

**BURIAL AREA #1**

**SUBSURFACE SOIL ASSESSMENT**

**CIMARRON CORPORATION**

**Crescent, OK**

**License Number: SNM-928**

**Docket Number: 70-0925**

**November 2007**

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# **Burial Area #1 Subsurface Soil Assessment**

## **Cimarron Corporation**

### **Introduction**

During the 1960's, Cimarron Corporation placed licensed material into four trenches located in the northeastern portion of the Cimarron site. During decommissioning activities performed during the 1980's, this area was designated Burial Ground #1. Figure 1 shows the location of Burial Ground #1 on the Cimarron site. Burial Ground #1 was closed in-place, being covered with soil, in 1970.

The Cimarron facility ceased operation in 1975, and initiated site decommissioning activities in 1976. Settlement of the material and cover soils in Burial Ground #1 led to an investigation of the area in 1984. Groundwater monitoring wells installed in the area in 1985 demonstrated that licensed material had impacted groundwater in this area. Cimarron began excavation of the material in the trenches in 1986.

At the time this work was being performed, regulatory guidance related to the radiological surveillance of subsurface soil or waste did not exist, thus Cimarron devised innovative survey methods related to the decommissioning of the Cimarron site. Survey methodology was developed and implemented via frequent communication with NRC and Oak Ridge Associated Universities (ORAU) personnel.

During Burial Ground #1 trench excavation in 1998, ORAU personnel visited the site to perform confirmatory surveys for other aspects of the decommissioning project. While on site, ORAU personnel evaluated the in-

process measurement program implemented by Cimarron during the excavation of buried material. ORAU and Cimarron recorded measurements and collected samples from Burial Ground #1 and agreed on methods for identifying material that exceeded the 1981 Branch Technical Position criteria (BTP Criteria) as presented in Storage and Disposal of Uranium or Thorium Contaminated Soil.

NRC did not approve the BTP Criteria until the Site Decommissioning Plan for the site was approved in 1999. These Criteria were stipulated as applicable to soil in License Condition 27(c) of Amendment #15 to license SNM-928, issued August 23, 1999. By this date, most soil surveys in Burial Ground #1 had been completed.

As assessment of the area continued and expanded, the vicinity surrounding Burial Ground #1 was given a new designation, Burial Area #1. This designation was developed to distinguish between the burial ground and the larger surrounding area impacted by groundwater migrating from the former trenches. Subsequent sections of this report will describe the work performed in both Burial Ground #1 and Burial Area #1 and will provide a chronological summary of the efforts Cimarron has employed since 1976 in the decommissioning and final survey of the area. Cimarron believes this information will provide NRC assurance that:

Cimarron has consistently applied the most current methodology to assess the area.

Cimarron has, over the past twenty years, developed many innovative procedures for the decommissioning and survey of subsurface material.

BA#1 subsurface soil complies with decommissioning criteria stipulated in 1999, despite the appearance of past efforts to comply with recently promulgated regulatory guidance.



## 1991 Final Survey

Cimarron completed the excavation of the trenches in 1988, and performed a "final status survey" for the area. At that time, the only available regulatory guidance related to the final survey of subsurface soil came from discussions between Cimarron personnel, NRC staff, and Mr. James Berger of ORAU. Surveillance methodology utilized in the survey of these trenches was similar to that later described for land areas in the draft regulatory guide NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination (June 1992), which Mr. Berger authored.

In accordance with Mr. Berger's guidance, borings were advanced on a ten-meter grid in an area extending 170 meters north-south and 80 meters east-west. This grid extended well beyond Burial Ground #1, extending 70 meters (~230 feet) downgradient from the trenches. Samples were collected at six inch intervals from the first foot of each boring, and then at one foot intervals to four feet in depth, or until the auger hit bedrock, whichever came first.

Cimarron collected and analyzed a total of 791 samples during this survey, and identified several locations where soil exceeded the Criteria. Cimarron returned to these areas and excavated this material. In some locations, additional samples were collected at the base of the excavated material. In other locations, the material was removed to bedrock, and "confirmatory" samples could not be collected. This reduced the number of samples in the "final" data set to 782 samples.

Cimarron first presented the initial results of this assessment to NRC in Decontamination and Final Survey Report for Cimarron Facility Contaminated Waste Burial Ground, submitted November 25, 1991. The 1991 Cimarron data are provided in this report in Appendix 1.

At some locations, the word "Rock" appears in the data set in Appendix 1. This "value" identifies a location where original samples exceeded the criteria, and the excavation of this material extended to bedrock. Consequently, if two feet of samples at a location cite "Rock", two feet of material was removed from this location.

In Appendix 1, the easting and northing coordinates are in meters from a local origin that was used specifically for Burial Ground #1. Values for depth are in feet, and represent the depth to the top of the sample interval. Sample thickness is in feet. The total uranium results represent gross activity (not subtracting background). A total of 782 samples were analyzed at that time. Not one sample exceeded the Criteria.

## 1992 Confirmatory Survey

In a September 11, 1991 letter to NRC, prior to the submission of the data described above, Cimarron requested NRC to expedite requests for additional verification surveys deemed necessary prior to authorization of trench backfill and closure. In response to this request, NRC sent ORAU to the Cimarron site in December 1991 to perform a confirmatory survey for the excavated trenches.

ORAU obtained and analyzed 87 samples of surficial soil, most of which were collected on a 10 X 10 meter grid, offset as needed due to obstructions. A total of 87 samples were collected from the top 15 centimeters of soil.

ORAU also collected samples from the sidewalls of the excavated trenches, at approximately ten meter intervals. A total of 37 samples were collected from the trench walls.

Finally, ORAU collected samples from sixteen borings advanced on selected five meter grid nodes. Although some of these samples were collected from the top 15 centimeters of soil, the data from these borings were included in the results for subsurface samples. A total of 20 samples were collected.

These data were initially reported to NRC in ORAU's Confirmatory Radiological Survey, Former Burial Ground, Cimarron Corp. Facility, July 1992. The report identified five samples that exceeded the Criteria. Cimarron returned to those locations and removed all material containing elevated levels of activity.

NRC approved the backfill of the trenches in Burial Ground #1 in December 1992 (Condition 22 of License Amendment #9). Because the area was backfilled, the existing grade is higher in elevation than the ground surface prior to backfilling. Consequently, all the samples ORAU collected now represent subsurface soil although some of the samples collected in December 1991 represented surface soil (0 – 15 cm in depth),. The data from the 1992 ORAU report is presented in this report in Appendix 2. The easting and northing coordinates shown in Appendix 2 are in meters from the local origin designated for Burial Ground #1.

Appendix 2 provides three tables; one with results for surface soil, one with results for samples collected from the sidewalls of the trenches, and the third provides results for subsurface soil samples. The subsurface sample data shows depth from grade to the top of the sample interval in centimeters. Sample thickness is also expressed in centimeters. The total uranium results represent gross activity (not subtracting background).



## **1996 Final Status Survey**

In October 1994, Cimarron submitted Radiological Characterization Report for Cimarron Corporation's Former Nuclear Fuel Fabrication Facility. That document divided the site into sixteen Subareas, which were grouped into three "phases". The different "phases" represented areas with different potential for contamination by licensed material. Subarea F, which includes Burial Ground #1, was listed in that report as one of the Phase II areas.

Cimarron submitted Final Status Survey Plan for Phase II Areas in July 1995. NRC commented on the plan in a letter dated October 1996. One of NRC's comments addressed potential subsurface contamination in affected areas. In a January 28, 1997 letter, Cimarron responded by committing to perform subsurface soil sampling along the haul road extending from the former BA#1 burial trenches to the decommissioned former operating facility. Cimarron did not submit a subsurface sampling plan for the former trenches because previous surveys demonstrated licensed material and soils exceeding the Criteria were removed.

NRC, fully aware of the surveys performed after the excavation of the trenches, did not require additional sampling of subsurface soil around the former burial trenches. NRC only required sampling along the haul road because of the potential for soil contaminated with licensed material to have fallen from haul trucks. NRC approved the final status survey plan for Phase II Areas in a letter dated March 14, 1997.

Cimarron conducted the final status survey later in 1997, in accordance with the NRC-approved final status survey plan. A total of 750 surface soil

samples and 32 subsurface soil samples were collected and analyzed. Not one of the surface or subsurface samples yielded results exceeding the Criteria.

At that time, both Cimarron and NRC were fully aware concentrations of licensed material exceeded the proposed groundwater release criterion for uranium in the area. Consequently, Cimarron elected not to submit the final status survey report for Subarea F at that time because the area could not be released for unrestricted use until groundwater had been addressed.

As Cimarron planned and prepared for groundwater remediation in Subarea F, it became clear that not only would NRC concurrence of soil compliance to the decommissioning criteria be required but would also facilitate groundwater remediation efforts. With that in mind, Cimarron submitted a final status survey report for Subarea F in 2005, presenting the 1996 soils data.

## **1999 Groundwater Assessment**

Cimarron submitted Site Decommissioning Plan – Groundwater Evaluation Report to NRC in July 1998. In this report, Cimarron committed to additional assessment work in the area surrounding Burial Ground #1. In describing plans for additional assessment, Cimarron stated,

"Former Burial Area #1 is being surveyed and mapped using both conductivity and magnetometer non-intrusive subsurface investigation techniques. In an effort to assure that no other solid wastes remain:

Any areas that are suspect due to the above studies will be investigated.

Any discovered waste (e.g., drums, scrap, etc.) will be removed, properly packaged and shipped to an appropriate disposal site.

Any suspect localized area soils that are revealed as a result of waste removal activities will be evaluated utilizing the NRC's Branch Technical Position and volumetric averaging guidance. These activities will serve to assure that any identifiable source of lingering groundwater contamination is identified and removed."

Cimarron immediately conducted a geophysical survey, completing the survey in July, 1998. In a letter dated January 19, 1999, NRC requested that Cimarron provide a more specific work plan describing how Cimarron would investigate and characterize the area. Cimarron provided a plan based on the results of the geophysical survey in a March 4, 1999 submittal.

Following the 1999 work plan submittal, Cimarron began the investigation of the four anomalies (labeled A through D) identified by the magnetometer



survey. A backhoe was used to excavate the anomalies, searching for any previously undetected material exceeding the Criteria. No material exceeding the Criteria was discovered; only miscellaneous debris was discovered (e.g., a "deadman" for a nearby utility pole, a steel culvert, etc.).

Eleven borings were advanced in proximity to the anomalies. As recovery allowed, samples were collected at one foot intervals from grade to refusal at the bedrock surface. A total of 83 samples were collected and analyzed. Not one sample exceeded the Criteria.

After the investigation of the four anomalies, twenty seven borings were performed in east-west trending lines across the former burial trenches. Soil samples were collected at one foot intervals from ground surface to refusal (bedrock), which varied from five to ten feet in depth. A total of 187 soil samples were collected and analyzed. Not one sample exceeded the Criteria.

No suspect material was identified as a result of this investigation. Consequently, in accordance with Decommissioning Plan Groundwater Evaluation Report, there was no need to utilize volumetric averaging methodology in this area.

The work plan called for the advancement of seven additional soil borings and the extraction of groundwater samples from these borings, without the completion of additional monitor wells. However, Cimarron performed 32 additional borings and installed thirteen additional monitor wells to better characterize the nature and extent of groundwater impact.

Soil borings were also advanced at thirteen locations in the process of installing monitor wells TMW-1 through TMW-13. As recovery allowed, samples were collected at one foot intervals from grade to refusal at the bedrock surface. A total of 287 soil samples were collected and analyzed. Not one sample exceeded the Criteria.

Finally, nineteen borings, labeled SB-1 through SB-19, were advanced at locations where monitoring wells were not installed. As recovery allowed, samples were collected at one foot intervals from grade to refusal at the bedrock surface. A total of 253 samples were collected and analyzed. Not one sample exceeded the Criteria.

In this assessment, a total of 810 soil samples were collected, and not one sample exceeded the Criteria. These data are presented in Appendix 3, which contains four sets of tables, representing data from each phase of this investigation:

Borings advanced in proximity to the four anomalies (identified in the tables as "Anomaly A" through "Anomaly D"),

Borings advanced along east-west transects perpendicular to the former trenches (identified as "B-1" through "B-27"),

Borings advanced at locations specified in the work plan (and more), but in which groundwater monitor wells were not installed (identified as "SB-1" through "SB-19"), and

Borings in which monitor wells TMW-1 through TMW-13 were installed (identified in the tables as "TMW-1" through "TMW-13").

In all four tables, easting and northing coordinates are in feet, using the State Plane Coordinate system. Values for depth are in feet below grade, and represent the depth to the top of the sample interval. The total uranium results represent gross activity (not subtracting background).

