

CIMARRON CORPORATION

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S. JESS LARSEN
VICE PRESIDENT

May 29, 1996

Mr. Michael F. Weber, Chief
Low-Level Waste Management and Decommissioning Projects Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 0555-0001

**Ref: Cimarron Corporation
Docket No. 70-0925, License No. SNM-928
"Final Status Survey Report, Phase III, Subarea L (Subsurface)"**

Dear Mr. Weber:

Cimarron Corporation has completed the remediation and final survey of the surface and underlying soils located on the Cimarron site in the area designated as Subarea L. The results of the characterization and final survey are included in the enclosed report entitled "Final Status Survey Report, Phase III, Subarea L (Subsurface)."

The work was done using established radiological characterization methods and in accordance with guidance provided in Draft NUREG/CR-5849. This report provides the data necessary to demonstrate that radiological parameters have been satisfied for release of this area for backfilling. It is Cimarron Corporation's belief that the area has been decontaminated and the excavations are ready to be backfilled with clean soils and recontoured to original elevations. This report is submitted to the Nuclear Regulatory Commission as basis for requesting approval to backfill, grade and seed the area. Vegetation needs to be established to control erosion and stormwater runoff.

A final surface survey, required to release this area from License SNM-928, will subsequently be included in the Phase III Final Status Survey. The Phase III Final Status Survey Plan for that process will be submitted to the NRC in the near future following NRC approval of the Phase II Plan.

Your assistance in obtaining timely review and approval of the enclosed report is greatly appreciated. Please contact me if there are clarifications that we may provide.

Sincerely,



S. Jess Larsen
Vice President

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FINAL STATUS SURVEY REPORT FOR SUBAREA L (SUBSURFACE)

**for
Cimarron Corporation's Former
Nuclear Fuel Fabrication Facility
Crescent, Oklahoma**

License Number: SNM-928

Prepared for:

**Cimarron Corporation
Oklahoma City, Oklahoma**

May 1996

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REFERENCES

1. Cimarron Corporation Nuclear Materials License, SNM-928 Docket No. 070-00925, issued for possession only March 31, 1982; Amendment No. 10, issued November 4, 1994.
2. Cimarron Corporation Nuclear Materials License, SNM-1174, Docket No. 070-1193, terminated February 5, 1993.
3. Cimarron Corporation Letter to USNRC, August 20, 1990.
4. USNRC Letter from Mr. Richard E. Cunningham, Director, Division of Industrial and Medical Nuclear Safety to Dr. John Stauter, Director of Environmental Services, Cimarron Corporation, dated February 5, 1993.
5. Chase Environmental Group, Inc. "Radiological Characterization Report for Cimarron Corporation's Former Nuclear Fuel Fabrication Facility, Crescent, Oklahoma", October 1994.
6. Chase Environmental Group, Inc. "Decommissioning Plan for Cimarron Corporation's Former Nuclear Fuel Fabrication Facility, Crescent, Oklahoma", April 1995.
7. Chase Environmental Group, Inc. "Final Status Survey Plan for Unaffected Areas for Cimarron Corporation's Former Nuclear Fuel Fabrication Facility, Crescent, Oklahoma", October 1994.
8. USNRC Letter from Mr. Michael F. Weber, Chief Low-Level Waste and Decommissioning Project Branch, Division of Waste Management, to Mr. Jess Larsen, Vice President Kerr-McGee Corporation, dated May 1, 1995.
9. Cimarron Corporation, "Final Status Survey Report, Phase I Areas at the Cimarron Facility, License No. SNM-928", July 1995.
10. USNRC Letter from Mr. R. A. Nelson Acting Chief Low-Level Waste and Decommissioning Project Branch, Division of Waste Management, to Mr. Jess Larsen, Vice President, Cimarron Corporation, dated April 23, 1996.
11. Chase Environmental Group, Inc., "Final Status Survey Plan for Phase II Areas for Cimarron Corporation's Former Nuclear Fuel Fabrication Facility", Crescent, Oklahoma, July 1995.
12. ORAU Background Survey completed in 1988 "Confirmatory Survey of Portions of the Sequoyah Fuels Corporation Cimarron Plant".

13. State of Oklahoma Letter from Mr. Robert L. Craig, Director Radiation Protection Division to Mr. W.J. Shelley, Director Regulations and Control, Kerr-McGee Nuclear Corporation, dated March 2, 1978.
14. USNRC Letter from Mr. Richard W. Starostecki, Chief Fuel Reprocessing and Recycle Branch to Mr. W.J. Shelley, Director Regulation and Control, Kerr-McGee Nuclear Corporation, dated July 10, 1978.
15. USNRC Letter from Mr. A. B. Davis, Chief, Fuel Facility and Materials Safety Branch to Mr. W.J. Shelley, Director Regulation and Control, Kerr-McGee Corporation, dated December 14, 1978
16. USNRC Letter from Mr. Jerry J. Swift, Section Leader, Advanced Fuel and Special Facilities Section, Office of Nuclear Material Safety and Safeguards to Dr. Edwin T. Still, Vice President, Kerr-McGee Corporation, dated January 8, 1993.
17. J.D. Berger, "Manual for Conducting Radiological Surveys in Support of License Termination"; Draft Report for Comment, Oak Ridge Associated Universities, NUREG/CR-5849, June 1992.
18. Kerr-McGee Corporation, "Report on the South Uranium Yard Remediation at the Cimarron Facility, License #SNM-928, November 1994.
19. USNRC, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of License for By-Product, Source, or Special Nuclear Material", August 1987.
20. USNRC, "Branch Technical Position on Disposal or On-site Storage of Residual Thorium and Uranium from Past Operations", FR. Vol. 46, No. 205, Page 52061, October 23, 1981.
21. USNRC Letter from Mr. John H. Austin, Chief Low-Level Waste and Decommissioning Project Branch, Office of Nuclear Material Safety and Safeguards to Dr. John Stauter, Kerr-McGee Corporation, dated November 4, 1994.
22. American National Standards Institute, "Radiation Protection Instrumentation Test and Calibration", ANSI N323-1978, Institute of Electrical and Electronic Engineers, Inc. September 1977.
23. USNRC Letter from Mr. Michael F. Weber, Chief Low-Level Waste and Decommissioning Project Branch, Division of Waste Management to Mr. Jess Larsen, Vice President, Kerr-McGee Corporation, dated May 31, 1995.
24. ORISE, "Confirmatory Survey of the Phase I Unaffected Areas, Kerr-McGee Corp., Cimarron Facility, Crescent, Oklahoma", Final Report, March 1996.

25. Cimarron Corporation By-Product Materials License 35-12636-02, Amendment No. 13, November 22, 1993.
26. American Society of Mechanical Engineers, "Quality Assurance Requirements for Nuclear Facility Applications", ASME NQA-1, 1994.

FINAL STATUS SURVEY REPORT FOR DECOMMISSIONING CIMARRON FACILITY SUBAREA L (SUBSURFACE)

1.0 Purpose

This Final Status Survey Report is being submitted by Cimarron Corporation to the Nuclear Regulatory Commission (NRC) for an area on the Cimarron site designated as Subarea L. This subarea is shown on Figure 1.1. This area is an affected area that has been extensively excavated as part of the ongoing site decommissioning process. This report includes the characterization survey performed to more precisely define the extent and magnitude of residual contamination present in soil within this subarea. The data generated by this survey was utilized to plan the initial remediation effort. After remediation activities were performed, a final status survey was completed over the entire area to demonstrate that the established guideline values have been met. The results of the final survey are presented as justification to release this subarea for backfilling, final grading and seeding.

2.0 Background

Cimarron Corporation, a subsidiary of Kerr-McGee Corporation, operated two plants near Crescent, Oklahoma, for the manufacture of enriched uranium and mixed oxide reactor fuels. The 840 acre Cimarron Facility site was originally licensed under two separate SNM Licenses. License SNM-928¹ was issued in 1965 for the Uranium Plant (U-Plant) and License SNM-1174² was issued in 1970 for the Mixed Oxide Fuel Fabrication (MOFF) Facility. Both facilities operated through 1975, at which time they were shut down and decommissioning work was initiated.

Decommissioning efforts at the MOFF Facility were completed in 1990 and Cimarron Corporation applied to the NRC on August 20, 1990³, to terminate License SNM-1174. After confirmatory surveys, the NRC terminated the MOFF Facility License, SNM-1174, on February 5, 1993⁴. However, the NRC did not release the land formerly licensed under License SNM-1174 and contained within the bounds of the 840 acre Cimarron site from License SNM-928.

Decommissioning efforts involving characterization, decontamination and decommissioning for the 840 acres, licensed under SNM-928 were initiated in 1976 and are still ongoing. The goal of the decommissioning effort is to release the entire 840 acre site for unrestricted use.

Based upon historic knowledge of site operations and the characterization work completed to date, Cimarron Corporation completed and submitted in October 1994 the Cimarron Radiological Characterization Report.⁵ As discussed in this report, the site has been divided into affected and unaffected areas. The affected and unaffected areas are shown on Drawing

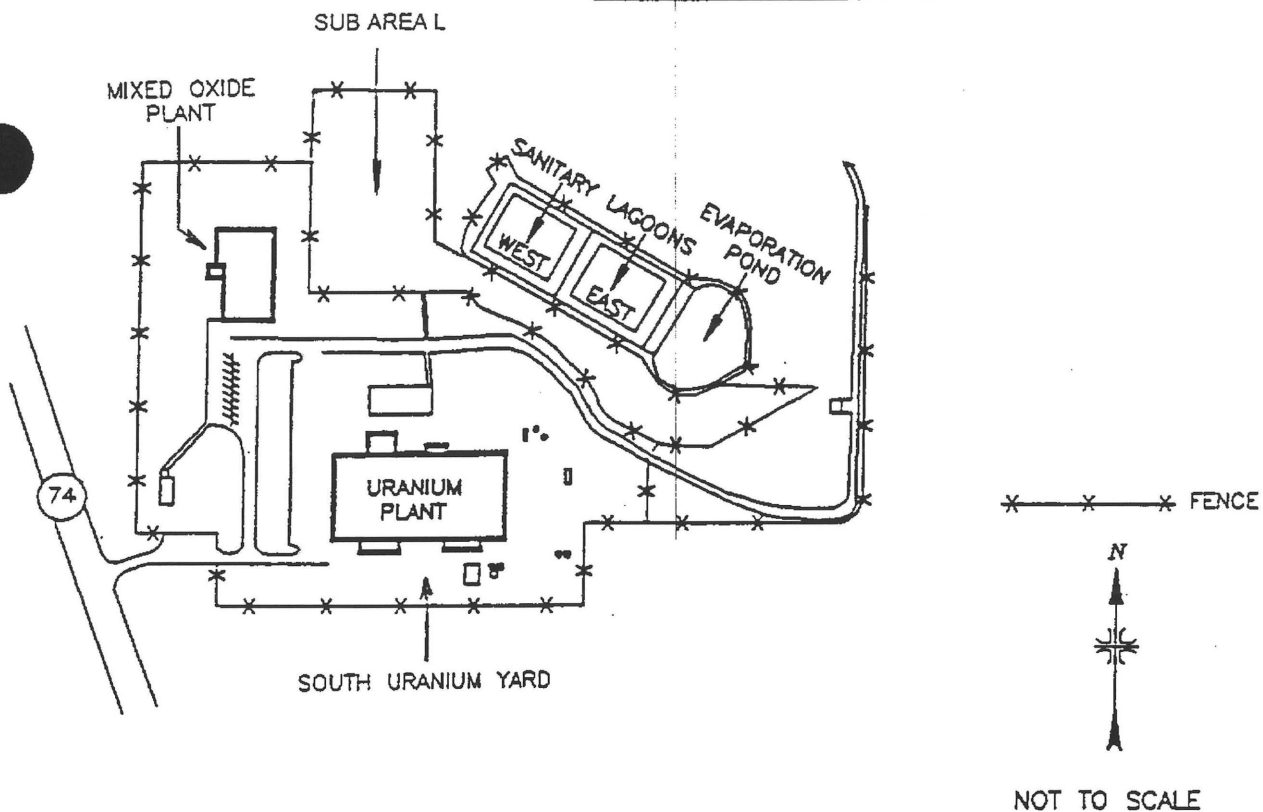
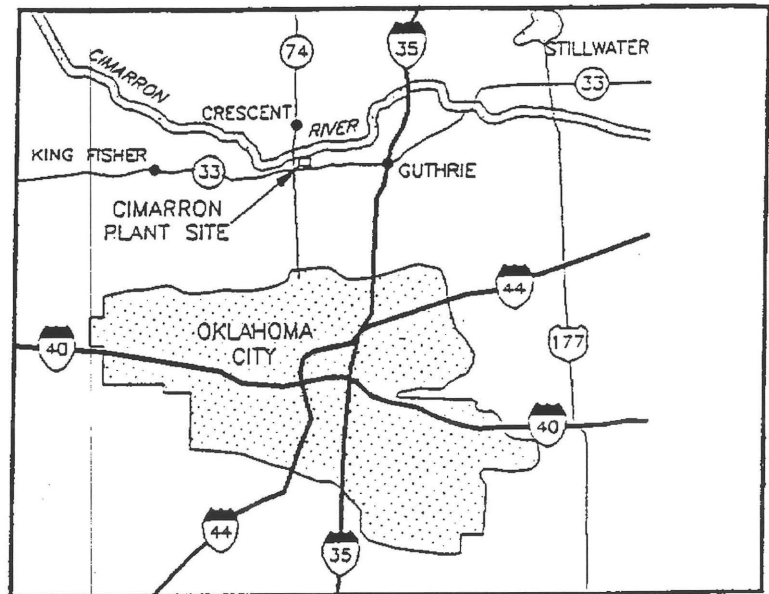


