and M were collected for analysis by the NRC Region III laboratory. The soil samples were analyzed for total uranium content. Sample results are provided in the attached Tables 2 through 4. All soil sample results were below the 30 pCi/g criteria specified under BTP Option 1.

License Condition 27 established the release criteria for the site of 10 microRoentgens per hour (μ R/hr) average and 20 μ R/hr maximum, both above background at 1 meter. Background radiation levels around the site averaged 7 μ R/hr. Ambient gamma exposure rates were measured at each soil sample location. Ambient radiation levels were slightly above background with the highest reading measured at 10 μ R/hr (i.e. 3 μ R/hr above background). The confirmatory survey effort did not identify any new areas of contamination and supported the licensee's conclusion that Sub-Areas H, I, and M met the approved release criteria.

Alpha and beta contamination and ambient gamma radiation levels were measured by the NRC inspectors in several buildings in Sub-Area I. Direct measurements for total alpha and beta contamination and smears for removable contamination were made at the TiO₂ building, the emergency building and the plutonium building. Direct measurements were all below the 5,000 disintegrations per minute/100 centimeters squared (dpm/100²) limit. All smear sample results were below the average release criteria for removable contamination of 1,000 dpm/100 cm². Results of these measurements are provided in the attached Tables 5 through 12 and were consistent with results obtained by the licensee. Building exposure rates provided with the tables are averages for the building and were below the 10 μ R/hr above background limit.

The instruments used for exposure-rate and direct alpha and beta measurements were a Ludlum Model 19, Micro-R Meter, Serial #33541, (calibration due October 12, 2000), a Ludlum Model 2224 scaler with an alpha/beta probe Model 43-89, serial #114606, (calibration due August 30, 2000) and a Ludlum Model 19 MicroRoentgen meter calibrated to radium-226, NRC No. 015540, (calibration due October 12, 2000).

c. Site Status of Pit 3

The licensee was approved by License Condition 23 to bury up to 500,000 cubic feet of soil contaminated with low-enriched uranium in concentrations less than Option 2 of the BTP in an onsite disposal cell. The cell was comprised of three pits. Pits 1 and 2 were filled and capped. Pit 3 was still open. Lift 5 was the most recent and final lift to be installed in Pit 3. This lift was approximately 20 meters wide and 160 meters long. Adjacent to the Lift 5 soil was a smaller lift of asphalt material that was authorized by the NRC for disposal in Pit 3. Samples of both the soil and the asphalt were collected and ambient gamma exposure rates were measured by the NRC inspectors to confirm compliance with site release criteria prior to the licensee permanently capping Pit 3 with clean soil.

d. Pit 3, Lift 5 Confirmatory Exposure Rate Survey Results

Pit 3, Lift 5 exposure rates had been evaluated by the licensee using a portable sodium iodide (NaI) detector. Background radiation levels around the site averaged 7 $\mu\text{R/hr}$. The NRC inspectors measured the ambient gamma exposure rates in all grids. The exposure rates were measured using an NRC-issued Ludlum Model 19 MicroRoentgen meter calibrated to radium-226 (NRC No. 015540, calibration due date of October 12, 2000). The inspectors measured an average background level of 8 $\mu\text{R/hr}$. Ambient exposure rates on Lift 5 varied from 7 to 14 $\mu\text{R/hr}$ at 1 meter above the ground surface with the highest readings obtained near the former "hot spot" that was previously identified in Grid 510E-405N and remediated by the licensee. The NRC inspectors noted that the licensee measured exposure rates of 11 to 14 $\mu\text{R/hr}$ on Lift 5.

License Condition 27 lists the release criteria. This condition states in part that the release criteria for soils is 10 $\mu\text{R/hr}$ average and 20 $\mu\text{R/hr}$ maximum both above background at 1 meter. With background subtracted, the exposure rates varied from below background up to 7 $\mu\text{R/hr}$ above background. The inspectors concluded that the ambient gamma exposure rates on Lift 5 were less than the License Condition 27 release limit of 10 $\mu\text{R/hr}$ above background for soils.

e. Pit 3 Lift 5 Confirmatory Surveys

The inspector reviewed the licensee's compliance with License Condition 23 for soil placed in Pit 3 Lift 5. The inspectors observed the sample storage and preparation area. A licensee technician collected and prepared 20 soil samples and 4 asphalt samples for split-sample analysis with the NRC as part of the confirmatory survey process. The licensee used a sodium iodide detector to conduct soil analysis for uranium. Radiation Protection Procedure KM-CI-RP-47 was used for soil counter operations including operational and calibration checks, cesium-137 energy and efficiency checks, background determinations and sample counting. Total uranium was determined by using a scaling factor applied to the uranium-235 value. The licensee's results concluded that the samples met the BTP Option 2 limit of 100 pCi/g uranium in Pit 3.