The January 20 letter report included the following conclusion:

"Cimarron Corporation feels confident that all discrete sources have been removed from BG-1 [Burial Ground #1]. The only remaining item to be addressed is achieving the 180 pCi/l total uranium concentration in groundwater required for license termination."

NRC commented on this report in a letter dated April 28, 2000. Although numerous comments regarding the characterization of water-bearing materials and groundwater conditions were noted, NRC did not comment on Cimarron's assertion that no source material remained. Multiple investigations demonstrated that subsurface soil in the area complied with the Criteria. NRC expressed a concern only about the delineation and characterization of impacted groundwater and the subsurface material through which it flows, as it relates to groundwater characterization and remediation.

Cimarron responded to NRC comments and presented the 1999 data in a June 19, 2000 submittal. As part of Cimarron's response, a work plan was prepared for further groundwater assessment. NRC neither recommended nor requested additional subsurface soil evaluation to identify material that may exceed the Criteria.



## **2002 Burial Area #1 Groundwater Assessment**

Cimarron submitted a work plan for groundwater assessment in Burial Area #1 in April 2002. Based on NRC comments, the work plan was revised and resubmitted in July 2002. In a letter dated November 13, 2002, NRC approved the work plan with one exception related to the construction of wells screened across the entire saturated thickness of the alluvial aquifer. Cimarron and NRC later resolved this issue.

Cimarron conducted a groundwater assessment in accordance with the NRC-approved work plan in August 2002. During this assessment, 62 borings were advanced (labeled 02W01 through 02W62). Soil samples were collected at one foot intervals from surface to refusal in select borings. From most other borings, one soil sample was collected from the unsaturated zone and one from the saturated zone. A total of 256 samples were collected and analyzed, and not one sample exceeded unrestricted release criteria. These data were initially presented in Burial Area #1 Groundwater Assessment Report, submitted to NRC in January 2003 and are presented in Appendix 4 of this report.

In Appendix 4, easting and northing coordinates are in feet, using the State Plane Coordinate system. Values for depth are in feet below grade, and represent the depth to the top of the sample interval. Sample thickness varied because of variable recovery of the alluvial sands in the sample barrel; values for sample length are in feet. The total uranium results represent gross activity (not subtracting background).

## Data Presentation

Substantial groundwater assessment performed in Subareas C and F has identified an area in which concentration of licensed material exceeds the groundwater release criterion for uranium. Isopleth maps of the plume in this area were presented in several documents, the most recent of which is Conceptual Site Model, Revision 01, submitted to NRC in October 2006.

Cimarron cannot present all subsurface soil data with only one figure. The older (1991) data was collected without measuring the elevation at grade. The original elevation in Burial Area #1 changed when the area was excavated and subsequently backfilled and recontoured; consequently, the elevation of these samples cannot be presented along with the elevation of more recent samples. These older data are presented relative to the existing grade, so the elevation of the actual sample locations was at or lower in elevation than they appear in the illustrations of the 1991 data.

Figure 2 presents in plan view the 1991 Cimarron and ORAU soil sampling locations while Figure 3 presents 3-dimensionally the associated 1991 soils data (relative to existing grade). These figures show that the volume of material in and around the excavated trenches (surveyed extensively in 1991 by Cimarron as well as a confirmatory survey by ORAU) contains no material exceeding the Criteria.

The data sets collected in 1999 and 2002 include accurate elevation data for boring locations. Consequently, these data are presented accurately relative to existing grade. Figure 4 presents in plan view the sampling



locations for the two more recent (1999 and 2002) data sets and is shown 3-dimensionally in Figure 5

These figures show that subsurface soils which could have been impacted by contaminated groundwater migrating from the trenches (both cross gradient and downgradient) have been extensively sampled. Although borings were not advanced on a systematic grid, borings were advanced at those locations most likely to be impacted. This is demonstrated by the fact that impacted soil was sampled and analyzed within areas exhibiting the most significant total uranium concentrations in groundwater. Consequently, these data are biased toward higher concentration soils. Yet not a single sample exceeded the Criteria.

## Conclusion

The volumetric averaging methodology developed by NRC in 1997 was developed for the evaluation of volumes of soil impacted by licensed material. The systematic survey methodology presented in that paper (borings on evenly spaced grids) assumes a consistent potential for distribution of licensed material throughout the volume evaluated. This is appropriate when evaluating a burial ground (such as Burial Ground #1) or backfilled impoundment. This methodology was employed in the 1991 and 1992 surveys of Burial Ground #1, and these surveys demonstrated that the soil in Burial Ground #1 complied with the Criteria.

In the water-bearing zones downgradient from Burial Ground #1 (representing the remainder of Burial Area #1), such a methodology as presented in the 1997 volumetric survey paper is unwarranted. The potential for contamination is a function of the migration of contaminated groundwater from the former burial trenches through downgradient soil. The most appropriate methodology for surveying this area is a biased survey focusing on subsurface soil where groundwater concentrations are highest, with supplementary data at locations outside this "most contaminated" zone.

The 1999 and 2002 investigations provided a large quantity of data from numerous locations both within and outside of the Burial Area #1 plume. As would be expected, the highest concentrations of uranium in subsurface soil are seen in the area represented by monitor well TMW-09, where groundwater concentrations are highest, just a short distance downgradient from the former source. Further downgradient, subsurface soil

concentrations decline rapidly. A total of 1,066 samples were collected during these investigations, and not one sample exceeded the Criteria.

Finally, in addition to these sampling programs, Cimarron fulfilled the requirements of the final status survey plan for Subarea F which NRC approved in 1997. That 1997 sampling event yielded an additional 782 samples, of which 32 were subsurface samples. Once again, not one sample exceeded the Criteria.

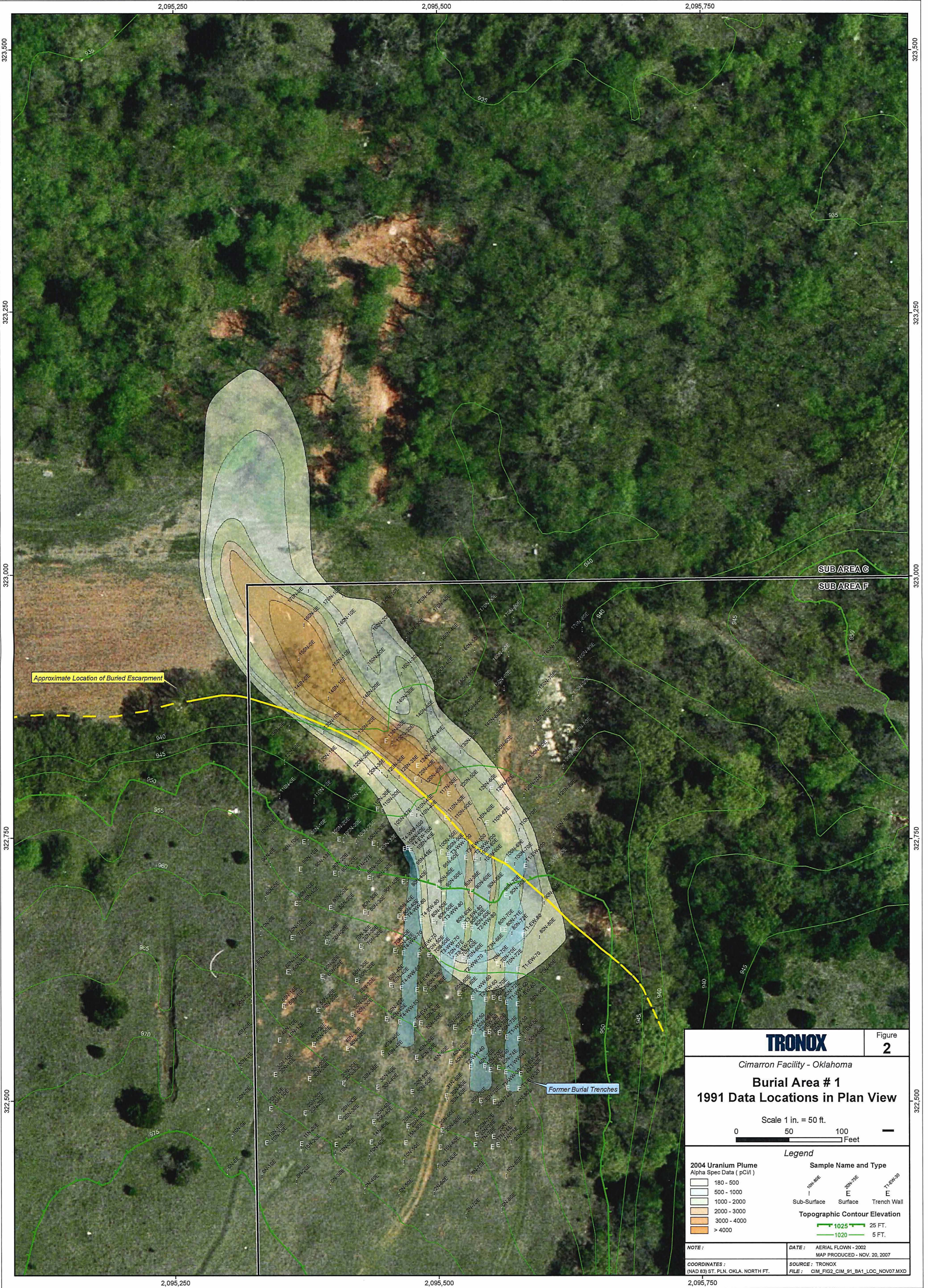
While evaluating alternative methods for groundwater decommissioning, Cimarron determined that NRC concurrence that soils in the area are releasable for unrestricted use would have a significant impact on the selection of a remedial technology. Consequently, Cimarron prepared a final status survey report that complies with the requirements of the NRC-approved final status survey plan.

As shown in the three-dimensional illustrations of Figures 3 and 5, sufficient evaluation of both surface and subsurface soil has been conducted in Subarea F to justify NRC concurrence that soils in Subarea F are releasable for unrestricted use. Additional investigations on a systematic grid are not warranted, since those areas with the highest probability for contamination comply with the Criteria, and the further expenditure of time and money to investigate soil that is unlikely to exceed the Criteria is not ALARA.









**TRONOX**

Figure  
**2**

Cimarron Facility - Oklahoma

**Burial Area # 1**  
**1991 Data Locations in Plan View**

Scale 1 in. = 50 ft.