Figure 1.1 Location of Cimarron Facility/Plot Plan for Cimarron Facility

No. 95MOST-RF3, included in Appendix I. For the Final Survey Plan the entire 840 acre site has been divided into three major areas which contain both affected and unaffected areas. Each of these three major areas are also shown on Drawing No. 95MOST-RF3 and are designated by Roman Numerals I, II, and III (herein referenced as Phases I, II, and III). These three major areas are then further subdivided into smaller sections (i.e. A, B, C, D, etc.).

2.1 Phase I Area

As presented in the Cimarron Decommissioning Plan,⁶ the Final Status Survey Plan (Phases I, II and III) was discussed in general terms, with the understanding that each of the three phases would be submitted to the NRC under separate cover for approval. The first of these three phases (Phase I⁷) has been approved by the NRC via letter dated May 1, 1995.⁸ The Final Status Survey Report⁹ for Phase I was submitted to the NRC and confirmatory sampling for the Phase I areas has been completed by the Oak Ridge Institute for Science and Education (ORISE). Cimarron Corporation received a license amendment from the NRC to release this area from SNM-928; the amendment was forwarded by letter dated April 23, 1996.¹⁰ This amendment reduced the licensed facility acreage from 840 to 152 acres.

2.2 Phase II Area

The area designated as Phase II on Drawing No. 95MOST-RF3 contains both affected and unaffected areas, and represents approximately 122 of the remaining licensed 152 acres. Phase II includes Burial Area #1 which was released by the NRC, backfilled with clean soil, and seeded. Also included in Phase II are the East and West Sanitary Lagoons, the MOFF Plant Building exterior and yard area, the Emergency Building, the Warehouse Building (Building #4) and surrounding yard, and numerous drainage areas. Remediation of this area is nearing completion. The Final Status Survey Plan for Phase II was submitted to the NRC in July 1995 for approval. The final survey of this area is currently being conducted by Cimarron personnel.

2.3 Phase III Area

The Phase III area survey is the last phase for completing the final status survey for the entire Cimarron site, and represents approximately 30 acres. This area is designated as Phase III on Drawing No. 95MOST-RF3. The Final Status Survey Plan for release of this area from the site license, will be submitted to the NRC for approval after the Phase II Plan is approved. The Phase III area includes the Uranium Processing buildings and yard area, Burial Areas #2 and #3, the New Sanitary Lagoon, the New On-site Disposal Cell (Burial Area #4), and the Five Former Waste Water Ponds, consisting of Uranium Waste Ponds #1 and #2, the Plutonium Waste Pond, the Uranium Emergency Pond, and the Plutonium Emergency Pond. Subarea L, as shown on Drawing No. 95MOST-RF3, is included within the Phase III area, and represents approximately 5 acres. This report presents the pre-remediation characterization data and the final status survey data to

justify releasing the Subarea L excavated areas for backfilling, grading, and final seeding. A final survey will be performed after backfilling and grading are completed as part of the Phase III final status survey for release of this subarea from license SNM-928.

3.0 Site Description

The Cimarron Facility is located in Logan County, Oklahoma, on the south side of the Cimarron River approximately 0.5 miles north of the intersection of Oklahoma State Highways #33 and #74. Figure 1.1 shows the site location. The 840 acre site (recently reduced to 152 acres) is located in an area of low, rolling hills and incised drainages. Local elevations range from about 940 feet along the river to 1,010 feet Mean Sea Level at the plant. The county is primarily rural with an economy primarily based upon agriculture and ranching. The entire site is owned by Cimarron Corporation, a wholly owned subsidiary of Kerr-McGee Corporation.

4.0 Facility Description

License SNM-928 was originally issued in 1965 to Kerr-McGee Nuclear Corporation for the manufacture of enriched uranium reactor fuels. The Uranium Plant (U-Plant) was constructed to be a complete nuclear fuel service facility. Initial equipment provided for the production of UO_2 , UF_4 , uranium metal and the recovery of scrap materials. In 1968 the plant was expanded by increasing the UO_2 and Pellet facilities through the installation of another complete production line for the production of fuel pellets. In 1969 fabrication facilities were added for the production of fuel pins. In 1970 facilities were added for the production of the fuel elements. Equipment initially installed for the recovery of enriched scrap material was not used after work performed under a scrap recovery contract was completed in 1970. All equipment utilized in fuel production activities has been either decontaminated and removed from the site for salvage or packaged and transported offsite for disposal at a commercial LLRW facility.

The process facilities included one pre-stressed concrete panel building (MOFF), several sheet metal buildings (U-Plant), five process related collection ponds, two original sanitary lagoons, a newer synthetic lined sanitary lagoon, a waste incinerator, several uncovered storage areas, and three burial areas. These areas are currently at differing stages of completion with respect to decommissioning.

5.0 History of Site Operations

The Cimarron Facility was originally licensed under two separate licenses. License SNM-928 was issued for the U-Plant Facility and License SNM-1174 was issued for the MOFF Facility.

Both facilities terminated production operations in 1975. Decontamination and decommissioning of the MOFF Facility was completed by 1990, and the license was terminated by the NRC in 1993. The U-Plant Facility decommissioning is nearing completion. A more detailed history of site operations can be found in both the Characterization Report and the Decommissioning Plan.

6.0 Decommissioning Activities

The purpose of this section is to discuss briefly the status of the on-going site decommissioning for areas included in Subarea L and to present the radiological criteria and guideline values utilized throughout the remediation of this subarea. Also included in this section is a discussion of the characterization sampling and survey results performed prior to area remediation. The Subarea L area has been divided into three smaller units for data presentation and evaluation. These units are shown on Drawing No. 96MOST-RF15LS

6.1 Identification of Contaminants

Based upon the knowledge of past site operations, the results of numerous characterization efforts to date, and other independent characterization efforts by regulatory agencies and their respective subcontractors, the radiological contaminants on the Cimarron site have been determined to consist of U-234, U-235 and U-238. The uranium is comprised of natural, depleted, and enriched forms, with an average enrichment above the naturally occurring level. The average U-235 enrichment at Cimarron has been previously established as approximately 2.7 weight percent.

Thorium contaminated materials from the Kerr-McGee Cushing Facility were disposed in Burial Area #1. Burial Area #1 is located within the Phase II area and is an affected area that was remediated between 1986 and 1988. Also, Burial Area #2 which is located within the Phase III area in Subarea L, contained some waste and soils contaminated with elevated thorium activity. In general, samples collected from affected areas are analyzed for natural thorium to ensure complete and accurate characterization even though thorium (natural) is not considered to be a principle contaminant at the Cimarron site.

6.2 Site Background Levels

Natural background levels for uranium and thorium in soil have been established through numerous measurements by Cimarron personnel utilizing the on-site soil counter and through independent laboratory analysis. Analytical results from Cimarron Corporation's environmental sampling program are reported to the NRC annually in Environmental Reports. These reports provide sample analysis results for soil samples collected from numerous off-site locations which are representative of background in surrounding soils.

Cimarron personnel collected and analyzed 30 surface soil samples from the perimeter of the Cimarron site during the first quarter of 1995 to further validate background levels. Total uranium ranged from 2.3 pCi/g to 6.6 pCi/g, with the average being 4.0 ± 2.6 (2σ) pCi/g. These values were obtained as a result of using the Cimarron on-site soil counter. The on-site soil counter is calibrated to assume an enrichment of 2.7 weight percent as this is the average enrichment found throughout the site. When a correction factor (0.67/1.5) is applied to these results to convert the values from an assumed 2.7 weight percent enrichment to a natural enrichment, the converted results ranged from 1.0 pCi/g to 2.9 pCi/g with an average of 1.8 ± 1.0 (2σ) pCi/g total uranium.

In addition to analyzing for total uranium, the 30 samples collected from the site perimeter were analyzed for natural thorium. Natural thorium background was determined to range from 0.7 to 1.7 pCi/g, with an average of 1.5 pCi/g.

Based upon these results, the average value of 4 pCi/g total uranium and 1.5 pCi/g natural thorium were used when the soil sample analytical results were compared to guideline values plus background.

Background exposure rates have been established at the Cimarron site by taking micro-R readings at off-site sample locations in addition to Cimarron site areas which are unaffected by past operations. Site background exposure rates of approximately 7 μ R/h have been observed in background areas by Cimarron personnel utilizing a Ludlum Micro-R survey meter. Site background exposure rates of approximately 7 μ R/h have also been determined by ORISE personnel utilizing similar instrumentation. In addition, site background exposure rates have been determined by ORISE personnel utilizing a pressurized ion chamber (PIC).¹² Based on the PIC measurements, the site background was determined to be approximately 10 μ R/hr. Based upon these numerous background assessments performed by both Cimarron and ORISE personnel, the background exposure rate at the Cimarron site ranges from 7 to 10 μ R/h.

6.3 Characterization Data

As discussed earlier, Subarea L has been subdivided into three smaller units. These units are naturally distinguishable or have a common history of characterization and decommissioning activities. Throughout most of the decommissioning process at the Cimarron site, a unit was characterized, remediated (if required), and resurveyed. The description of the decommissioning activities and final survey data were then submitted to the NRC for review and approval. After review of the submittal, the NRC either released the unit or contracted with ORISE (previously ORAU) to perform a confirmatory survey. Based upon the ORISE confirmatory survey (if requested by the NRC), the NRC would either release the unit or require additional remediation.

The status of the Subarea L characterization and decommissioning activities are discussed in this section. The three units are referred to as 1) Burial Area #2, 2) three former waste

ponds and new Lined Sanitary Lagoon areas, and 3) the adjoining area south of original East/West Sanitary Lagoons.

