KERR-McGEE CORPORATION

FINAL STATUS SURVEY REPORT
PHASE I AREAS

at the

CIMARRON FACILITY
License No. SNM-928

July, 1995

CIMARRON CORPORATION
OKLAHOMA CITY, OKLAHOMA

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REFERENCES

1. Cimarron Corporation Nuclear Materials License, SNM-928 Docket No. 070-00925, Amendment 10, Dated November 4, 1994.

2. Cimarron Corporation Nuclear Materials License, SNM-1174, Docket No. 070-1193, terminated February 5, 1993.

3. 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, February 5, 1993.

4. Chase Environmental Group, Inc. "Decommissioning Plan for Cimarron Corporation's Former Nuclear Fuel Fabrication Facility, Crescent, Oklahoma", April 1995.

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. "Final Status Survey Plan for Unaffected Areas for Cimarron Corporation's Former Nuclear Fuel Fabrication Facility, Crescent, Oklahoma", October 1994.

7. 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, Cimarron Corporation, May 1, 1995.

8. Cimarron Letter from Mr. Jess Larsen, Vice President, Cimarron Corporation, to Mr. Michael Weber, Chief Low Level Waste and Decommissioning Project Branch, US Nuclear Regulatory Commission, dated June 21, 1995.

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12. 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.

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FINAL STATUS SURVEY REPORT FOR DECOMMISSIONING
Cimarron Facility (Phase I)

1.0 Purpose

This Final Status Survey Report is being submitted by Cimarron Corporation to the NRC for the Phase I area of the Cimarron site as part of the ongoing site decommissioning process. As described in the April 1995 Cimarron Decommissioning Plan, the Final Status Survey Plan for the Cimarron site was separated into three phases: Phases I, II and III. The Phase I Final Status Survey Plan has been approved by the Nuclear Regulatory Commission (NRC) and includes only unaffected areas of the Cimarron site. This Report provides all the results of the Phase I final survey.

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-928[1] was issued in 1965 for the Uranium Fuel Fabrication (U-Plant) Facility and License SNM-1174[2] 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, 1990, to terminate License SNM-1174. After confirmatory surveys, the NRC terminated the MOFF Facility License, SNM-1174, on February 5, 1993.[3] 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 major steps in the ongoing site decommissioning process are discussed in the April 1995 Cimarron Decommissioning Plan.[4] 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 (presented in the 1994 Cimarron Radiological Characterization Report)[5], the site has been divided into affected and unaffected

areas. Affected areas are areas in which residual contamination has been identified or where historical information indicates the potential for radioactive contamination. Unaffected areas are areas which are not expected to contain residual contamination. The designated affected and unaffected areas are shown on Drawing No. 95MOST-RF3, included in Attachment I.

Cimarron Corporation has divided the 840 acre site into three major areas which contain both affected and unaffected areas for the Final Survey Plan. Each of these three major areas are 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 divided into sub-areas (i.e. A, B, C, D, etc.).

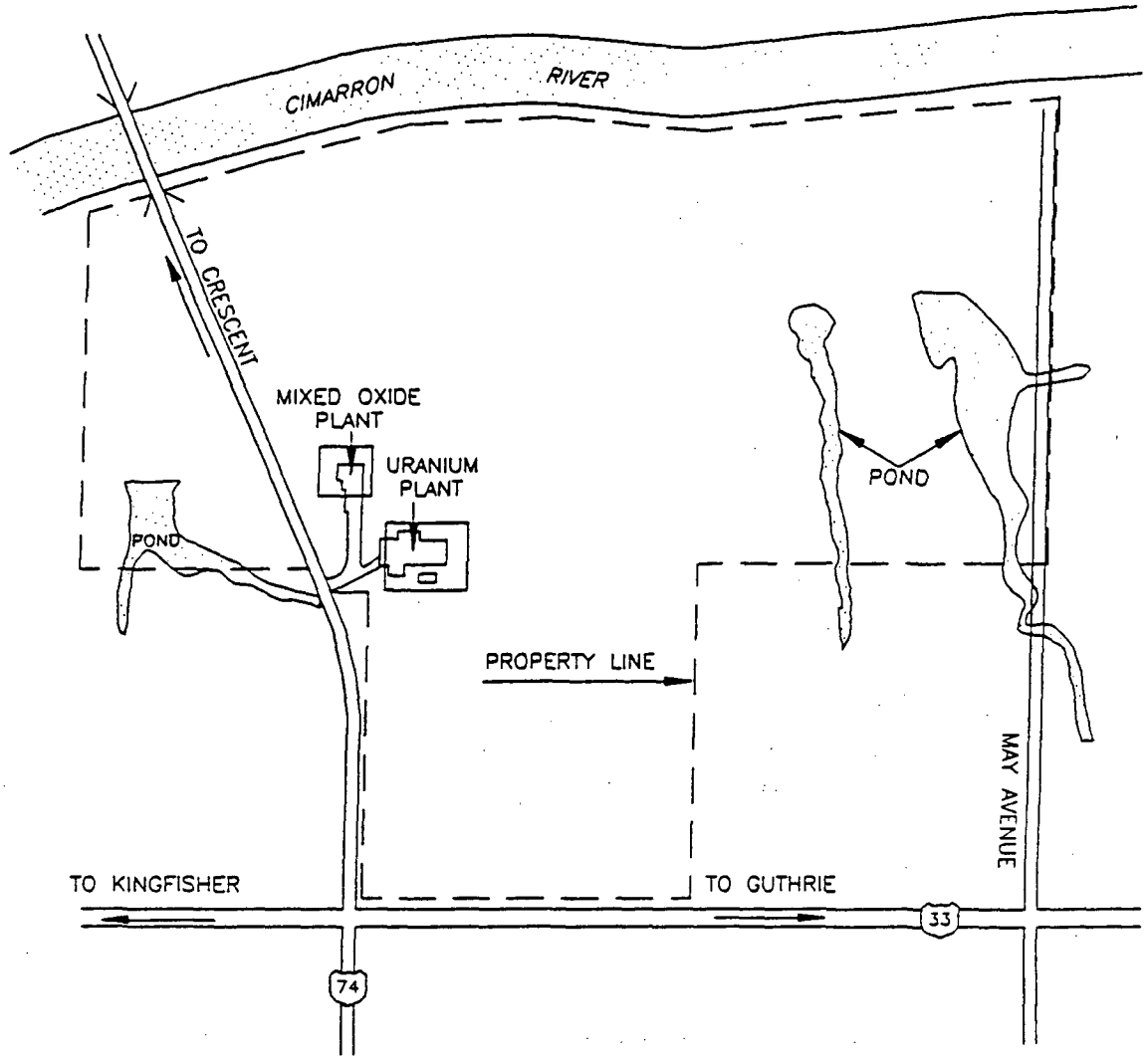
The first of these three major areas, Phase I, was addressed in the October 1994 Final Status Survey Plan for Unaffected Areas[6] which is shown on Drawing No. 95MOST-RF3. The Phase I Plan has been reviewed by the NRC and the NRC submitted their comments to Cimarron on February 24, 1995. The NRC's comments were addressed and incorporated into the Phase I plan. The Phase I plan was approved by the NRC by letter dated May 1, 1995.[7] The results of the field surveys and soil sample data analyses comparison are presented in this Final Status Survey Report for Phase I.

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 3.1 shows the site location. The 840 acre site 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 above 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

The process facilities included one pre-stressed concrete panel building (MOFF), several one-story sheet metal buildings (U-Plant), five process related collection ponds, two original sanitary lagoons, a newer sanitary lagoon, a waste incinerator, several uncovered storage areas, and three burial areas.



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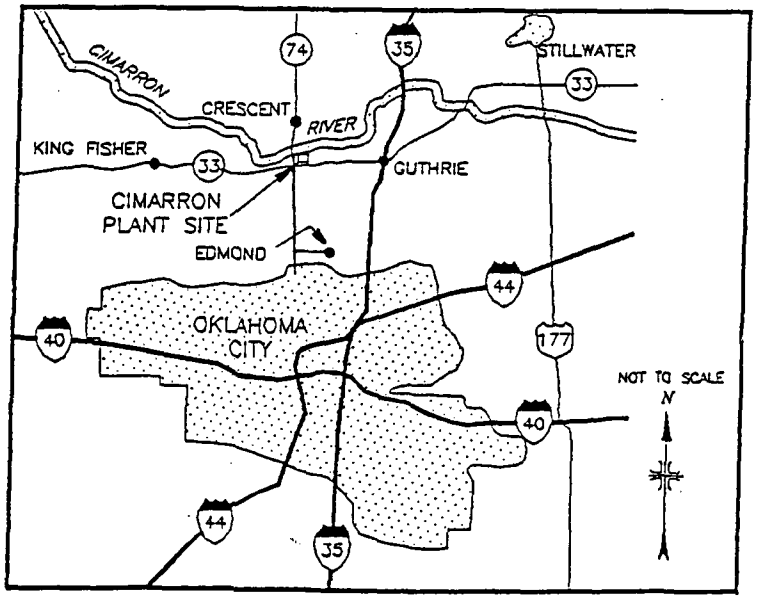

Cimarron Corporation
Crescent Oklahoma Facility
Location Map
Figure 3.1

These affected areas (herein referred to as "units") are currently at differing stages of completion with respect to decommissioning. The general site layout is shown on Drawing No. 95MOST-RF7, included in Attachment I. Included within the affected areas are several drainage ways and the site road to the old burial area (Burial Area #1). The majority of the 840 acre site was never used during nuclear fuel fabrication operations. Reservoirs #2 and #3, which were constructed for process make-up and potable water, are located in unaffected areas. The current status of the Cimarron site decommissioning efforts are discussed at length in both the Characterization Report and the Decommissioning Plan.

The Final Status Survey for Phase I includes only unaffected areas, as shown on Drawing No. 95MOST-RF3, and designated by sub-areas A, B, C, D and E. These areas represent approximately 695 acres of the entire 840 acre site and contain no process buildings.

5.0 History of Site Operations

The Cimarron Facility was originally licensed under two separate SNM Licenses. License SNM-928 was issued for the U-Plant Facility and License SNM-1174 was issued for the MOFF Facility. The U-Plant Facility was initially licensed by the Atomic Energy Commission (AEC) in 1965 to fabricate products containing enriched uranium. Cimarron Corporation (then named Kerr-McGee Nuclear Corporation) received another license from the AEC in 1970 to fabricate mixed oxide reactor fuels. Production operations at both facilities ceased in 1975. Characterization and decommissioning efforts commenced in 1976. Completed decommissioning activities include the MOFF Facility which was released from License SNM-1174 and approved for unrestricted use by the NRC in 1993. Decommissioning of the U-Plant Facility is still ongoing. Many of the NRC approved procedures used during the decommissioning of the MOFF Facility were also utilized to decommission numerous areas of the U-Plant Facility.

The Characterization Report includes a more detailed description of the U-Plant Facility and the processes that were utilized during fuel fabrication.

6.0 Decommissioning Activities (Phase I)

The purpose of this section is to discuss briefly the status of ongoing decommissioning efforts for areas included in Phase I and to present the radiological criteria and guideline values utilized during the Final Status Survey.

6.1 Objective

The entire 840 acre Cimarron site is being characterized, decontaminated, and decommissioned. Throughout most of the decommissioning process 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.

For the final survey, the entire site was divided into three major phases. The Phase I area, which was further divided into sub-areas, is comprised only of unaffected areas. Additionally, this Phase I area contains no units that required remediation. The objective of this Report is to present sufficient survey data for the NRC to determine that the Phase I area is acceptable for free release.

6.2 Results of Previous Surveys (Phase I areas)

A Micro-R Survey, using a Micro-R meter, was performed in 1979 to provide an initial characterization (scoping survey) of the entire 840 acre site including the Phase I area. The results of this survey are plotted on Drawing No. 79PRSAUR-0, included in Attachment I. All dose rates within the Phase I area were at background levels (7 to 10 μR/hr).

6.3 Decontamination Procedures

The Phase I area has been designated as an unaffected area and has not required any decontamination work. In general, this area is located outside of restricted areas and is comprised of land which is used primarily for agricultural purposes.

7.0 Final Survey Procedure

The Phase I Final Status Survey Plan was approved by the NRC via letter dated May 1, 1995. The unaffected area (Phase I) has been divided into five individual tracts of land or sub-areas encompassing approximately 695 acres of the 840 acre site. These sub-areas include only open land and contain no building structures with the exception of a small pump house which housed a

make-up water pump. Each of the five sub-areas (i.e. A, B, C, D and E) has been surveyed and sampled as described herein.

7.1 Sampling Parameters

7.1.1 Grid Areas

For purposes of identification, the five sub-areas were designated as Areas A through E, as shown on Drawing No. 95MOST-RF3. The 100m x 100m grid system shown on this drawing was utilized for locating soil sampling and survey points for the final survey. The 0.0 grid point is located just south and slightly west of the main Uranium Building as noted on Drawing No. 95MOST-RF3 and will be tied into a permanent site marker prior to license termination.

7.1.2 Survey Locations

In general, the five Phase I sub-areas each border a portion of the Phase II area of the site as shown on Drawing No. 95MOST-RF3. The border of the five Phase I sub-areas located adjacent to the Phase II area were 100% surveyed at 1m above the surface utilizing a Micro-R meter. Surface surveys utilizing a Micro-R meter were also conducted at each 10m interval along the same boundary. The dose rates for each 10m interval at both the surface and at one meter above the surface were recorded. Also, these borders were scanned with a 3" x 1/2" unshielded NaI Scintillation Detector (NaI) and the readings were recorded in counts per minute (CPM) at each 10m interval along the boundary. The specific instruments used were selected by the Health Physics Supervisor. Technicians walked the borders of the five unaffected sub-areas, 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 7.4 were flagged for subsequent soil sampling.

Additionally, within each of the five sub-areas, at the intersect of each 100m grid location, a survey was completed at ground surface and at 1m above the surface for ambient radiation using a Micro-R meter, and at the ground surface with an unshielded 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 100m grid intersect located within each of the five Phase I sub-areas. Within each unaffected sub-area, the following number of soil samples were collected, composited and analyzed by the Cimarron on-site counter for total uranium and thorium.

Sub-Area	No. Soil Samples
A	64
B	45
C	41
D	34
E	66
TOTAL	250

As discussed in the Final Status Survey Plan, the number of soil samples to be collected could vary based upon site conditions including highways, the Cimarron River and site reservoirs. The actual number of soil samples collected was less than originally proposed due to these factors. However, the total number of soil samples collected in each of the Phase I sub-areas significantly exceeded the 30 sample requirement suggested by NUREG/CR-5849 for an unaffected area. In addition, the Phase I unaffected area was divided into 5 sub-areas in order to simplify the characterization effort; thus, from a technical perspective, 250 samples were taken from the Phase I unaffected area.

7.2 Background/Baseline Levels Identified

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 by independent laboratories.

To further validate background levels, Cimarron personnel collected and analyzed 30 surface soil samples from the perimeter of the Cimarron site during the first quarter of 1995. These results are discussed in Cimarron Corporation's response to the NRC dated June 21, 1995,[8] which was in regard to the release of the south U-Yard for backfilling. This response provided results obtained from a 30 minute count, assuming an enrichment of 2.7 weight percent. Total uranium ranged from 2.3 pCi/g to 6.6 pCi/g with an average of 4.0 pCi/g. By applying a correction factor of 0.67/1.5 (ratio to correct from an enrichment of 2.7% to

natural) to the data, the results were converted to naturally enriched uranium ranging from 1.0 pCi/g to 2.9 pCi/g with an average of 1.8 pCi/g. The soil sample location and analytical results are shown on Drawing No. 95FIBKSS-0. Dose rates were also taken at each of the 30 locations. This data is presented in Drawing Nos. 95FIBKUR-0 and 95FIBKUR-1, included in Attachment I.

Based upon the activity measurements performed with the on-site counter, it can be stated that measurements of background soils should fall below 2.8 pCi/g total uranium 95% of the time, when results are reported in terms of natural enrichment. This concentration represents the upper 95 percent confidence interval for total uranium (natural enrichment) for the 30 background samples. Additionally, the above statement can be interpreted with respect to the on-site counter results reported in terms of 2.7% enriched activity. The conversion factor 1.5/0.67 can be applied to the average value (i.e. 1.8 pCi/g) to obtain a concentration for naturally enriched total uranium reported as 2.7% enriched. Application of the conversion factor results in an average uranium concentration of 4 pCi/g. The 30 samples were also analyzed for total thorium using the on-site counter. The average was 1.5 pCi/g.

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

Since the initiation of decommissioning activities, Cimarron Corporation has utilized a background value of 6 pCi/g total uranium for soil analyzed with the on-site counter. This background value has been presented in numerous submittals, including the Characterization Report and Decommissioning Plan. As a result of the recent South U-Yard remediation effort, the NRC requested that background be re-established as 4 pCi/g total uranium for soil analyzed with the on-site counter. As stated above, this value will be delineated in future submittals to the NRC.

Background exposure rates have been established at the Cimarron site by taking Micro-R readings at off-site environmental sample locations, in addition to Cimarron site areas which are unaffected by past operations. Site background exposure rates of approximately 7 μR/h have been observed in background areas by Cimarron personnel utilizing a Ludlum Micro-R survey meter. Site background exposure rates of approximately 7 μR/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).[9] Based on the PIC measurements, the site background was

determined to be approximately 10 μR/hr. Depending upon the survey instrumentation utilized, background assessments performed by both Cimarron and ORISE personnel have shown that the background exposure rates at the Cimarron site range from 7 to 10 μR/h.

7.3 Major Contaminants Identified

Based upon knowledge of past site operations, the results of numerous characterization efforts to date, and other independent characterization reviews 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, which results in an average enrichment above the naturally occurring level. The average U-235 enrichment in on-site soils is 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, with the transportation of all previously buried waste off site for disposal. ORAU[10] performed a confirmatory survey, and the NRC released this area for backfilling in accordance with Amendment #9 to License SNM-928. Sections 2.0 and 7.0 of the Characterization Report provide additional information on this area. Thorium (Th-232) is not considered to be a principal contaminant at the Cimarron site as it was never processed on-site. However, samples collected from certain affected areas are analyzed for thorium to ensure complete and accurate characterization.

7.4 Guidelines Established

The purpose of this section is to discuss methods utilized for the generation of additional survey and soil sampling data to supplement existing final status survey data for the Phase I area. The guidance promulgated in NUREG/CR-5849[11] has been utilized throughout the conduct of this Final Status Survey. Additional data is being presented in this Report for Phase I to demonstrate that all radiological parameters are satisfied for unrestricted release.