0 50 100 Feet

**Legend**

**2004 Uranium Plume**  
Alpha Spec Data (pCi/l)

180 - 500

500 - 1000

1000 - 2000

2000 - 3000

3000 - 4000

> 4000

**Sample Name and Type**

10N-80E

10N-70E

11E-20W

Sub-Surface

Surface

Trench Wall

**Topographic Contour Elevation**

1025

1020

25 FT.

5 FT.

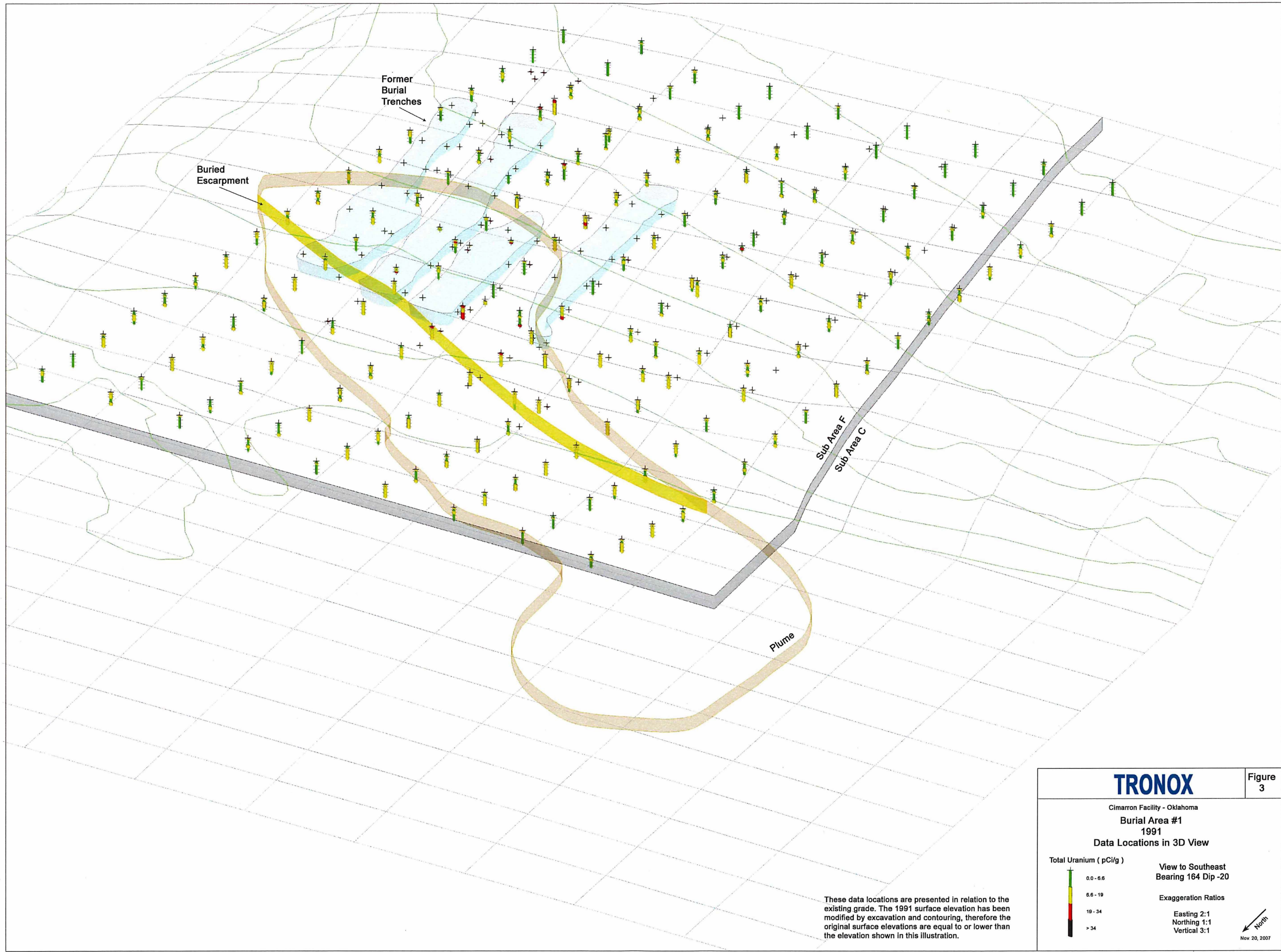
**NOTE:**

**DATE:** AERIAL FLOWN - 2002  
MAP PRODUCED - NOV. 20, 2007

**COORDINATES:**  
(NAD 83) ST. PLN. OKLA. NORTH FT.

**SOURCE:** TRONOX  
**FILE:** CIM\_FIG2\_CIM\_91\_BA1\_LOC\_NOV07.MXD





These data locations are presented in relation to the existing grade. The 1991 surface elevation has been modified by excavation and contouring, therefore the original surface elevations are equal to or lower than the elevation shown in this illustration.

**TRONOX**

Cimarron Facility - Oklahoma

**Burial Area #1**

1991

Data Locations in 3D View

Total Uranium ( pCi/g )

0.0 - 6.6

6.6 - 19

19 - 34

> 34

View to Southeast

Bearing 164 Dip -20

Exaggeration Ratios

Easting 2:1

Northing 1:1

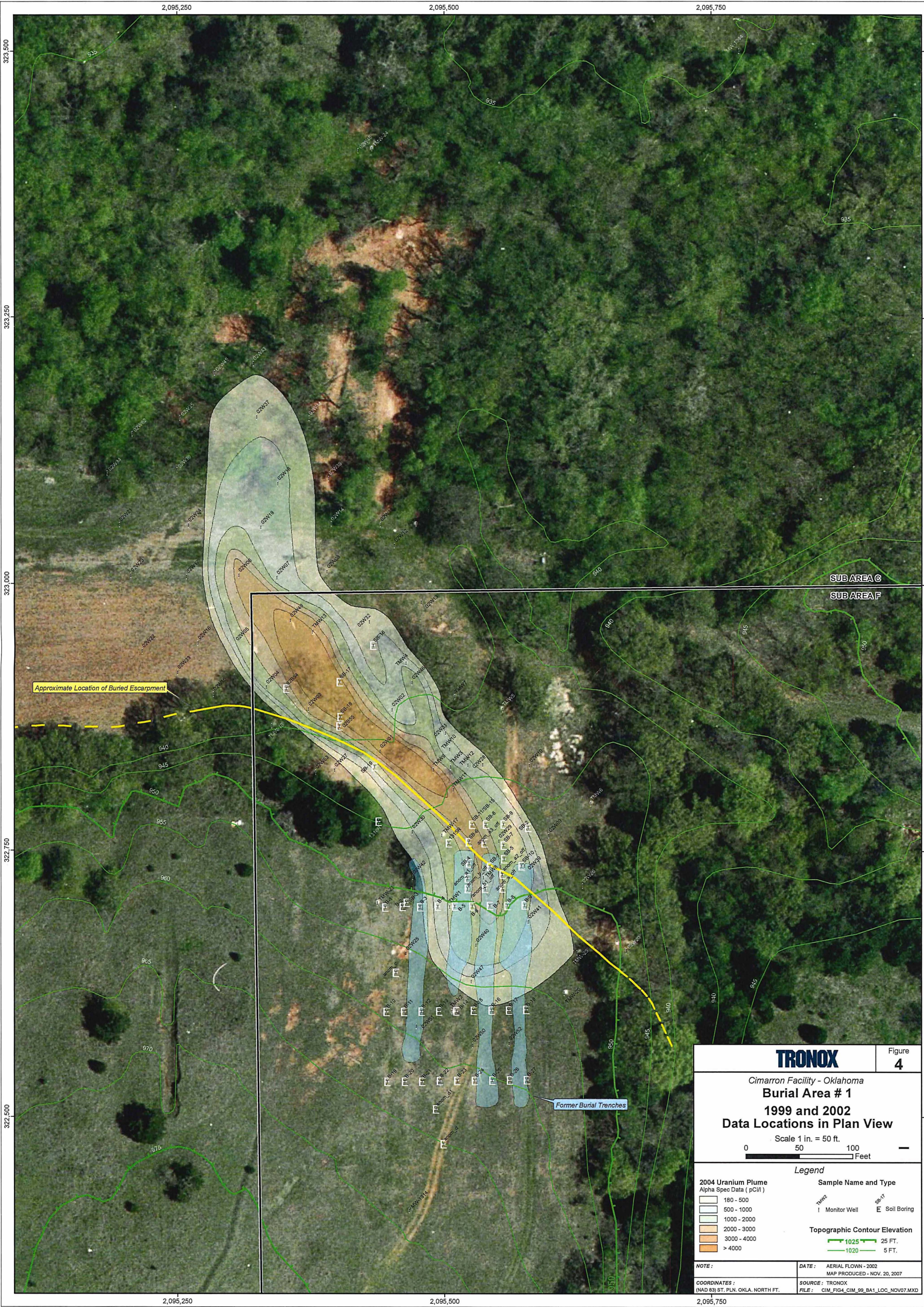
Vertical 3:1

North

Nov 20, 2007

Figure 3





**TRONOX**

Figure  
**4**

Cimarron Facility - Oklahoma

**Burial Area # 1**

**1999 and 2002**

**Data Locations in Plan View**

Scale 1 in. = 50 ft.

050100

Feet

**Legend**

**2004 Uranium Plume**  
Alpha Spec Data (pCi/l)

180 - 500

500 - 1000

1000 - 2000

2000 - 3000

3000 - 4000

> 4000

**Sample Name and Type**

TW1

Monitor Well

SB1

Soil Boring

**Topographic Contour Elevation**

1025

25 FT.

1020

5 FT.

**NOTE:**

**DATE:** AERIAL FLOWN - 2002  
MAP PRODUCED - NOV. 20, 2007

**COORDINATES:**  
(NAD 83) ST. PLN. OKLA. NORTH FT.

**SOURCE:** TRONOX  
**FILE:** CIM\_FIG4\_CIM\_99\_BA1\_LOC\_NOV07.MXD

323,500  
323,250  
323,000  
322,750  
322,500

323,500  
323,250  
323,000  
322,750  
322,500

2,095,250 2,095,500 2,095,750

2,095,250 2,095,500 2,095,750







APPENDIX 1

1991 CIMARRON SUBSURFACE SOIL DATA

from

DECONTAMINATION AND FINAL SURVEY REPORT

FOR

CIMARRON FACILITY

CONTAMINATED WASTE BURIAL GROUND

November 25, 1991

**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
0	0	0	0.5	4.9
0	0	0.5	0.5	6.5
0	0	1	1	4.3
0	0	2	1	3.5
0	0	3	1	4.4
0	10	0	0.5	5.5
0	10	0.5	0.5	4.4
0	10	1	1	5.4
0	10	2	1	5.1
0	10	3	1	1.3
0	20	0	0.5	8.2
0	20	0.5	0.5	9.2
0	20	1	1	6.3
0	20	2	1	3.3
0	20	3	1	7.2
0	30	0	0.5	5.0
0	30	0.5	0.5	4.3
0	30	1	1	8.4
0	30	2	1	9.0
0	30	3	1	4.4
0	40	0	0.5	11.1
0	40	0.5	0.5	11.3
0	40	1	1	10.0
0	40	2	1	8.7
0	40	3	1	2.1
0	50	0	0.5	6.7
0	50	0.5	0.5	3.0
0	50	1	1	5.4
0	50	2	1	9.8
0	50	3	1	9.4
0	60	0	0.5	5.8
0	60	0.5	0.5	9.6
0	60	1	1	5.5
0	60	2	1	8.4
0	60	3	1	5.3
0	70	0	0.5	11.7
0	70	0.5	0.5	8.7
0	70	1	1	6.5
0	70	2	1	4.5
0	70	3	1	2.7
0	80	0	0.5	12.0
0	80	0.5	0.5	8.1
0	80	1	1	5.3
0	80	2	1	3.4
0	80	3	1	6.8

Source: Decontamination and Final Survey Report for  
Cimarron Facility Contaminated Waste Burial Ground  
November 25, 1991

**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
0	90	0	0.5	8.4
0	90	0.5	0.5	9.8
0	90	1	1	6.7
0	90	2	1	6.8
0	90	3	1	9.9
0	100	0	0.5	9.3
0	100	0.5	0.5	6.3
0	100	1	1	3.4
0	100	2	1	5.8
0	100	3	1	6.1
0	110	0	0.5	10.7
0	110	0.5	0.5	9.7
0	110	1	1	6.9
0	110	2	1	5.0
0	110	3	1	9.0
0	120	0	0.5	7.1
0	120	0.5	0.5	5.6
0	120	1	1	6.3
0	120	2	1	8.9
0	120	3	1	6.3
0	130	0	0.5	4.0
0	130	0.5	0.5	7.9
0	130	1	1	6.3
0	130	2	1	6.0
0	130	3	1	11.2
0	140	0	0.5	6.7
0	140	0.5	0.5	4.0
0	140	1	1	7.1
0	140	2	1	7.0
0	140	3	1	5.9
0	150	0	0.5	16.8
0	150	0.5	0.5	6.8
0	150	1	1	7.8
0	150	2	1	12.4
0	150	3	1	11.5
0	160	0	0.5	7.2
0	160	0.5	0.5	1.9
0	160	1	1	8.6
0	160	2	1	6.9
0	160	3	1	7.6
0	170	0	0.5	7.8
0	170	0.5	0.5	4.3
0	170	1	1	7.4
0	170	2	1	4.9
0	170	3	1	4.2

Source: Decontamination and Final Survey Report for  
Cimarron Facility Contaminated Waste Burial Ground  
November 25, 1991

**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
10	0	0	0.5	5.1
10	0	0.5	0.5	7.1
10	0	1	1	6.4
10	0	2	1	5.9
10	0	3	1	6.4
10	10	0	0.5	5.0
10	10	0.5	0.5	3.7
10	10	1	1	5.6
10	10	2	1	2.9
10	10	3	1	3.0
10	20	0	0.5	4.7
10	20	0.5	0.5	4.1
10	20	1	1	3.6
10	20	2	1	8.8
10	20	3	1	5.2
10	30	0	0.5	7.2
10	30	0.5	0.5	11.6
10	30	1	1	4.0
10	30	2	1	4.3
10	30	3	1	6.2
10	50	0	0.5	8.3
10	50	0.5	0.5	6.7
10	50	1	1	7.3
10	50	2	1	Rock
10	50	3	1	Rock
10	60	0	0.5	10.8
10	60	0.5	0.5	13.5
10	60	1	1	6.5
10	60	2	1	7.6
10	60	3	1	10.1
10	70	0	0.5	5.6
10	70	0.5	0.5	5.7
10	70	1	1	9.3
10	70	2	1	6.9
10	70	3	1	Rock
10	80	0	0.5	14.0
10	80	0.5	0.5	12.2
10	80	1	1	6.6
10	80	2	1	6.2
10	80	3	1	9.0
10	98	0	0.5	8.1
10	98	0.5	0.5	11.6
10	98	1	1	7.3
10	98	2	1	10.2
10	98	3	1	8.0