6.3.1 Burial Area #2:

Burial Area #2 was intended to be utilized in the 1970's for the disposal of on-site generated industrial solid waste. During an investigation of this area in 1990, it was discovered that radioactive waste materials were present in the buried waste. Remediation of this area was initiated in 1991. Both BTP Option #2 and Option #4 soils have been removed from this area and separated from the industrial waste (i.e. metal, piping, etc.) recovered. The initial volume of Option #2 soils have been stockpiled, characterized and disposed in the on-site disposal cell. The remaining volume is in a stockpile awaiting final characterization and disposal. Option #4 soil has been packaged for transportation and disposal off-site. The industrial waste will be either decontaminated, surveyed and released, or packaged and transported offsite for disposal at a LLRW disposal facility. The characterization data for this unit is discussed below and in Section 8.0 of the Characterization Report.

Soil samples were collected in May 1990 on a 10m x 10m grid interval at depths of 0 to 4 feet, in one-foot intervals. The samples were completed and analyzed on the Cimarron on-site soil counter for total uranium and natural thorium. Additional soil sampling was performed in 1991, 1994 and 1995 to increase the frequency of sampling to correspond to a 5m x 5m grid interval. Also, samples were collected in several areas to a depth of 6 feet. These samples were also collected in one foot increments and composited for analysis on the Cimarron on-site counter. The characterization soil sample results were consolidated for the four years in which the data was collected for presentation on Drawing Nos. 90PR3LSS-0 thru 90PR3LSS-5. Analytical data is presented for both total uranium and natural thorium. These drawings and the analytical data sheets are included in Appendix II. As noted on the drawings, numerous areas exceeded the guideline value of 30 pCi/g uranium above background, and several locations had a total thorium concentration above 10 pCi/g above background.

To date, approximately 20,000 ft³ of Option #4 waste with an average activity of 300 pCi/g uranium has been excavated from this unit and shipped off-site for disposal at a commercial LLRW disposal facility. The 20,000 ft³ of waste contained approximately 47 kg of U-235. Sample test results from these soils showed uranium present at greater than 5% enrichment and thorium concentrations up to 150 pCi/g. As stated above, these materials were removed and shipped offsite for disposal. Cimarron has completed the remediation of this area.

6.3.2 Three Former Waste Water Ponds and New Lined Sanitary Lagoon Areas

The three former waste water ponds, discussed in this section, provided a method of liquid waste control during facility operations. These ponds are three of the five ponds closed in 1978 and include the Plutonium Evaporation and Emergency Ponds and the Uranium Emergency Pond. The Plutonium Evaporation and Plutonium Emergency Ponds were lined ponds. By early 1977, these ponds contained no free-standing liquid. The sludge remaining was removed, mixed with cement and shipped off-site for disposal at a licensed LLRW disposal facility.

After the sludge was removed, Cimarron staff, the Oklahoma State Department of Health (October 1977), and the NRC (November 1977), sampled the soils/liner materials in each of the ponds. Based upon the analytical results, Cimarron Corporation received written permission from the Oklahoma State Department of Health to backfill and cover these ponds on March 2, 1978¹³. Cimarron Corporation received written permission from the NRC to backfill and cover these ponds on July 10, 1978¹⁴. These three ponds along with Uranium Waste Ponds #1 and #2 were backfilled and covered between August 3, 1978, and November 1, 1978. An October 30, 1978, NRC inspection, which was documented via letter dated December 14, 1978,¹⁵ states that burial of the "five liquid effluent retention ponds was completed during the inspection". Initial seeding as well as fencing of the areas was performed between November 2, 1978, and March 20, 1979. Sprigging and fertilizing of the cap soil was performed from July 18, 1979, to October 30, 1979. Even though closed in accordance with "current guidelines" as stated in the NRC letter dated January 8, 1993,¹⁶ the NRC informed Cimarron Corporation that "the five former waste water ponds that were closed in 1978 must be addressed in detail". In response to this issue, additional characterization work has been conducted by Cimarron Corporation in these pond areas and is discussed herein and in Section 12.0 of the Characterization Report and in Section 2.1 of the Decommissioning Plan.

The additional characterization data for this unit are presented on Drawing Nos. 90PR3LSS-0 thru 90PR3LSS-5 and includes analytical data for soil samples collected at the surface and to four feet in depth. The drawings and analytical data sheets are included in Appendix II.

The New Sanitary Lagoon area is included within this unit. The lagoon was installed in January 1986 to replace the East and West Sanitary Lagoons. This lagoon was installed directly above the closed Plutonium Evaporation Pond and a portion of the closed Plutonium Emergency Pond. The New Sanitary Lagoon was utilized from early 1986 to October 22, 1991, at which time it was isolated. The lagoon received liquids from the facility floor drains, laundry, shower and sinks, during a portion of the plant's decommissioning. Sediment samples taken after

pond isolation show concentrations which range from 22 pCi/g to 26 pCi/g total uranium.

This lagoon has been closed in accordance with the procedures outlined in Section 2.2 of the Decommissioning Plan. The rainwater which has been collected within the isolated lagoon has been evaporated and the sediments dewatered and sampled. All sediment samples were analyzed for total uranium. The sediments were removed and placed in the Option #2 stockpile (DAP #4) awaiting final characterization for on-site disposal. The liner has been removed from the lagoon and cut into sections awaiting final survey prior to being removed from the site. The synthetic liner surfaces will be surveyed to demonstrate that they meet the free release criteria.

The surface soils (after liner removal) have been surveyed at the surface and at 1 meter utilizing a Micro R meter. A 5m x 5m grid was established to facilitate this survey. There were no locations noted to be twice background. At the grid intersects, composite soil samples of 0"-6" in depth below grade were collected for analysis. The samples were analyzed for total uranium and natural thorium; the data for this final survey is discussed in Section 7.0. Any area found to contain residual contamination greater than the BTP Option #1 limit was further characterized or "hot spot" averaging was performed in accordance with NUREG/CR-5849.¹⁷ If required, these areas were remediated.

6.3.3 Adjoining Area South of Original East/West Sanitary Lagoons

Several small areas within the unit required soil remediation. The characterization data for this unit is presented on Drawing Nos. 90PR3LSS-0 thru 90PR3LSS-5. The drawings and analytical data sheets are included in Appendix II. The data presented includes analytical data for soil samples collected at the surface and to four feet in depth. The soils were analyzed for both total uranium and natural thorium.

7.0 Final Survey Procedure

The purpose of this section is to discuss the methodology utilized for the collection of the survey and soil sampling data presented as Final Status Survey data. The methodology employed is similar to that utilized for the release of the South-U Yard¹⁸ for backfilling. The final survey data will be used to demonstrate the applicable radiological parameters (guideline values) are satisfied for release of this area for backfilling, and final grading. The guideline values utilized for comparison to the final status survey data are described in this section. The guidance promulgated in Draft NUREG/CR-5849 has been utilized throughout the completion of this Final Status Survey.

7.1 Survey Method

In general, survey and soil sampling data were collected utilizing established methods that have been demonstrated through the release of other areas on the Cimarron site. These methods are discussed below:

7.1.1 Grid Areas

For purposes of data evaluation, Subarea L was subdivided into three smaller units. These units are shown on Drawing No. 96MOST-RF15LS. The 100m x 100m grid shown on this drawing was utilized for locating soil sampling and survey points for this final survey. Cimarron employs a Ground Positioning Survey (GPS) unit to check pre-established grid points and to locate sample collection and survey positions in the field. This GPS unit is accurate to less than ± 1 m. The 0.0 grid point is located just south and slightly west of the main Uranium Building. This grid point will be tied into a permanent marker for future reference.

7.1.2 Survey Locations

This subarea was 100% scanned with a 3" x 1/2" shielded NaI Scintillation Detector (NaI) and the readings were recorded in counts per minute (CPM). Technicians walked the grid lines of the affected subarea, surveying an area approximately 2 meters in width. The highest reading found within each approximate ten (10) meter distance was recorded. Survey performance, documentation, and record retention were in accordance with the Cimarron Radiation Protection Program. Any survey readings exceeding the limits described in Section 7.2 were flagged for subsequent soil sampling.

Additionally, within the subarea, at the intersect of each 5m x 5m grid location, a systematic survey was completed at ground surface and at 1 m above the surface for ambient radiation using a Micro-R meter. Also, a survey at the ground surface was recorded with a shielded 3" x 1/2" NaI detector.

7.1.3 Soil Sample Locations

Where practical, a surface soil sample (0 to 6 inches deep) was obtained from each 5m x 5m grid intersect located within Subarea L. Subarea L has been divided into three smaller areas for final survey data presentation and review. The 5m x 5m grid sampling frequency is equivalent to the guidance in NUREG/CR-5849 which recommends four samples be collected at locations equidistant between the center and each corner of a 10m grid. The following number of soil

samples were collected, composited and analyzed by the Cimarron on-site counter for total uranium and thorium.

<u>Subarea L Unit</u>	<u>No. Soil Samples</u>
Burial Area #2	415
Waste Ponds/Lagoon Area	240
Adjoining Area	151

Additionally, surface and subsurface soil samples were collected from the overburden Option #1 stockpile that was accumulated during remediation of Burial Ground #2. This soil will be used to backfill excavated areas within this subarea. A total of 64 soil samples were collected for analysis.

Except for the stockpile, the soil samples analyzed were surface soil samples collected after remediation was completed to verify that the soils remaining met the guideline values. Even though designated as surface soil samples, the actual excavated grades after remediation in numerous cases are below the original site grade. It is these excavated areas, including the New Sanitary Lagoon, that require final backfilling and grading.

7.2 Guidelines Established

The radiological guidelines discussed in this section are utilized when comparing the final survey data to verify that the area can be released for backfilling.

7.2.1 Equipment and Materials

Release limits for contamination on all materials and equipment will comply with Facility License SNM-928 and are identical to the limits specified in Table 1 of the NRC's "Guidance for Decommissioning of Facilities and Equipment Prior to Release for Unrestricted Use".¹⁹ This subarea contains no buildings or equipment. However, this guidance will be utilized when surveying the construction materials excavated and separated from Burial Area #2. Additionally, the synthetic liner removed from the New Sanitary Lagoon will be surveyed using this guidance.

7.2.2 Volumetric Activity of Soil

For an affected area (i.e., Subarea L), the guideline value for residual concentrations of uranium which may remain in soil is specified as Option #1 material. For enriched uranium, as specified in Table 2 of the BTP²⁰, the Option #1 limit is up to 30 pCi/g total uranium above background. Systematic

sampling was performed within each 10m x 10m grid area to determine the average value for residual activity. This average value was then compared to the guideline values. Hot-spot averaging was performed for all locations which contain average soil concentrations in excess of 30 pCi/g total uranium above background as described in NUREG/CR-5849. The maximum enriched uranium soil concentration within a 10m x 10m grid area may not exceed three times the BTP Option #1 limit (90 pCi/g total uranium above background).

The Option #1 guideline value for residual concentrations of thorium which may remain in soil per Table 2 of the BTP is up to 10 pCi/g above background. The average background for natural thorium has been determined to be 1.5 pCi/g for soil analyzed with the on-site counter.

Option #2 materials removed from this subarea were stockpiled for characterization prior to on-site disposal. On-site disposal of BTP Option #2 material in a designated earthen cell was approved by the NRC through the issuance of Amendment #10 to License SNM-928.²¹ Current authorization is for the burial of 500,000 ft³ of Option #2 materials. The average concentration of radioactive material that may be buried on site is 100 pCi/g total uranium above background (this assumes that the uranium is 100% soluble), and up to 250 pCi/g total uranium above background for insoluble uranium. The average concentrations of thorium and plutonium in the soil earmarked for disposal cannot exceed 10 pCi/g and 1 pCi/g, respectively above background. Hot-spot averaging can be applied to any location within a 100 square meter area which contains soil concentrations in excess of the limits stated above. The maximum total uranium soil concentration for any "hot spot" location within a 10m x 10m grid area may not exceed three times the BTP Option #2 limit for soluble uranium (300 pCi/g above background).