The radiological parameters for the surveys and soil sampling performed for Phase I were compared to the criteria described below:

7.4.1 Volumetric Activity of Soil

The guideline value for residual concentrations of uranium which may remain in soil is specified as Option #1 material (for enriched uranium, this is up to 30 pCi/g total uranium above background) in Table 2 of the BTP.[12] For an unaffected area, NUREG/CR-5849 recommends reclassifying an unaffected area if any individual sample result exceeds 75% of the guideline value (i.e. 22.5 pCi/g total uranium above background for BTP Option #1 enriched uranium). Prior to reclassifying any unaffected area as an affected area, the NRC recommends investigating any individual sample analysis result which exceeds 25% of the guideline value above background. The average site background value for total uranium concentration in background soil, as determined by the Cimarron soil counter when calibrated for 2.7% enriched uranium, is approximately 4.0 pCi/g. The total uranium concentration corresponding to 25% of the guideline value of 30 pCi/g is 7.5 pCi/g. This value is then added to the average background value for the Cimarron site to derive the corresponding limit of 11.5 pCi/g total uranium. Therefore, any total uranium concentrations in soil for unaffected areas which were greater than 11.5 pCi/g have been further investigated.

The average background for total thorium has been determined to be 1.5 pCi/g for soil analyzed with the on-site counter. The total thorium concentration corresponding to 25% of the guideline value of 10 pCi/g is 2.5 pCi/g. This value is then added to the average background value for the Cimarron site to derive the corresponding limit of 4.0 pCi/g total thorium.

For any affected area, hot-spot averaging will be performed for all locations, within 100 m^2 grid areas, which contain 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 100m^2 grid area may not exceed three times the BTP Option #1 limit (90 pCi/g total uranium above background). This first phase of the decommissioning process was designed to deal only with unaffected areas. No affected areas were encountered during this Final Status Survey.

7.4.2 Gamma Surface Survey (Open Land Areas)

On occasion, Cimarron personnel utilize a shielded or unshielded 3" X 0.5" NaI detector as an additional screening device for

qualitative identification of residual contamination in soil. The shielded detector has been utilized primarily in affected areas to assist in remediation activities. The unshielded (NaI) detector has been utilized during the initial survey of unaffected areas. As stated above, this instrument is utilized only for qualitative measurements. When this type of detector is required by a Special Work Permit, any instrument reading (in counts per minute) greater than twice background is used as an indication that an area may require additional investigation. Quantitative measurements of residual activity levels in soil are performed with the on-site soil counter.

Direct comparisons between soil radionuclide concentrations and surface activity measurements in CPM cannot be made. However, surface activity measurements in CPM can be used as a means of identifying areas of elevated activity when performing both systematic and random measurements.

Cimarron personnel have established a background count rate (CPM) for use when surveying with the unshielded NaI detector. Cimarron personnel reviewed the soil sample data collected in accordance with the Phase I Plan and compiled the NaI detector measurements from all locations which showed an activity of less than or equal to 4 pCi/g total uranium (total of 82 samples). The NaI detector readings recorded at each of these locations were averaged to establish a sample mean for background in CPM. The average level for background in CPM was determined to be 8,850, with a standard deviation of 1,494 CPM.

Cimarron recognizes that there is no direct correlation between activity (either from naturally occurring radioactive materials or residual activity from past operations) in soil and survey readings in CPM. The background value established herein in CPM is to be used only as a qualitative check for determining the potential for residual contamination.

7.4.3 Exposure Rate Survey (Open Land Areas)

For either affected or unaffected areas, the average exposure rate guideline is 10 μR/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. In addition, the maximum exposure rate at any discrete location within a 100 m^2 grid area cannot exceed 20 μR/hr above background. Any areas with average exposure rates greater than 10 μR/hr above background

and any discrete locations within a 100 m^2 grid area with exposure rates greater than 20 μR/hr above background were delineated and remediated if required. As stated by ORISE, background at the Cimarron site averages 10 μR/hr.

7.5 Equipment and Procedures Selected

As required by the Cimarron Corporation Quality Assurance Program (QAP), a Special Work Permit (SWP) was written and approved prior to commencement of field work covered under the Final Status Survey Plan. The SWP for this project specified the type of instrumentation to be utilized in performing the site surveys. The instrumentation utilized by site personnel is discussed below:

7.5.1 Equipment and Instrumentation

The instrumentation utilized to generate the characterization 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, "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.

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).

7.5.1.1 Survey Instrumentation

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

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	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" Nal Detector	1	Gamma	0 - 3,000 µR/h	7 µR/h	7 uR/h
Ion Chamber (Victoreen)	2	Gamma	0.1 - 300 mR/h	<.0 1 mR/h	<0.2 mR/h
3" x 1/2" Nal 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" Nal (T1) Detector	2	Gamma	0 - 500,000 cpm	20,000 cpm	700 cpm
Soil Counter - Computer Linked 4" x 4" x16" Nal (T1) Detector	1	Gamma	---	4 pCi/g Total U 1.5 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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In addition to the quarterly calibration requirements, source checks are required on a daily basis for all instruments being utilized during characterization work. All calibration and source check records are completed, reviewed, signed-off and retained in accordance with the Cimarron Quality Assurance Program.

7.5.1.2 Unshielded 3" x 0.5" NaI Gamma Detector

The 3" x 0.5" detector is a sodium iodide (NaI) crystal gamma detector which is unshielded around the sides and socket end. 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.

7.5.1.3 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 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 most recent confirmatory analysis performed for the DAP-3 stockpile. (NRC approval letter dated May 31, 1995).[13]

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 uranium and thorium total 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.

7.5.2 Procedures/Plans

7.5.2.1 Organization

The Phase I survey of unaffected areas was performed by a survey team consisting of qualified personnel from the Cimarron site. The final survey team operated under the general direction of the Phase I Project Manager who reported 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 Phase I Project Manager. The Phase I Project

Manager was responsible for developing the SWP for the Phase I surveys, with input from the RSO/Health Physics Supervisor. The SWP was reviewed and approved by the Cimarron Site Manager.

7.5.2.2 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 prior to commencement of work under the Phase I survey plan. All survey procedures and quality assurance requirements were reviewed during this training session.

7.5.2.3 Radiation Protection Program

Cimarron Corporation maintains a radiation protection program which meets and/or exceeds all of the applicable regulatory requirements associated with all activities conducted under Special Nuclear Materials License SNM-928 and By-Product License 35-12636-02.[14] 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 all 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 Health, NRC Region IV, NRC Headquarters staff, and ORISE.

7.5.2.4 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 all characterization samples are collected, controlled, and analyzed in accordance with all applicable quality controls to ensure that 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 characterization 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.[15]

Written procedures, designated as Special Work Permits, are prepared, reviewed and approved for activities involved in carrying out the decommissioning process. The Phase I Survey SWP was written in accordance with the Cimarron QAP. This work permit 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, consistency, and for comparison to the guideline values. Reviews are performed on a regular basis. When identified, correction of recognized deficiencies are performed to validate the data.

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, survey data was generated for the 695 acre Phase I area in accordance with the Phase I Final Status Survey Plan. The survey findings, including the statistical methodology employed to evaluate the data, are discussed in this section.

8.1 Data Evaluation

As discussed in NUREG/CR-5849, soil activity concentrations and exposure rate guideline values are average values (above background) established for areas of survey units (i.e. Phase I sub-areas). In order to compare the survey data with guideline values, the mean ($\bar{x}$) of all measurements for each of the sub-areas (i.e. A, B, C, D and E) were calculated using all measurements (x_i)within that sub-area:

$$\bar{x} = \frac{1}{n_s} \sum_{i-1}^{n_s} x_i$$

Each individual survey point and the mean value for each survey unit were compared to 25% of the guideline value (i.e. 11.5 pCi/g total uranium or 4 pCi/g total thorium as discussed in Section 7.4.1) for soil.

If the results exceeded 25% of the guideline value, a follow up investigation was undertaken.

If the mean value for each sub-area was less than 25% of the guideline value, the mean value was evaluated to determine whether the data for each survey unit met the 25% of guideline value criteria at a 95% confidence level. This comparison was performed by calculating the mean and standard deviation for the data. The standard deviation (S_x) was calculated as follows:

$$S_x = \sqrt{\frac{\sum_{i=1}^{n} (\bar{x} - x_i)^2}{n-1}}$$

After the standard deviation for the data set was calculated, the following equation was utilized to test the data relative to the 25% of guideline value criteria, at the 95% confidenc (μ_α):

$$\mu_\alpha = \bar{x} + t_{1-\alpha,\,df} \frac{S_x}{\sqrt{n}}$$

where

$t_{1-\alpha,df}$	=	is the 95% confidence level obtained from Appendix B, Table B-1 in NUREG/CR-5849.
$\bar{x}$	=	is the calculated mean .
S_x	=	is the standard deviation.
n	=	is the number of individual data points used to determine $\bar{x}$ and s_x.

The level of confidence (μ_α) was compared to the 25% of guideline value criteria. If μ_α was less than this criteria, the area being tested met the 25% of guideline value criteria at a 95% confidence level.

8.2 Comparison With Guideline Values

The data for each of the five sub-areas (A, B, C, D and E) were compared to the 25% of guideline value criteria. Each of the five sub-areas is discussed separately below:

8.2.1 Phase I - Sub-area A

This section discusses the data from the grid intersect survey and the boundary survey for sub-area A. The data includes soil sample analytical results and systematic survey readings for the

62 grid intersects and all boundary areas. Split samples were obtained from 2 grid intersect locations. The data, statistical analyses, and drawings are presented in Attachment IIA.

All soil sample analytical results for sub-area A were below 25% of the uranium guideline value (i.e. 11.5 pCi/g total uranium). The mean value was 4.9 pCi/g, with a standard deviation of 1.3 pCi/g. The 95% confidence level value was 5.1 pCi/g. The soil sample locations and analytical results are shown on Drawing No. 95FIUASS-0.

Also, the soil sample analytical results for sub-area A were all below 25% of the thorium guideline value (i.e. 4 pCi/g total thorium as described in Section 7.4.1). The 95% confidence level value was 1.7 pCi/g.

The NaI detector survey results for the grid intersect sample locations ranged from 6,624 to 11,236 CPM. All survey results were less than twice background (i.e. 2 x 8,850 CPM as described in Section 7.4.2). The average was 9,241 CPM. The survey results are presented on Drawing No. 95FIUA3D-0. The dose rates at the surface and at one meter above the surface both ranged from 7 to 10 μR/hr. The dose rates are presented on Drawing Nos. 95FIUAUR-0 and 95FIUAUR-1

The NaI detector survey results for the boundaries of sub-area A and the Phase II area ranged from 5,386 to 10,358 CPM. All survey results were less than twice background. The average was 7,710 CPM. The survey results are presented on Drawing No. 95FIU13D-0. The dose rates at the surface and at one meter above the surface ranged from 5 to 10 μR/hr and from 5 to 11 μR/hr respectively. The dose rates are presented on Drawing Nos. 95FIU1UR-0 and 95FIU1UR-1.

No soil samples were required to be collected in the boundary area due to the fact that all survey results were less than twice background and all dose rates recorded for the boundary survey were less than or equal to 11 μR/hr.

8.2.2 Phase I - Sub-area B

This section discusses the data from the grid intersect survey and the boundary survey for sub-area B. The data includes soil sample analytical results and systematic survey readings for the 43 grid intersects and the data from the boundary survey. Split

samples were obtained from 2 grid intersect locations. The data, statistical analyses, and drawings are presented in Attachment IIB.

All soil sample analytical results for sub-area B were below 25% of the uranium guideline value (i.e. 11.5 pCi/g total uranium as described in Section 7.4.1). The mean value was 4.0 pCi/g, with a standard deviation of 1.0 pCi/g. The 95% confidence level value was 5.0 pCi/g. The soil sample locations and analytical results are shown on Drawing No. 95FIUBSS-0.

Also, the soil sample analytical results for sub-area B were all below 25% of the thorium guideline value (i.e. 4 pCi/g total thorium as described in Section 7.4.1). The 95% confidence level value was 1.4 pCi/g.

The NaI detector survey results for the grid intersect sample locations ranged from 5,259 to 10,431 CPM. All survey results were less than twice background (i.e. 2 x 8,850 CPM as described in Section 7.4.2). The average was 8,307 CPM. The survey results are presented on Drawing No. 95FIUB3D-0. The dose rates at the surface and at one meter above the surface ranged from 7 to 10 μR/hr. The dose rates are presented on Drawing Nos. 95FIUBUR-0 and 95FIUBUR-1.

The NaI detector survey results for the boundaries of sub-area B and the Phase II area ranged from 5,402 to 10,514 CPM. The average was 7,757 CPM. The survey results are presented on Drawing No. 95FIU23D-0. The dose rates at the surface and at one meter above the surface both ranged from 5 to 10 μR/hr. The dose rates are presented on Drawing Nos. 95FIU2UR-0 and 95FIU2UR-1.

No soil samples were required to be collected in the boundary area due to the fact that all survey results were less than twice background and all dose rates were less than or equal to 10 μR/hr.

8.2.3 Phase I - Sub-area C

This section discusses the data from the grid intersect survey and the boundary survey for sub-area C. The data includes soil sample analytical results and systematic survey readings for the 39 grid intersects and all boundary areas. Split samples were

obtained from 2 grid intersect locations. The data, statistical analyses, and drawings are presented in Attachment IIC.

All soil sample analytical results for sub-area C were below 25% of the uranium guideline value (i.e. 11.5 pCi/g total uranium as described in Section 7.4.1) with the exception of one sample collected from grid location 400E-700N which was 12.4 pCi/g. The mean value was 5.0 pCi/g, with a standard deviation of 2.0 pCi/g. The 95% confidence level value was 6.0 pCi/g. The soil sample locations and analytical results are shown on Drawing No. 95FIUCSS-0.

Four surface soil samples were collected at one meter intervals in the north, south, east and west directions from the elevated grid location (400E-700N). The four additional soil sample analytical results were averaged with the one elevated sample analytical result. These five soil sample analytical results averaged 9.4 pCi/g total uranium with a standard deviation of 2.1 pCi/g. The 95% confidence level value was 11.1 pCi/g. Therefore, no further investigation of this area was performed.

Also, the soil sample analytical results for sub-area C were all below 25% of the thorium guideline value (i.e. 4 pCi/g total thorium as described in Section 7.4.1). The 95% confidence level value was 1.5 pCi/g.

The NaI detector survey results for the grid intersect soil sample locations ranged from 6,891 to 11,948 CPM. All survey results were less than twice background (i.e. 2 x 8,850 CPM as described in Section 7.4.2). The average was 9,864 CPM. The survey results are presented on Drawing No. 95FIUC3D-0. The dose rates at the surface and at one meter above the surface ranged from 6 to 11 μR/hr and 6 to 10 μR/hr respectively. The dose rates are presented on Drawing Nos. 95FIUCUR-0 and 95FIUCUR-1.

The NaI detector survey results for the boundaries of sub-area C and the Phase II area ranged from 6,259 to 10,934 CPM. All survey results were less than twice background. The average was 8,874 CPM. The survey results are presented on Drawing No. 95FIU33D-0. The dose rates at the surface and at one meter above the surface ranged from 6 to 12 μR/hr and from 6 to 11 μR/hr respectively. The dose rates are presented on Drawing Nos. 95FIU3UR-0 and 95FIU3UR-1.

No soil samples were required to be collected in the boundary area due to the fact that all survey results were less than twice background and all dose rates were less than or equal to 12 μR/hr.

8.2.4 Phase I - Sub-area D

This section discusses the data from the grid intersect survey and the boundary survey for sub-area D. The data includes soil sample analytical results and systematic survey readings for the 32 grid intersects and all boundary areas. Split samples were obtained from 2 grid intersect locations. The data, statistical analyses, and drawings are presented in Attachment IID.

All soil sample analytical results for sub-area D were below 25% of the uranium guideline value (i.e. 11.5 pCi/g total uranium as described in Section 7.4.1). The mean value was 5.8 pCi/g, with a standard deviation of 1.4 pCi/g. The 95% confidence level value was 6.2 pCi/g. The soil sample locations and analytical results are shown on Drawing No. 95FIUDSS-0.

Also, the soil sample analytical results for sub-area D were all below 25% of the thorium guideline value (i.e. 4 pCi/g total thorium as described in Section 7.4.1). The 95% confidence level value was 1.2 pCi/g.

The NaI detector survey results for the grid intersect soil sample locations ranged from 5,780 to 11,319 CPM. All survey results were less than twice background (i.e. 2 x 8,850 CPM as described in Section 7.4.2). The average was 8,399 CPM. The survey results are presented on Drawing No. 95FIUD3D-0. The dose rates at the surface and at one meter above the surface ranged from 6 to 11 μR/hr and 5 to 10 μR/hr respectively. The dose rates are presented on Drawing Nos. 95FIUDUR-0 and 95FIUDUR-1.

The NaI detector survey results for the boundaries of sub-area D and the Phase II area ranged from 4,690 to 11,006 CPM. All survey results were less than twice background. The average was 8,497 CPM. The survey results are presented on Drawing No. 95FIU43D-0. The dose rates at the surface and at one meter above the surface ranged from 5 to 11 μR/hr and from 5 to 10 μR/hr respectively. The dose rates are presented on Drawing Nos. 95FIU4UR-0 and 95FIU4UR-1.

No soil samples were required to be collected in the boundary area due to the fact that all survey results were less than twice background and all dose rates were less than or equal to 11 μR/hr.

8.2.5 Phase I - Sub-area E

This section discusses the data from the grid intersect survey and the boundary survey for sub-area E. The data includes soil sample analytical results and systematic survey readings for the 64 grid intersects and all boundary areas. Split samples were obtained from 2 grid intersect locations. The data, statistical analyses, and drawings are presented in Attachment IIE.

All soil sample analytical results for sub-area E were below the 25% of the uranium guideline value (i.e. 11.5 pCi/g total uranium as described in Section 7.4.1). The mean value was 4.8 pCi/g, with a standard deviation of 1.6 pCi/g. The 95% confidence level value was 5.1 pCi/g. The sample locations and analytical results are shown on Drawing No. 95FIUESS-0.

Also, the soil sample analytical results for sub-area E were all below 25% of the thorium guideline value (i.e. 4 pCi/g total thorium as Section 7.4.1). The 95% confidence value was 1.3 pCi/g.

The NaI detector survey results at the grid intersect soil sample locations ranged from 6,044 to 11,704 CPM. All survey results were less than twice background (i.e. 2 x 8,850 CPM as described in Section 7.4.2). The average was 9,179 CPM. The survey results are presented on Drawing No. 95FIUE3D-0. The dose rates at the surface and at one meter above the surface ranged from 5 to 10 μR/hr and from 5 to 11 μR/hr respectively. The dose rates are presented on Drawing Nos. 95FIUEUR-0 and 95FIUEUR-1.

The NaI detector survey results for the boundaries of sub-area E and the Phase II area ranged from 5,862 to 10,778 CPM. All survey results were less than twice background. The average was 8,482 CPM. The survey results are presented on Drawing No. 95FIU53D-0. The dose rates at the surface and at one meter above the surface ranged from 4 to 11 μR/hr and from 5 to 10 μR/hr respectively. The dose rates are presented on Drawing Nos. 95FIU5UR-0 and 95FIU5UR-1.