Further, the results indicate that the samples met the License Condition 23.b limit of 10 pCi/g for thorium.

The 24 split-samples collected for the NRC were sent to the NRC Region III laboratory for analysis on August 15, 2000. NRC sample results were compared with the licensee's results and confirmed that uranium and thorium levels were below the license limits. Table 13 provides a summary of both the licensee's results and the NRC results. The licensee's samples averaged 29.4 ± 11.0 pCi/gm uranium in the soil in Pit 3 Lift 5. The NRC results were consistent with the licensee's results and averaged 28.8 ± 9 pCi/gm.

The licensee had previously informed the NRC that the total uranium background level in soil was 4 pCi/g while the total thorium background was 1.5 pCi/g.

1.3 Conclusion

Site decommissioning activities were conducted in accordance with applicable license conditions and regulatory requirements. Site fences were in good condition and perimeter postings were appropriate. No health or safety hazards were identified.

Exposure-rate measurements, direct measurements of total alpha and beta contamination, smears and soil samples were collected from various locations within Sub-Areas H, I, and M. NRC analysis results were consistent with the results obtained by the licensee and confirmed that these areas met the approved release criteria for BTP Option 1.

Soil samples were collected from Pit 3, Lift 5 during this inspection. Samples were collected from the same locations by both the NRC and the licensee. Analysis of the samples confirmed uranium levels were less than the BTP Option 2 limit for soil. Also, the thorium concentrations were below the licensed limit. No significant bias or statistical errors between the licensee's soil results and the NRC's results were identified. Licensee soil measurement methods and counting times were found to be acceptable.

Ambient gamma exposure rates on Lift 5 were measured and found to be less than the License Condition 27 release limit of 10 μ R/hr above background.

2 **Exit Meeting Summary**

The NRC inspectors presented the inspection results to the licensee representatives at the conclusion of the onsite inspection on July 14 and August 15, 2000. A telephone exit was conducted on October 26, 2000, to discuss the result of the NRC's analysis of the split samples. Licensee representatives acknowledged the findings as presented. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspector.

ATTACHMENT 1

PARTIAL LIST OF PERSONS CONTACTED

Cimarron Corporation

J. Larsen, Site Manager and Vice President, Cimarron
K. Morgan, Radiation Safety Officer

Contractor Personnel

S. Marshall, Nextep Environmental
W. Rogers, Technical Consultant
L. Smith, Quality Assurance Manager

INSPECTION PROCEDURES USED

IP 83890 Closeout Inspection and Survey
IP 88104 Decommissioning Inspection Procedure for Fuel Cycle Facilities

ITEMS OPENED, CLOSED AND DISCUSSED

Closed

None

Opened

None

Discussed

None

LIST OF ACRONYMS

ALARA	As Low As is Reasonably Achievable
ANSI	American National Standards Institute
BTP	Branch Technical Position
CFR	Code of Federal Regulations
dpm/100 cm ²	disintegrations per minute/100 centimeters squared
μR/hr	microRoentgen/hour
pCi/g	picocuries/gram
PDR	public document room
QA	quality assurance
SNM	special nuclear material