7.2.3 Gamma Surface Survey (Open Land Areas)

Cimarron personnel utilized a shielded 3" X 0.5" sodium iodide (NaI) detector as a final screening device for qualitative identification of residual contamination in soil. This type of detector is utilized primarily in affected areas to assist in remediation activities.

The shielded detector was utilized during the initial survey and at the completion of remediation activities for Subarea L to identify elevated areas. When this type of detector is used, any survey instrument reading (in counts per minute) greater than twice background is used as an indication that an area requires additional investigation. As stated above, this instrument is only utilized for qualitative measurements. Quantitative measurement of residual contamination levels in soil is performed with the Cimarron soil counter.

7.2.4 Exposure Rate Survey (Open Land Areas)

For either affected or unaffected areas, the average exposure rate may not exceed 10 $\mu\text{R/hr}$ above background, at 1 meter above the surface. Exposure rates may be averaged over a 100 m^2 grid area as described in NUREG/CR-5849. The maximum exposure rate at any discrete location within a 100 square meter area cannot exceed 20 $\mu\text{R/hr}$ above background. Any areas with average exposure rates greater than 10 $\mu\text{R/hr}$ above background and any discrete locations within a 100 square meter area with exposure rates greater than 20 $\mu\text{R/hr}$ above background was delineated and remediated as required. As stated by ORISE, background at the Cimarron site averages 7-10 $\mu\text{R/hr}$.

7.3 Equipment Selection

As required by the Cimarron Corporation Quality Assurance Program (QAP), a Special Work Permits (SWP) and Work Plans (WP) were written and approved prior to commencement of field work required for this subsurface final status survey. The SWP and WP for this project specified the type of instrumentation to be utilized in performing the site surveys. In general, the instrumentation utilized by site personnel is discussed below:

7.3.1 Equipment and Instrumentation

The instrumentation utilized to generate the characterization, remediation, and final survey data discussed herein was calibrated and maintained at the site in accordance with the Cimarron Radiation Protection Program procedures. These procedures utilize the guidance contained in ANSI N323-1978,²² "Radiation Protection Instrumentation Test and Calibration". Specific requirements for instrumentation include traceability of calibrations to NIST standards, field checks for operability, background radioactivity checks, operation of instruments within established environmental bounds, training of individuals, scheduled performance checks, calibration with isotopes of energies similar to those to be measured, quality assurance tests, data review, and recordkeeping.

Portable survey instruments (Micro-R survey meters, α/β survey meters, dose rate instruments, scalers/ratemeters, etc.) are calibrated on a quarterly basis. Where applicable, activities of sources utilized for calibration are corrected for decay. A calibrated electronic pulse generator is utilized for instrument scale linearity checks.

In addition to the quarterly calibration requirements, source checks are required on a daily basis for all instruments being utilized during characterization, remediation and final status survey work. All calibration and source check

records are completed, reviewed, signed-off and retained in accordance with the Cimarron Quality Assurance Program.

The instrumentation available at Cimarron for use during the Final Status Survey are listed in Table 7.1 along with the detector sensitivities for the instrumentation (MDA). Several typical instruments utilized by site personnel for surveying this subarea are discussed below:

7.3.1.1 Shielded 3" x 0.5" NaI Gamma Detector

The 3" x 0.5" detector is a sodium iodide (NaI) crystal gamma detector which is shielded around the sides. The NaI detector is utilized with a portable scaler/ratemeter that has single channel analyzer capability. Americium-241, Uranium-235, and natural thorium sources are utilized to set the instrumentation window and threshold to detect gamma energies in the range of 50 to 250 keV. This energy range corresponds to the energies of interest when surveying for uranium and natural thorium contamination. The instrument is operated in the window "out" mode, meaning that the instrument response is for the entire range of detectable energies.

7.3.1.2 Micro-R Meters

The 1" x 1" detector is a NaI crystal gamma detector which measures between 0 and 5,000 $\mu\text{R/hr}$. Background readings are obtained at a defined location prior to each use of the instrument. In general, this instrument is utilized for determination of exposure rates at both systematic and random locations and at locations of elevated radiation, identified by area scans.

7.3.1.3 Soil Counter (Gamma Spectroscopy)

The on-site soil counter consists of a 4" x 4" x 16" sodium iodide crystal housed in a shielded chamber which is computer linked to a multi-channel analyzer (MCA). Data from the MCA is processed through an EG&G Ortec Analysis Program which, in turn, determines uranium and thorium concentrations in soil samples.

Calibration of this counting system is traceable to NIST standards through contractor laboratory evaluations of the on-site standards. The standard concentrations have been confirmed through measurements performed by ORISE. ORISE has been used by the NRC to verify the majority of decommissioning work completed to date at the Cimarron site. ORISE has conducted an evaluation of the on-site soil counter system's ability to accurately measure total uranium concentrations in soil samples. This was done by comparing ORISE sample

TABLE 7.1

RADIATION MONITORING INSTRUMENTS

INSTRUMENT TYPE	NUMBER AVAILABLE	RADIATION DETECTED	SCALE RANGE	BKG	TYPICAL MDA 95% CONFIDENCE LEVEL
Scintillation (Ludlum 2224) Scaler/Ratemeter (fixed measurement)	2	Alpha Beta	0-500,000 cpm	< 10 cpm < 300 cpm	100 dpm/100 cm ² 500 dpm/100cm ²
Micro-R Meter (Ludlum) 1" x 1" NaI Detector	1	Gamma	0 - 3,000 μ R/h	7 μ R/h	1-2 uR/h
Ion Chamber (Victoreen)	2	Gamma	0.1 - 300 mR/h	<0.1 mR/h	<0.2 mR/h
3" x 1/2" NaI Scintillation Detector Digital Scaler	3	Gamma	0 - 500,000 cpm	3,000 cpm avg shielded 9,000 cpm avg unshielded	250 cpm 500 cpm
435 cm ² gas flow (43-27) Digital Scaler	1	Alpha	0 - 500,000 cpm	<10 cpm	20 dpm/100 cm ²
100 cm ² gas flow (43-68) Digital Scaler	1	Alpha	0 - 500,000 cpm	<10 cpm	100 dpm/100 cm ²
60 cm ² gas flow (43-4) Digital Scaler	1	Alpha	0 - 500,000 cpm	<10 cpm	200 dpm/100 cm ²
60 cm ² Count Rate Meter (PRM-6)	6	Alpha	0 - 500,000 cpm	<100 cpm	350 dpm/100 cm ²
50 cm ² Personnel Room Monitor (Ludlum 177)	3	Alpha	0 - 500,000 cpm	<100 cpm	500 dpm/100 cm ²
5" Slide-Drawer Counter	1	Alpha	0 - 500,000 cpm	<0.3 cpm	2 dpm
Eberline 2" GM Tube (Pancake)	1	Beta, Gamma	0 - 500,000 cpm 720 cpm = 0.2 mR/h	<200 cpm	70 cpm
Ludlum 2" GM Tube (Pancake)	2	Beta, Gamma	0 - 500,000 cpm 720 cpm = 0.2 mR/h	<200 cpm	70 cpm
Tennelec LB5100 Computer Based Auto Sample Counter	1	Alpha Beta	0 - 99,999,999 cpm	<0.3 cpm 1.5 cpm	0.4 dpm 1.5 dpm
Ludlum Dirt Probe 1 1/2" x 4" NaI (T1) Detector	2	Gamma	0 - 500,000 cpm	20,000 cpm	700 cpm
Soil Counter - Computer Linked 4" x 4" x 16" NaI (T1) Detector	1	Gamma	---	4 pCi/g Total U 1.2 pCi/g Th (Nat)	10 pCi/g U (5 minute count) 4 pCi/g U (30 minute count) .25 pCi/g Th (Nat)
100 cm ² Gas Flow Digital Scaler	2	Beta, Gamma	0 - 10,000 cpm	<300 cpm	600 dpm/100 cm ²
Ludlum 2" GM Tube (Pancake)	1	Alpha-Beta Gamma	0-500,000 cpm	<200 cpm	70 cpm

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analysis results obtained by alpha pulse height analysis and gamma spectroscopy with the results obtained from the use of the on-site soil counter. ORISE and Cimarron analysis results compared favorably as demonstrated by the two most recent confirmatory analysis performed for the DAP-3 stockpile. (NRC approval letter dated May 31, 1995²³), and the Phase I Unaffected Areas (ORISE Report dated March, 1996²⁴).

Established quality assurance practices for the on-site soil counter include cesium-137 centroid checks, Chi-square tests, background determinations, and the counting of appropriate standards each time the on-site soil counter is utilized for counting. All of these quality assurance practices are recorded on control charts and are trended on a continual basis.

Standards used for calibration and quality assurance checks with the on-site soil counter have been analyzed by outside laboratories and are NIST traceable. Comparisons have been made between the standards as counted using the on-site soil counter and two off-site independent laboratories. The assigned values for the standards are the average of the results obtained from the off-site laboratories. The standards range in activity concentration from 4.5 pCi/g total uranium to 292 pCi/g total uranium. This covers the entire range of interest for the Cimarron characterization and remediation activities.

Cimarron personnel determine total uranium and natural thorium activities based upon the evaluation of net counts from the on-site soil counter. Net activities are calculated through the use of efficiency and correction factors obtained with the appropriate standards. Soil activity concentrations are then calculated by dividing the net activity by the soil mass or weight. Soil masses or weights are determined on a laboratory scale which is checked on a daily basis (when in use) utilizing NIST traceable standards. Total uranium concentrations are also calculated by applying the site average enrichment value of 2.7 weight percent for Uranium-235.

7.4 Procedures/Plans

As discussed in Section 7.3, SWP's and WP's are written and approved prior to commencement of field work required for this survey. These permits and work plans are an integral part of this site's radiation protection and quality assurance program. Project organization and responsibilities, which are a part of the site's quality assurance program, are discussed in this section.

7.4.1 Organization

The Sub-Area L final survey was performed by a survey team consisting of qualified personnel from the Cimarron site. The final survey team operated under

the general direction of a Project Manager who reports directly to the Site Manager at the Cimarron Facility.

The selection of field measurement equipment and sample collection techniques was under the direction of the RSO/Health Physics Supervisor who reports to the Cimarron Site Manager. Actual field measurements and sample collection were under the direction of the Project Manager. The Project Manager was responsible for developing the SWP and WP for this sub-area with input from the RSO/Health Physics Supervisor. The SWP and WP were reviewed and approved by the Cimarron Site Manager.

7.4.2 Training

Cimarron Corporation provides continuing training to Cimarron personnel and any other personnel (i.e., contractors, visitors, etc.) who are allowed access to the site. All members of the final survey team attended an in-house training session on the SWP and WP prior to commencement of work under the final survey plan. All survey procedures and quality assurance requirements were reviewed during this training session.

7.4.3 Radiation Protection Program

Cimarron Corporation maintains a radiation protection program which meets and/or exceeds all of the applicable regulatory requirements associated with activities conducted under Special Nuclear Materials License SNM-928 and By-Product License 35-12636-02.²⁵ The Cimarron Radiation Protection Program currently in place for all decommissioning activities is administered through the use of the following documents:

- Cimarron Radiation Protection Procedures
- Cimarron Site Health and Safety Plan
- Cimarron Quality Assurance Plan and Procedures
- Cimarron Emergency Plan

It is the policy of Cimarron Corporation to perform all work in strict compliance with applicable regulatory and internal requirements. The goal of the Cimarron decommissioning effort is to conduct all operations at a level of excellence which exceeds regulatory requirements. Cimarron staff will continue to exercise appropriate radiation protection precautions throughout the remaining decommissioning work and final survey process.