No soil samples were required to be collected in the boundary area due to the fact that all survey results were less than twice background and all dose rates were less than or equal to 11 μR/hr.

8.2.6 Guideline Value Comparison Conclusion

All soil sample analytical results and survey results from the Phase I Final Status Survey were substantially below the guideline values (i.e. 30 pCi/g total uranium above background, 10 pCi/g total thorium above background, 2 x 8,850 CPM, and 2 x 10 μR/hr). In fact, only one soil sample analytical result exceeded the 25% of guideline value criteria. This soil sample had a total uranium concentration of 12.4 pCi/g.

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 Phase I, a total of 26 soil samples were split and sent off site for analysis. The split sampling included two background samples. The soil samples were first analyzed by the on-site counter prior to being packaged and sent off site for analysis to independent laboratory. The results for both off-site and on-site analysis are listed in Table 8.1.

Two soil samples from each of the five sub-areas and two background samples were included in the split samples. The two samples from each sub-area were taken at grid intersect which were locations selected using a random number generator. Additionally, fourteen samples were selected at random from other grid intersects for submission to the off-site laboratory for analysis.

The average (mean) for the twenty-four Phase I area samples analyzed both on-site and off-site was 2.13 pCi/g total uranium from the independent laboratory versus 2.21 pCi/g total uranium for the on-site counter with the Cimarron samples corrected for natural enrichment. These sample results show excellent agreement.

Table 8.1

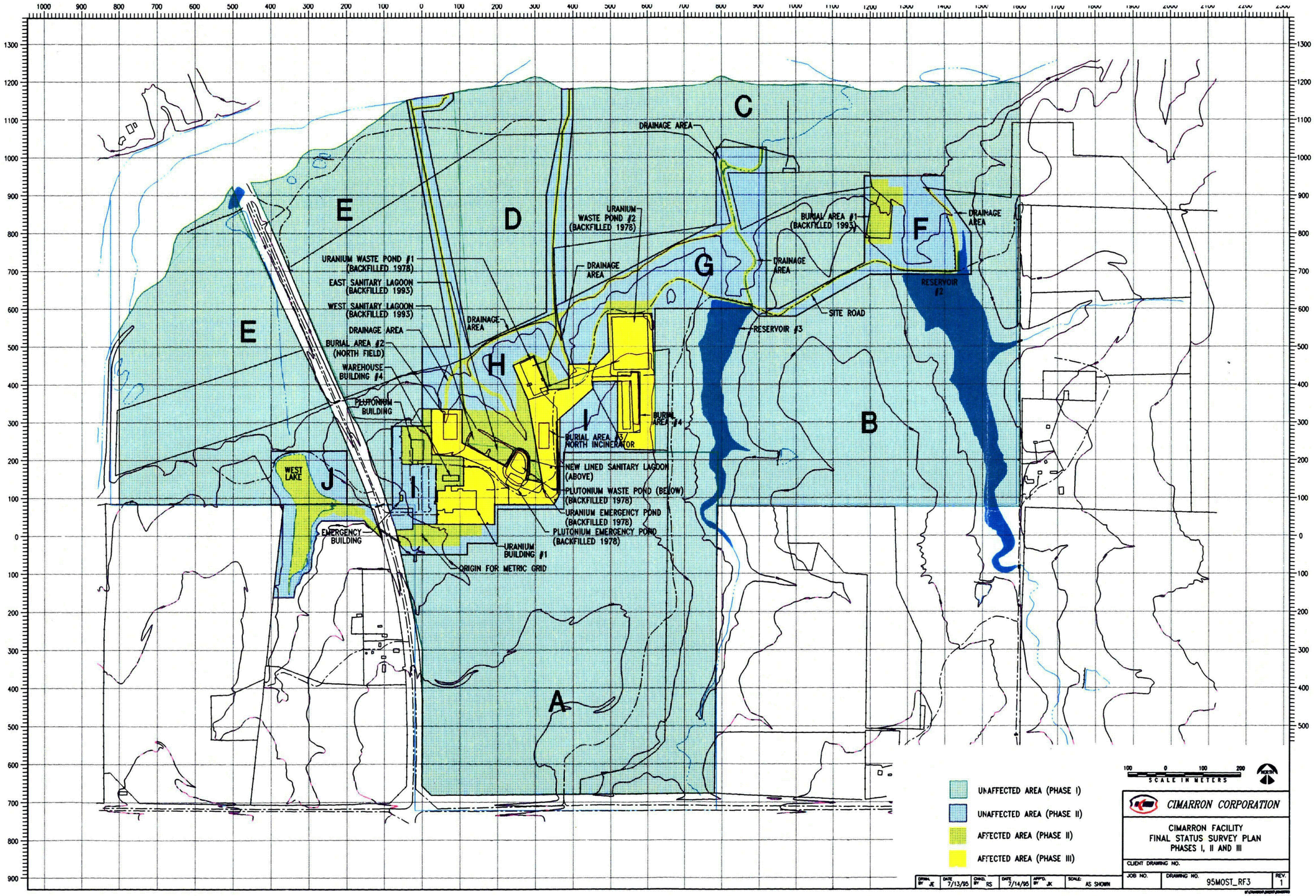
Sample Data Comparison Off-Site Laboratory vs. On-Site Counter
(Soil data in pCi/g total uranium)

Sample Number	Independent Laboratory (Isotopic Analysis)	Cimarron Soil Counter (2.7% Enrichment)	Cimarron Soil Counter (Natural Enrichment)
UAF-A-4	1.7 ± 0.6	4.4 ± 2.3	2.0 ± 1.0
UAF-A-10	1.7 ± 0.7	4.8 ± 3.8	2.1 ± 1.7
UAF-A-18	1.3 ± 0.5	4.8 ± 3.4	2.1 ± 1.5
UAF-A-19	2.3 ± 0.7	4.4 ± 3.3	2.0 ± 1.5
UAF-A-62	2.1 ± 0.7	3.2 ± 2.6	1.4 ± 1.2
UAF-B-20	1.3 ± 0.5	5.5 ± 2.8	2.5 ± 1.3
UAF-B-27	1.9 ± 0.6	4.2 ± 2.9	1.9 ± 1.3
UAF-B-28	1.8 ± 0.7	5.1 ± 3.2	2.3 ± 1.4
UAF-B-32	1.4 ± 0.6	3.7 ± 3.2	1.7 ± 1.4
UAF-B-44	2.1 ± 0.7	6.6 ± 3.3	2.9 ± 1.5
UAF-C-2	1.8 ± 0.7	5.6 ± 3.1	2.5 ± 1.4
UAF-C-6	9.1 ± 1.5	6.6 ± 5.1	2.9 ± 2.3
UAF-C-12	2.3 ± 0.7	4.0 ± 3.8	1.8 ± 1.7
UAF-C-26	2.6 ± 0.8	5.4 ± 3.7	2.4 ± 1.7
UAF-C-31	1.2 ± 0.5	4.6 ± 3.6	2.1 ± 1.6
UAF-D-6	1.4 ± 0.6	4.3 ± 2.4	1.9 ± 1.1
UAF-D-14	1.4 ± 0.6	5.7 ± 3.5	2.5 ± 1.6
UAF-D-16	2.2 ± 0.7	5.3 ± 3.2	2.4 ± 1.4
UAF-D-18	2.5 ± 0.8	6.9 ± 5.8	3.1 ± 2.6
UAF-E-11	1.7 ± 0.7	4.0 ± 3.1	1.8 ± 1.4
UAF-E-21	1.6 ± 0.6	<3.6	<1.6
UAF-E-29	0.5 ± 0.3	3.5 ± 2.4	1.6 ± 1.1
UAF-E-42	2.8 ± 0.7	6.2 ± 3.1	2.8 ± 1.4
UAF-E-56	2.1 ± 0.7	6.2 ± 3.8	2.8 ± 1.7
UAF-BKG-2	1.9 ± 0.7	5.4 ± 2.9	2.4 ± 1.3
UAF-BKG-6	2.3 ± 0.7	4.8 ± 3.8	2.1 ± 1.7

One soil sample collected from grid 500E x 700N (Sample No. UAF-C-6), which was first counted on-site prior to being sent off site for analysis, had results of 9.1 pCi/g total uranium from the independent laboratory and 6.6 pCi/g total uranium (@ 2.7 enrichment) for the on-site counter. The independent laboratory isotopic analysis indicated that the uranium present was slightly enriched. This sample was collected in sub-area C at the base of a hill near a drainage area. With this sample result removed from the data set, the average for the twenty-three samples was 1.81 pCi/g total uranium from the independent laboratory versus 2.18 pCi/g total uranium for the on-site analysis (with the on-site analytical data corrected for natural enrichment).

9.0 Summary

A Final Status Survey was performed in accordance with the "Final Status Survey Plan For Unaffected Areas" which was approved by the NRC on May 1, 1995. This report presents a comparison of the results of the Phase I Final Status Survey to the clean-up criteria (guideline values) for the Phase I Area at the Cimarron site. The comparison presented herein demonstrates that all clean-up criteria (guidelines values) have been met and/or exceeded and thus all Phase I Area can now be released for unrestricted use. Therefore, this report is being submitted to the NRC in conjunction with a license amendment request to release the Phase I Area for unrestricted use and to remove the Phase I Area from License SNM-928.



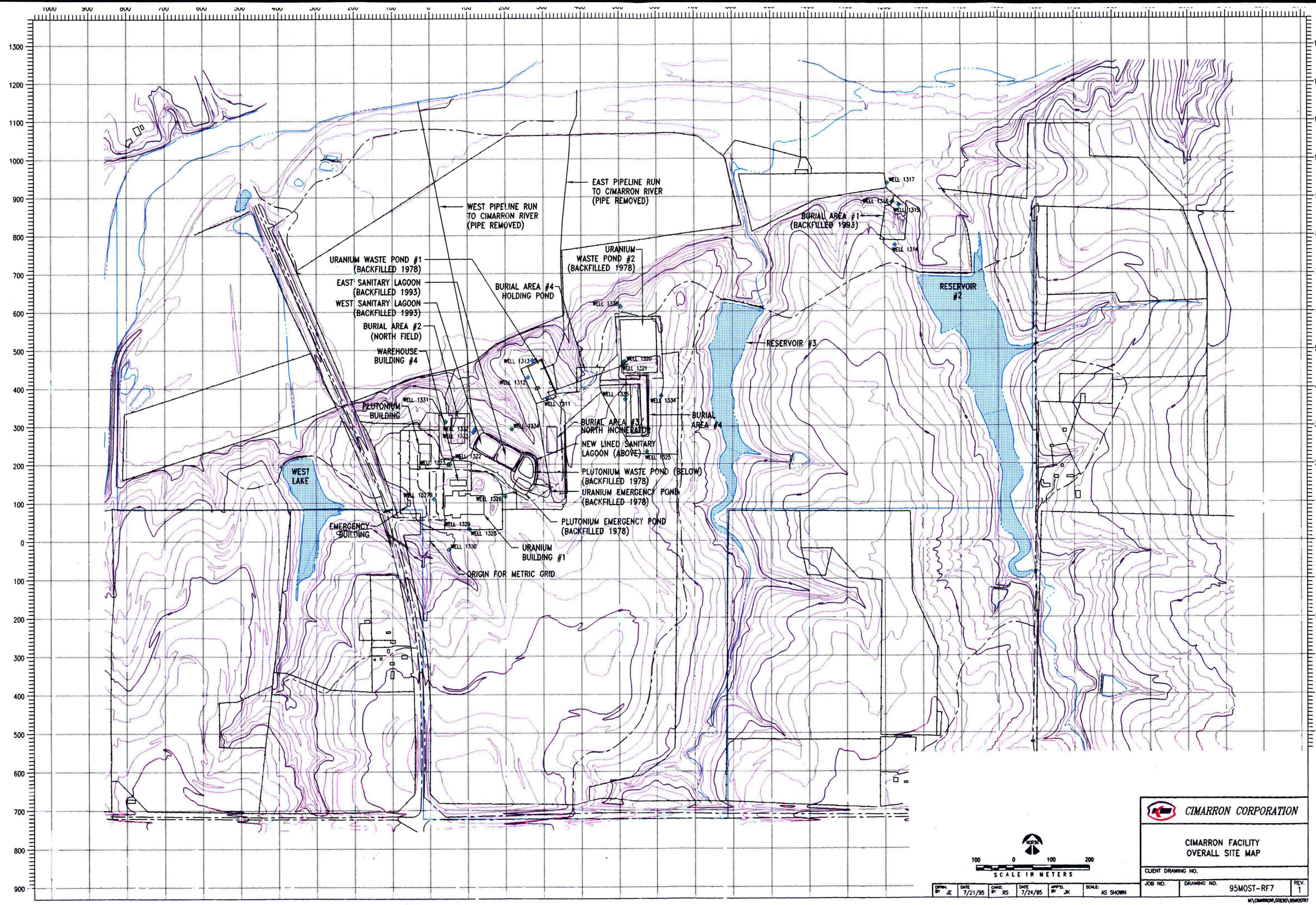
CIMARRON CORPORATION

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

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:
JE	7/13/95	RS	7/14/95	JK	AS SHOWN

JOB NO.	DRAWING NO.	REV.
	95MOST_RF3	1


EAST PIPELINE RUN TO CIMARRON RIVER (PIPE REMOVED)
WEST PIPELINE RUN TO CIMARRON RIVER (PIPE REMOVED)
URANIUM WASTE POND #1 (BACKFILLED 1978)
EAST SANITARY LAGOON (BACKFILLED 1993)
WEST SANITARY LAGOON (BACKFILLED 1993)
BURIAL AREA #2 (NORTH FIELD)
WAREHOUSE BUILDING #4
BURIAL AREA #4 HOLDING POND
URANIUM WASTE POND #2 (BACKFILLED 1978)
BURIAL AREA #1 (BACKFILLED 1993)
RESERVOIR #2
RESERVOIR #3
PLUTONIUM BUILDING
WEST LAKE
EMERGENCY BUILDING
BURIAL AREA #3/ NORTH INCINERATOR
BURIAL AREA #4
NEW LINED SANITARY LAGOON (ABOVE)
PLUTONIUM WASTE POND (BELOW) (BACKFILLED 1978)
URANIUM EMERGENCY POND (BACKFILLED 1978)
PLUTONIUM EMERGENCY POND (BACKFILLED 1978)
URANIUM BUILDING #1
ORIGIN FOR METRIC GRID
WELL 1311
WELL 1312
WELL 1313
WELL 1314
WELL 1315
WELL 1316
WELL 1317
WELL 1320
WELL 1321
WELL 1322
WELL 1323
WELL 1325
WELL 1326
WELL 1327
WELL 1328
WELL 1329
WELL 1330
WELL 1331
WELL 1332
WELL 1333
WELL 1334
WELL 1335
NORTH
100 0 100 200
SCALE IN METERS
CIMARRON CORPORATION
CIMARRON FACILITY
OVERALL SITE MAP
CLIENT DRAWING NO.
JOB NO.
DRAWING NO. 95MOST-RF7
REV. 1
DRWN. BY JE
DATE 7/21/95
CHKD. BY RS
DATE 7/24/95
APP'D. BY JK
SCALE: AS SHOWN
M:\CIMARRON\SITE95\95MOST07

WEST PIPELINE RUN TO CIMARRON RIVER

EAST PIPELINE RUN TO CIMARRON RIVER

URANIUM WASTE POND #1 (BACKFILLED 1978)

EAST SANITARY LAGOON

WEST SANITARY LAGOON

PLUTONIUM BUILDING

URANIUM WASTE POND #2 (BACKFILLED 1978)

BURIAL AREA #1

RESERVOIR #3

RESERVOIR #2

BURIAL AREA #2

BURIAL AREA #3/ NORTH INCINERATOR

NEW LINED SANITARY LAGOON (ABOVE)

PLUTONIUM WASTE POND (BELOW) (BACKFILLED 1978)

WEST LAKE

EMERGENCY BUILDING

URANIUM EMERGENCY POND (BACKFILLED 1978)

WAREHOUSE BUILDING #4

URANIUM BUILDING #1

PLUTONIUM EMERGENCY POND (BACKFILLED 1978)

ORIGIN FOR METRIC GRID

NORTH

200 0 200 400

SCALE IN FEET

READINGS ARE IN MICRO-R/Hr. (μR/Hr.)

INSTRUMENT: LUDLUM MICRO-R METER
MODEL NO: 12S
SERIAL NO: 9081

ESTABLISHED SITE BACKGROUND OF 7 MICRO-R/Hr., NOT SUBTRACTED.

READINGS TAKEN BEFORE SITE REMEDIATION.

CIMARRON CORPORATION

CIMARRON FACILITY
PRE-REMEDIATION MICRO-R SURVEY (1979)
AT LAND SURFACE

ORIGINAL BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:
JE	9/2/94	JA	10/1/94	KM	AS SHOWN

CLIENT DRAWING NO.

JOB NO.	DRAWING NO.	REV.
	79PRSAUR-0	1

WEST PIPELINE RUN TO CIMARRON RIVER (PIPE REMOVED)

EAST PIPELINE RUN TO CIMARRON RIVER (PIPE REMOVED)

BURIAL AREA #1 (BACKFILLED 1993)

BURIAL AREA #4 HOLDING POND

URANIUM WASTE POND #1 (BACKFILLED 1978)

PLUTONIUM WASTE POND (BELOW) (BACKFILLED 1978)

EAST SANITARY LAGOON (BACKFILLED 1993)

WEST SANITARY LAGOON (BACKFILLED 1993)

URANIUM WASTE POND #2 (BACKFILLED 1978)

RESERVOIR #3

RESERVOIR #2

BURIAL AREA #4

BURIAL AREA #2 (NORTH FIELD)

PLUTONIUM BUILDING

WEST LAKE

BURIAL AREA #3/ NORTH INCINERATOR

NEW LINED SANITARY LAGOON (ABOVE)

EMER. BLDG.

URANIUM EMERGENCY POND (BACKFILLED 1978)

PLUTONIUM EMERGENCY POND (BACKFILLED 1978)

WAREHOUSE BUILDING #4

URANIUM BLDG. #1

4.4 0.7
6.0 1.1
4.7 1.1
3.3 1.2
2.5 1.0
6.1 1.4
3.4 1.1
5.4 1.5
6.3 1.2
4.3 1.4
5.0 1.4
3.3 1.4
3.0 1.1
3.6 1.6
6.6 1.7
5.9 1.3
5.0 1.3
4.5 1.2
2.6 1.3
3.4 1.2
3.2 0.9
2.8 1.0
3.3 1.1
2.3 1.3
4.8 1.4
2.9 0.8
2.3 1.0
3.2 1.1
4.8 1.1
4.8 0.9

NORTH

200 0 200

SCALE IN METERS

SAMPLES ARE IN PICO-CURIES PER GRAM URANIUM (pCi/g U) AND THORIUM (pCi/g Th).