ATTACHMENT 2

TABLE 1: RELEASE CRITERIA

TYPE OF SAMPLE	RELEASE CRITERIA	RELEASE CRITERIA ADJUSTED FOR BACKGROUND
Exposure-rate (License Condition 27)	$\leq 10 \mu\text{R/hr}$ average $\leq 20 \mu\text{R/hr}$ maximum	$\leq 17 \mu\text{R/hr}$ average $\leq 27 \mu\text{R/hr}$ maximum
Soil Concentration Around Buildings (Option 1)	$\leq 30 \text{ pCi/gm}$ Enriched Uranium	$\leq 34 \text{ pCi/gm}$
Soil Concentration in the Pit (Option 2)	$\leq 100 \text{ pCi/gm}$ Soluble Uranium $\leq 250 \text{ pCi/gm}$ Insoluble Uranium	$\leq 104 \text{ pCi/gm}$ Soluble $\leq 254 \text{ pCi/gm}$ Insoluble
Surface Concentration (FC 83-23)	$\leq 5000 \text{ dpm/100cm}^2$ (fixed) $\leq 1000 \text{ dpm/100cm}^2$ (removable)	Not Applicable

Note: Background values used were 7 $\mu\text{R/hr}$ and 4 pCi/gm Uranium (Total)

TABLE 2: SUB-AREA H SOIL SAMPLES

Sample Location	Sample Depth	Licensee Gross Result (pCi/gm)	NRC Gross Results (pCi/gm)	NRC Gross Exposure rate ($\mu\text{R/hr}$)
835N-33E	3-4 feet	5.7 \pm 0.6	2.0 \pm 0.7	7
395N-105E	1-2 feet	Remediated to Rock	3.5 \pm 0.6	6
425N-104E	1-2 feet	7.4 \pm 3.4	1.7 \pm 0.0	8
455N-102E	1-2 feet	6.7 \pm 2.9	2.1 \pm 0.7	10
290N-140E	0-6 inches	6.8 \pm 3.3	3.6 \pm 1.0	9
285N-155E	0-6 inches	2.4 \pm 2.4	3.4 \pm 1.0	10
320N-240E	0-6 inches	5.0 \pm 3.6	2.7 \pm 0.6	8
365N-108E	0-6 inches	4.5 \pm 3.3	2.1 \pm 0.8	8
365N-210E	1-2 feet	7.6 \pm 3.2	4.0 \pm 0.8	8
440N-95E	1-2 feet	10.6 \pm 3.4	1.8 \pm 0.0	8

TABLE 3: SUB-AREA I SOIL SAMPLES

Sample Location	Sample Depth	Licensee Gross Result (pCi/gm)	NRC Gross Result (pCi/gm)	NRC Gross Exposure rate (μR/hr)
185N-95E	0-6 inches	13.0±3.0	3.9±0.7	8
220N-5E	0-6 inches	7.6±3.3	4.5±0.6	9
220N-5E	3-4 feet	11.5±2.8	1.8±0.8	9
200N-15E	0-6 inches	10.0±3.1	2.3±0.5	8
200N-15E	3-4 feet	8.6±2.5	0.8±0.4	8
10S-10E	0-6 inches	16.6±3.5	3.4±1.4	8
5N-10E	0-6 inches	14.6±3.7	4.5±0.9	9
220N-460E	0-6 inches	4.6±2.9	8.5±0.0	7
360N-450E	0-6 inches	7.1±3.6	11.2±0.0	10

TABLE 4: SUB-AREA M SOIL SAMPLES

Sample Location	Sample Depth	Licensee Gross Result (pCi/gm)	NRC Gross Result (pCi/gm)	NRC Gross Exposure rate (μR/hr)
315E-255N	2-3 feet	6.0±3.0	3.4±0.5	8
320E-240N	2-3 feet	3.6±3.0	1.9±0.5	8
335E-270N	0-0.5 foot	9.1±3.2	7.6±3.0	8
305E-265N	2-3 feet	7.5±2.8	2.3±0.6	7
290E-330N	0.5-1 foot	4.1±3.2	2.3±1.0	8
305E-265N	3-4 feet	7.5±3.0	1.4±0.6	7

TABLE 5: SUB-AREA I, TiO₂ BUILDING ROOF

Sample Location	Licensee Direct (dpm/100cm ²)		NRC Direct (dpm/100cm ²)		Licensee Smear (dpm/100cm ²)		NRC Smear (dpm/100cm ²)	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
43	1840	4650	22	0	4	16	0	0
82	1310	4270	198	2160	4	12	0	1
103	1270	4120	1309	2190	4	12	8	16
107	1570	4200	869	2985	7	4	12	8
119	2040	5380	495	1545	4	16	9	13
205	1440	5900	308	1590	10	13	10	11
211	810	4060	396	1365	2	14	0	0
224	1150	4010	616	1230	12	13	5	4
229	600	4550	230	1290	2	2	1	1
256	940	4710	297	1650	4	14	1	0
284	290	4090	143	2295	0	2	1	0
290	1600	4890	187	1410	10	13	0	0
319	1610	4060	187	1260	7	9	0	0

Background: Alpha = 2 cpm; Beta= 92 cpm. All values are corrected for background.