Source: Decontamination and Final Survey Report for  
Cimarron Facility Contaminated Waste Burial Ground  
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**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
10	110	0	0.5	12.0
10	110	0.5	0.5	11.6
10	110	1	1	5.9
10	110	2	1	3.7
10	110	3	1	5.2
10	120	0	0.5	8.0
10	120	0.5	0.5	8.0
10	120	1	1	10.6
10	120	2	1	8.6
10	120	3	1	6.5
10	130	0	0.5	8.4
10	130	0.5	0.5	6.0
10	130	1	1	4.2
10	130	2	1	8.6
10	130	3	1	9.0
10	140	0	0.5	18.9
10	140	0.5	0.5	10.1
10	140	1	1	8.4
10	140	2	1	7.0
10	140	3	1	5.3
10	150	0	0.5	7.7
10	150	0.5	0.5	4.8
10	150	1	1	5.0
10	150	2	1	2.7
10	150	3	1	3.7
10	160	0	0.5	2.5
10	160	0.5	0.5	7.1
10	160	1	1	4.6
10	160	2	1	5.4
10	160	3	1	6.3
10	170	0	0.5	9.4
10	170	0.5	0.5	4.9
10	170	1	1	6.3
10	170	2	1	6.3
10	170	3	1	5.8
12	40	0	0.5	5.9
12	40	0.5	0.5	8.2
12	40	1	1	6.9
12	40	2	1	8.7
12	40	3	1	5.0
13	90	0	0.5	9.8
13	90	0.5	0.5	8.4
13	90	1	1	4.7
13	90	2	1	9.7
13	90	3	1	5.7

Source: Decontamination and Final Survey Report for  
Cimarron Facility Contaminated Waste Burial Ground  
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**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
20	0	0	0.5	3.0
20	0	0.5	0.5	6.4
20	0	1	1	6.2
20	0	2	1	5.0
20	0	3	1	3.4
20	10	0	0.5	4.6
20	10	0.5	0.5	5.9
20	10	1	1	4.6
20	10	2	1	4.0
20	10	3	1	4.6
20	20	0	0.5	11.0
20	20	0.5	0.5	6.7
20	20	1	1	5.4
20	20	2	1	Rock
20	20	3	1	Rock
20	30	0	0.5	7.0
20	30	0.5	0.5	2.8
20	30	1	1	6.5
20	30	2	1	5.4
20	30	3	1	2.1
20	40	0	0.5	11.0
20	40	0.5	0.5	9.1
20	40	1	1	6.1
20	40	2	1	4.0
20	40	3	1	8.4
20	50	0	0.5	11.3
20	50	0.5	0.5	5.8
20	50	1	1	4.3
20	50	2	1	5.2
20	50	3	1	7.5
20	60	0	0.5	13.0
20	60	0.5	0.5	7.0
20	60	1	1	7.7
20	60	2	1	7.4
20	60	3	1	8.2
20	70	0	0.5	10.3
20	70	0.5	0.5	6.2
20	70	1	1	11.0
20	70	2	1	2.9
20	70	3	1	5.2
20	80	0	0.5	5.7
20	80	0.5	0.5	3.9
20	80	1	1	8.6
20	80	2	1	7.4
20	80	3	1	9.5

Source: Decontamination and Final Survey Report for  
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**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
20	90	0	0.5	9.3
20	90	0.5	0.5	5.9
20	90	1	1	8.4
20	90	2	1	8.8
20	90	3	1	11.5
20	100	0	0.5	13.8
20	100	0.5	0.5	6.9
20	100	1	1	8.6
20	100	2	1	8.7
20	100	3	1	7.8
20	110	0	0.5	13.6
20	110	0.5	0.5	7.8
20	110	1	1	10.6
20	110	2	1	10.4
20	110	3	1	Rock
20	120	0	0.5	14.2
20	120	0.5	0.5	10.4
20	120	1	1	8.8
20	120	2	1	10.4
20	120	3	1	7.2
20	130	0	0.5	9.8
20	130	0.5	0.5	11.5
20	130	1	1	9.2
20	130	2	1	10.0
20	130	3	1	10.8
20	140	0	0.5	12.4
20	140	0.5	0.5	11.9
20	140	1	1	10.7
20	140	2	1	10.2
20	140	3	1	14.5
20	150	0	0.5	9.0
20	150	0.5	0.5	3.9
20	150	1	1	4.3
20	150	2	1	10.5
20	150	3	1	9.8
20	160	0	0.5	12.1
20	160	0.5	0.5	5.5
20	160	1	1	9.4
20	160	2	1	13.4
20	160	3	1	7.0
20	170	0	0.5	10.6
20	170	0.5	0.5	5.8
20	170	1	1	8.0
20	170	2	1	4.8
20	170	3	1	4.5

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Cimarron Facility Contaminated Waste Burial Ground  
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**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
30	0	0	0.5	4.7
30	0	0.5	0.5	5.4
30	0	1	1	3.7
30	0	2	1	6.0
30	0	3	1	5.2
30	10	0	0.5	3.8
30	10	0.5	0.5	5.1
30	10	1	1	5.6
30	10	2	1	5.4
30	10	3	1	3.2
30	20	0	0.5	7.7
30	20	0.5	0.5	8.5
30	20	1	1	10.3
30	20	2	1	4.7
30	20	3	1	3.4
30	30	0	0.5	8.1
30	30	0.5	0.5	6.8
30	30	1	1	4.0
30	30	2	1	5.8
30	30	3	1	8.5
30	40	0	0.5	6.0
30	40	0.5	0.5	3.7
30	40	1	1	9.6
30	40	2	1	4.6
30	40	3	1	4.5
30	50	0	0.5	4.3
30	50	0.5	0.5	2.0
30	50	1	1	5.6
30	50	2	1	2.4
30	50	3	1	3.2
30	60	0	0.5	14.3
30	60	0.5	0.5	5.7
30	60	1	1	9.3
30	60	2	1	4.9
30	60	3	1	6.3
30	70	0	0.5	17.3
30	70	0.5	0.5	12.4
30	70	1	1	10.9
30	70	2	1	10.1
30	70	3	1	5.8
30	80	0	0.5	3.7
30	80	0.5	0.5	4.8
30	80	1	1	3.5
30	80	2	1	5.5
30	80	3	1	6.9

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**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
30	90	0	0.5	18.9
30	90	0.5	0.5	12.3
30	90	1	1	5.8
30	90	2	1	9.0
30	90	3	1	10.6
30	100	0	0.5	16.6
30	100	0.5	0.5	10.9
30	100	1	1	10.4
30	100	2	1	7.3
30	100	3	1	8.3
30	110	0	0.5	9.7
30	110	0.5	0.5	10.2
30	110	1	1	7.0
30	110	2	1	7.5
30	110	3	1	2.8
30	120	0	0.5	9.5
30	120	0.5	0.5	17.0
30	120	1	1	11.1
30	120	2	1	12.7
30	120	3	1	18.6
30	130	0	0.5	12.1
30	130	0.5	0.5	9.6
30	130	1	1	6.3
30	130	2	1	6.3
30	130	3	1	8.9
30	140	0	0.5	10.5
30	140	0.5	0.5	9.0
30	140	1	1	8.4
30	140	2	1	12.0
30	140	3	1	8.9
30	150	0	0.5	6.4
30	150	0.5	0.5	8.9
30	150	1	1	4.7
30	150	2	1	9.8
30	150	3	1	8.6
30	160	0	0.5	8.3
30	160	0.5	0.5	6.2
30	160	1	1	4.9
30	160	2	1	4.6
30	160	3	1	11.1
30	170	0	0.5	12.0
30	170	0.5	0.5	8.9
30	170	1	1	7.8
30	170	2	1	6.8
30	170	3	1	7.2

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**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
40	0	0	0.5	8.1
40	0	0.5	0.5	5.5
40	0	1	1	5.4
40	0	2	1	5.4
40	0	3	1	4.5
40	10	0	0.5	4.3
40	10	0.5	0.5	6.0
40	10	1	1	4.8
40	10	2	1	4.3
40	10	3	1	2.3
40	20	0	0.5	9.4
40	20	0.5	0.5	6.7
40	20	1	1	10.2
40	20	2	1	5.0
40	20	3	1	6.8
40	30	0	0.5	6.2
40	30	0.5	0.5	4.6
40	30	1	1	9.2
40	30	2	1	12.9
40	30	3	1	6.9
40	40	0	0.5	10.0
40	40	0.5	0.5	5.4
40	40	1	1	8.5
40	40	2	1	4.4
40	40	3	1	5.3
40	50	0	0.5	6.6
40	50	0.5	0.5	5.9
40	50	1	1	4.4
40	50	2	1	Rock
40	50	3	1	Rock
40	60	0	0.5	8.2
40	60	0.5	0.5	4.7
40	60	1	1	7.3
40	60	2	1	7.4
40	60	3	1	7.3
40	80	0	0.5	Rock
40	80	0.5	0.5	Rock
40	80	1	1	Rock
40	80	2	1	Rock
40	80	3	1	Rock
40	90	0	0.5	8.8
40	90	0.5	0.5	7.6
40	90	1	1	15.1
40	90	2	1	11.4
40	90	3	1	19.5

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**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
40	100	0	0.5	14.3
40	100	0.5	0.5	6.8
40	100	1	1	10.2
40	100	2	1	8.1
40	100	3	1	11.5
40	110	0	0.5	20.3
40	110	0.5	0.5	9.6
40	110	1	1	11.9
40	110	2	1	13.6
40	110	3	1	8.5
40	120	0	0.5	11.4
40	120	0.5	0.5	12.3
40	120	1	1	8.1
40	120	2	1	9.8
40	120	3	1	16.3
40	130	0	0.5	5.9
40	130	0.5	0.5	9.1
40	130	1	1	6.9
40	130	2	1	8.9
40	130	3	1	8.5
40	140	0	0.5	5.3
40	140	0.5	0.5	2.6
40	140	1	1	6.8
40	140	2	1	10.3
40	140	3	1	9.2
40	150	0	0.5	8.7
40	150	0.5	0.5	10.1
40	150	1	1	8.2
40	150	2	1	8.8
40	150	3	1	5.0
40	160	0	0.5	5.4
40	160	0.5	0.5	7.0
40	160	1	1	7.0
40	160	2	1	6.9
40	160	3	1	8.2
40	170	0	0.5	5.2
40	170	0.5	0.5	8.1
40	170	1	1	5.9
40	170	2	1	5.3
40	170	3	1	5.6
42	70	0	0.5	7.7
42	70	0.5	0.5	5.3
42	70	1	1	9.9
42	70	2	1	Rock
42	70	3	1	Rock

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**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
50	0	0	0.5	5.6
50	0	0.5	0.5	6.0
50	0	1	1	4.9
50	0	2	1	2.6
50	0	3	1	4.4
50	10	0	0.5	3.1
50	10	0.5	0.5	2.0
50	10	1	1	5.2
50	10	2	1	4.6
50	10	3	1	5.2
50	20	0	0.5	5.9
50	20	0.5	0.5	9.0
50	20	1	1	8.1
50	20	2	1	6.2
50	20	3	1	7.7
50	30	0	0.5	6.0
50	30	0.5	0.5	5.4
50	30	1	1	8.7
50	30	2	1	3.1
50	30	3	1	6.8
50	40	0	0.5	11.5
50	40	0.5	0.5	8.2
50	40	1	1	6.9
50	40	2	1	4.8
50	40	3	1	8.2
50	50	0	0.5	9.7
50	50	0.5	0.5	7.7
50	50	1	1	11.6
50	50	2	1	6.0
50	50	3	1	10.8
50	60	0	0.5	11.7
50	60	0.5	0.5	10.5
50	60	1	1	17.6
50	60	2	1	19.6
50	60	3	1	15.2
50	70	0	0.5	11.0
50	70	0.5	0.5	4.0
50	70	1	1	7.3
50	70	2	1	6.6
50	70	3	1	6.8
50	80	0	0.5	12.4
50	80	0.5	0.5	4.6
50	80	1	1	4.5
50	80	2	1	5.6
50	80	3	1	Rock