Independent Kerr-McGee Corporate audits for regulatory and internal requirements are conducted on a periodic basis and include the review of the Cimarron Radiation Protection Program and associated programs. Assessments

of program effectiveness are also performed periodically by the Cimarron RSO/Health Physics Supervisor. Additionally, the Cimarron Radiation Protection Program is inspected for compliance with applicable rules and regulations by the Oklahoma Department of Environmental Quality (formally the Oklahoma Department of Health), NRC Region IV, NRC Headquarters staff, and ORISE.

7.4.4 Cimarron Quality Assurance Program

The Cimarron Corporation QAP is an integral part of the Cimarron Radiation Protection Program. A principal component of the QAP is the confirmation of the quality of project work performed during decommissioning by assuring that all tasks are performed in a quality manner by qualified personnel. The Program ensures that samples are collected, controlled, and analyzed in accordance with applicable quality controls to provide adequate confidence in the resulting data accuracy and validity are verifiable. Such quality controls provide for the independent verification of analysis results by third party review, thereby assuring that all data is both accurate and complete.

The Cimarron QAP is implemented and maintained in accordance with written policies, procedures, and instructions. This Program is administered under the direction of the Quality Assurance Manager. Periodic audits and reviews are conducted to ensure that all aspects of the Program are addressed. The Cimarron QAP satisfies all of the applicable requirements of ASME NQA-1.²⁶

Written procedures, designated as SWP's and WP's, are prepared, reviewed and approved for activities involved in carrying out the decommissioning process. The Subarea L Survey SWP and WP were written in accordance with the Cimarron QAP. These documents designated the type of surveys to be performed, samples to be collected, frequency of sample collection, number of samples to be split with an off-site independent laboratory, and the type of field instrumentation required for the tasks required.

The facility performs its own radiological soil analysis in accordance with written procedures and QA/QC protocols. Field data are gathered and maintained in logs for all samples in accordance with the Cimarron QAP. Necessary data are transferred to the on-site laboratory sample log when the sample is brought to the on-site laboratory for analysis. The sample logs provide a record of sample collection and transport (chain or custody) and are incorporated into the facility quality assurance files.

In addition, off-site independent radiological analysis of split samples is an integral part of the Cimarron QAP. Samples sent to an off-site independent laboratory for analysis are accompanied by a chain of custody form in accordance with the Cimarron QAP. These forms provide documentation for all aspects of

sample control and are maintained by the Quality Assurance Manager as permanent records.

Sample and survey data are reviewed by the Health Physics Department for accuracy and consistency and are compared to the guideline values. Reviews are performed on a regular basis. When identified, corrections to recognized deficiencies are performed.

Planned and periodic audits of Cimarron's Quality Assurance Program are performed by individuals who do not have direct responsibilities for the areas being audited. Audit results are documented for review by management.

8.0 Survey Findings

As discussed in Section 7.0, final status survey data was generated for Subarea L to justify release of the area for backfilling and final grading. The survey findings, including the statistical methodology employed to evaluate the data for the three units in Subarea L, are discussed in this section.

8.1 Data Evaluation

As discussed in NUREG/CR-5849, the guideline values for soil activity concentrations and exposure rates are average values (above background) established for areas of survey units. In order to compare the analytical and survey data developed for the final status survey with guideline values, data at each individual survey grid location was compared to the respective guideline value. The guideline value for leaving soil in place is Option #1 material up to 30 pCi/g total uranium above background.

If an individual soil activity measurement exceeded the applicable guideline value, then the average was determined for the survey unit (100 square meters). Also, hot spot averaging may have been performed. Areas of residual activity exceeding the guideline value, known as elevated areas, were acceptable provided they did not exceed the guideline value by greater than a factor of $(100/A)^{1/2}$, where A was the area of residual activity in m^2 , and provided the activity level at any location did not exceed three times the guideline value. These levels (averages) were then compared to the guideline value. If the average was below the guideline plus background, further remediation was not required.

8.2 Comparison With Guideline Values

The data for each of the three unit areas were compared to the guideline value criteria and are discussed separately below:

8.2.1 Burial Area #2

This section evaluates the data collected from both the 100% scan and the systematic survey performed at the grid intersects for this unit. The data includes analytical soil sample results, systematic survey readings for the 5m x 5m grid intersects, and survey results from the 100% scan performed after completion of remediation. A total of 479 soil samples were collected from this unit, with 415 samples collected from surface sampling and 64 collected from the overburden stockpile. The data, tabulation, statistical analyses, and drawings are presented in Appendix III and IV.

For the surface sampling, all soil samples analytical results for this unit were below the total uranium guideline value (i.e. 30 pCi/g total uranium above background), except for two locations. These locations were 75E x 300N and 70E x 315N. However, the activity average determined for the samples within a 10m x 10m grid for both locations was below the total uranium guideline value. The mean value for all 415 sample locations was 11 pCi/g total uranium, with a standard deviation of 6 pCi/g. The 95% confidence level value was 11 pCi/g which is below the guideline values for total uranium. Also, the soil sample analytical results for this unit were all below the thorium guideline value (i.e., 10 pCi/g total thorium above background). The mean value was 2 pCi/g natural thorium, with a standard deviation of 1 pCi/g thorium. The soil sample locations and analytical results for both total uranium and thorium, are shown on Drawing No. 95POB2SS-0.

The NaI scan that was performed after remediation and prior to the systematic survey identified no locations that exceeded twice background. The NaI detector survey results for the grid intersect sample locations ranged from 1612 to 5450 CPM. All survey results were less than twice background (i.e. 2 x 3100 CPM as described in Section 7.4.2). The average was 3584 CPM. The survey results are presented on Drawing No. 95POB23D-0. The dose rates at the surface and at one meter above the surface both ranged from 5 to 11 μ R/hr, with the mean being 8 μ R/hr. The dose rates are presented on Drawing Nos. 95POB2UR-0 and 95POB2UR-1.

For the overburden stockpile, all 64 soil samples analytical results were below the total uranium guideline value. The mean value was 9 pCi/g, with a standard deviation of 3 pCi/g. For natural thorium, the mean value was 2 pCi/g with a standard deviation of 1 pCi/g. The soil samples location and analytical results for both total uranium and thorium, are shown on Drawing Nos. 953L20SS-0 thru 953L20SS-4. The NaI detector survey results for the surface grid intersects range from 2850 to 3390 CPM; all survey results were less than twice background. The survey results are presented on Drawing No. 953L203D-0. The dose rates at the

surface and at one meter above the surface both ranged from 7 to 9 $\mu\text{R/hr}$. The dose rates are presented on Drawing Nos. 953L2OUR-0 and 953L2OUR-1.

8.2.2 Three Former Waste Ponds and New Sanitary Lagoon Areas

This section evaluates the data collected from both the 100% scan and the systematic survey performed at the grid intersects for this unit. The data includes analytical soil sample results, systematic survey readings for the 5m x 5m grid intersects, and survey results for the 100% scan performed after completion of remediation. A total of 240 soil samples were collected from this unit. The data, tabulation, statistical analyses, and drawings are presented in Appendix V.

All 240 soil sample analytical results for this unit were at or below the total uranium guideline value (i.e. 30 pCi/g total uranium above background). The mean value was 7 pCi/g total uranium, with a standard deviation of 3 pCi/g. The highest result was 34 pCi/g at location 230E x 40N, this result is equal to the guideline value of 30 pCi/g plus background. At location 225E x 145N, the soil activity was 31 pCi/g total uranium; this is below the guideline value when background is added (i.e., 34 pCi/g). The 95% confidence level value was calculated at 7.8 pCi/g which is below the guideline value for total uranium. The soil sample locations and analytical results are shown on Drawing No. 95PO3LSS-0.

Also, the soil sample analytical results were all below the thorium guideline value. The mean value was 1 pCi/g natural thorium.

The NaI scan that was performed after remediation and prior to the systematic survey identified no locations that exceeded twice background. The NaI detector survey results for the grid intersect sample locations ranged from 2984 to 4390 CPM. All survey results were less than twice background (i.e. 2 x 3100 CPM as described in Section 7.4.2). The average was 3334 CPM. The survey results are presented on Drawing No. 95PO3L3D-0. The dose rates at the surface and at one meter above the surface both ranged from 5 to 8 $\mu\text{R/hr}$, with the mean being 7 $\mu\text{R/hr}$. The dose rates are presented on Drawing Nos. 95PO3LUR-0 and 95PO3LUR-1.

8.2.3 Adjoining Area South of Original East/West Sanitary Lagoons

This section evaluates the data collected from both the 100% scan and the systematic survey performed at the grid intersects for this unit. The data includes analytical soil sample results, systematic survey readings for the 5m x 5m grid intersects, and survey results for the 100% scan performed after completion of remediation. A total of 151 soil samples were collected from this unit. The data, tabulation, statistical analyses, and drawings are presented in Appendix VI.

All 151 soil sample analytical results for this unit were below the total uranium guideline value (i.e. 30 pCi/g total uranium above background). The mean value was 9 pCi/g total uranium, with a standard deviation of 4 pCi/g. The 95% confidence level value was 9.7 pCi/g, which is below the guideline value for total uranium. The soil sample locations and analytical results are shown on Drawing No. 95PO3SS-0.

Also, the soil sample analytical results were all below the thorium guideline value. The mean value was 1 pCi/g natural thorium.

The NaI scan that was performed after remediation and prior to the systematic survey identified no locations that exceeded twice background. The NaI detector survey results for the grid intersect sample locations ranged from 2140 to 4538 CPM. All survey results were less than twice background (i.e. 2×3100 CPM as described in Section 7.4.2). The average was 3508 CPM. The survey results are presented on Drawing No. 95PO3S3D-0. The dose rates at the surface and at one meter above the surface both ranged from 5 to 9 $\mu\text{R/hr}$, and 6 to 9 $\mu\text{R/hr}$ respectively. The dose rates are presented on Drawing Nos. 95PO3SUR-0 and 95PO3SUR-1.

8.3 QA/QC Procedures

As discussed in Section 7.5.2.4, Cimarron Corporation QAPPs are an integral part of the overall site decommissioning program and include off-site independent isotopic analysis of split samples. For the soil activity ranges that apply to this survey, a total of 17 soil samples were split and sent off-site for analysis. The soil samples were first analyzed by the on-site counter prior to being packaged and sent off-site for analysis at an independent laboratory. The results for both off-site and on-site analysis are listed in Table 8.1.

The average (mean) for the split samples analyzed both onsite and offsite was 32.3 pCi/g total uranium from the independent laboratory versus 34.5 pCi/g total uranium for the on-site counter with the Cimarron samples. These sample results show excellent agreement.