TABLE 6: SUB-AREA I TiO₂ BUILDING OUTSIDE WALLS

Sample Location	Licensee Direct (dpm/100cm ²)		NRC Direct (dpm/100cm ²)		Licensee Smear (dpm/100cm ²)		NRC Smear (dpm/100cm ²)	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
5	120	80	44	0	5	4	4	5
15	0	160	0	0	0	2	0	1
16	10	210	11	0	0	0	0	0
26	120	530	99	450	0	7	0	0

Background: Alpha = 2 cpm; Beta= 86 cpm. All values are corrected for background.

Exposure-rate measurements at locations adjacent to the outside wall ranged from 5 to 9 µR/hr.

TABLE 7: SUB-AREA I TiO₂ BUILDING INSIDE WALLS

Sample Location	Licensee Direct (dpm/100cm ²)		NRC Direct (dpm/100cm ²)		Licensee Smear (dpm/100cm ²)		NRC Smear (dpm/100cm ²)	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
6	90	0	0	0	0	0	0	0
19	0	0	0	0	2	0	0	0
23	0	0	0	0	2	0	0	0

Background: Alpha = 2 cpm; Beta= 86 cpm. All values are corrected for background.
Exposure-rate measurements adjacent to sample locations on inside wall ranged from 5 to 7 µR/hr.

TABLE 8: SUB-AREA I TiO₂ BUILDING UNAFFECTED FLOORS

Sample Location	Licensee Direct (dpm/100cm ²)		NRC Direct (dpm/100cm ²)		Licensee Smear (dpm/100cm ²)		NRC Smear (dpm/100cm ²)	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
8	50	792	11	375	0	2	0	0
10	40	198	0	0	0	0	0	0
15	30	1804	22	555	0	4	0	2
20	20	1056	0	570	0	0	0	0
22	60	1056	0	405	2	2	0	0
25	20	561	33	750	0	0	0	0
29	50	869	66	585	0	2	1	0

Background: Alpha = 2 cpm; Beta= 92 cpm. All values are corrected for background.
Exposure-rate measurements at the sample locations ranged from 6 to 9 µR/hr.

TABLE 9: SUB-AREA I TiO₂ BUILDING AFFECTED FLOORS

Sample Location	Licensee Direct (dpm/100cm ²)		NRC Direct (dpm/100cm ²)		Licensee Smear (dpm/100cm ²)		NRC Smear (dpm/100cm ²)	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
1	250	2520	319	2490	0	2	0	0
8	250	1100	11	600	0	0	0	0
12	190	2410	121	2385	0	0	0	0
21	240	3450	176	4185	0	2	1	0
30	190	2670	0	645	0	12	0	0
42	60	2060	44	855	0	2	0	0
54	270	1820	77	795	0	0	0	0
60	270	1950	66	945	2	2	0	0
88	240	1340	297	735	4	6	1	0

Background: Alpha = 2 cpm; Beta= 92 cpm. All values are corrected for background.
Exposure-rates measurements taken at each sample location ranged from 6 to 9 µR/hr.

TABLE 10: SUB-AREA I EMERGENCY BUILDING INSIDE WALLS

Sample Location	Licensee Direct (dpm/100cm ²)		NRC Direct (dpm/100cm ²)		Licensee Smear (dpm/100cm ²)		NRC Smear (dpm/100cm ²)	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
34	27	170	0	0	0	6	0	0
200	56	127	11	0	0	4	0	0
202	9	236	0	0	2	1	0	0
265	27	306	0	0	0	0	0	0

Background: Alpha = 2 cpm; Beta= 97 cpm. All values are corrected for background.
Exposure-rate measurements taken inside the emergency building ranged from 5 to 9 µR/hr.