CIMARRON GAMMA SPEC SOIL COUNTER.

SITE SOIL BACKGROUND OF APPROX. 4 pCi/g U AND 1.5 pCi/g Th, NOT SUBTRACTED.

LEGEND

6 + URANIUM pCi/g

2 + THORIUM pCi/g

CIMARRON CORPORATION

CIMARRON FACILITY
UNAFFECTED AREA BACKGROUND
FINAL SOIL SAMPLES IN pCi/g (1995)
AT LAND SURFACE

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:	JOB NO.	DRAWING NO.	REV.
JE	7/26/95	WR	8/1/95	JK	AS SHOWN		95FIBKSS-0	0

M:\CIMARRON\UNAF_BKG\95FIBKSS

WEST PIPELINE RUN TO CIMARRON RIVER (PIPE REMOVED)

EAST PIPELINE RUN TO CIMARRON RIVER (PIPE REMOVED)

BURIAL AREA #1 (BACKFILLED 1993)

BURIAL AREA #4 HOLDING POND

URANIUM WASTE POND #2 (BACKFILLED 1978)

URANIUM WASTE POND #1 (BACKFILLED 1978)

PLUTONIUM WASTE POND (BELOW) (BACKFILLED 1978)

EAST SANITARY LAGOON (BACKFILLED 1993)

WEST SANITARY LAGOON (BACKFILLED 1993)

RESERVOIR #3

RESERVOIR #2

BURIAL AREA #4

BURIAL AREA #2 (NORTH FIELD)

PLUTONIUM BUILDING

WEST LAKE

BURIAL AREA #3/ NORTH INCINERATOR

NEW LINED SANITARY LAGOON (ABOVE)

URANIUM EMERGENCY POND (BACKFILLED 1978)

EMER. BLDG.

PLUTONIUM EMERGENCY POND (BACKFILLED 1978)

WAREHOUSE BUILDING #4

URANIUM BLDG. #1

NORTH

200 0 200

SCALE IN METERS

READINGS ARE IN MICRO-R/HR (μR/Hr)

INSTRUMENT: LUDLUM MICRO-R METER
MODEL NO: 19
BACKGROUND RANGE: 7 - 10 μR/Hr.

CIMARRON CORPORATION

CIMARRON FACILITY UNAFFECTED AREA BACKGROUND FINAL MICRO-R SURVEY (1995) AT LAND SURFACE

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:	JOB NO.	DRAWING NO.	REV.
JE	7/26/95	WR	8/1/95	JK	AS SHOWN		95FIBKUR-0	0

M:\CIMARRON\UNAF_BKG\95FIBKUR

WEST PIPELINE RUN TO CIMARRON RIVER (PIPE REMOVED)

EAST PIPELINE RUN TO CIMARRON RIVER (PIPE REMOVED)

BURIAL AREA #1 (BACKFILLED 1993)

BURIAL AREA #4 HOLDING POND

URANIUM WASTE POND #2 (BACKFILLED 1978)

URANIUM WASTE POND #1 (BACKFILLED 1978)

PLUTONIUM WASTE POND (BELOW) (BACKFILLED 1978)

EAST SANITARY LAGOON (BACKFILLED 1993)

WEST SANITARY LAGOON (BACKFILLED 1993)

RESERVOIR #3

RESERVOIR #2

BURIAL AREA #4

BURIAL AREA #2 (NORTH FIELD)

PLUTONIUM BUILDING

WEST LAKE

BURIAL AREA #3/ NORTH INCINERATOR

NEW LINED SANITARY LAGOON (ABOVE)

URANIUM EMERGENCY POND (BACKFILLED 1978)

EMER. BLDG.

PLUTONIUM EMERGENCY POND (BACKFILLED 1978)

WAREHOUSE BUILDING #4

URANIUM BLDG. #1

NORTH

200 0 200

SCALE IN METERS

READINGS ARE IN MICRO-R/HR (μR/Hr)

INSTRUMENT: LUDLUM MICRO-R METER
MODEL NO: 19
BACKGROUND RANGE: 7 - 10 μR/Hr.

CIMARRON CORPORATION

CIMARRON FACILITY
UNAFFECTED AREA BACKGROUND
FINAL MICRO-R SURVEY (1995)
AT ONE METER ABOVE SURFACE

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:	JOB NO.	DRAWING NO.	REV.
JE	7/26/95	WR	8/1/95	JK	AS SHOWN		95FIBKUR-1	0

M:\CIMARRON\UNAF_BKG\95FIBKUR

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'A
SWP - 940001

DATE: 12/19/94 - 12/22/94

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
0E - 100S	7866	7	7	2.9	1.1
0E - 200S	9182	8	8	7.2	1.3
0E - 300S	10180	9	9	4.4	2.2
0E - 400S	10763	9	9	4.4	2.0
0E - 500S	10900	9	9	6.6	2.1
0E - 600S	10698	9	9	5.8	2.4

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7 - 10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) -1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIUASS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'A
SWP - 940001

DATE: 12/19/94 - 12/22/94

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
100E - 100S	10032	9	9	6.6	1.8
100E - 200S	10214	9	9	4.8	2.1
100E - 300S	9960	9	8	5.3	2.1
100E - 400S	10918	9	10	4.8	2.3
100E - 500S	10766	9	9	5.5	2.1
100E - 600S	10782	9	9	8.4	1.9

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7 - 10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) -1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIUASS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'A
SWP - 940001

DATE: 12/19/94 - 12/22/94

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
200E - 000S	7380	6	7	6.9	1.4
200E - 100S	9758	9	9	6.1	1.7
200E - 200S	8938	8	8	4.9	1.5
200E - 300S	10786	10	10	5.5	2.0
200E - 400S	10938	10	10	3.8	2.2
200E - 500S	10392	9	9	4.8	1.8
200E - 600S	10436	10	10	4.4	1.8
200E - 600S	10436	10	10	5.9	1.9

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7 - 10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) -1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIUASS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'A
SWP - 940001

DATE: 12/19/94 - 12/22/94

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
300E - 000S	9456	8	8	4.7	1.8
300E - 100S	9936	8	9	5.4	1.9
300E - 200S	10862	9	9	3.7	1.6
300E - 300S	10278	10	9	6.3	1.8
300E - 400S	10918	10	9	4.0	1.6
300E - 500S	10604	10	9	3.7	2.0
300E - 600S	10796	9	10	3.2	2.0

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7 - 10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) -1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIUASS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'A
SWP - 940001

DATE: 12/19/94 - 12/22/94

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
400E - 000S	8698	8	8	6.0	1.4
400E - 100N	8650	7	7	4.0	1.3
400E - 100S	8774	9	8	2.8	1.5
400E - 200N	7584	7	7	5.8	1.1
400E - 200S	9334	7	8	3.6	1.5
400E - 300S	11236	8	8	6.0	1.7
400E - 400S	9270	8	8	7.3	1.9
400E - 500S	9798	7	7	5.6	1.6
400E - 600S	9910	7	7	3.5	1.4

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7 - 10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) -1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIUASS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'A
SWP - 940001

DATE: 12/19/94 - 12/22/94

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
500E - 000S	8960	8	8	5.0	1.6
500E - 100N	7852	7	6	3.2	1.3
500E - 100S	8630	7	7	3.7	1.7
500E - 200N	6970	7	7	6.8	1.3
500E - 200S	9120	6	7	4.5	1.5
500E - 300S	10562	9	8	6.7	1.8
500E - 400S	9996	9	9	4.2	1.9
500E - 500S	8890	8	8	3.5	1.7
500E - 600S	10264	8	8	6.2	1.6

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7 - 10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) -1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIUASS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'A
SWP - 940001

DATE: 12/19/94 - 12/22/94

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
600E - 000S	7390	7	8	3.1	1.3
600E - 100S	6624	7	7	3.3	1.1
600E - 100N	8598	8	8	6.0	1.5
600E - 200S	8502	8	8	4.5	1.5
600E - 200N	8188	7	7	3.6	1.8
600E - 300S	7894	8	8	4.0	1.5
600E - 400S	8674	8	8	6.6	1.4
600E - 500S	6424	7	7	4.5	1.1
600E - 600S	9564	7	8	3.9	1.4

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7 - 10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) -1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIUASS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'A
SWP - 940001

DATE: 12/19/94 - 12/22/94

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
700E - 000S	8284	8	8	4.4	1.4
700E - 100S	7576	7	7	2.9	1.5
700E - 100N	7348	7	7	5.7	1.3
700E - 200N	7040	7	6	5.4	1.3
700E - 200S	8566	8	8	2.4	1.4
700E - 300S	8146	7	7	5.2	1.5
700E - 400S	8680	8	8	5.9	1.4
700E - 500S	9076	8	7	3.2	1.3
700E - 500S	9076	8	7	5.3	1.6
700E - 600S	8100	8	7	3.5	1.3

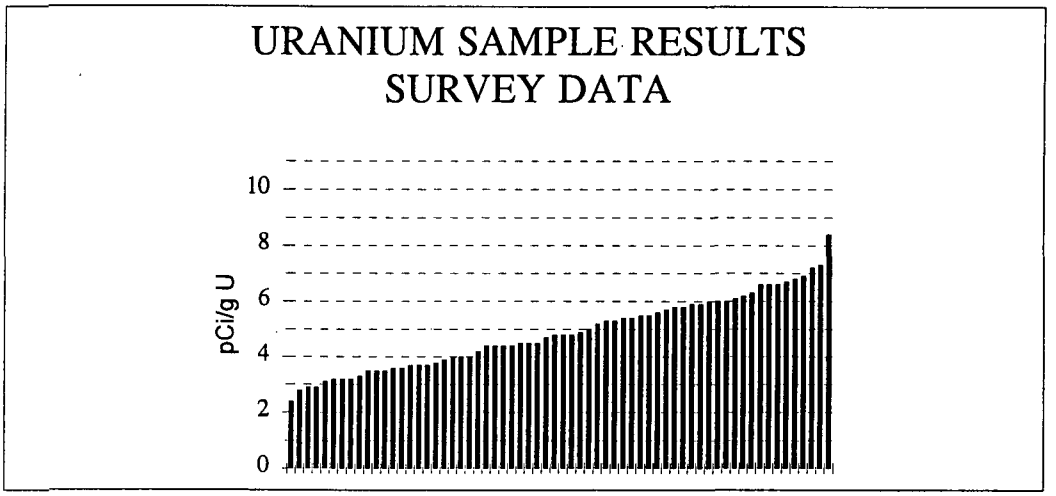
INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7 - 10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) -1.5 U (Total) - 4.0	0.25 4.0

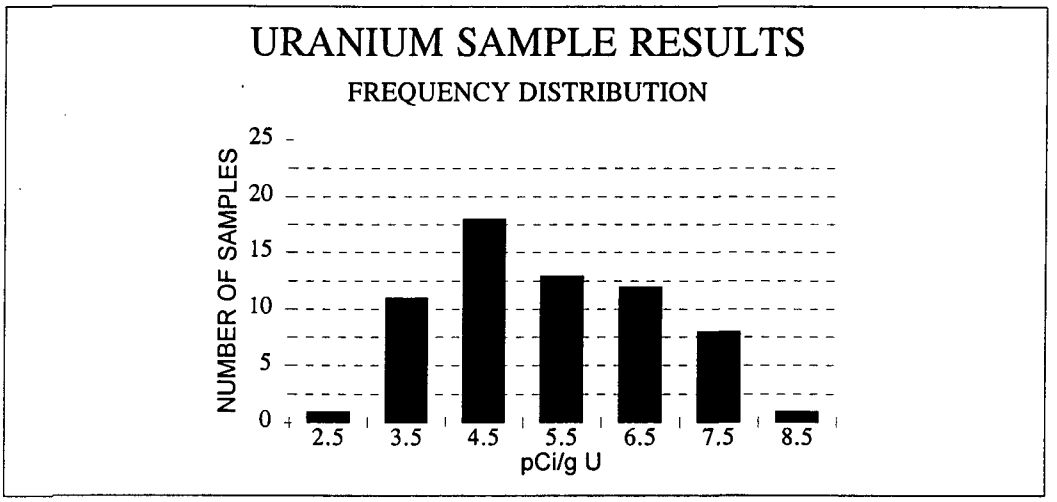
BACKGROUND NOT SUBTRACTED

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIUASS95

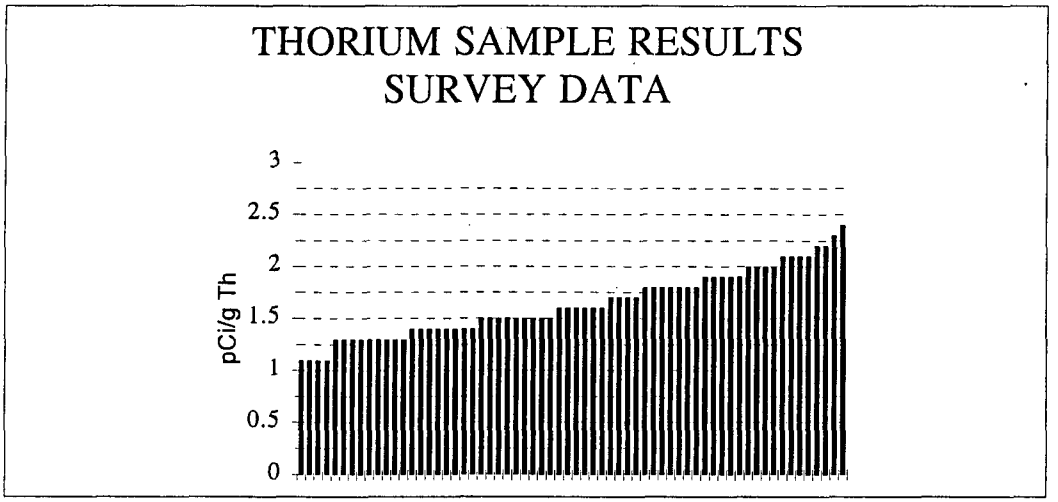
FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'A' (GRID SURVEY SAMPLES)
CIMARRON SOIL COUNTER
URANIUM SOIL SAMPLE RESULTS
SITE BACKGROUND OF 4 pCi/g URANIUM NOT SUBTRACTED
JANUARY, 1995

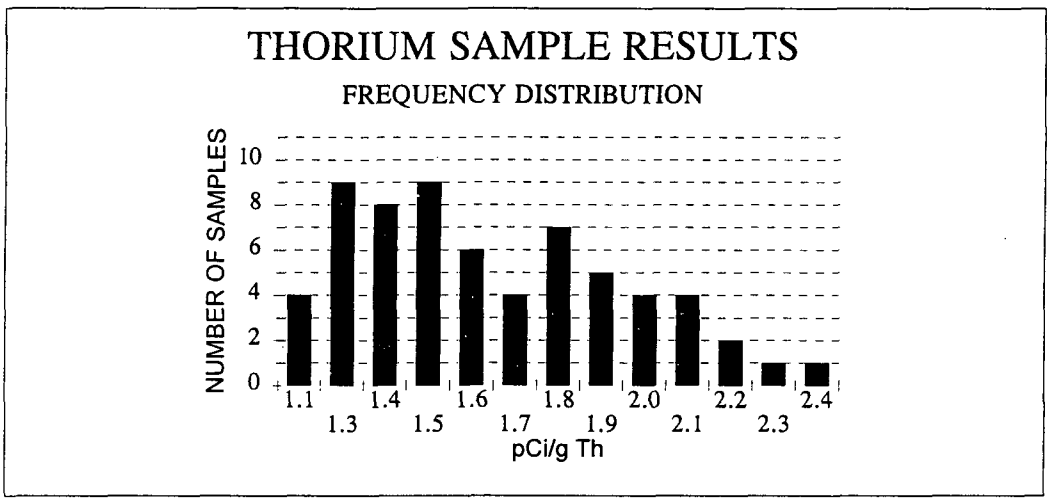




NUMBER OF SAMPLES	64
AVERAGE SAMPLE	4.9
MINIMUM SAMPLE	2.4
MAXIMUM SAMPLE	8.4
STANDARD DEVIATION	1.3

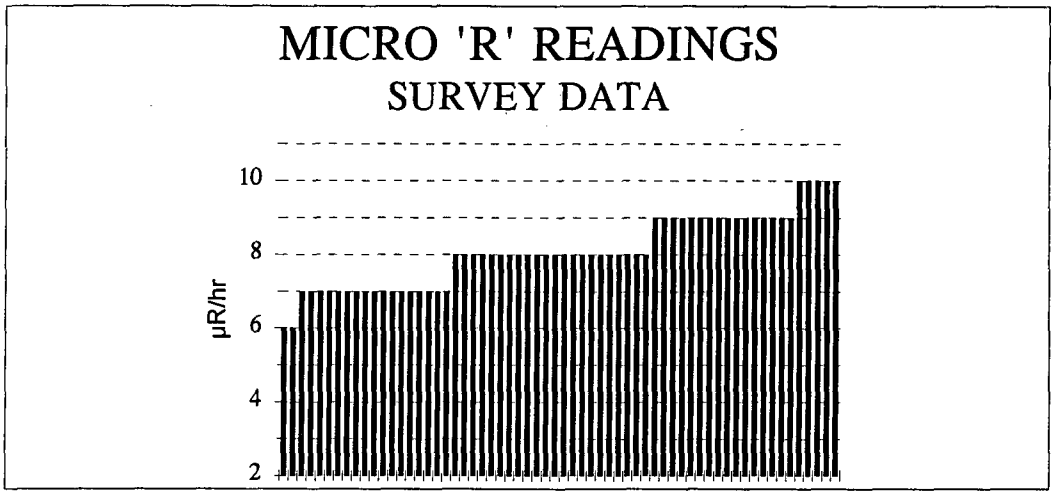
FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'A' (GRID SURVEY SAMPLES)
CIMARRON SOIL COUNTER
THORIUM SOIL SAMPLE RESULTS
SITE BACKGROUND OF 1.5 pCi/g Th NOT SUBTRACTED
JANUARY, 1995