9.0 Summary

A Final Status Survey was performed in accordance with the SWP and WP approved by Cimarron Management for Subarea L. This report presents a comparison of the results of the Final Status Survey to the clean-up criteria (guideline values) for an affected area at the

TABLE 8.1

SOIL ANALYTICAL RESULTS
 QA/QC DATA SUMMARY FOR 1995
 COMPARISON OF OFF-SITE LAB vs CIMARRON ON-SITE COUNTER
 (RANGE OF ANALYTICAL RESULTS, 10 pCi/g to 60 pCi/g total U)

SAMPLE ID	OFF-SITE LAB pCi/g U	CIMARRON pCi/g U
DCK-10	17.4 ± 2.3	13 ± 5.8
YRD-485	32.4 ± 4.5	32 ± 5.2
YRD-471	22.5 ± 3.4	33 ± 4.5
YRD 495	53.2 ± 6.4	52 ± 7.4
DAP-3-34	32.5 ± 5.7	35 ± 4.7
DAP-3-95	35.5 ± 5.7	38 ± 4.7
DAP-3-130	21.1 ± 3.7	33 ± 4.9
DAC-2-12	46.3 ± 5.3	42 ± 5.1
DAC-2-13	40.6 ± 5.6	44 ± 4.9
DCA-2-15	31.0 ± 4.4	28 ± 4.0
DCA-2-20	24.3 ± 4.5	33 ± 5.9
DAC2-23	24.3 ± 5.0	32 ± 4.1
BUR-2-296	27.8 ± 3.6	25 ± 7
BUR-2-297	27.4 ± 3.7	31 ± 8
DAP-3-36	46.9 ± 6.0	54 ± 7
BUR-2-295	34.1 ± 5.7	30 ± 5.2
NSL-3	31.6 ± 4.5	31 ± 5.8
AVERAGE	32.3	34.5

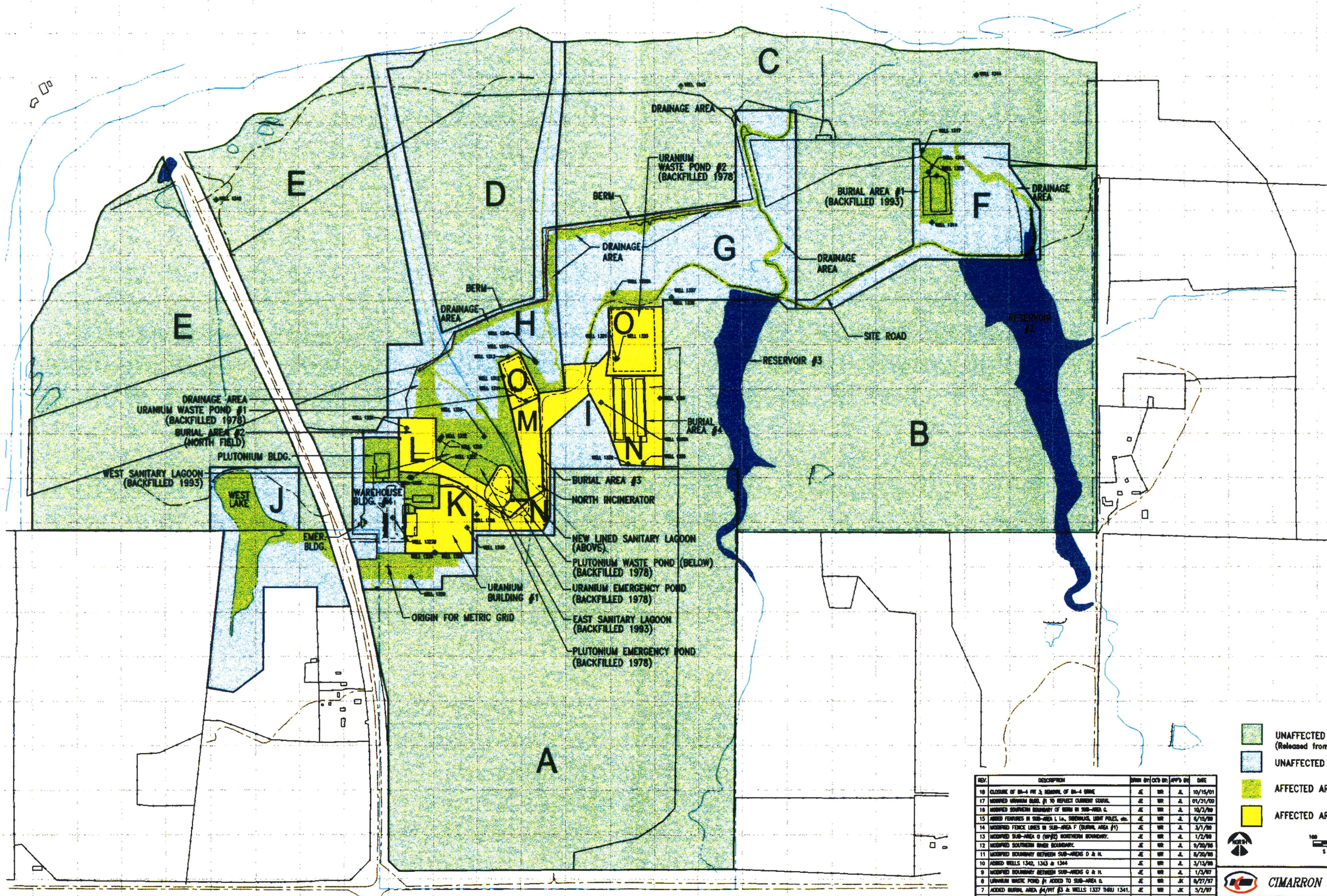
Cimarron site. The comparison presented herein demonstrates that all clean-up criteria (guidelines values) have been met and/or exceeded and thus Subarea L can now be released for backfilling, grading and seeding. Therefore, this report is being submitted to the NRC in conjunction with a request to release the area for backfilling and final grading.

The surface survey, required to release this area from license SNM-928, will be a part of the Phase III Final Status Survey. The Phase III Final Status Survey Plan will be submitted to the NRC in the near future after approval of the Phase II Plan.

10.0 Appendixes

- Appendix I Drawing 95 MOST-RF3 & 96 MOST-RF15LS
- Appendix II Subarea L Pre-remediation Data Sheets and Drawings
- Appendix III Burial Area #2 Final Survey Data Evaluation, Data Sheets, and Drawings
- Appendix IV Overburden Stockpile Final Survey Data Evaluation, Data Sheets, and Drawings
- Appendix V New Lined Sanitary Lagoon Area Final Survey Data Evaluation, Data Sheets, and Drawings
- Appendix VI Adjoining Area South of Original East/West Sanitary Lagoons Final Survey Data Evaluation, Data Sheets, and Drawings

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- UNAFECTED AREA (PHASE I)
(Released from License 1996)
- UNAFECTED AREA (PHASE II)
- AFFECTED AREA (PHASE II)
- AFFECTED AREA (PHASE III)

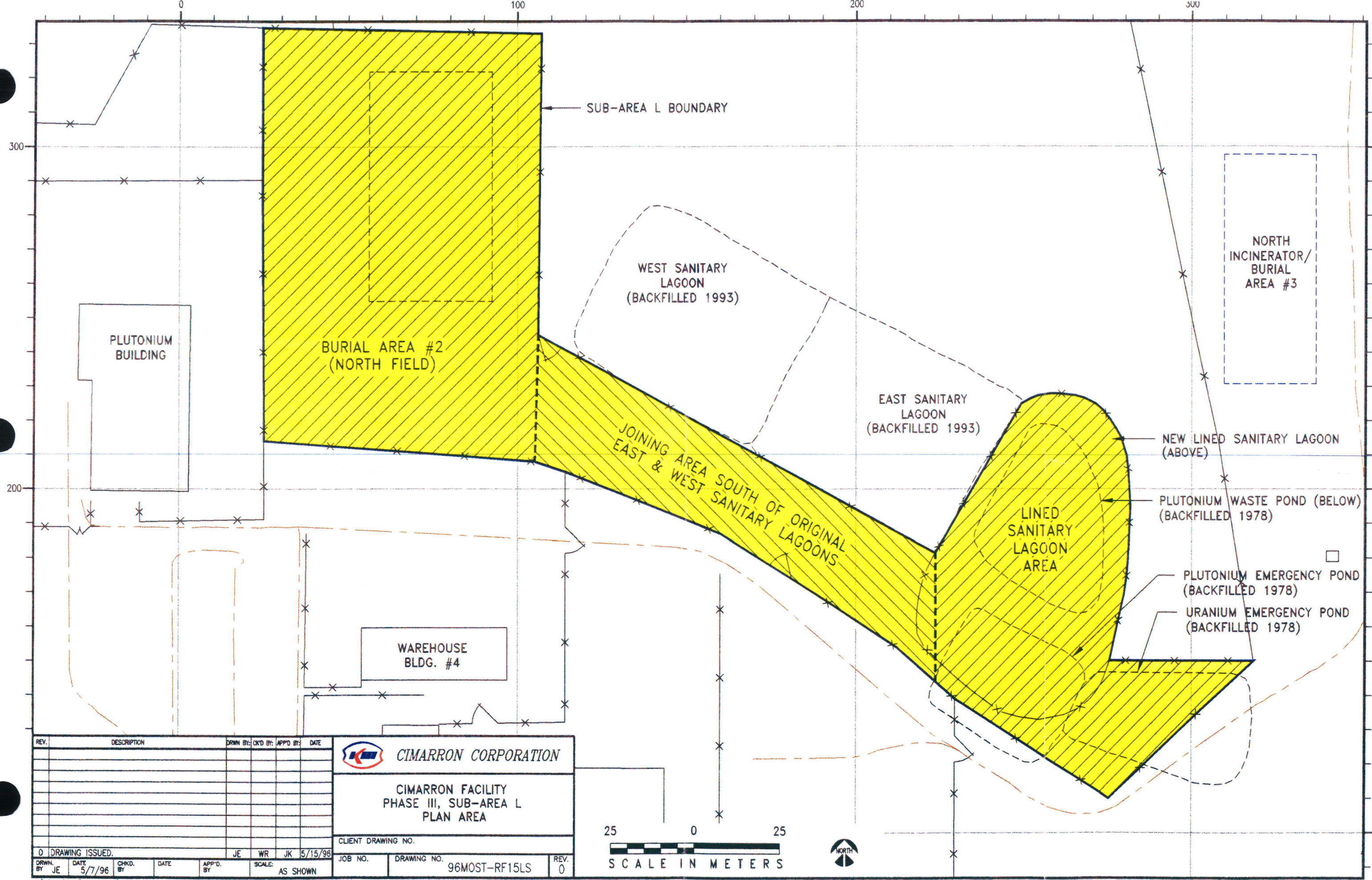


REV.	DESCRIPTION	DATE	BY	CHKD.	DATE	BY	CHKD.	DATE	BY
10	CLOSURE OF 24-4 PRT 3, REMOVAL OF 24-4 BONE	10/15/01	JE	WR	AL	10/15/01			
17	MODIFIED URANIUM BLDG. #1 TO REFLECT CURRENT CONFG.	01/31/00	JE	WR	AL	01/31/00			
16	MODIFIED SOUTHERN BOUNDARY OF BERM IN SUB-AREA G.	10/13/99	JE	WR	AL	10/13/99			
15	ADDED FENCE LINES IN SUB-AREA L (LA, SUBURBAN, LIGHT POLES, etc.)	6/15/99	JE	WR	AL	6/15/99			
14	MODIFIED FENCE LINES IN SUB-AREA F (BURIAL AREA #1)	3/1/99	JE	WR	AL	3/1/99			
13	MODIFIED SUB-AREA G (UPPER) NORTHERN BOUNDARY.	1/2/99	JE	WR	AL	1/2/99			
12	MODIFIED SOUTHERN BERM BOUNDARY.	9/20/98	JE	WR	AL	9/20/98			
11	MODIFIED BOUNDARY BETWEEN SUB-AREAS D & H.	5/20/98	JE	WR	AL	5/20/98			
10	ADDED WELLS 1342, 1343 & 1344	3/13/98	JE	WR	AL	3/13/98			
9	MODIFIED BOUNDARY BETWEEN SUB-AREAS G & H.	1/3/97	JE	WR	AL	1/3/97			
8	URANIUM WASTE POND #1 ADDED TO SUB-AREA G.	8/27/97	JE	WR	JK	8/27/97			
7	ADDED BURIAL AREA #4 (PRT #3 & WELLS 1337 THRU 1341).	3/2/97	JE	WR	JK	3/2/97			
6	PHASE I AFFECTED AREA MODIFIED IN SUB-AREA H & BOUNDARY CHANGE TO SUB-AREAS I & H.	12/18/96	JE	WR	JK	12/18/96			
5	PHASE II AFFECTED AREA MODIFIED TO MATCH GPS SURVEY DATA.	10/11/96	JE	WR	JK	10/11/96			
4	DRAWING REFLECTS NEW SURVEY DATA ON FENCE.	6/13/96	JE	WR	JK	6/13/96			
3	DRAWING REFLECTS NEW SURVEY DATA ON FENCES AND BORDS.	6/16/96	JE	WR	JK	6/16/96			
2	MODIFICATIONS TO PHASE I SUB-AREAS.	11/13/95	JE	WR	JK	11/13/95			
1	ADDED PROPERTY DATA OF WEST LAKE MODIFIED NORTHERN BOUNDARY.	7/14/95	JE	WR	JK	7/14/95			
0	DRAWING ISSUED.	4/1/95	JE	WR	JK	4/1/95			