TABLE 11: SUB-AREA I EMERGENCY BUILDING FLOORS

Sample Location	Licensee Direct		NRC Direct		Licensee Smear		NRC Smear	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
2	36	414	0	360	0	0	0	0
31	18	420	0	0	0	1	0	0
45	45	400	0	75	0	4	0	0
57	18	450	22	30	0	0	0	0
79	18	370	0	15	0	1	0	0
117	27	306	22	240	0	0	1	0
159	18	702	0	570	2	0	0	3
163	36	729	11	270	0	2	0	0

Background: Alpha = 2 cpm; Beta= 97 cpm. All values are corrected for background.
Exposure-rate measurements taken inside the emergency building ranged from 5 to 9 μ R/hr.

TABLE 12: SUB-AREA I PLUTONIUM BUILDING FLOORS

Sample Location	NRC Direct		NRC Smear	
	Alpha	Beta	Alpha	Beta
On floor just inside front Door of Guard Shack	0	0	0	0
On floor just inside of 1 st Door after entering Guard Shack going into main building	0	60	0	0
On floor in doorway to Room 105 (bare concrete)	33	1500	0	0
On floor in Room 129	0	375	0	0
On floor in Room 116	33	285	0	0
On floor in Room 124	22	645	0	0
On floor in rear (opposite of loading dock) of Rm121	22	540	0	0
On floor inside of loading dock roll up door	33	60	0	0

Background: Alpha = 2 cpm; Beta= 100 cpm. All values are corrected for background.

TABLE 13: CONFIRMATORY SOIL SAMPLE RESULTS FOR PIT 3, LIFT 5

Grid Location	NRC Results Total Uranium (pCi/g)	Licensee Results Total Uranium (pCi/g)	NRC Results Total Thorium (pCi/g)	Licensee Results Natural Thorium (pCi/g)
510E-290N	17.1±1.0	12.3±3.4	1.6±0.0	2.5 ±0.2
510E-310N	24.7±4.8	21.7±3.6	2.4±0.2	2.6 ±0.2
510E-320N	24.4±3.7	27.6±3.3	1.4±0.1	1.8 ±0.2
510E-335N	49.1±6.0	40.3±3.4	1.7±0.1	2.1 ±0.2
510E-350N	22.9±4.1	19.6 ±4.0	1.8±0.1	1.9 ±0.2
510E-365N	22.7±1.9	18.9 ±3.7	2.1±0.1	3.1±0.2
510E-380N	23.4±4.1	34.2±3.7	2.1±0.1	1.8 ±0.2
510E-390N	28.5±1.2	36.1 ±3.7	1.9±0.0	2.4 ±0.2
510E-405N	48.6±2.0	42.4 ±3.9	2.0±0.1	2.7±0.2
510E-415N	23.1±2.0	24.6 ±3.6	1.7±0.1	2.2±0.2
515E-295N	21.3±4.5	23.6 ±3.3	1.9±0.1	2.0 ±0.2
515E-305N	29.9±3.7	29.8 ±3.4	1.7±0.1	1.9±0.2
515E-315N	43.7±1.9	42.8 ±3.6	1.5±0.1	2.0 ±0.2
515E-325N	24.3±3.7	32.9 ±3.4	1.7±0.1	2.0±0.1
515E-340N	45.1±6.5	31.9 ±3.7	1.8±0.1	2.6±0.2
515E-350N	44.6±0.8	35.0 ±3.5	1.8±0.1	1.9 ±0.2
515E-365N	25.4±1.3	26.8 ±3.6	1.9±0.0	2.9±0.2
515E-385N	33.6±4.0	29.4 ±3.8	1.9±0.0	2.4±0.2
515E-400N	40.4±1.4	39.1±3.9	1.7±0.0	2.2±0.2
515E-415N	20.3±4.2	25.9 ±3.6	2.1±0.1	1.7 ±0.2
520E-290N	26.8±2.9	29.7± 3.4	0.6±0.1	0.9± 0.2
520E-315N	26.9±4.2	27.6± 3.5	0.6±0.1	0.7± 0.2
520E-340N	28.7±3.2	23.0± 3.5	0.5±0.1	1.6± 0.2
520E-360N	28.7±2.2	27.1± 3.5	0.6±0.0	1.3± 0.2