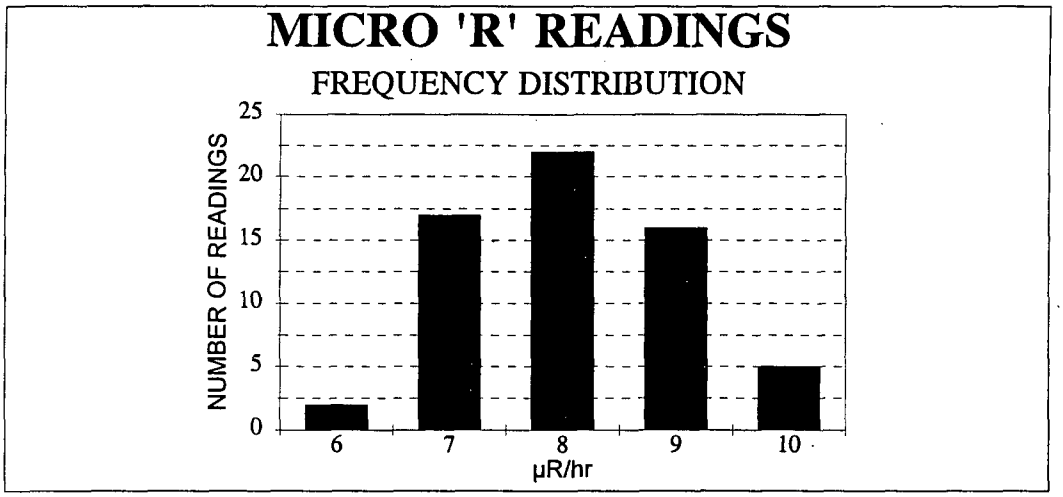




NUMBER OF SAMPLES	64
AVERAGE SAMPLE	1.6
MINIMUM SAMPLE	1.1
MAXIMUM SAMPLE	2.4
STANDARD DEVIATION	0.3

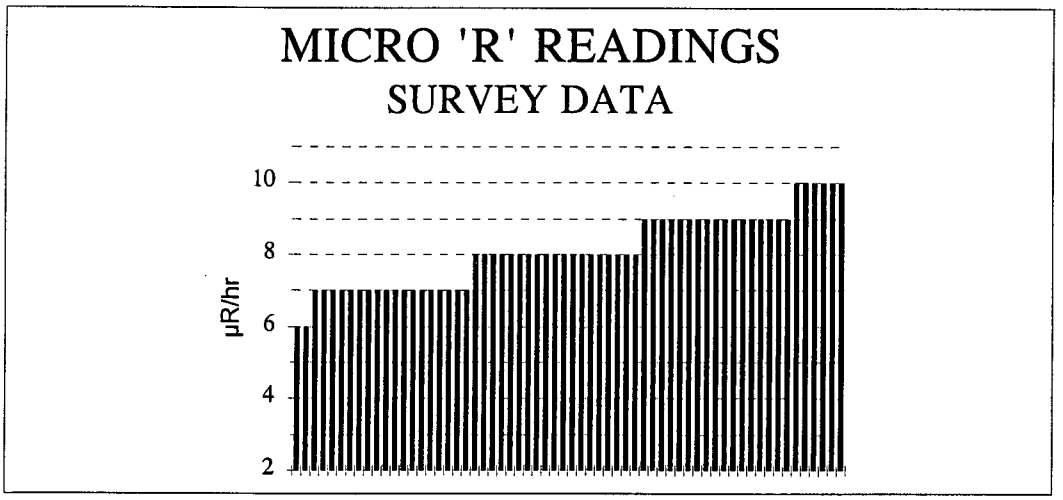
FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'A' (GRID SURVEY READINGS)
MICRO 'R' METER READINGS AT SURFACE
LUDLUM MODEL 19 S/N 111299
RESULTS IN μR/hr
SITE BACKGROUND 7-10 μR/hr
JANUARY, 1995

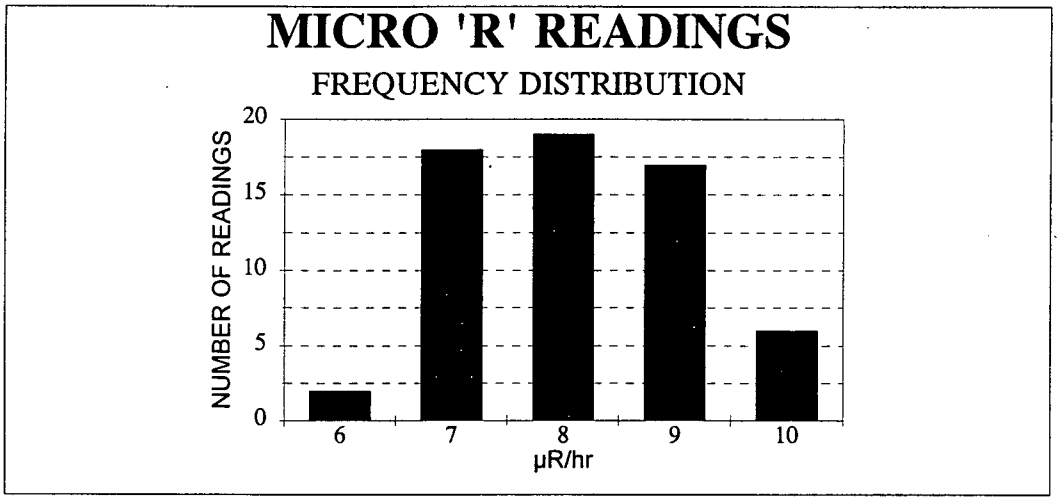




NUMBER OF READINGS	62
AVERAGE READING	8
MINIMUM READING	6
MAXIMUM READING	10
STANDARD DEVIATION	1

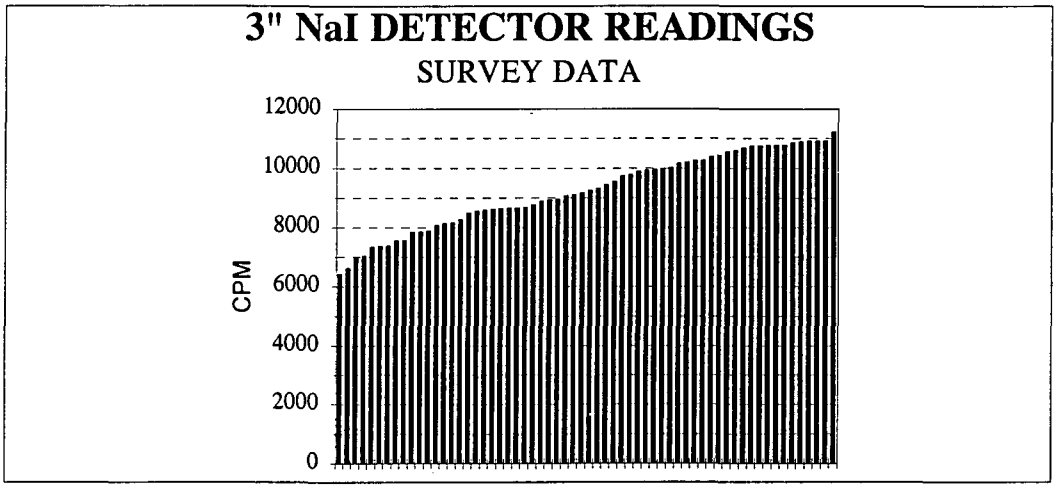
FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'A' (GRID SURVEY READINGS)
MICRO 'R' METER READINGS AT ONE METER ABOVE SURFACE
LUDLUM MODEL 19 S/N 111299
RESULTS IN μR/hr
SITE BACKGROUND 7-10 μR/hr
JANUARY, 1995

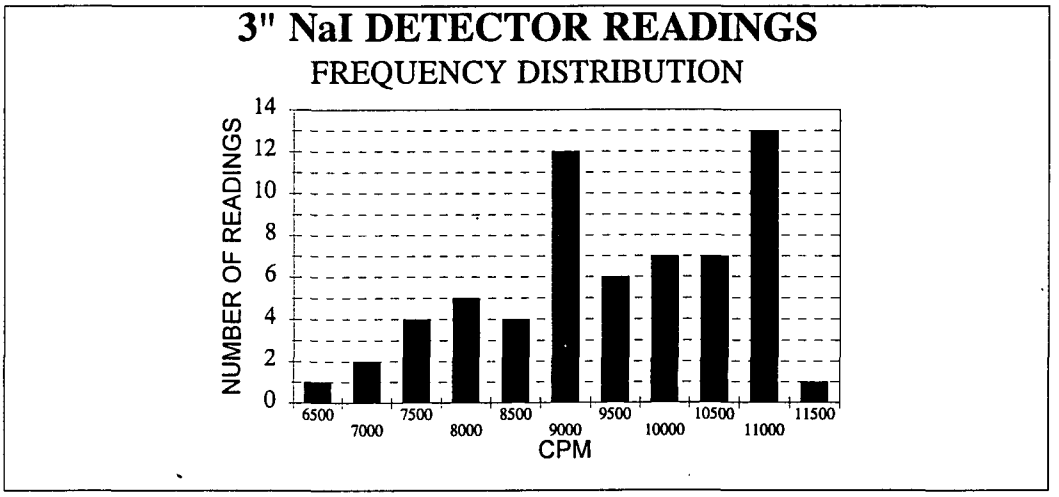




NUMBER OF READINGS	62
AVERAGE READING	8
MINIMUM READING	6
MAXIMUM READING	10
STANDARD DEVIATION	1

FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'A' (GRID SURVEY READINGS)
GROSS GAMMA READINGS IN CPM
LUDLUM MODEL 2220 S/N 48395
UNSHIELDED 3" X 1/2" NaI DETECTOR
BACKGROUND AVERAGE: 8850 CPM
JANUARY, 1995





NUMBER OF READINGS	62
AVERAGE READING	9241
MINIMUM READING	6424
MAXIMUM READING	11236
STANDARD DEVIATION	1270

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'A' BOUNDARY
SWP - 940001

DATE: 1/27/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
50S - 10W	8669	9	9
50S - 0E	9247	9	8
50S - 10E	9264	9	8
50S - 20E	9354	11	8
50S - 30E	9516	11	8
50S - 40E	10244	10	9
50S - 50E	10358	10	10
50S - 60E	9308	9	8
50S - 70E	9796	10	9
50S - 80E	9770	10	9
50S - 90E	9398	9	9
50S - 100E	7058	9	7
50S - 110E	7416	8	7
50S - 120E	7342	8	8

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: William F. Rhodes 7-28-95

FILE: FIU1SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'A' BOUNDARY
SWP - 940001

DATE: 1/27/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
120E - 30S	8306	9	8
120E - 40S	8322	8	8

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: William T. Crabtree 7-28-95

FILE: FIU1SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'A' BOUNDARY
SWP - 940001

DATE: 1/27/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
20S - 120E	8346	8	8
20S - 130E	6674	8	6
20S - 140E	6906	7	7
20S - 150E	7362	8	6
20S - 160E	6258	7	7
20S - 170E	6332	8	7
20S - 180E	6400	7	6
20S - 190E	6684	7	6
20S - 200E	7674	8	7

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIU1SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'A' BOUNDARY
SWP - 940001

DATE: 1/27/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
200E - 10S	7864	8	8
200E - 0N	8008	8	8
200E - 10N	8382	8	9
200E - 20N	7750	8	7
200E - 30N	7928	8	7
200E - 40N	7394	7	8
200E - 50N	8502	9	9
200E - 60N	8080	8	8
200E - 70N	8286	8	8

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: William J. Rhodes 7-28-95

FILE: FIU1SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'A' BOUNDARY
SWP - 940001

DATE: 1/27/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
70N - 210E	7744	9	8
70N - 220E	8234	9	7
70N - 230E	7668	7	7
70N - 240E	7670	8	7
70N - 250E	7850	8	6
70N - 260E	7800	6	8
70N - 270E	8282	8	8
70N - 280E	8216	8	8
70N - 290E	8188	8	8
70N - 300E	7892	8	7
70N - 310E	8046	8	8
70N - 320E	7920	8	9
70N - 330E	8304	8	8
70N - 340E	8194	8	8
70N - 350E	8068	8	7
70N - 360E	7544	8	7
70N - 370E	7626	8	7

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIU1SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'A' BOUNDARY
SWP - 940001

DATE: 1/27/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
375E - 70N	7364	7	6
375E - 80N	7776	7	6
375E - 90N	7550	7	7
375E - 100N	7636	8	7
375E - 110N	7554	8	8
375E - 120N	6750	7	6
375E - 130N	6536	7	7
375E - 140N	6378	7	6
375E - 150N	6488	7	7
375E - 160N	6188	7	6
375E - 170N	5832	6	6
375E - 180N	5980	7	5
375E - 190N	5476	6	5
375E - 200N	5430	6	5
375E - 210N	5454	5	5
375E - 220N	5386	6	5

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIU1SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'A' BOUNDARY
SWP - 940001

DATE: 1/27/95

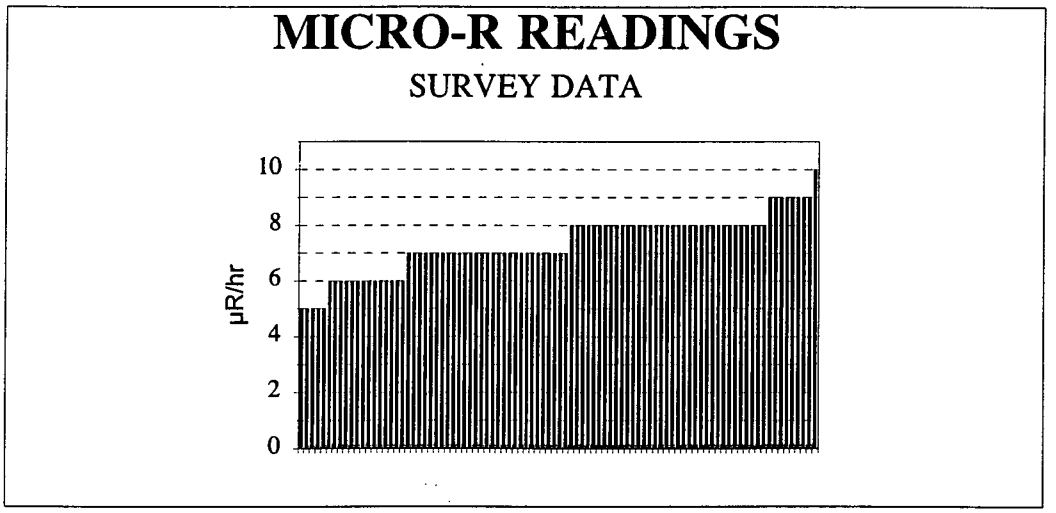
GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
220N - 380E	5604	5	6
220N - 390E	7736	7	7
220N - 400E	7600	8	7
220N - 410E	7654	7	8
220N - 420E	7734	7	7
220N - 430E	7766	8	7
220N - 440E	7924	8	8
220N - 450E	7858	8	7
220N - 460E	6888	8	6
220N - 470E	6922	6	6
220N - 480E	7580	7	7
220N - 490E	7534	8	8
220N - 500E	8036	8	8
220N - 510E	7862	8	7
220N - 520E	7842	8	7
220N - 530E	8028	7	8
220N - 540E	7936	9	8
220N - 550E	7776	8	8
220N - 560E	8184	8	8
220N - 570E	7878	8	7
220N - 580E	8098	7	7
220N - 590E	7760	7	8
220N - 600E	7764	7	8
220N - 610E	7820	7	8
220N - 620E	8332	9	8

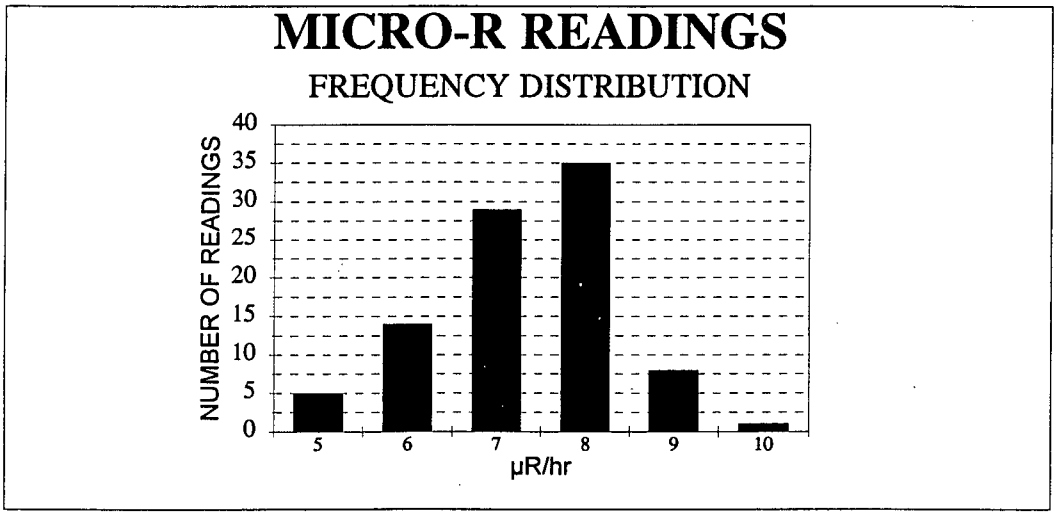
INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: Wilbur T. Rhodes 7-28-95

FILE: FIU1SS95

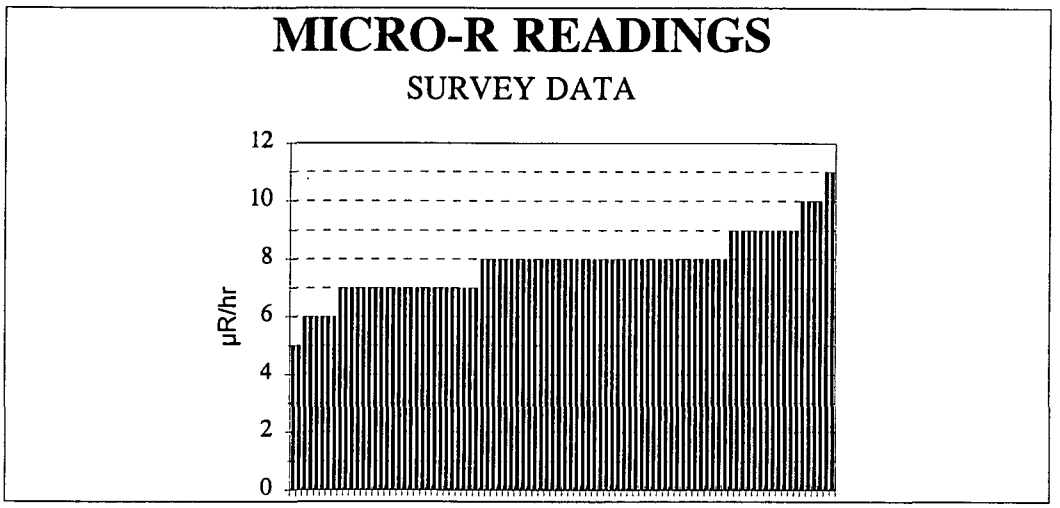
FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'A' (BOUNDARY SURVEY READINGS)
MICRO-R METER READINGS AT SURFACE
LUDLUM MODEL 19 S/N 222399
RESULTS IN μR/hr
SITE BACKGROUND 7-10 μR/hr
JANUARY , 1995