CIMARRON FACILITY
FINAL STATUS SURVEY PLAN
PHASES I, II AND III

CLIENT DRAWING NO.
JOB NO. DRAWING NO. 95MOST-RF3 REV. 18



CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	30E - 220N	10	1	17	3	7	1	8	3				
2	30E - 230N	17	1	5	2	8	2	7	2				
3	30E - 240N	16	5	7	2	8	2	13	1				
4	30E - 250N	10	2	8	2	6	3	12	3				
5	30E - 260N	12	1	10	2	11	2	6	1				
6	30E - 270N	25	1	24	2	24	2	18	1				
7	30E - 280N	13	1	12	1	12	2	9	3				
8	30E - 290N	14	1	7	2	8	2	8	2				
9	30E - 300N	12	1	14	2	7	2	10	2				
10	30E - 310N	8	2	10	2	7	2	14	3				
11	30E - 320N	11	2	5	2	8	1	9	1				
12	30E - 330N	13	1	9	2	9	2	8	2				
13													
14													
15													
16													
17													
18													

INSTRUMENTS: _____

RESULTS IN _____

BACKGROUND _____

MDA _____

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

pCi/G
pCi/G

TOTAL U - 4
Th (Nat) - 1.5

TOTAL U - 10
Th (Nat) - 1

BACKGROUND NOT SUBTRACTED

REVIEWED BY: W.A. Rogers

DATE: 5-3-96

FILE: PR3LSS90

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	40E - 220N	8	2	10	2	9	3	7	2				
2	40E - 230N	21	2	17	3	6	2	7	1				
3	40E - 240N	8	2	6	2	4	3	12	2				
4	40E - 250N	8	2	11	1	11	2	14	1				
5	40E - 260N	12	1	4	2	7	2	10	3				
6	40E - 270N	9	1	5	2	5	2	9	2				
7	40E - 280N	11	2	9	3	6	2	6	2				
8	40E - 290N	11	2	6	2	5	1	3	2				
9	40E - 300N	7	2	9	1	10	2	9	3				
10	40E - 310N	9	1	7	1	3	2	8	1				
11	40E - 320N	7	2	3	2	14	1	7	1				
12	40E - 330N	12	1	6	3	3	1	5	2				
13													
14													
15													
16													
17													
18													

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

MDA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY: W.A. Rogers

DATE: 5-3-96

THIS DATA COMBINES FIVE YEARS
OF DATA. WHERE DUPLICATE
RESULTS EXIST THE HIGHEST
TOTAL U RESULTS WERE
RECORDED FOR THAT GRID
LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	45E - 220N	13	1	8	2	9	2	12	1				
2	45E - 225N	12	1	11	1	10	1	7	1				
3	45E - 230N	9	2	6	2	6	1	5	1				
4	45E - 320N	6	2	6	2	4	2	14	2				
5	45E - 325N	11	2	12	2	13	2	4	1	13	1		
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													

INSTRUMENTS: _____

RESULTS IN

BACKGROUND

MDA

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

pCi/G
pCi/G

TOTAL U - 4
Th (Nat) - 1.5

TOTAL U - 10
Th (Nat) - 1

BACKGROUND NOT SUBTRACTED

REVIEWED BY: W. A. Rogers

DATE: 5-3-96

FILE: PR3LSS90

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	50E - 220N	13	1	11	1	12	1	4	2				
2	50E - 225N	11	1	9	1	10	1	8	1				
3	50E - 230N	11	1	12	2	8	2	5	1				
4	50E - 240N	11	1	9	4	9	1	4	2				
5	50E - 250N	11	2	10	1	9	2	7	2				
6	50E - 260N	25	1	12	2	9	1	3	1				
7	50E - 270N	13	1	13	1	9	1	12	4				
8	50E - 280N	16	1	7	1	4	2	11	3				
9	50E - 290N	14	1	13	1	3	2	6	1				
10	50E - 300N	7	2	11	2	9	2	4	2				
11	50E - 310N	14	1	12	2	12	2	9	2				
12	50E - 320N	18	3	10	1	13	3	11	1				
13	50E - 325N	24	2	9	1	15	1	5	1				
14	50E - 330N	9	2	13	2	9	1	13	1	5	1		
15													
16													
17													
18													

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

REVIEWED BY:

W.A. Rogers

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

DATE: 5-3-96

MDA

TOTAL U - 10
Th (Nat) - 1

THIS DATA COMBINES FIVE YEARS
OF DATA. WHERE DUPLICATE
RESULTS EXIST THE HIGHEST
TOTAL U RESULTS WERE
RECORDED FOR THAT GRID
LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	55E - 220N	18	1	9	2	11	1	11	1				
2	55E - 225N	16	1	9	1	9	1	10	1				
3	55E - 230N	10	1	9	1	4	1	9	1				
4	55E - 280N	8	2	11	3	8	2	4	2				
5	55E - 285N	14	2	9	3	8	2	4	2	12	1		
6	55E - 300N	9	2	14	2								
7	55E - 305N	11	2	6	3								
8	55E - 310N	16	2	18	2	18	2	19	2	24	2		
9	55E - 315N	11	2	9	4	11	2	13	2	9	3		
10	55E - 320N	12	2	9	2	11	2	10	2	11	2		
11	55E - 325N	21	2	36	2	20	2	10	1	10	1		
12	55E - 330N	14	2	9	1	9	1	11	1	9	1		
13													
14													
15													
16													
17													
18													

INSTRUMENTS: _____

RESULTS IN

BACKGROUND

MDA

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

pCi/G
pCi/G

TOTAL U - 4
Th (Nat) - 1.5

TOTAL U - 10
Th (Nat) - 1

BACKGROUND NOT SUBTRACTED

REVIEWED BY: W.A. Rogers

DATE: 5-3-96

FILE: PR3LSS90

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	60E - 220N	13	1	8	1	10	1	7	2				
2	60E - 225N	10	1	8	2	11	1	11	1				
3	60E - 230N	15	1	10	2	12	1	7	1				
4	60E - 235N	14	1	6	1	5	1	7	1				
5	60E - 240N	30	1	10	2	13	1	9	1				
6	60E - 245N	12	1	7	2	13	2	10	2				
7	60E - 250N	14	2	4	3	10	1	11	1				
8	60E - 260N	12	2	9	2	6	3	5	2				
9	60E - 270N	11	1	7	2	8	2	8	2				
10	60E - 280N	25	3	16	1	7	2	6	1				
11	60E - 290N	14	3	22	1	16	1	21	4				
12	60E - 300N	24	2	23	2	12	2	23	2				
13	60E - 305N	10	2	18	2								
14	60E - 310N	20	2	22	1	38	5	25	2				
15	60E - 315N	11	2	5	2	32	1	77	1	119	7	57	2
16	60E - 320N	15	1	10	2	4	2	14	1				
17	60E - 325N	13	2	11	2	14	2	30	1	37	1		
18													

INSTRUMENTS: _____

RESULTS IN

BACKGROUND

MDA

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

pCi/G
pCi/G

TOTAL U - 4
Th (Nat) - 1.5

TOTAL U - 10
Th (Nat) - 1

BACKGROUND NOT SUBTRACTED

REVIEWED BY: W.A. Rogers

DATE: 5-3-96

FILE: PR3LSS90

THIS DATA COMBINES FIVE YEARS
OF DATA. WHERE DUPLICATE
RESULTS EXIST THE HIGHEST
TOTAL U RESULTS WERE
RECORDED FOR THAT GRID
LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	65E - 220N	25	1	13	1	10	1	10	1				
2	65E - 225N	11	1	10	1	6	2	5	1				
3	65E - 230N	16	1	10	1	11	1	9	1				
4	65E - 235N	12	1	7	1	12	1	11	1				
5	65E - 300N	14	2	40	15	17	4	18	1	16	2		
6	65E - 305N	23	1	26	2			80	1	36	1		
7	65E - 310N	35	2	341	3	835	8	359	4	280	2		
8	65E - 315N	28	1	260	1	310	2			1106	13	214	2
9	65E - 320N	49	1	54	2	100	1	57	1				
10													
11													
12													
13													
14													
15													
16													
17													
18													

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

MDA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY:

W.A. Rogers

DATE: *5-3-96*

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	70E - 220N	12	1	10	1	8	2	8	2				
2	70E - 225N	12	1	12	1	11	1	8	1				
3	70E - 230N	11	2	12	1	8	2	11	1				
4	70E - 240N	8	2	14	1	6	2	8	2				
5	70E - 250N	8	2	12	1	9	2	8	2				
6	70E - 260N	9	2	10	1	10	2	10	1				
7	70E - 265N	19	1	10	2	6	2	10	1				
8	70E - 270N	78	1	10	2	10	1						
9	70E - 280N	9	2	3	2	6	1	5	2				
10	70E - 290N	15	2	21	5	19	2	14	2				
11	70E - 295N	16	2	17	2								
12	70E - 300N	38	1	11	1	12	1						
13	70E - 305N	17	2	44	1								
14	70E - 310N	28	1	373	25	60	3	44	2				
15	70E - 315N	53	12	487	4	155	1	193	2				
16	70E - 320N	33	3	372	36	158	7	66	5				
17	70E - 325N	22	2	8	1	9	1	5	1				
18													

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

REVIEWED BY:

W.A. Rogers

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

DATE: *5-3-96*

MDA

TOTAL U - 10
Th (Nat) - 1

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	75E - 225N	9	2	13	2	12	2	12	1				
2	75E - 230N	12	1	8	2	10	1	11	1				
3	75E - 270N	13	2	26	2	24	1	14	1				
4	75E - 275N	14	1	6	2	8	1	13	1				
5	75E - 280N	17	2	9	1	7	1	14	2				
6	75E - 285N	59	1	65	1	60	1	29	1				
7	75E - 290N	26	1	11	2	8	2	11	1				
8	75E - 295N	12	2	13	2								
9	75E - 300N	1254	14	1045	3								
10	75E - 305N	35	2	17	1	9	1						
11	75E - 310N	34	1	8	1	8	1						
12	75E - 315N	340	3	1143	9	108	7						
13	75E - 320N	27	2	24	2								
14	75E - 325N	10	2	9	3	8	3	13	2				
15													
16													
17													
18													

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

MDA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY:

W.A. Rogers

DATE:

5-3-96

THIS DATA COMBINES FIVE YEARS
OF DATA. WHERE DUPLICATE
RESULTS EXIST THE HIGHEST
TOTAL U RESULTS WERE
RECORDED FOR THAT GRID
LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	80E - 210N	17	2	9	1	12	1	11	1				
2	80E - 220N	7	2	8	1	9	1	7	1				
3	80E - 230N	11	1	9	1	8	2	8	2				
4	80E - 240N	7	3	6	3	7	2	9	2				
5	80E - 250N	11	1	11	1	6	3	5	2				
6	80E - 255N	7	2	3	3	5	2						
7	80E - 260N	9	1	7	2	10	1	12	1				
8	80E - 265N	10	1	11	1								
9	80E - 270N	27	1	8	1	34	2	24	1				
10	80E - 275N	12	3	26	2	253	3	125	1	86	1	74	1
11	80E - 280N	13	2	19	2	16	1	20	2				
12	80E - 285N	8	2	16	2	13	3	30	6				
13	80E - 290N	19	2	24	2	7	1	5	2				
14	80E - 295N	17	1	10	1								
15	80E - 300N	10	2	8	1	8	1	7	1				
16	80E - 305N	31	2	20	2								
17	80E - 310N	22	1	10	1	14	1						
18	80E - 315N	64	2	15	2								
19	80E - 320N	21	1	18	1	11	2	9	1				
20	80E - 325N	12	2	9	1								
21	80E - 330N	16	1	8	1	6	3	7	1				