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**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
50	90	0	0.5	Rock
50	90	0.5	0.5	Rock
50	90	1	1	Rock
50	90	2	1	Rock
50	90	3	1	Rock
50	100	0	0.5	19.2
50	100	0.5	0.5	12.5
50	100	1	1	15.1
50	100	2	1	19.3
50	100	3	1	24.6
50	110	0	0.5	20.9
50	110	0.5	0.5	15.9
50	110	1	1	11.0
50	110	2	1	14.4
50	110	3	1	7.2
50	120	0	0.5	5.2
50	120	0.5	0.5	8.9
50	120	1	1	9.0
50	120	2	1	7.2
50	120	3	1	8.7
50	130	0	0.5	7.6
50	130	0.5	0.5	12.7
50	130	1	1	10.5
50	130	2	1	6.2
50	130	3	1	7.4
50	140	0	0.5	11.2
50	140	0.5	0.5	8.3
50	140	1	1	8.6
50	140	2	1	6.0
50	140	3	1	11.4
50	150	0	0.5	7.8
50	150	0.5	0.5	9.0
50	150	1	1	8.5
50	150	2	1	9.3
50	150	3	1	9.9
50	160	0	0.5	5.6
50	160	0.5	0.5	3.4
50	160	1	1	3.7
50	160	2	1	3.9
50	160	3	1	8.0
50	170	0	0.5	9.0
50	170	0.5	0.5	5.1
50	170	1	1	4.5
50	170	2	1	7.2
50	170	3	1	2.8

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**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
58	90	0	0.5	16.5
58	90	0.5	0.5	10.9
58	90	1	1	8.1
58	90	2	1	Rock
58	90	3	1	Rock
60	2	0	0.5	7.4
60	2	0.5	0.5	7.1
60	2	1	1	4.8
60	2	2	1	3.8
60	2	3	1	4.4
60	10	0	0.5	6.7
60	10	0.5	0.5	4.4
60	10	1	1	6.2
60	10	2	1	3.3
60	10	3	1	5.1
60	20	0	0.5	13.5
60	20	0.5	0.5	12.2
60	20	1	1	7.4
60	20	2	1	4.8
60	20	3	1	8.4
60	30	0	0.5	8.8
60	30	0.5	0.5	7.4
60	30	1	1	9.5
60	30	2	1	4.8
60	30	3	1	5.4
60	40	0	0.5	10.8
60	40	0.5	0.5	8.2
60	40	1	1	3.0
60	40	2	1	6.0
60	40	3	1	9.7
60	50	0	0.5	5.2
60	50	0.5	0.5	4.2
60	50	1	1	9.1
60	50	2	1	4.3
60	50	3	1	13.9
60	60	0	0.5	12.1
60	60	0.5	0.5	6.5
60	60	1	1	6.7
60	60	2	1	9.2
60	60	3	1	9.1
60	70	0	0.5	13.9
60	70	0.5	0.5	16.3
60	70	1	1	Rock
60	70	2	1	Rock
60	70	3	1	Rock

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**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
60	80	0	0.5	13.5
60	80	0.5	0.5	22.2
60	80	1	1	18.6
60	80	2	1	Rock
60	80	3	1	Rock
60	100	0	0.5	17.8
60	100	0.5	0.5	12.7
60	100	1	1	12.3
60	100	2	1	12.0
60	100	3	1	8.7
60	110	0	0.5	6.8
60	110	0.5	0.5	10.3
60	110	1	1	6.9
60	110	2	1	9.3
60	110	3	1	7.8
60	120	0	0.5	5.4
60	120	0.5	0.5	2.7
60	120	1	1	5.7
60	120	2	1	8.7
60	120	3	1	9.0
60	130	0	0.5	5.3
60	130	0.5	0.5	2.8
60	130	1	1	6.5
60	130	2	1	6.3
60	130	3	1	6.3
60	140	0	0.5	9.5
60	140	0.5	0.5	7.8
60	140	1	1	7.9
60	140	2	1	7.0
60	140	3	1	5.1
60	150	0	0.5	7.3
60	150	0.5	0.5	5.2
60	150	1	1	5.0
60	150	2	1	5.0
60	150	3	1	8.0
60	160	0	0.5	5.2
60	160	0.5	0.5	2.6
60	160	1	1	3.6
60	160	2	1	7.8
60	160	3	1	6.5
60	170	0	0.5	6.7
60	170	0.5	0.5	5.7
60	170	1	1	3.3
60	170	2	1	6.2
60	170	3	1	6.3

Source: Decontamination and Final Survey Report for  
Cimarron Facility Contaminated Waste Burial Ground  
November 25, 1991

**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
70	3	0	0.5	3.0
70	3	0.5	0.5	8.0
70	3	1	1	4.0
70	3	2	1	5.7
70	3	3	1	5.8
70	8	0	0.5	3.9
70	8	0.5	0.5	2.5
70	8	1	1	4.3
70	8	2	1	2.7
70	8	3	1	6.5
70	20	0	0.5	14.8
70	20	0.5	0.5	5.3
70	20	1	1	8.0
70	20	2	1	6.4
70	20	3	1	10.5
70	30	0	0.5	22.0
70	30	0.5	0.5	9.1
70	30	1	1	4.9
70	30	2	1	5.0
70	30	3	1	7.2
70	40	0	0.5	4.4
70	40	0.5	0.5	8.9
70	40	1	1	9.4
70	40	2	1	7.3
70	40	3	1	5.3
70	50	0	0.5	10.2
70	50	0.5	0.5	6.3
70	50	1	1	5.7
70	50	2	1	5.2
70	50	3	1	7.0
70	60	0	0.5	8.3
70	60	0.5	0.5	5.9
70	60	1	1	4.7
70	60	2	1	4.9
70	60	3	1	3.6
70	70	0	0.5	9.2
70	70	0.5	0.5	10.2
70	70	1	1	5.6
70	70	2	1	6.5
70	70	3	1	7.0
70	90	0	0.5	6.6
70	90	0.5	0.5	10.1
70	90	1	1	5.3
70	90	2	1	5.6
70	90	3	1	6.2

Source: Decontamination and Final Survey Report for  
Cimarron Facility Contaminated Waste Burial Ground  
November 25, 1991



**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
70	100	0	0.5	6.8
70	100	0.5	0.5	5.2
70	100	1	1	7.8
70	100	2	1	8.7
70	100	3	1	10.0
70	110	0	0.5	10.2
70	110	0.5	0.5	11.0
70	110	1	1	6.8
70	110	2	1	9.1
70	110	3	1	11.8
70	120	0	0.5	7.6
70	120	0.5	0.5	6.1
70	120	1	1	7.3
70	120	2	1	8.5
70	120	3	1	4.1
70	130	0	0.5	2.9
70	130	0.5	0.5	3.3
70	130	1	1	2.8
70	130	2	1	5.6
70	130	3	1	8.6
70	140	0	0.5	10.2
70	140	0.5	0.5	8.8
70	140	1	1	10.9
70	140	2	1	4.0
70	140	3	1	7.3
70	150	0	0.5	8.3
70	150	0.5	0.5	7.0
70	150	1	1	6.7
70	150	2	1	7.4
70	150	3	1	7.7
70	160	0	0.5	11.7
70	160	0.5	0.5	11.2
70	160	1	1	2.7
70	160	2	1	4.7
70	160	3	1	6.2
70	170	0	0.5	7.8
70	170	0.5	0.5	10.8
70	170	1	1	7.5
70	170	2	1	4.7
70	170	3	1	6.6
72	80	0	0.5	7.1
72	80	0.5	0.5	4.0
72	80	1	1	6.4
72	80	2	1	7.1
72	80	3	1	6.8

Source: Decontamination and Final Survey Report for  
Cimarron Facility Contaminated Waste Burial Ground  
November 25, 1991



**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
80	0	0	0.5	5.9
80	0	0.5	0.5	5.6
80	0	1	1	4.8
80	0	2	1	5.6
80	0	3	1	3.1
80	10	0	0.5	3.6
80	10	0.5	0.5	4.8
80	10	1	1	5.1
80	10	2	1	3.5
80	10	3	1	2.9
80	20	0	0.5	3.4
80	20	0.5	0.5	5.4
80	20	1	1	6.7
80	20	2	1	7.1
80	20	3	1	2.9
80	30	0	0.5	4.4
80	30	0.5	0.5	6.9
80	30	1	1	7.5
80	30	2	1	5.5
80	30	3	1	5.5
80	40	0	0.5	7.7
80	40	0.5	0.5	16.1
80	40	1	1	2.8
80	40	2	1	4.8
80	40	3	1	5.2
80	50	0	0.5	9.9
80	50	0.5	0.5	7.3
80	50	1	1	7.2
80	50	2	1	3.7
80	50	3	1	5.3
80	60	0	0.5	10.5
80	60	0.5	0.5	10.9
80	60	1	1	6.4
80	60	2	1	8.3
80	60	3	1	7.6
80	70	0	0.5	8.8
80	70	0.5	0.5	5.8
80	70	1	1	10.3
80	70	2	1	9.0
80	70	3	1	3.2
80	80	0	0.5	4.4
80	80	0.5	0.5	9.5
80	80	1	1	8.2
80	80	2	1	4.4
80	80	3	1	6.6

Source: Decontamination and Final Survey Report for  
Cimarron Facility Contaminated Waste Burial Ground  
November 25, 1991

**APPENDIX 1**  
**1991 CIMARRON SUBSURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Depth (feet)</b>	<b>Sample Thickness (feet)</b>	<b>Total U (pCi/g)</b>
80	90	0	0.5	11.0
80	90	0.5	0.5	8.5
80	90	1	1	5.2
80	90	2	1	6.8
80	90	3	1	11.8
80	100	0	0.5	9.1
80	100	0.5	0.5	6.6
80	100	1	1	12.1
80	100	2	1	4.9
80	100	3	1	4.3
80	110	0	0.5	5.2
80	110	0.5	0.5	9.1
80	110	1	1	7.8
80	110	2	1	7.4
80	110	3	1	8.2
80	120	0	0.5	8.3
80	120	0.5	0.5	5.4
80	120	1	1	5.6
80	120	2	1	14.4
80	120	3	1	4.8
80	130	0	0.5	5.9
80	130	0.5	0.5	7.4
80	130	1	1	4.7
80	130	2	1	3.0
80	130	3	1	8.1
80	140	0	0.5	6.4
80	140	0.5	0.5	4.4
80	140	1	1	9.8
80	140	2	1	6.9
80	140	3	1	5.8
80	150	0	0.5	8.7
80	150	0.5	0.5	6.0
80	150	1	1	7.6
80	150	2	1	7.8
80	150	3	1	7.7
80	160	0	0.5	2.6
80	160	0.5	0.5	6.3
80	160	1	1	2.3
80	160	2	1	4.8
80	160	3	1	2.8
80	170	0	0.5	5.5
80	170	0.5	0.5	6.8
80	170	1	1	7.7
80	170	2	1	3.7
80	170	3	1	5.1

Source: Decontamination and Final Survey Report for  
Cimarron Facility Contaminated Waste Burial Ground  
November 25, 1991

APPENDIX 2

1991 OAK RIDGE SUBSURFACE SOIL DATA

from

CONFIRMATORY RADIOLOGICAL SURVEY

FORMER BURIAL GROUND

CIMARRON CORPORATION FACILITY

July 1992

**APPENDIX 2**  
**1991 ORAU SURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Total Uranium (pCi/g)</b>
10	10	6
10	20	5.9
10	30	<7.8
10	40	5.9
10	50	3.5
10	60	6.4
10	70	3.3
10	80	<7.7
10	90	5.9
10	98	12
20	11	7.8
20	20	9.1
20	30	11
20	40	9.7
20	50	6.2
20	60	3.5
20	70	5.4
20	80	6.6
20	90	6.3
20	100	4.1
30	12	7.2
30	20	3.4
30	30	7
30	40	3.6
30	50	6.6
30	60	13
30	70	27
30	80	6.4
30	90	16
30	100	18
30	110	17
30	120	22
30	130	9
40	14	5.5
40	20	7.3
40	30	6.1
40	40	13
40	50	5.6
40	60	<5.4
40	70	30
40	80	5.8
40	90	5.3
40	100	6.1
40	110	16
40	120	11
40	124	<3.6



**APPENDIX 2**  
**1991 ORAU SURFACE SOIL DATA**

<b>Easting (meters)</b>	<b>Northing (meters)</b>	<b>Total Uranium (pCi/g)</b>
50	15	5.8
50	20	7.4
50	30	16
50	40	3.4
50	50	8.4
50	60	7.7
50	70	9.3
50	80	22
50	90	16
50	100	16
50	110	21
50	117	13
60	15	11
60	20	3.5
60	30	8.2
60	40	<4.1
60	50	5.6
60	60	11
60	70	23
60	80	18.5
60	90	13
60	100	19
62	110	5.8
62	120	22
69	100	8.6
70	17	24
70	20	6.7
70	30	9.9
70	40	2.7
70	50	8.4
70	60	6.2
70	70	3
70	80	8.6
70	90	7.3
71	80	9.1
72	60	6.1
72	70	14
73	50	5.6
74	30	9.2
74	40	10
75	17	25.6