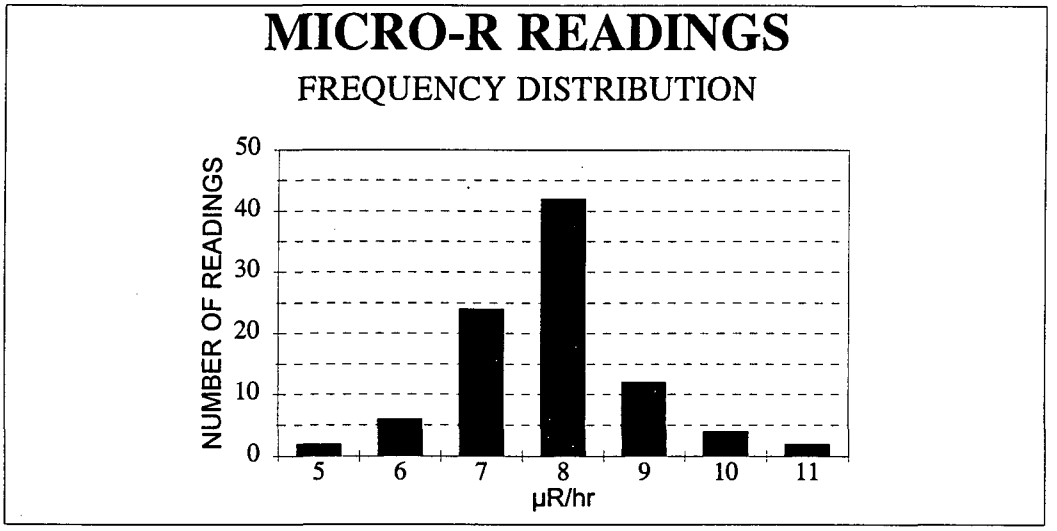




NUMBER OF READINGS	**92**
AVERAGE READING	**7**
MINIMUM READING	**5**
MAXIMUM READING	**10**
STANDARD DEVIATION	**1**

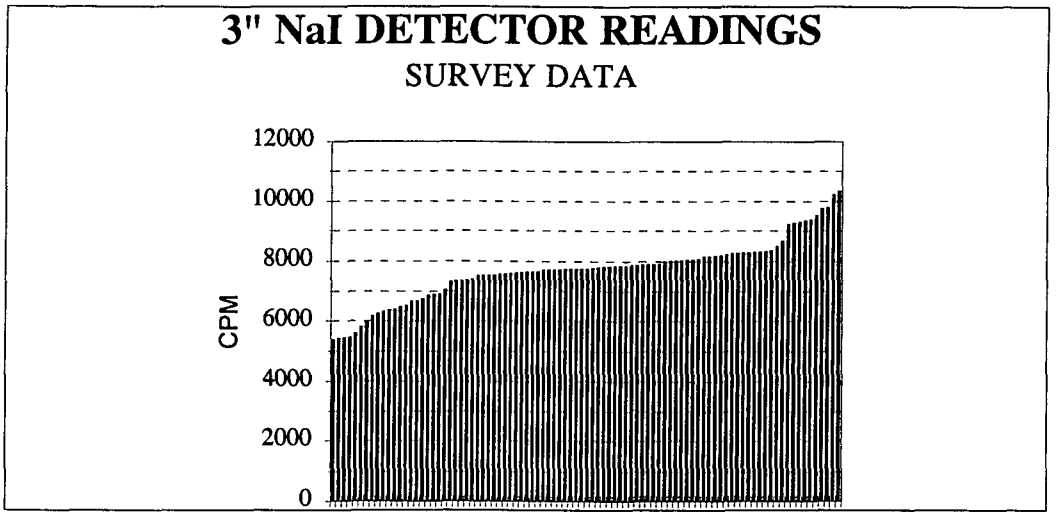
FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'A' (BOUNDARY SURVEY READINGS)
MICRO-R READINGS AT 1 METER ABOVE SURFACE
LUDLUM MODEL 19 S/N 222399
RESULTS IN μR/hr
SITE BACKGROUND 7-10 μR/hr
JANUARY , 1995

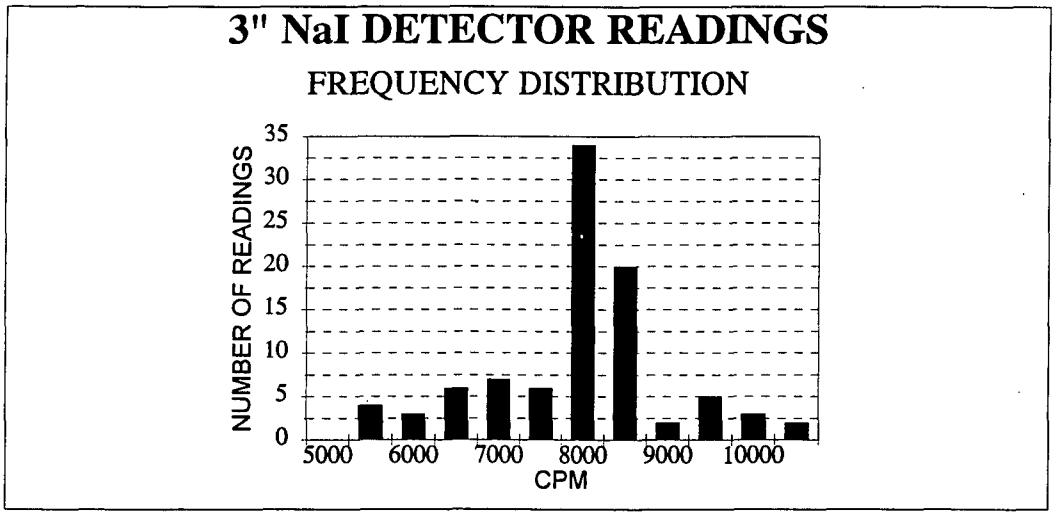




NUMBER OF READINGS	92
AVERAGE READING	8
MINIMUM READING	5
MAXIMUM READING	11
STANDARD DEVIATION	1

FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'A' (BOUNDARY SURVEY READINGS)
GROSS GAMMA READINGS IN CPM
LUDLUM 2220 S/N 48395
UNSHIELDED 3" X 1/2" NaI DETECTOR
BACKGROUND AVERAGE: 8850 CPM
JANUARY ,1995





NUMBER OF READINGS	**92**
AVERAGE READING	**7,710**
MINIMUM READING	**5,386**
MAXIMUM READING	**10,358**
STANDARD DEVIATION	**1,019**

Sub Area A

Soil Sample
Statistical Evaluation of Data

CIMARRON CORPORATION STATISTICAL EVALUATION OF DATA FOR SUB AREA - A (pCi/gU)

CALCULATIONS FROM *MANUAL FOR CONDUCTING RADIOLOGICAL SURVEYS IN SUPPORT OF LICENSE TERMINATION NUREG/CR-5849, DRAFT REPORT FOR COMMENTS*

NO. OF SAMPLES (n): 64

SAMPLE MEAN ($\bar{x}$) = 4.9

EQUATION 8-12

$$\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$$

STANDARD DEVIATION 1.3

EQUATION 8-13

$$s_x = \sqrt{\frac{\sum_{i=1}^{n} (\bar{x} - x_i)^2}{n-1}}$$

DEGREES OF FREEDOM (df) = n-1 **DATA LISTED ON TABLE B-1**

$t_{1\text{-}a,df}$ = 1.670 **95% CONFIDENCE LEVEL**

AREA'S AVERAGE LEVEL

EQUATION 8-11

$$\mu_a = \bar{x} + t_{1-a,df} \frac{S_x}{\sqrt{n}}$$

μ_a = 5.1 pCi/gU

ACCEPTABLE LEVEL = 11.5 pCi/gU

TABLE B - 1

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

CIMARRON CORPORATION STATISTICAL EVALUATION OF DATA FOR SUB AREA - A (pCi/gU)

CALCULATIONS FROM *MANUAL FOR CONDUCTING RADIOLOGICAL SURVEYS IN SUPPORT OF LICENSE TERMINATION NUREG/CR-5849, DRAFT REPORT FOR COMMENTS*

NUMBER	$\bar{x}$	$\bar{x} - x_i$	$(\bar{x} - x_i)^2$
1	2.9	-2.0	3.9
2	7.2	2.3	5.4
3	4.4	-0.5	0.2
4	4.4	-0.5	0.2
5	6.6	1.7	3.0
6	5.8	0.9	0.9
7	6.6	1.7	3.0
8	4.8	-0.1	0.0
9	5.3	0.4	0.2
10	4.8	-0.1	0.0
11	5.5	0.6	0.4
12	8.4	3.5	12.4
13	6.9	2.0	4.1
14	6.1	1.2	1.5
15	4.9	0.0	0.0
16	5.5	0.6	0.4
17	3.8	-1.1	1.1
18	4.8	-0.1	0.0
19	4.4	-0.5	0.2
20	5.9	1.0	1.1
21	4.7	-0.2	0.0
22	5.4	0.5	0.3
23	3.7	-1.2	1.4
24	6.3	1.4	2.0
25	4	-0.9	0.8
26	3.7	-1.2	1.4
27	3.2	-1.7	2.8
28	6	1.1	1.3
29	4	-0.9	0.8
30	2.8	-2.1	4.3
31	5.8	0.9	0.9
32	3.6	-1.3	1.6
33	6	1.1	1.3
34	7.3	2.4	5.9
35	5.6	0.7	0.5
36	3.5	-1.4	1.9
37	5	0.1	0.0
38	3.2	-1.7	2.8
39	3.7	-1.2	1.4
40	6.8	1.9	3.7
41	4.5	-0.4	0.1
42	6.7	1.8	3.3
43	4.2	-0.7	0.5
44	3.5	-1.4	1.9
45	6.2	1.3	1.8
46	3.1	-1.8	3.1
47	3.3	-1.6	2.5
48	6	1.1	1.3
49	4.5	-0.4	0.1
50	3.6	-1.3	1.6
	248.9		89.228926
	Sum (x)		Sum $(\bar{x} - x_i)^2$

NUMBER	$\bar{x}$	$\bar{x} - x_i$	$(\bar{x} - x_i)^2$
51	4	-0.9	0.8
52	6.6	1.7	3.0
53	4.5	-0.4	0.1
54	3.9	-1.0	0.9
55	4.4	-0.5	0.2
56	2.9	-2.0	3.9
57	5.7	0.8	0.7
68	5.4	0.5	0.3
59	2.4	-2.5	6.1
60	5.2	0.3	0.1
61	5.9	1.0	1.1
62	3.2	-1.7	2.8
63	5.3	0.4	0.2
64	3.5	-1.4	1.9
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100			
	311.8		111.2694
	Sum (x)		Sum $(\bar{x} - x_i)^2$

NO. OF SAMPLES (n): 64

SAMPLE MEAN ($\bar{x}$) = 1.6

EQUATION 8-12

$$\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$$

STANDARD DEVIATION 0.3

EQUATION 8-13

$$s_x = \sqrt{\frac{\sum_{i=1}^{n} (\bar{x} - x_i)^2}{n-1}}$$

DEGREES OF FREEDOM (df) = n-1 **DATA LISTED ON TABLE B-1**

$t_{1-a,df}$ = 1.670 **95% CONFIDENCE LEVEL**

AREA'S AVERAGE LEVEL

EQUATION 8-11

$$\mu_a = \bar{x} + t_{1-a,df} \frac{S_x}{\sqrt{n}}$$

μ_a = 1.7 pCi/gTh

ACCEPTABLE LEVEL = 4.0 pCi/gTh

TABLE B - 1

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

FINAL STATUS SURVEY REPORT - (PHASE I)

CIMARRON CORPORATION STATISTICAL EVALUATION OF DATA FOR SUB AREA - A (pCi/gTh)

CALCULATIONS FROM *MANUAL FOR CONDUCTING RADIOLOGICAL SURVEYS IN SUPPORT OF LICENSE TERMINATION NUREG/CR-5849, DRAFT REPORT FOR COMMENTS*

NUMBER	$\bar{x}$	$\bar{x} - x_i$	$(\bar{x} - x_i)^2$
1	1.1	-0.5	0.3
2	1.3	-0.3	0.1
3	2.2	0.6	0.3
4	2	0.4	0.1
5	2.1	0.5	0.2
6	2.4	0.8	0.6
7	1.8	0.2	0.0
8	2.1	0.5	0.2
9	2.1	0.5	0.2
10	2.3	0.7	0.4
11	2.1	0.5	0.2
12	1.9	0.3	0.1
13	1.4	-0.2	0.1
14	1.7	0.1	0.0
15	1.5	-0.1	0.0
16	2	0.4	0.1
17	2.2	0.6	0.3
18	1.8	0.2	0.0
19	1.8	0.2	0.0
20	1.9	0.3	0.1
21	1.8	0.2	0.0
22	1.9	0.3	0.1
23	1.6	-0.0	0.0
24	1.8	0.2	0.0
25	1.6	-0.0	0.0
26	2	0.4	0.1
27	2	0.4	0.1
28	1.4	-0.2	0.1
29	1.3	-0.3	0.1
30	1.5	-0.1	0.0
31	1.1	-0.5	0.3
32	1.5	-0.1	0.0
33	1.7	0.1	0.0
34	1.9	0.3	0.1
35	1.6	-0.0	0.0
36	1.4	-0.2	0.1
37	1.6	-0.0	0.0
38	1.3	-0.3	0.1
39	1.7	0.1	0.0
40	1.3	-0.3	0.1
41	1.5	-0.1	0.0
42	1.8	0.2	0.0
43	1.9	0.3	0.1
44	1.7	0.1	0.0
45	1.6	-0.0	0.0
46	1.3	-0.3	0.1
47	1.1	-0.5	0.3
48	1.5	-0.1	0.0
49	1.5	-0.1	0.0
50	1.8	0.2	0.0
	85.4		5.3053125
	Sum (x)		Sum $(\bar{x} - x_i)^2$

NUMBER	$\bar{x}$	$\bar{x} - x_i$	$(\bar{x} - x_i)^2$
51	1.5	-0.1	0.0
52	1.4	-0.2	0.1
53	1.1	-0.5	0.3
54	1.4	-0.2	0.1
55	1.4	-0.2	0.1
56	1.5	-0.1	0.0
57	1.3	-0.3	0.1
68	1.3	-0.3	0.1
59	1.4	-0.2	0.1
60	1.5	-0.1	0.0
61	1.4	-0.2	0.1
62	1.3	-0.3	0.1
63	1.6	-0.0	0.0
64	1.3	-0.3	0.1
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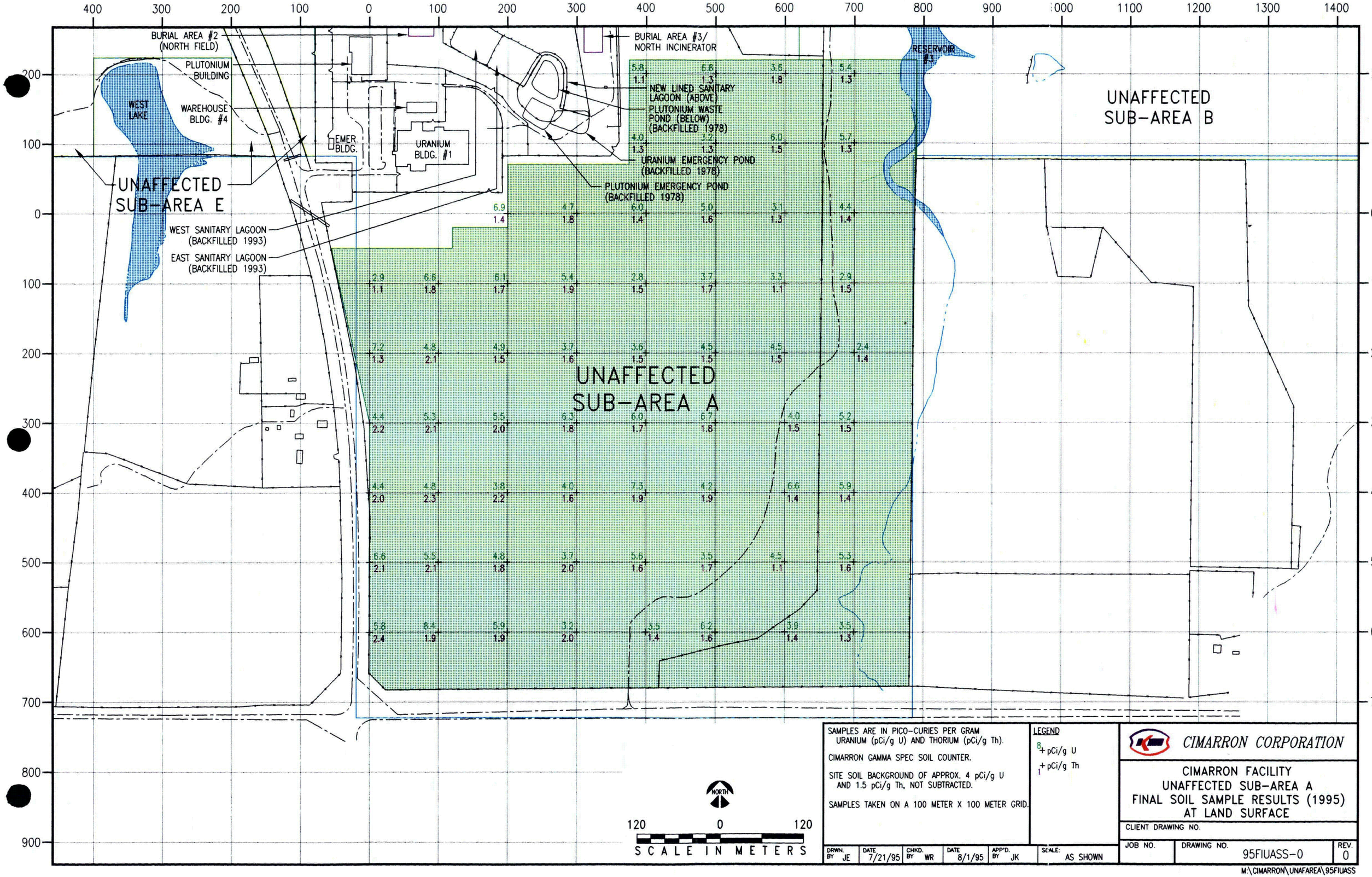
	104.8		6.39
	Sum (x)		Sum $(\bar{x} - x_i)^2$



SAMPLES ARE IN PICO-CURIES PER GRAM URANIUM (pCi/g U) AND THORIUM (pCi/g Th).

CIMARRON GAMMA SPEC SOIL COUNTER.

SITE SOIL BACKGROUND OF APPROX. 4 pCi/g U AND 1.5 pCi/g Th, NOT SUBTRACTED.

SAMPLES TAKEN ON A 100 METER X 100 METER GRID.