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

MOA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY:

W.A. Rogers

DATE:

5-3-96

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.
W.A. ROGERS 07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	85E - 255N	9	3	7	2			15	3				
2	85E - 260N	11	2	12	2	11	3						
3	85E - 265N	14	2	7	3	10	3	9	3	242	2	106	2
4	85E - 270N	15	2	12	2								
5	85E - 275N	17	3	19	3	24	3	27	2	26	3	18	3
6	85E - 280N	16	3	35	3	33	3	30	2	27	2		
7	85E - 285N	28	2	21	3	52	2	19	2				
8	85E - 290N	9	2	14	2								
9	85E - 295N	19	3	28	1								
10	85E - 300N	106	1	67	1	41	2						
11	85E - 305N	11	2	6	3	5	2						
12													
13													
14													
15													
16													
17													
18													

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

MDA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY:

W.A. Rogers

DATE: 5-3-96

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	90E - 210N	19	2	8	2	9	1	9	2				
2	90E - 220N	19	1	10	1	12	4	4	2				
3	90E - 230N	9	1	7	2	4	3	9	2				
4	90E - 240N	8	2	7	2	5	2	6	2				
5	90E - 250N	12	1	3	2	9	1	7	2				
6	90E - 260N	7	2	8	2	7	2	11	1				
7	90E - 265N	11	3	12	2	13	2	5	3	7	2		
8	90E - 270N	8	2	12	2	4	2	5	2				
9	90E - 275N	21	3	12	3	13	2	6	3	10	3	8	3
10	90E - 280N	35	3	174	7	268	14						
11	90E - 285N	26	3	571	5	431	4	302	2	441	4	271	2
12	90E - 290N	12	1	8	2	11	2	9	1				
13	90E - 295N	19	2	22	2								
14	90E - 300N	25	1	22	1	13	1	10	2				
15	90E - 305N	30	2	27	2	19	2	12	2				
16	90E - 310N	13	1	7	1	8	1	7	1				
17	90E - 320N	16	2	4	1	4	4	5	1				
18	90E - 330N	11	1	6	2	9	1	9	1				

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FIL FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

REVIEWED BY:

W.A. Rogers

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

DATE: 5-3-96

MDA

TOTAL U - 10
Th (Nat) - 1

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	95E - 255N	10	3	9	2	6	3						
2	95E - 260N	8	3	12	2	11	3	10	2	6	3		
3	95E - 265N	12	2	8	2	10	2	9	3	10	3		
4	95E - 270N	10	2	8	3	9	3						
5	95E - 275N	10	2	13	1	8	2						
6	95E - 280N	11	3	11	2	15	2						
7	95E - 285N	16	2	9	2	11	2						
8	95E - 290N	15	3	15	3	7	2						
9	95E - 295N	7	2	6	3	15	2	44	2				
10	95E - 300N	17	2	44	3	32	2						
11	95E - 305N	21	2	17	2	18	2	24	2				
12													
13													
14													
15													
16													
17													
18													

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.6

MDA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY:

W.A. Rogers

DATE:

5-3-96

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	100E - 210N	19	1	10	1	7	1	7	1				
2	100E - 220N	14	1	6	1	7	4	9	2				
3	100E - 230N	18	2	6	2	6	2	5	2				
4	100E - 240N	9	2	7	2	7	2	6	2				
5	100E - 250N	16	1	6	2	5	2	11	4				
6	100E - 260N	14	1	9	2	8	1	11	1				
7	100E - 270N	9	2	8	2	18	4	8	2				
8	100E - 280N	17	2	10	2	14	1	8	2				
9	100E - 290N	19	1	9	2	6	2	2	3				
10	100E - 300N	13	2	12	1	7	2	7	2				
11	100E - 310N	12	2	7	2	9	2	7	2				
12	100E - 320N	11	2	5	1	7	2	6	1				
13	100E - 330N	10	2	8	1	7	1	8	2				
14													
15													
16													
17													
18													

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

MDA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY:

W. A. Rogers

DATE:

5-3-96

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	105E - 210N	17	1	12	1	8	1	9	1				
2	105E - 220N	16	1	12	1	6	1	7	2				
3	105E - 230N	21	1	9	2	9	2	11	2				
4	105E - 240N	10	2	15	2	8	1	14	2				
5	105E - 250N	16	2	8	2	14	2	8	1				
6	105E - 260N	35	2	7	2	15	2	16	3				
7	105E - 270N	12	3	7	2	7	2	7	2				
8	105E - 280N	12	2	13	2	14	2	6	2				
9	105E - 290N	11	2	6	2	14	2	7	2				
10	105E - 300N	16	2	9	2	7	2	5	2				
11	105E - 310N	10	2	9	1	7	1	7	1				
12	105E - 320N	14	2	5	1	6	1						
13	105E - 330N	12	2	6	2	13	2						
14													
15													
16													
17													
18													

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

MDA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY:

W.A. Rogers

DATE:

5-3-96

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	110E - 210N	18	5	6	2	8	2	9	2				
2	110E - 220N	15	1	5	1	5	1	7	2				
3	110E - 230N	14	2	6	3	6	2	4	3				
4	110E - 240N	15	1	9	2	8	2	8	2				
5													
6													
7	120E - 210N	10	1	7	2	8	1	9	2				
8	120E - 220N	10	1	4	2	4	2	6	1				
9	120E - 230N	7	1	13	3	8	2	7	2				
10													
11													
12	130E - 200N	11	1	9	1	9	1	5	2				
13	130E - 210N	7	1	6	1	6	2	17	3				
14	130E - 220N	16	1	14	3	7	1	7	1				
15	130E - 230N	11	1	5	1	5	1	6	2				
16													
17													
18													

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

MDA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY:

W.A. Rogers

DATE:

5-3-96

THIS DATA COMBINES FIVE YEARS
OF DATA. WHERE DUPLICATE
RESULTS EXIST THE HIGHEST
TOTAL U RESULTS WERE
RECORDED FOR THAT GRID
LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	140E - 200N	15	1	5	2	7	2	8	1				
2	140E - 210N	17	1	9	2	9	2	7	2				
3	140E - 220N	6	1	6	1	3	1	6	1				
4													
5													
6	150E - 190N	14	1	11	1	12	2	5	1				
7	150E - 200N	13	3	5	2	8	1	9	2				
8	150E - 210N	12	1	8	1	2	2	10	2				
9	150E - 220N	13	1	3	1	7	2	7	1				
10													
11													
12	160E - 190N	11	1	3	2	6	1	7	2				
13	160E - 200N	19	2	8	1	8	1	9	2				
14	160E - 210N	29	5	4	1	7	1	7	2				
15	160E - 215N	13	1	3	1	17	1	7	1				
16													
17													
18	165E - 210N	9	1	5	1	7	2	9	1				

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

DATE: 5-3-96

MDA

TOTAL U - 10
Th (Nat) - 1

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

REVIEWED BY: W.A. Rogers

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	170E - 180N	9	2	5	1	11	2	8	1				
2	170E - 190N	27	2	12	1	13	2	5	1				
3	170E - 200N	20	4	9	2	9	1						
4													
5													
6	175E - 205N	11	1	8	2	6	2	5	1				
7													
8													
9	180E - 180N	7	2	9	4	7	2	7	2				
10	180E - 190N	23	1	8	1	6	2	10	1				
11	180E - 200N	11	1	8	1	8	1	4	1				
12													
13													
14	185E - 200N	9	1	5	1	6	1	8	1				
15													
16													
17													
18													

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

MDA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY:

W.G. Rogers

DATE:

5-3-96

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	190E - 170N	11	1	12	2	6	2	4	2				
2	190E - 180N	5	1	6	1	12	2	9	2				
3	190E - 190N	5	2	7	1	4	1	4	1				
4													
5													
6	195E - 195N	8	1	10	2	7	2	9	1				
7													
8													
9	200E - 160N	13	4	7	1	8	2	16	3				
10	200E - 170N	9	2	7	2	7	1						
11	200E - 180N	10	1	9	1	8	1	7	1				
12	200E - 190N	12	1	6	2	8	1	3	2				
13													
14													
15	210E - 160N	7	1	4	1	8	1	4	1				
16	210E - 170N	5	1	10	1	11	1	7	1				
17	210E - 180N	14	2	16	2	7	1	9	1				
18	210E - 185N	8	2	6	1	9	1	6	2				

INSTRUMENTS: _____

RESULTS IN _____

BACKGROUND _____

MDA _____

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

pCi/G
pCi/G

TOTAL U - 4
Th (Nat) - 1.5

TOTAL U - 10
Th (Nat) - 1

BACKGROUND NOT SUBTRACTED

REVIEWED BY: W.A. Rogers

DATE: 5-3-96

FILE: PR3LSS90

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON CORPORATION
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

DATE: 1990, 91, 94, 95

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	220E - 150N	14	4	5	1	4	1	4	1				
2	220E - 160N	6	1	3	1	6	1	4	1				
3	220E - 170N	8	3	7	2	6	1	4	1				
4	220E - 180N	27	2	10	2	9	2	4	3				
5													
6													
7	230E - 140N	10	2	9	1	5	2	6	1				
8	230E - 150N	7	2	3	1	3	1	3	1				
9													
10													
11	240E - 140N	8	1	8	1	3	1	6	1				
12													
13													
14	250E - 130N	11	1	7	1	8	2	7	1				
15													
16													
17	260E - 120N	13	2	7	1	9	1	9	4				
18	260E - 130N	10	2	10	2	8	2	18	3				

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

MDA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY:

W. A. Rogers

DATE:

5-3-96

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

CIMARRON SOIL COUNTER
CIMARRON FACILITY
PHASE III - AREA L
PRE-REMEDIATION SOIL SAMPLES

LN #	GRID NUMBER	pCi/g											
		0 - 1'		1' - 2'		2' - 3'		3' - 4'		4' - 5'		5' - 6'	
		Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)	Total-U	Th (Nat)
1	270E - 120N	9	2	7	1	5	1	7	1				
2	270E - 130N	18	4	3	1	2	1	4	1				
3													
4													
5	280E - 120N	9	1	10	2	10	2	6	1				
6	280E - 130N	11	2	9	2	10	3	5	1				
7	280E - 140N	8	1	5	1	6	1	10	1				
8	280E - 150N	8	1	4	2	8	1	7	1				
9													
10													
11	290E - 130N	7	1	8	1	6	1	12	1				
12	290E - 140N	6	1	7	1	3	1	4	1				
13	290E - 150N	10	1	6	1	7	1	8	1				
14													
15													
16	300E - 140N	5	1	4	2	7	1	11	1				
17	300E - 150N	5	1	6	2	9	1	5	2				
18													
19													
20	310E - 150N	12	1	15	1	10	1	14	1				

INSTRUMENTS:

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

BACKGROUND NOT SUBTRACTED

FILE: PR3LSS90

RESULTS IN

pCi/G
pCi/G

BACKGROUND

TOTAL U - 4
Th (Nat) - 1.5

MDA

TOTAL U - 10
Th (Nat) - 1

REVIEWED BY:

W.A. Rogers

DATE:

5-3-96

THIS DATA COMBINES FIVE YEARS OF DATA. WHERE DUPLICATE RESULTS EXIST THE HIGHEST TOTAL U RESULTS WERE RECORDED FOR THAT GRID LOCATION.

W.A. ROGERS

07/28/95