**APPENDIX 2**  
**1991 ORAU TRENCH SIDEWALL SOIL DATA**

Trench	Distance (meters)	Sidewall	Total Uranium (pCi/g)
Trench 1	30	East Wall	< 4
	30	East Wall	< 8.2
	40	East Wall	5.6
	40	East Wall	< 5.3
	50	East Wall	< 3.7
	50	East Wall	< 10
	60	East Wall	< 3.1
	60	East Wall	< 5.5
	70	East Wall	5.9
	80	East Wall	< 3.3
	100	East Wall	9.4
Trench 2	40	East Wall	5.4
	40	West Wall	< 13
	50	East Wall	23
	50	West Wall	< 12
	60	East Wall	< 3.3
	60	West Wall	< 10
	70	West Wall	12
	80	West Wall	7.8
Trench 3	100	West Wall	< 8.4
	70	East Wall	< 5.4
	70	West Wall	13
	80	East Wall	26.6
	80	West Wall	6
	100	East Wall	< 3.9
Trench 4	100	West Wall	< 3.3
	50	East Wall	< 4
	50	West Wall	< 7.5
	60	East Wall	6.8
	60	West Wall	< 5.5
	70	East Wall	< 12
	70	West Wall	< 5.5
	80	East Wall	< 12
	80	West Wall	6.1
	?	West Wall	7.1
	100	East Wall	12
	100	West Wall	14

**APPENDIX 2**  
**1991 ORAU SUBSURFACE SOIL DATA**

<b>EASTING (meters)</b>	<b>NORTHING (meters)</b>	<b>Depth (cm)</b>	<b>Thickness (cm)</b>	<b>Total Uranium (pCi/g)</b>
70	25	15	25	21
70	25	40	40	13
70	25	80	50	9.9
70	25	130	20	6.8
35	30	0	15	7.6
35	30	15	35	< 5.5
35	30	50	25	3.9
35	30	75	45	4.1
35	30	120	30	8
60	31	0	15	8.8
60	31	15	25	5.3
60	31	40	40	5.6
60	31	80	50	6.4
60	31	130	20	< 8
60	45	0	15	20
60	45	15	35	6.9
60	45	50	40	5.3
60	45	90	40	6.1
60	45	130	20	5.9
66	50	0	15	6.1
66	50	15	30	5.8
66	50	45	30	5
30	55	0	15	6.3
30	55	15	25	19.7
30	55	40	10	3
30	70	0	15	8.4
30	70	15	25	5.6
30	70	40	40	8.8
30	70	80	40	10
30	70	120	30	9.1
57	70	0	15	7.8
57	70	15	15	27
66	73	0	15	9
66	73	15	15	15
65	90	0	15	13
65	90	15	20	18.6
65	90	35	15	25
27	91	0	15	12
27	91	15	25	8
27	91	40	50	5.9
27	91	90	40	6.1
27	91	130	20	< 12

**APPENDIX 2**  
**1991 ORAU SUBSURFACE SOIL DATA**

45	95	0	15	6.1
45	95	15	35	< 6.1
45	95	50	20	6.6
45	95	70	60	5.4
45	95	130	20	23
50	95	15	25	13
50	95	40	10	14
25	100	0	15	13
25	100	15	25	6
25	100	40	30	9
25	100	70	50	6.6
37	105	0	15	15
37	105	15	35	9.3
37	105	50	30	6.9
37	105	80	50	8.5
35	120	0	15	14
35	120	15	25	14
35	120	40	35	13
35	120	75	35	13
35	120	110	60	0.9



APPENDIX 3

1999 CIMARRON SUBSURFACE SOIL DATA

from

RESPONSE TO NRC COMMENTS ON

CIMARRON PROGRESS REPORT REGARDING

BURIAL AREA #1 GROUNDWATER EVALUATION

June 19, 2000

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "ANOMALY" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCl/g)
Anomaly A	1256	864	0	7
	1256	864	1	8
	1256	864	2	9
	1256	864	3	9
Anomaly A	1246	867	0	3
	1246	867	1	6
	1246	867	2	6
	1246	867	3	11
	1246	867	4	16
	1246	867	5	11
	1246	867	6	5
	1246	867	7	12
Anomaly A (also SB-1)	1252	871	0	6
	1252	871	1	6
	1252	871	2	5
	1252	871	3	10
	1252	871	4	8
	1252	871	5	11
	1252	871	6	5
	1252	871	7	8
	1252	871	8	6
	1252	871	9	9
	1252	871	10	10
	1252	871	11	11
	1252	871	12	5
	1252	871	13	6
Anomaly A	1251	877	0	4
	1251	877	1	3
	1251	877	2	6
	1251	877	3	5
	1251	877	4	9
Anomaly A	1256	868	0	9
	1256	868	1	5
	1256	868	2	4
	1256	868	3	4
	1256	868	4	7
	1256	868	5	5
	1256	868	6	7
	1256	868	7	10
	1256	868	8	No Sample
	1256	868	9	No Sample
	1256	868	10	15
Anomaly B (also SB-3)	1228	861	0	5
	1228	861	1	4
	1228	861	2	5
	1228	861	3	5
	1228	861	4	No Sample
	1228	861	5	8
	1228	861	6	6
	1228	861	7	8
	1228	861	8	11

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "ANOMALY" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
Anomaly B	1246	864	0	7
	1246	864	1	4
	1246	864	2	7
	1246	864	3	7
	1246	864	4	7
	1246	864	5	19
Anomaly B	1251	864	0	6
	1251	864	1	8
	1251	864	2	6
	1251	864	3	10
	1251	864	4	20
Anomaly C	1224	841	0	7
	1224	841	1	4
	1224	841	2	6
	1224	841	3	No Sample
	1224	841	4	No Sample
	1224	841	5	9
	1224	841	6	10
	1224	841	7	10
	1224	841	8	No Sample
	1224	841	9	No Sample
	1224	841	10	6
Anomaly D	1236	801	0	9
	1236	801	1	4
	1236	801	2	5
Anomaly D	1238	791	0	5
	1238	791	1	6
	1238	791	2	4
	1238	791	3	1
	1238	791	4	5
	1238	791	5	6
	1238	791	6	5

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "B" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
B-1	1220	810	0	6
	1220	810	1	7
	1220	810	2	6
	1220	810	3	3
	1220	810	4	4
B-2	1225	810	0	9
	1225	810	1	3
	1225	810	2	5
	1225	810	3	4
	1225	810	4	4
	1225	810	5	4
B-3	1230	810	0	3
	1230	810	1	7
	1230	810	2	7
	1230	810	3	6
	1230	810	4	8
	1230	810	5	4
	1230	810	6	3
	1230	810	7	4
B-4	1235	810	0	5
	1235	810	1	6
	1235	810	2	5
	1235	810	3	6
	1235	810	4	6
	1235	810	5	6
	1235	810	6	5
	1235	810	7	7
	1235	810	8	5
B-5	1240	810	0	9
	1240	810	1	10
	1240	810	2	10
	1240	810	3	6
	1240	810	4	10
	1240	810	5	9
	1240	810	6	5
	1240	810	7	3
	1240	810	8	5
	1240	810	9	5
B-6	1245	810	0	5
	1245	810	1	11
	1245	810	2	8
	1245	810	3	4
	1245	810	4	No Sample
	1245	810	5	2
	1245	810	6	5



**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "B" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
B-7	1250	810	0	6
	1250	810	1	4
	1250	810	2	2
	1250	810	3	5
	1250	810	4	5
B-8	1255	810	0	5
	1255	810	1	3
	1255	810	2	5
	1255	810	3	11
	1255	810	4	5
	1255	810	5	3
B-9	1260	810	0	6
	1260	810	1	2
	1260	810	2	5
	1260	810	3	8
	1260	810	4	5
B-10	1220	830	0	5
	1220	830	1	2
	1220	830	2	4
	1220	830	3	6
	1220	830	4	6
B-11	1225	830	0	5
	1225	830	1	6
	1225	830	2	5
	1225	830	3	8
	1225	830	4	7
	1225	830	5	5
	1225	830	6	4
	1225	830	7	3
	1225	830	8	4
B-12	1230	830	0	4
	1230	830	1	9
	1230	830	2	5
	1230	830	3	5
	1230	830	4	7
	1230	830	5	5
	1230	830	6	4
	1230	830	7	3

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "B" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
B-13	1235	830	0	8
	1235	830	1	13
	1235	830	2	8
	1235	830	3	7
	1235	830	4	8
	1235	830	5	6
	1235	830	6	8
	1235	830	7	5
	1235	830	8	5
B-14	1240	830	0	5
	1240	830	1	6
	1240	830	2	10
	1240	830	3	8
	1240	830	4	18
	1240	830	5	5
	1240	830	6	9
	1240	830	7	4
	1240	830	8	9
B-15	1245	830	0	5
	1245	830	1	4
	1245	830	2	5
	1245	830	3	5
	1245	830	4	2
	1245	830	5	4
	1245	830	6	6
	1245	830	7	9
B-16	1250	830	0	5
	1250	830	1	4
	1250	830	2	10
	1250	830	3	8
	1250	830	4	No Sample
	1250	830	5	4
	1250	830	6	6
	1250	830	7	6
B-17	1255	830	0	5
	1255	830	1	9
	1255	830	2	5
	1255	830	3	3
	1255	830	4	7
B-18	1260	830	0	6
	1260	830	1	7
	1260	830	2	4
	1260	830	3	7
	1260	830	4	5

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "B" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
B-19	1220	860	0	3
	1220	860	1	6
	1220	860	2	4
	1220	860	3	2
	1220	860	4	6
	1220	860	5	No Sample
	1220	860	6	8
	1220	860	7	6
	1220	860	8	5
	1220	860	9	6
B-20	1225	860	0	5
	1225	860	1	6
	1225	860	2	No Sample
	1225	860	3	No Sample
	1225	860	4	No Sample
	1225	860	5	4
	1225	860	6	5
	1225	860	7	8
	1225	860	8	5
	1225	860	9	5
B-21	1230	860	0	4
	1230	860	1	7
	1230	860	2	3
	1230	860	3	7
	1230	860	4	9
	1230	860	5	10
	1230	860	6	7
	1230	860	7	5
B-22	1235	860	0	6
	1235	860	1	5
	1235	860	2	5
	1235	860	3	5
	1235	860	4	No Sample
	1235	860	5	11
	1235	860	6	4
	1235	860	7	7
B-23	1240	860	0	8
	1240	860	1	6
	1240	860	2	4
	1240	860	3	9
	1240	860	4	No Sample
	1240	860	5	4
	1240	860	6	4
	1240	860	7	5
	1240	860	8	6



**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "B" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
B-24	1245	860	0	4
	1245	860	1	6
	1245	860	2	7
	1245	860	3	10
	1245	860	4	15
	1245	860	5	15
	1245	860	6	15
	1245	860	7	1
B-25	1250	860	0	6
	1250	860	1	5
	1250	860	2	8
	1250	860	3	7
	1250	860	4	9
B-26	1255	860	0	5
	1255	860	1	6
	1255	860	2	7
	1255	860	3	13
	1255	860	4	9
B-27	1260	860	0	11
	1260	860	1	4
	1260	860	2	5
	1260	860	3	6
	1260	860	4	7
	1260	860	5	7
	1260	860	6	7



**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "SB" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
SB-1 (also Anomaly A)	1252	871	0	6
	1252	871	1	6
	1252	871	2	5
	1252	871	3	10
	1252	871	4	8
	1252	871	5	11
	1252	871	6	5
	1252	871	7	8
	1252	871	8	6
	1252	871	9	9
	1252	871	10	10
	1252	871	11	11
	1252	871	12	5
	1252	871	13	6
SB-2	1263	882	0	2
	1263	882	1	4
	1263	882	2	2
	1263	882	3	5
	1263	882	4	7
	1263	882	5	4
	1263	882	6	6
	1263	882	7	7
	1263	882	8	6
	1263	882	9	No Sample
	1263	882	10	10
	1263	882	11	9
	1263	882	12	8
	1263	882	13	7
	1263	882	14	No Sample
	1263	882	15	9
	1263	882	16	2
	1263	882	17	10
	1263	882	18	6
	1263	882	19	6
	1263	882	20	5
	1263	882	21	7
	1263	882	22	3
	1263	882	23	3