LEGEND

8 + pCi/g U

1 + pCi/g Th

CIMARRON CORPORATION

CIMARRON FACILITY
UNAFFECTED SUB-AREA A
FINAL SOIL SAMPLE RESULTS (1995)
AT LAND SURFACE

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:
JE	7/21/95	WR	8/1/95	JK	AS SHOWN

JOB NO.	DRAWING NO.	REV.
	95FIUASS-0	0

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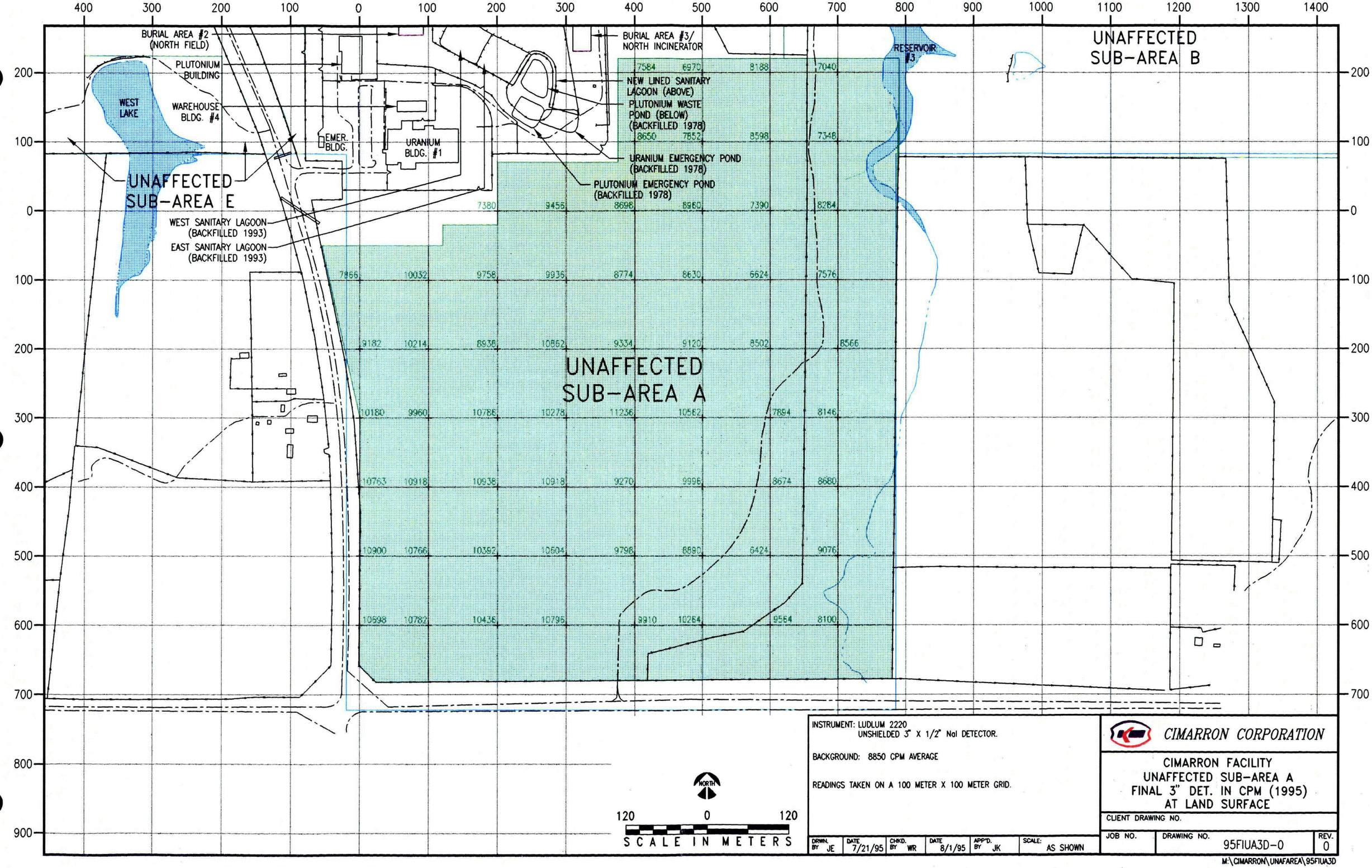


INSTRUMENT: LUDLUM 2220
UNSHIELDED 3" X 1/2" NaI DETECTOR.

BACKGROUND: 8850 CPM AVERAGE

READINGS TAKEN ON A 100 METER X 100 METER GRID.

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:
JE	7/21/95	WR	8/1/95	JK	AS SHOWN

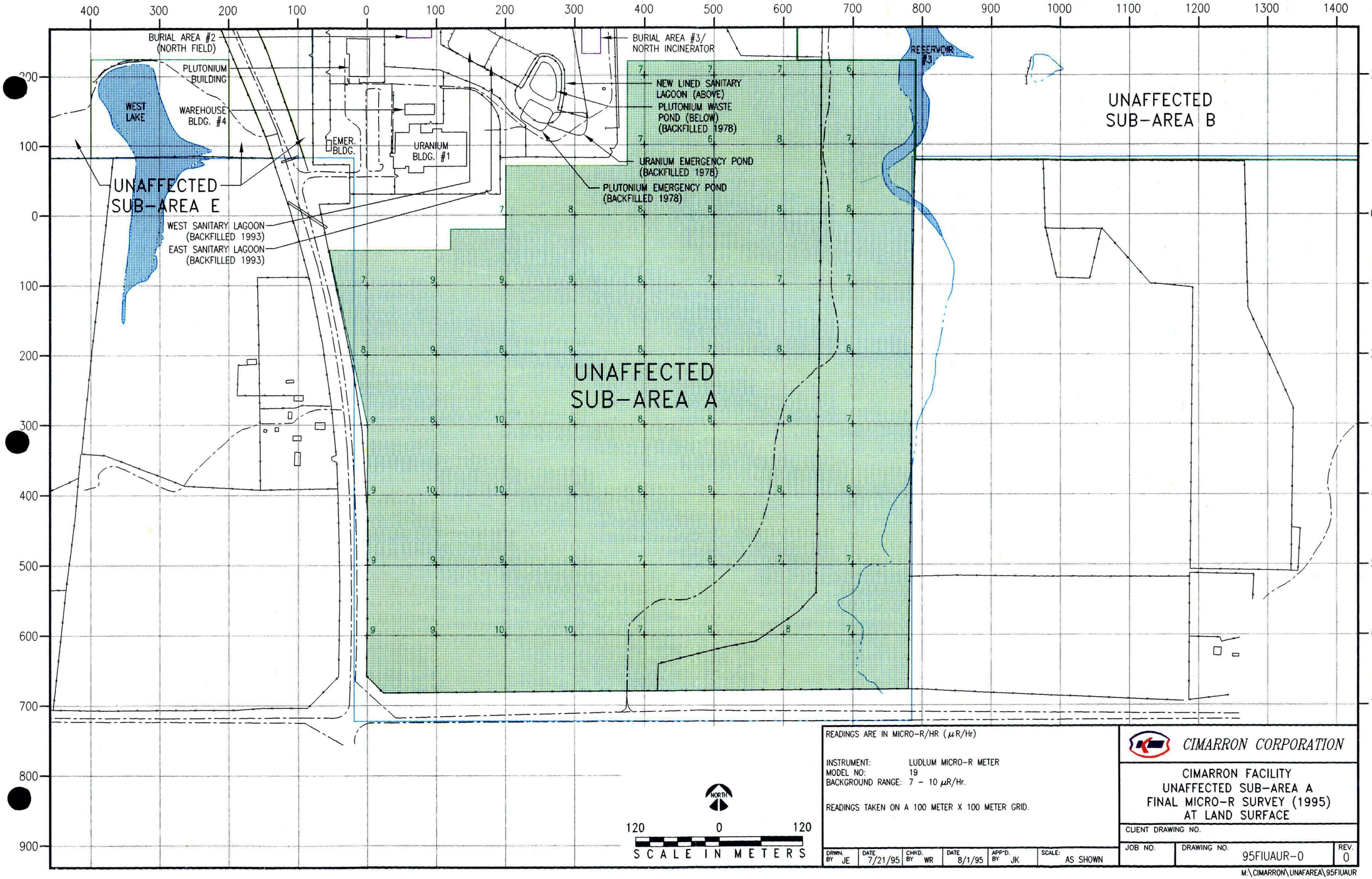
CIMARRON CORPORATION

CIMARRON FACILITY
UNAFFECTED SUB-AREA A
FINAL 3" DET. IN CPM (1995)
AT LAND SURFACE

CLIENT DRAWING NO.

JOB NO.	DRAWING NO.	REV.
	95FIUA3D-0	0

M:\CIMARRON\UNAFAREA\95FIUA3D



READINGS ARE IN MICRO-R/HR (μR/Hr)

INSTRUMENT: LUDLUM MICRO-R METER
MODEL NO: 19
BACKGROUND RANGE: 7 - 10 μR/Hr.

READINGS TAKEN ON A 100 METER X 100 METER GRID.

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:
JE	7/21/95	WR	8/1/95	JK	AS SHOWN

CIMARRON CORPORATION

CIMARRON FACILITY
UNAFFECTED SUB-AREA A
FINAL MICRO-R SURVEY (1995)
AT LAND SURFACE

CLIENT DRAWING NO.

JOB NO.	DRAWING NO.	REV.
	95FIUAUR-0	0

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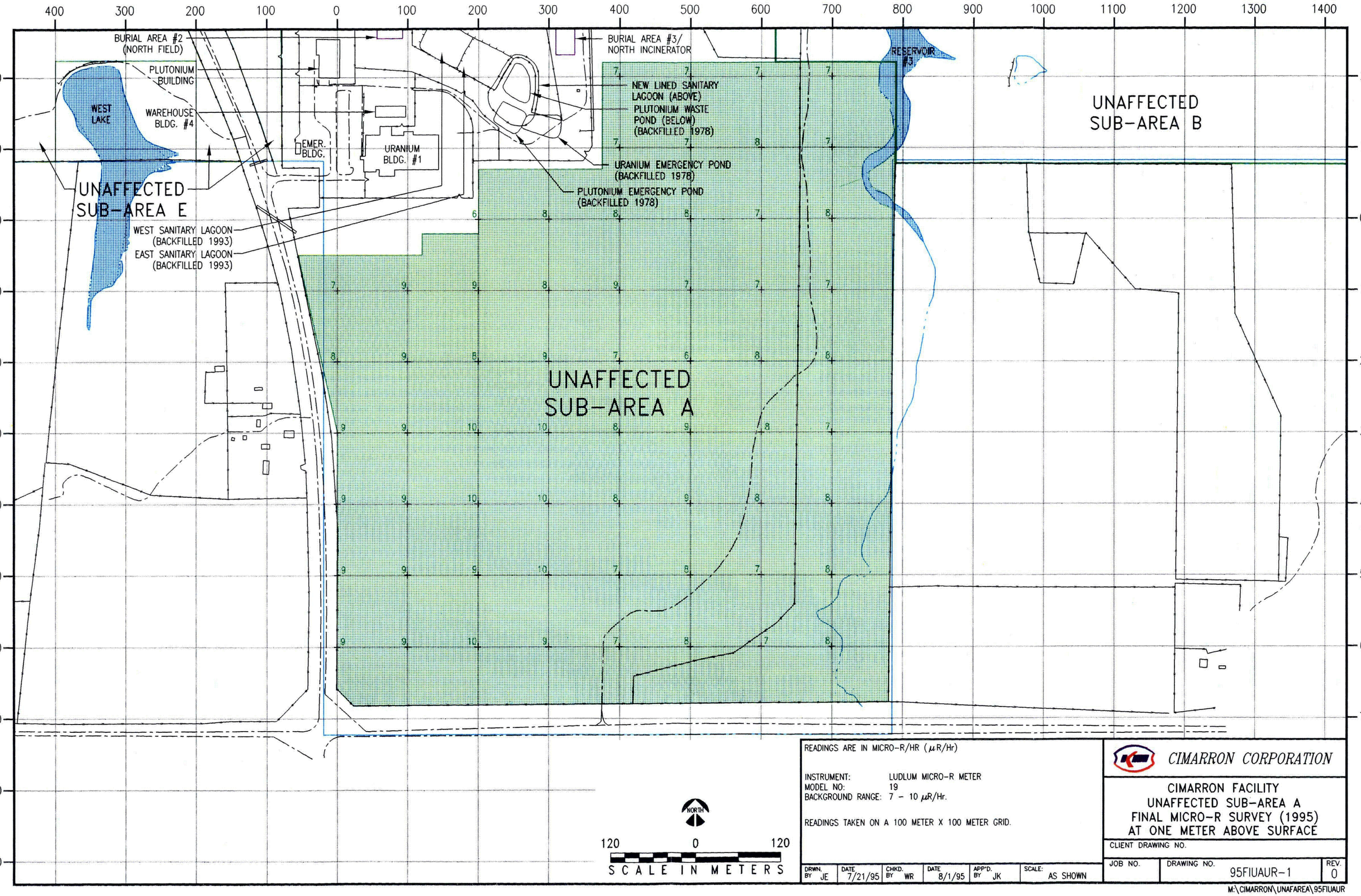

READINGS ARE IN MICRO-R/HR (μR/Hr)

INSTRUMENT: LUDLUM MICRO-R METER
MODEL NO: 19
BACKGROUND RANGE: 7 - 10 μR/Hr.

READINGS TAKEN ON A 100 METER X 100 METER GRID.

CIMARRON CORPORATION

CIMARRON FACILITY
UNAFFECTED SUB-AREA A
FINAL MICRO-R SURVEY (1995)
AT ONE METER ABOVE SURFACE

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:	JOB NO.	DRAWING NO.	REV.
JE	7/21/95	WR	8/1/95	JK	AS SHOWN		95FIUAUR-1	0

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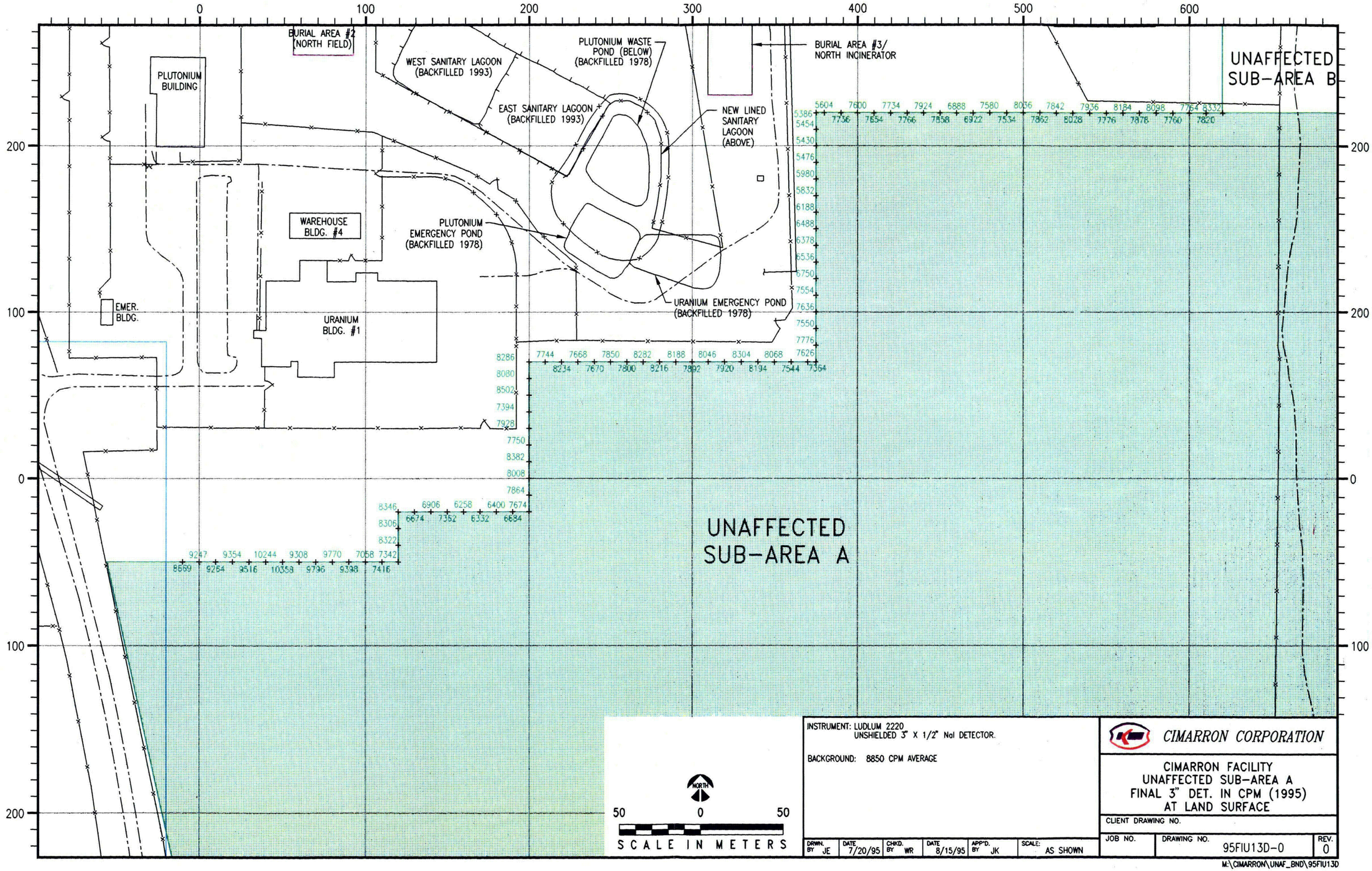


INSTRUMENT: LUDLUM 2220
UNSHIELDED 3" X 1/2" NaI DETECTOR.