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "SB" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
SB-3 (also Anomaly B)	1228	861	0	5
	1228	861	1	4
	1228	861	2	5
	1228	861	3	5
	1228	861	4	No Sample
	1228	861	5	8
	1228	861	6	6
	1228	861	7	8
	1228	861	8	11
SB-4	1246	872	0	2
	1246	872	1	7
	1246	872	2	5
	1246	872	3	11
	1246	872	4	6
	1246	872	5	5
	1246	872	6	5
	1246	872	7	5
	1246	872	8	No Sample
	1246	872	9	No Sample
	1246	872	10	12
	1246	872	11	9
	1246	872	12	9
	1246	872	13	No Sample
	1246	872	14	No Sample
	1246	872	15	8
	1246	872	16	7
SB-5	1256	873	0	4
	1256	873	1	16
	1256	873	2	8
	1256	873	3	6
	1256	873	4	10
	1256	873	5	10
	1256	873	6	17
	1256	873	7	10
	1256	873	8	11
	1256	873	9	11
	1256	873	10	14
	1256	873	11	14
	1256	873	12	12
	1256	873	13	14
	1256	873	14	18
	1256	873	15	18
	1256	873	16	16
	1256	873	17	14
	1256	873	18	16

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "SB" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
SB-6	1246	878	0	7
	1246	878	1	8
	1246	878	2	5
	1246	878	3	4
	1246	878	4	5
	1246	878	5	5
	1246	878	6	4
	1246	878	7	5
	1246	878	8	10
	1246	878	9	12
	1246	878	10	11
	1246	878	11	15
	1246	878	12	13
	1246	878	13	14
	1246	878	14	12
	1246	878	15	20
	1246	878	16	13
SB-7	1256	877	0	7
	1256	877	1	2
	1256	877	2	5
	1256	877	3	5
	1256	877	4	No Sample
	1256	877	5	5
	1256	877	6	8
	1256	877	7	7
	1256	877	8	7
	1256	877	9	7
	1256	877	10	5
	1256	877	11	9
	1256	877	12	7
	1256	877	13	8
	1256	877	14	No Sample
	1256	877	15	11
	1256	877	16	7
	1256	877	17	11
	1256	877	18	8



**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "SB" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
SB-8	1251	883	0	8
	1251	883	1	7
	1251	883	2	8
	1251	883	3	2
	1251	883	4	5
	1251	883	5	6
	1251	883	6	3
	1251	883	7	3
	1251	883	8	12
	1251	883	9	No Sample
	1251	883	10	11
	1251	883	11	9
	1251	883	12	12
	1251	883	13	11
	1251	883	14	No Sample
	1251	883	15	12
	1251	883	16	12
	1251	883	17	9
	1251	883	18	11
	1251	883	19	13
	1251	883	20	10
	1251	883	21	10
	1251	883	22	12
SB-9	1256	883	0	4
	1256	883	1	6
	1256	883	2	3
	1256	883	3	5
	1256	883	4	3
	1256	883	5	3
	1256	883	6	5
	1256	883	7	6
	1256	883	8	6
	1256	883	9	7
	1256	883	10	4
	1256	883	11	10
	1256	883	12	6
	1256	883	13	11
	1256	883	14	11
	1256	883	15	11
	1256	883	16	12
	1256	883	17	12
	1256	883	18	10
	1256	883	19	6
	1256	883	20	7
	1256	883	21	10
	1256	883	22	9
	1256	883	23	15
	1256	883	24	10

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "SB" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
SB-10	1261	871	0	4
	1261	871	1	5
	1261	871	2	5
	1261	871	3	2
	1261	871	4	4
	1261	871	5	5
	1261	871	6	4
	1261	871	7	6
	1261	871	8	No Sample
	1261	871	9	No Sample
	1261	871	10	8
	1261	871	11	6
	1261	871	12	5
	1261	871	13	No Sample
	1261	871	14	No Sample
	1261	871	15	13
	1261	871	16	8
	1261	871	17	11
	1261	871	18	12
	1261	871	19	No Sample
	1261	871	20	11
	1261	871	21	7
	1261	871	22	9
SB-14 (also TMW-7)	1241	920	0	4
	1241	920	1	5
	1241	920	2	6
	1241	920	3	6
	1241	920	4	No Sample
	1241	920	5	8
	1241	920	6	5
	1241	920	7	9
	1241	920	8	6
	1241	920	9	No Sample
	1241	920	10	5
	1241	920	11	6
	1241	920	12	7
	1241	920	13	7
	1241	920	14	9

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "SB" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
SB-15	1246	883	0	7
	1246	883	1	2
	1246	883	2	4
	1246	883	3	6
	1246	883	4	8
	1246	883	5	9
	1246	883	6	12
	1246	883	7	8
	1246	883	8	11
	1246	883	9	No Sample
	1246	883	10	10
	1246	883	11	8
	1246	883	12	12
	1246	883	13	15
	1246	883	14	16
	1246	883	15	12
	1246	883	16	13
	1246	883	17	15
	1246	883	18	16
	1246	883	19	29
SB-16	1220	935	0	2
	1220	935	1	5
	1220	935	2	6
	1220	935	3	6
	1220	935	4	8
	1220	935	5	9
	1220	935	6	13
	1220	935	7	11
	1220	935	8	13
	1220	935	9	14
	1220	935	10	8
	1220	935	11	5
	1220	935	12	No Sample
	1220	935	13	No Sample
	1220	935	14	No Sample
	1220	935	15	2
	1220	935	16	5



**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "SB" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
SB-17	1210	925	0	3
	1210	925	1	5
	1210	925	2	5
	1210	925	3	5
	1210	925	4	No Sample
	1210	925	5	8
	1210	925	6	12
	1210	925	7	16
	1210	925	8	10
	1210	925	9	13
	1210	925	10	12
	1210	925	11	12
	1210	925	12	8
	1210	925	13	No Sample
	1210	925	14	No Sample
	1210	925	15	2
	1210	925	16	5
SB-18	1214	915	0	2
	1214	915	1	6
	1214	915	2	3
	1214	915	3	5
	1214	915	4	5
	1214	915	5	7
	1214	915	6	8
	1214	915	7	18
	1214	915	8	15
	1214	915	9	22
	1214	915	10	5
	1214	915	11	4
	1214	915	12	5
	1214	915	13	4
	1214	915	14	5
	1214	915	15	5
	1214	915	16	3
SB-19	1226	900	0	3
	1226	900	1	4
	1226	900	2	4
	1226	900	3	4
	1226	900	4	2
	1226	900	5	No Sample
	1226	900	6	5
	1226	900	7	9
	1226	900	8	8
	1226	900	9	8
	1226	900	10	7
	1226	900	11	14
	1226	900	12	14
	1226	900	13	11
	1226	900	14	7

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "TMW" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
TMW-1	1240	860	0	8
	1240	860	1	6
	1240	860	2	4
	1240	860	3	9
	1240	860	4	No Sample
	1240	860	5	4
	1240	860	6	4
	1240	860	7	5
	1240	860	8	6
	1240	860	9	15
	1240	860	10	13
	1240	860	11	10
	1240	860	12	4
	1240	860	13	2
	1240	860	14	4
	1240	860	15	6
	1240	860	16	6
	1240	860	17	6
	1240	860	18	4
	1240	860	19	4
	1240	860	20	5
	1240	860	21	4
	1240	860	22	6
	1240	860	23	9
	1240	860	24	4
	1240	860	25	6
	1240	860	26	5
	1240	860	27	4
	1240	860	28	8
	1240	860	29	3

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "TMW" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
TMW-2	1240	830	0	5
	1240	830	1	6
	1240	830	2	10
	1240	830	3	8
	1240	830	4	18
	1240	830	5	5
	1240	830	6	9
	1240	830	7	4
	1240	830	8	9
	1240	830	9	9
	1240	830	10	11
	1240	830	11	9
	1240	830	12	8
	1240	830	13	No Sample
	1240	830	14	No Sample
	1240	830	15	10
	1240	830	16	4
	1240	830	17	4
	1240	830	18	6
	1240	830	19	3
	1240	830	20	6
	1240	830	21	4
	1240	830	22	4
	1240	830	23	6
	1240	830	24	6
	1240	830	25	6
	1240	830	26	5
	1240	830	27	2
	1240	830	28	3
	1240	830	29	7
	1240	830	30	2
	1240	830	31	5
	1240	830	32	6
	1240	830	33	6
	1240	830	34	7



**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "TMW" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
TMW-3	1240	900	0	7
	1240	900	1	9
	1240	900	2	4
	1240	900	3	5
	1240	900	4	No Sample
	1240	900	5	5
	1240	900	6	6
	1240	900	7	3
	1240	900	8	10
	1240	900	9	14
	1240	900	10	19
	1240	900	11	16
	1240	900	12	17
	1240	900	13	25
	1240	900	14	30
TMW-4	1230	930	0	10
	1230	930	1	5
	1230	930	2	7
	1230	930	3	5
	1230	930	4	No Sample
	1230	930	5	8
	1230	930	6	9
	1230	930	7	7
	1230	930	8	No Sample
	1230	930	9	No Sample
	1230	930	10	5
	1230	930	11	7
	1230	930	12	5
	1230	930	13	6
	1230	930	14	4
	1230	930	15	3
	1230	930	16	6
	1230	930	17	4
	1230	930	18	5

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "TMW" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
TMW-5	1255	915	0	7
	1255	915	1	3
	1255	915	2	2
	1255	915	3	7
	1255	915	4	No Sample
	1255	915	5	6
	1255	915	6	2
	1255	915	7	9
	1255	915	8	3
	1255	915	9	No Sample
	1255	915	10	3
	1255	915	11	5
	1255	915	12	3
	1255	915	13	5
	1255	915	14	3
	1255	915	15	3
	1255	915	16	4
	1255	915	17	4
	1255	915	18	10
	1255	915	19	6
	1255	915	20	5
	1255	915	21	3
	1255	915	22	4
	1255	915	23	3
	1255	915	24	2

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "TMW" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
TMW-6	1280	890	0	3
	1280	890	1	5
	1280	890	2	3
	1280	890	3	7
	1280	890	4	5
	1280	890	5	4
	1280	890	6	5
	1280	890	7	6
	1280	890	8	3
	1280	890	9	5
	1280	890	10	5
	1280	890	11	2
	1280	890	12	4
	1280	890	13	3
	1280	890	14	3
	1280	890	15	5
	1280	890	16	11
	1280	890	17	4
	1280	890	18	4
	1280	890	19	4
	1280	890	20	6
	1280	890	21	2
	1280	890	22	4
	1280	890	23	5
	1280	890	24	3
	1280	890	25	7
	1280	890	26	3
	1280	890	27	5
	1280	890	28	3
	1280	890	29	3



**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "TMW" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
TMW-7 (also SB-14)	1241	920	0	4
	1241	920	1	5
	1241	920	2	6
	1241	920	3	6
	1241	920	4	No Sample
	1241	920	5	8
	1241	920	6	5
	1241	920	7	9
	1241	920	8	6
	1241	920	9	No Sample
	1241	920	10	5
	1241	920	11	6
	1241	920	12	7
	1241	920	13	7
	1241	920	14	9
TMW-8	1251	867	0	4
	1251	867	1	5
	1251	867	2	4
	1251	867	3	6
	1251	867	4	No Sample
	1251	867	5	11
	1251	867	6	8
	1251	867	7	20
	1251	867	8	15
	1251	867	9	12
	1251	867	10	15
	1251	867	11	9
	1251	867	12	4
	1251	867	13	7
	1251	867	14	9
	1251	867	15	2
	1251	867	16	5
	1251	867	17	3
	1251	867	18	5
	1251	867	19	7
	1251	867	20	2
	1251	867	21	4
	1251	867	22	7
	1251	867	23	2
	1251	867	24	5

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "TMW" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
TMW-9	1235	900	0	7
	1235	900	1	4
	1235	900	2	7
	1235	900	3	No Sample
	1235	900	4	No Sample
	1235	900	5	11
	1235	900	6	15
	1235	900	7	32
	1235	900	8	17
	1235	900	9	16
	1235	900	10	15
	1235	900	11	16
	1235	900	12	18
	1235	900	13	16
	1235	900	14	15
	1235	900	15	11
	1235	900	16	12
	1235	900	17	12
	1235	900	18	11
	1235	900	19	19
	1235	900	20	17
	1235	900	21	10
	1235	900	22	3
	1235	900	23	4
TMW-10	1240	905	0	6
	1240	905	1	3
	1240	905	2	9
	1240	905	3	No Sample
	1240	905	4	No Sample
	1240	905	5	3
	1240	905	6	4
	1240	905	7	11
	1240	905	8	12
	1240	905	9	12
	1240	905	10	9
	1240	905	11	12
	1240	905	12	11
	1240	905	13	15
	1240	905	14	14
	1240	905	15	11
	1240	905	16	12
	1240	905	17	10
	1240	905	18	8
	1240	905	19	4
	1240	905	20	3

**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "TMW" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
TMW-11	1240	894	0	9
	1240	894	1	6
	1240	894	2	No Sample
	1240	894	3	No Sample
	1240	894	4	No Sample
	1240	894	5	8
	1240	894	6	28
	1240	894	7	23
	1240	894	8	23
	1240	894	9	15
	1240	894	10	10
	1240	894	11	12
	1240	894	12	20
	1240	894	13	19
	1240	894	14	No Sample
	1240	894	15	8
	1240	894	16	17
	1240	894	17	21
	1240	894	18	No Sample
	1240	894	19	No Sample
	1240	894	20	19
	1240	894	21	15
	1240	894	22	6



**APPENDIX 3**  
**1999 CIMARRON SUBSURFACE SOIL DATA - "TMW" BORINGS**

Sample Station	Easting (feet)	Northing (feet)	Depth (feet)	Total U (pCi/g)
TMW-12	1245	900	0	5
	1245	900	1	5
	1245	900	2	5
	1245	900	3	No Sample
	1245	900	4	7
	1245	900	5	6
	1245	900	6	8
	1245	900	7	9
	1245	900	8	23
	1245	900	9	20
	1245	900	10	12
	1245	900	11	15
	1245	900	12	13
	1245	900	13	18
	1245	900	14	18
	1245	900	15	14
	1245	900	16	19
	1245	900	17	12
	1245	900	18	7
	1245	900	19	5
	1245	900	20	8
	1245	900	21	8
TMW-13	1204	938	0	4
	1204	938	1	1
	1204	938	2	4
	1204	938	3	6
	1204	938	4	No Sample
	1204	938	5	8
	1204	938	6	4
	1204	938	7	8
	1204	938	8	7
	1204	938	9	No Sample
	1204	938	10	No Sample
	1204	938	11	5
	1204	938	12	2

APPENDIX 4

2002 CIMARRON SUBSURFACE DATA

from

BURIAL AREA #1 GROUNDWATER ASSESSMENT REPORT

January 2003

**APPENDIX 4**  
**2002 CIMARRON SUBSURFACE SOIL DATA - "02W" BORINGS**

Sample Station	Northing (feet)	Easting (feet)	Depth (feet)	Sample Length (feet)	Total U (pCi/g)
02W01	907	1222	8	4	6.1
	907	1222	15	5	3.0
02W02	915	1225	0	1	2.7
	915	1225	1	1	2.9
	915	1225	2	1	2.8
	915	1225	3	1	7.4
	915	1225	4	1	9.6
	915	1225	5	1	12.8
	915	1225	6	1	12.8
	915	1225	7	1	8.6
	915	1225	8	1	8.0
	915	1225	9	1	7.7
	915	1225	10	1	5.8
	915	1225	11	1	5.1
	915	1225	12	1	3.2
	915	1225	13	1	3.1
	915	1225	14	1	4.1
	915	1225	15	1	3.1
	915	1225	16	1	2.6
	915	1225	17	1	2.4
02W03	917	1202	8	5	9.1
	917	1202	15	3	2.6
02W04	923	1189	3	2	3.3
	923	1189	9	1	3.4
	923	1189	10	5	4.1
	923	1189	15	1	1.6
02W05	936	1186	5	5	3.0
	936	1186	10	5	2.1
02W06	955	1182	0	1	2.2
	955	1182	1	1	2.9
	955	1182	2	1	3.3
	955	1182	3	1	2.4
	955	1182	4	1	1.8
	955	1182	5	5	2.5
	955	1182	20	1.5	1.2
02W07	954	1193	5	5	2.9
	954	1193	10	5	2.0
	954	1193	15	5	2.3
	954	1193	20	2	0.8



**APPENDIX 4**  
**2002 CIMARRON SUBSURFACE SOIL DATA - "02W" BORINGS**

Sample Station	Northing (feet)	Easting (feet)	Depth (feet)	Sample Length (feet)	Total U (pCi/g)
02W08	956	1208	0	1	2.6
	956	1208	1	1	2.8
	956	1208	2	1	2.9
	956	1208	3	1	1.8
	956	1208	4	1	2.4
	956	1208	10	1	3.6
	956	1208	11	1	3.1
	956	1208	12	1	2.5
	956	1208	13	1	2.2
	956	1208	14	1	2.7
	956	1208	15	1	1.4
	956	1208	16	1	2.7
	956	1208	17	1	1.9
	956	1208	18	1	1.5
	956	1208	20	1	3.1
	956	1208	21	1	3.7
	956	1208	22	1	2.1
02W09	879	1269	8.5	5	1.8
	879	1269	17.5	5	1.9
02W10	899	1264	7.5	5	2.2
	899	1264	15.5	5	3.3
02W11	969	1222	8	1	2.9
	969	1222	20	5	1.6
02W12	963	1226	8	5	2.3
	963	1226	20	5	1.5
02W13	947	1234	7	5	2.4
	947	1234	19	5	1.6
02W14	969	1208	8	5	3.2
	969	1208	21	5	1.7
02W15	921	1174	9.5	2.5	1.8
02W16	936	1170	8	2	1.9
	936	1170	15	2	2.1
02W17	955	1167	8	5	2.2
	955	1167	15	7.5	1.3
	955	1167	22.5	0.5	0.6

**APPENDIX 4**  
**2002 CIMARRON SUBSURFACE SOIL DATA - "02W" BORINGS**

Sample Station	Northing (feet)	Easting (feet)	Depth (feet)	Sample Length (feet)	Total U (pCi/g)
02W18	981	1194	0	1	2.2
	981	1194	1	1	2.6
	981	1194	2	1	2.7
	981	1194	3	1	1.8
	981	1194	4	1	2.0
	981	1194	5	1	2.0
	981	1194	6	1	1.8
	981	1194	10	5	3.0
	981	1194	15	5	1.5
	981	1194	25	0.5	0.8
	981	1194	25.5	0.5	0.3
02W19	969	1188	7.5	7.5	2.1
	969	1188	15	5	2.4
02W20	846	1292	0	1	2.2
	846	1292	1	1	3.6
	846	1292	2	1	3.0
	846	1292	3	1	3.2
	846	1292	4	1	2.5
	846	1292	5	1	1.8
	846	1292	6	1	2.9
	846	1292	7	1	2.1
	846	1292	8	1	3.0
	846	1292	9	1	2.1
	846	1292	10	1	1.9
	846	1292	11	1	2.3
	846	1292	12	1	2.6
	846	1292	13	1	2.5
	846	1292	14	1	2.8
	846	1292	15	1	0.4
	846	1292	16	1	2.0
	846	1292	17	1	1.8
	846	1292	18	1	1.8
	846	1292	19	1	2.8
	846	1292	20	1	0.4
	846	1292	21	1	1.9
	846	1292	22	1	1.9
02W21	970	1149	0	5	2.7
	970	1149	11	1.5	1.3
	970	1149	20	5	1.9
02W22	933	1154	0	5	1.2
	933	1154	8	5	2.0

**APPENDIX 4**  
**2002 CIMARRON SUBSURFACE SOIL DATA - "02W" BORINGS**

Sample Station	Northing (feet)	Easting (feet)	Depth (feet)	Sample Length (feet)	Total U (pCi/g)
02W23	955	1152	9.5	5.5	1.0
	955	1152	20	2.5	1.9
02W24	969	1167	9	7	1.8
	969	1167	23	1	1.8
	969	1167	24	1	2.2
	969	1167	25	0.5	1.4
02W25	846	1228	0	1	3.1
	846	1228	1	1	1.9
	846	1228	2	1	3.0
	846	1228	6	1	3.7
	846	1228	7	1	3.5
	846	1228	8	1	2.9
	846	1228	9	1	4.7
	846	1228	10	1	6.3
	846	1228	11	1	16.4
	846	1228	12	1	3.7
	846	1228	13	1	2.5
	846	1228	14	1	3.1
	846	1228	15	1	2.0
	846	1228	16	1	2.8
	846	1228	17	1	2.4
	846	1228	18	1	0.8
	846	1228	22	1	1.8
	846	1228	23	1	1.3
	846	1228	24	1	1.5
	846	1228	25	1	0.9
	846	1228	26	1	1.5
	846	1228	27	1	1.4
	846	1228	30	1	2.2
	846	1228	31	1	2.0
02W26	863	1280	0	5	3.2
	863	1280	5	5	2.1
	863	1280	10	5	2.2
	863	1280	15	5	2.8
	863	1280	20	4	2.6
02W27	899	1208	13	3	1.8
02W28	900	1251	9.5	5	4.3
	900	1251	18	5	2.1
02W29	877	1256	9.5	5	4.6
	877	1256	14.5	5.3	8.1
02W30	880	1230	17.5	5	2.1



**APPENDIX 4**  
**2002 CIMARRON SUBSURFACE SOIL DATA - "02W" BORINGS**

Sample Station	Northing (feet)	Easting (feet)	Depth (feet)	Sample Length (feet)	Total U (pCi/g)
02W31	909	1240	5.5	5	6.2
	909	1240	15	5	4.1
02W32	941	1219	9.5	5	2.7
	941	1219	14.5	5.5	1.3
02W33	927	1164	6	5	1.7
02W34	984	1145	9	5	1.6
02W35	1001	1166	9	5	1.1
02W36	984	1165	20	5	1.4
02W37	1000	1188	20	5	1.8
02W38	982	1208	21	5	1.4
02W39	871	1263	10	5	3.5
	871	1263	17	5	5.6
02W40	848	1249	17	5	2.2
	848	1249	25	5	1.8
02W41	854	1263	23	5	0.6
02W42	868	1230	23	5	2.5
02W43	1016	1188	20	7.5	1.7
02W44	999	1203	10	5	1.2
	999	1203	22	4.5	1.6
02W45	1014	1178	10	5	2.0
	1014	1178	23	5	3.8
02W46	923	1232	10	5	2.8
	923	1232	15	4	3.5
02W47	837	1246	10	5	2.0
	837	1246	25	5	1.2
02W48	1075	1219	5	5	1.5
	1075	1219	10	5	1.6
	1075	1219	15	5	2.6
	1075	1219	20	5	2.4
	1075	1219	25	5	2.2
	1075	1219	29	5	1.8
	1075	1219	34	5	1.5
	1075	1219	39	5	1.2
	1075	1219	44	5	2.1
02W49	942	1197	6	12	1.8
	942	1197	18	1	1.9
02W50	820	1246	17	3	1.2
	820	1246	20	5	1.4
	820	1246	25	3	1.2
	820	1246	28	5	2

**APPENDIX 4**  
**2002 CIMARRON SUBSURFACE SOIL DATA - "02W" BORINGS**

Sample Station	Northing (feet)	Easting (feet)	Depth (feet)	Sample Length (feet)	Total U (pCi/g)
02W51	826	1230	4.5	4.5	1.7
	826	1230	30	4	1.3
02W52	820	1257	10	14	1.0
	820	1257	28	5.5	2.4
02W53	898	1203	10	5	1.0
	898	1203	15	5	1.5
02W54	922	1195	0	1	3.0
	922	1195	1	1	1.4
	922	1195	2	1	2.1
	922	1195	3	1	2.6
	922	1195	4	1	3.3
	922	1195	5	1	5.1
	922	1195	6	1	3.6
	922	1195	7	1	14.9
	922	1195	8	1	6.9
	922	1195	9	1	8.4
	922	1195	10	1	2.1
	922	1195	11	1	8.4
	922	1195	12	1	5.9
	922	1195	13	1	1.0
02W55	911	1210	0	1	2.5
	911	1210	1	1	2.3
	911	1210	2	1	3.2
	911	1210	3	1	2.8
	911	1210	4	1	3.3
	911	1210	5	1	4.9
	911	1210	6	1	8.2
	911	1210	7	1	9.5
	911	1210	8	1	8.7
	911	1210	9	1	8.7
	911	1210	10	1	21.3
	911	1210	11	1	16.2
	911	1210	12	1	18.5
	911	1210	13	1	12.8
	911	1210	14	1	20.9
	911	1210	15	1	7.0
	911	1210	16	1	4.0
	911	1210	17	1	3.4
	911	1210	18	1	3.3
	911	1210	19	1	1.4
	911	1210	20	1	1.6
	911	1210	21	1	2.2
02W56	939	1122	0	8	2.1

**APPENDIX 4**  
**2002 CIMARRON SUBSURFACE SOIL DATA - WELLS 1315R AND 1316R**

Sample Station	Northing (feet)	Easting (feet)	Depth (feet)	Sample Length (feet)	Total U (pCi/g)
1315R	878	1242	12	1	8.1
	878	1242	13	1	4.9
	878	1242	14	1	3.2
	878	1242	15	1	4.3
	878	1242	16	1	4.3
	878	1242	17	1	4.6
	878	1242	18	2	2.5
	878	1242	20	1	2.3
	878	1242	21	1	1.1
	878	1242	22	1	1.9
	878	1242	23	1	2.3
	878	1242	24	1	1.7
1316R	884	1221	20	5	2.5