BACKGROUND: 8850 CPM AVERAGE

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:
JE	7/20/95	WR	8/15/95	JK	AS SHOWN

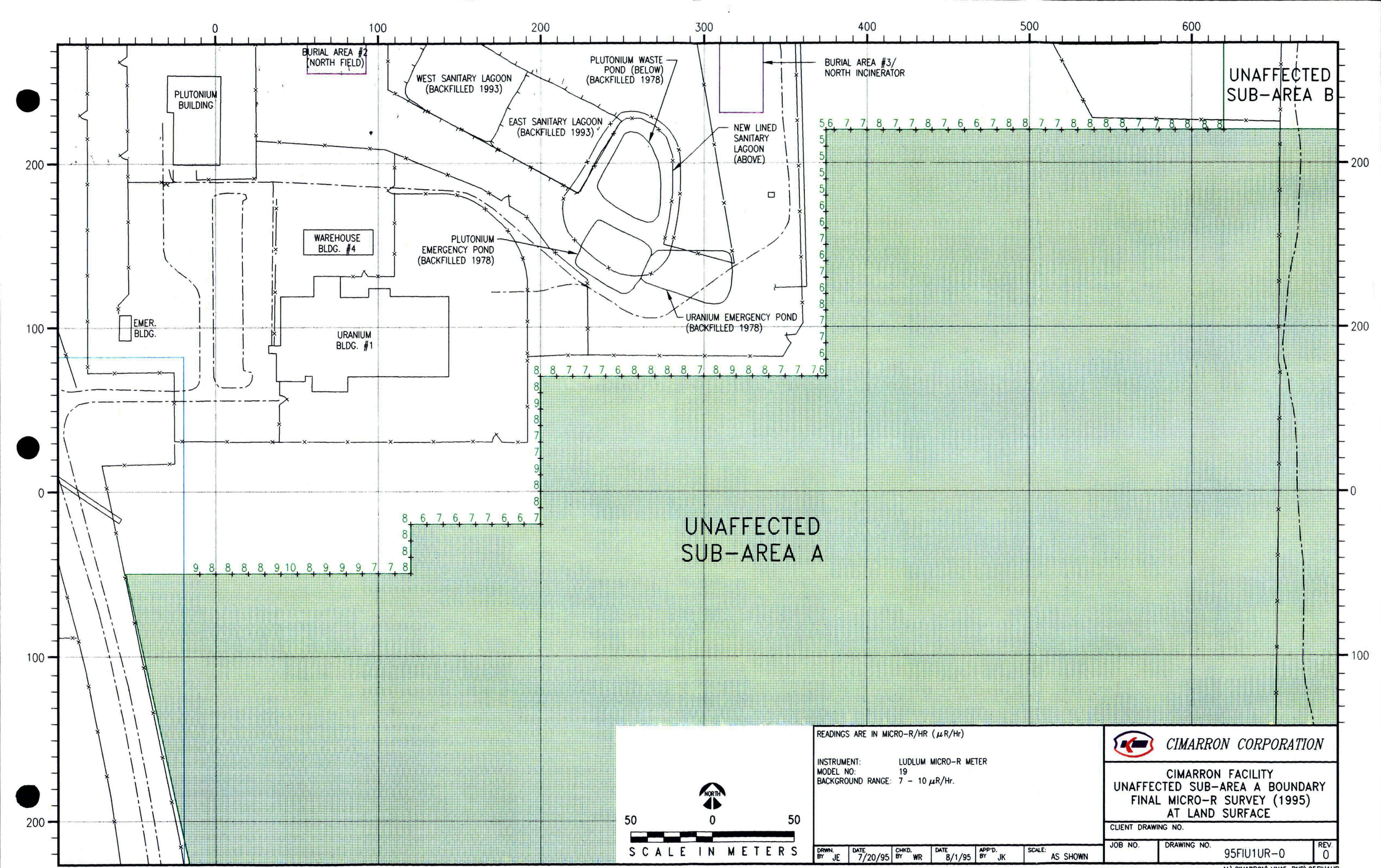
CIMARRON CORPORATION

CIMARRON FACILITY
UNAFFECTED SUB-AREA A
FINAL 3" DET. IN CPM (1995)
AT LAND SURFACE

CLIENT DRAWING NO.

JOB NO.	DRAWING NO.	REV.
	95FIU13D-0	0

M:\CIMARRON\UNAF_BND\95FIU13D



READINGS ARE IN MICRO-R/HR (μR/Hr)

INSTRUMENT: LUDLUM MICRO-R METER
MODEL NO: 19
BACKGROUND RANGE: 7 - 10 μR/Hr.

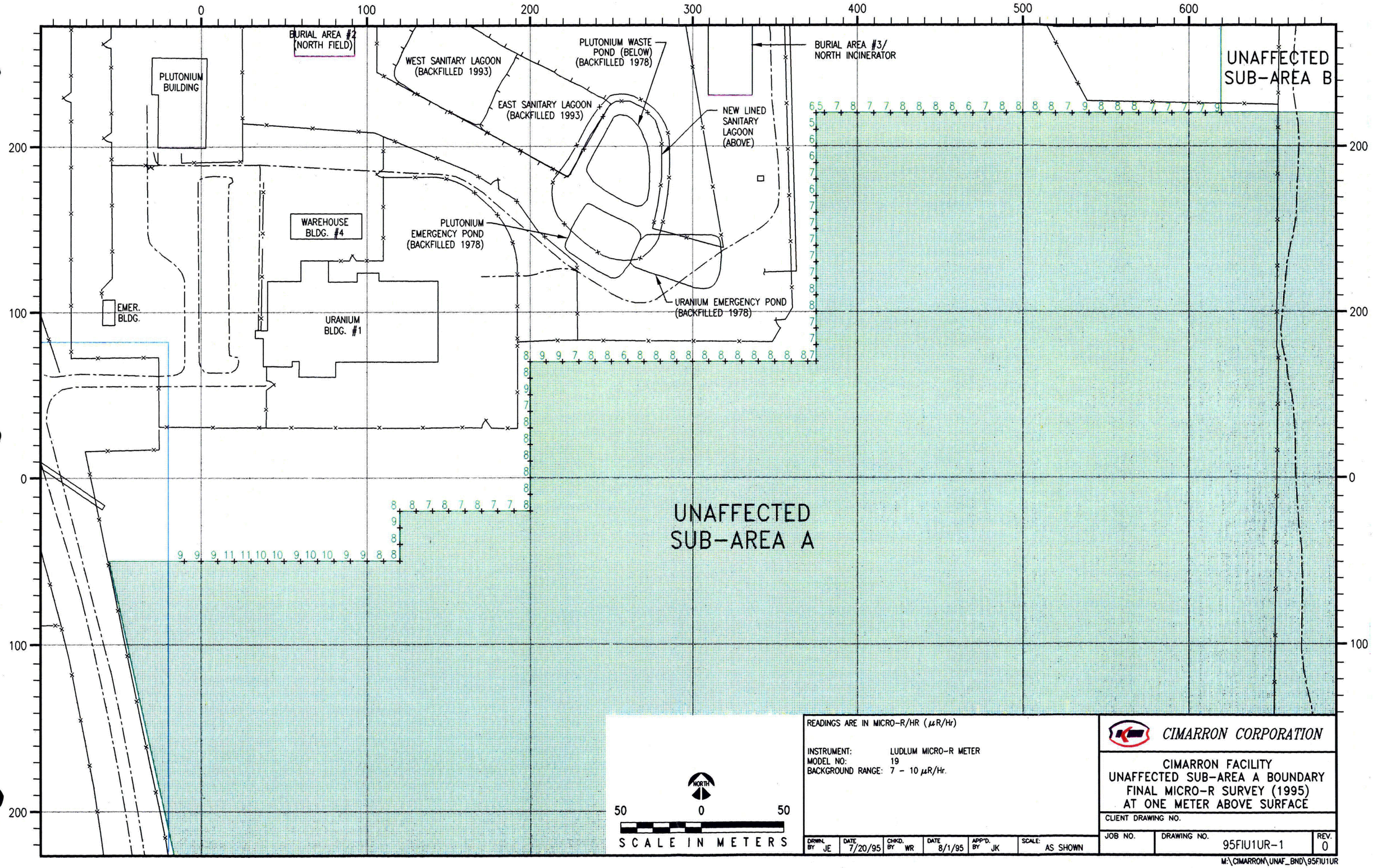
CIMARRON CORPORATION

CIMARRON FACILITY
UNAFFECTED SUB-AREA A BOUNDARY
FINAL MICRO-R SURVEY (1995)
AT LAND SURFACE

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:	JOB NO.	DRAWING NO.	REV.
JE	7/20/95	WR	8/1/95	JK	AS SHOWN		95FIU1UR-0	0

M:\CIMARRON\UNAF_BND\95FIU1UR



READINGS ARE IN MICRO-R/HR (μR/Hr)

INSTRUMENT: LUDLUM MICRO-R METER
MODEL NO: 19
BACKGROUND RANGE: 7 - 10 μR/Hr.

CIMARRON CORPORATION

CIMARRON FACILITY
UNAFFECTED SUB-AREA A BOUNDARY
FINAL MICRO-R SURVEY (1995)
AT ONE METER ABOVE SURFACE

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:	JOB NO.	DRAWING NO.	REV.
JE	7/20/95	WR	8/1/95	JK	AS SHOWN		95FIU1UR-1	0

M:\CIMARRON\UNAF_BND\95FIU1UR

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'B'
SWP - 940001

DATE: 1/16/95 - 1/20/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
700E - 300N	8565	8	8	4.3	1.2
700E - 400N	8460	8	8	3.3	1.4
700E - 500N	8672	9	9	5.9	1.7
700E - 600N	9535	9	9	5.6	1.5

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7-10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) - 1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: William F. Rhodes 7-28-95

FILE: FIUBSS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'B'
SWP - 940001

DATE: 1/16/95 - 1/20/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
1100E - 100N	9473	9	8	3.9	1.4
1100E - 200N	9150	9	8	4.1	1.4
1100E - 300N	9705	9	9	4.5	1.4
1100E - 400N	10010	9	10	5.5	1.5
1100E - 500N	9489	9	9	3.0	1.2
1100E - 600N	8864	9	9	5.5	1.5

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	µr/hr	7-10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) - 1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIUBSS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'B'
SWP - 940001

DATE: 1/16/95 - 1/20/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
1200E - 100N	9761	9	9	4.5	1.7
1200E - 200N	9206	8	9	4.1	1.5
1200E - 300N	9473	7	8	3.1	1.5
1200E - 400N	8492	8	7	3.9	1.3
1200E - 500N	7598	6	6	3.3	1.1
1200E - 600N	7544	6	7	2.6	1.4

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7-10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) - 1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: Eileen T. Rhodes 7-28-95

FILE: FIUBSS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'B'
SWP - 940001

DATE: 1/16/95 - 1/20/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6" TOTAL U	pCi/g 0 - 6" Th (Nat)
1300E - 100N	8738	7	7	4.2	1.6
1300E - 100N	8738	7	7	5.1	1.6
1300E - 200N	8847	8	8	2.7	1.4
1300E - 300N	8465	7	7	3.6	1.3
1300E - 400N	9209	8	8	4.8	1.5
1300E - 500N	7624	8	8	3.7	1.7
1300E - 600N	5259	5	5	3.6	0.9

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7-10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) - 1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: William T. Rhodes

FILE: FIUBSS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'B'
SWP - 940001

DATE: 1/16/95 - 1/20/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
1400E - 100N	7707	8	7	3.9	1.0
1400E - 200N	8735	8	7	2.0	1.2
1400E - 300N	7507	7	6	3.3	0.9
1400E - 400N	10431	7	7	3.2	1.3
1400E - 500N	8037	7	7	2.4	1.4
1400E - 900N	7313	8	7	5.5	1.1

INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7-10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) - 1.5 U (Total) - 4.0	0.25 4.0

BACKGROUND NOT SUBTRACTED

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIUBSS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
100 X 100 METER GRID SURVEY

SUB-AREA 'B'
SWP - 940001

DATE: 1/16/95 - 1/20/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE	pCi/g 0 - 6"	
				TOTAL U	Th (Nat)
1500E - 100N	7046	7	7	2.9	0.9
1500E - 200N	6968	7	6	2.2	1.0
1500E - 700N	8608	7	8	2.9	1.5
1500E - 800N	9129	8	8	2.6	1.6
1500E - 800N	9129	8	8	6.6	1.8
1500E - 900N	6225	6	6	3.7	0.9

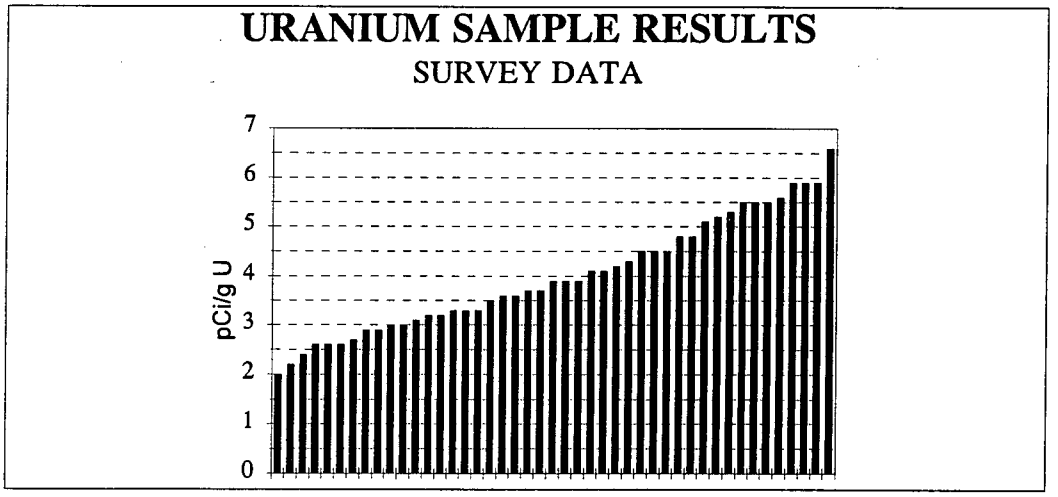
INSTRUMENTS:	RESULTS IN	BACKGROUND	MDA
LUDLUM MICRO 'R' METER - MODEL 19	μr/hr	7-10	7
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG	500
CIMARRON SOIL COUNTER 4" X 4" X 16" NaI DETECTOR	pCi/g	Th (Nat) - 1.5 U (Total) - 4.0	0.25 4.0

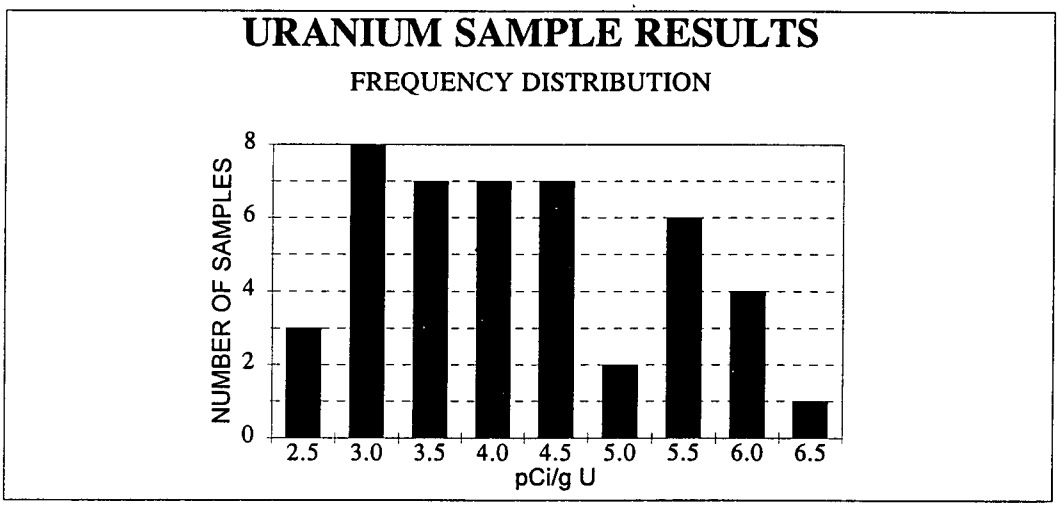
BACKGROUND NOT SUBTRACTED

REVIEWED BY: William F. Rhodes 7-28-95

FILE: FIUBSS95

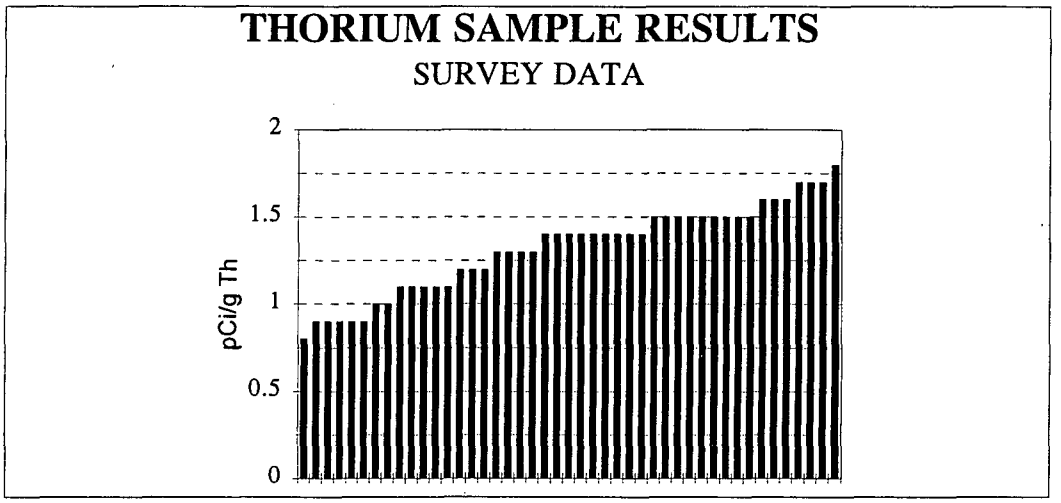
FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'B' (GRID SURVEY SAMPLES)
CIMARRON SOIL COUNTER
URANIUM SOIL SAMPLE RESULTS
SITE BACKGROUND 4 pCi/g URANIUM NOT SUBTRACTED
JANUARY, 1995

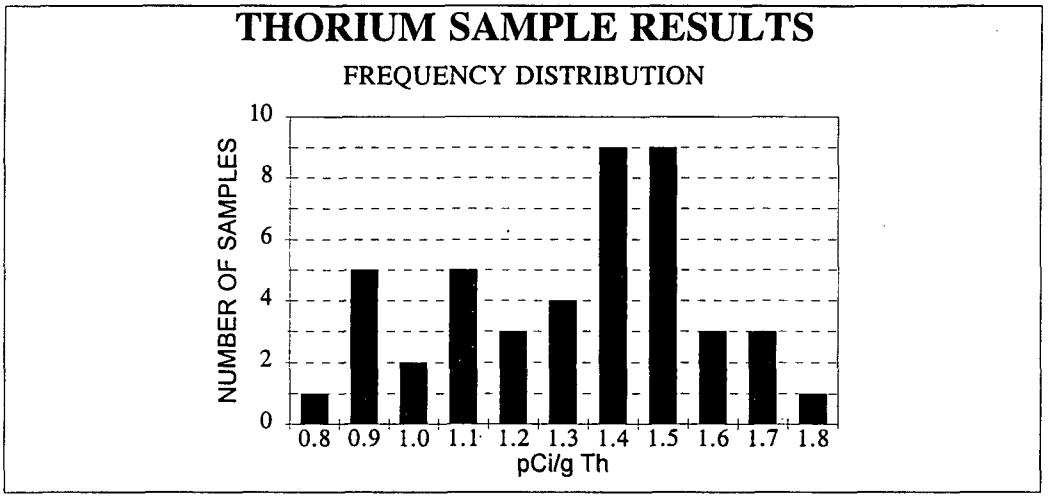




NUMBER OF SAMPLES	45
AVERAGE SAMPLE	4.0
MINIMUM SAMPLE	2.0
MAXIMUM SAMPLE	6.6
STANDARD DEVIATION	1.2

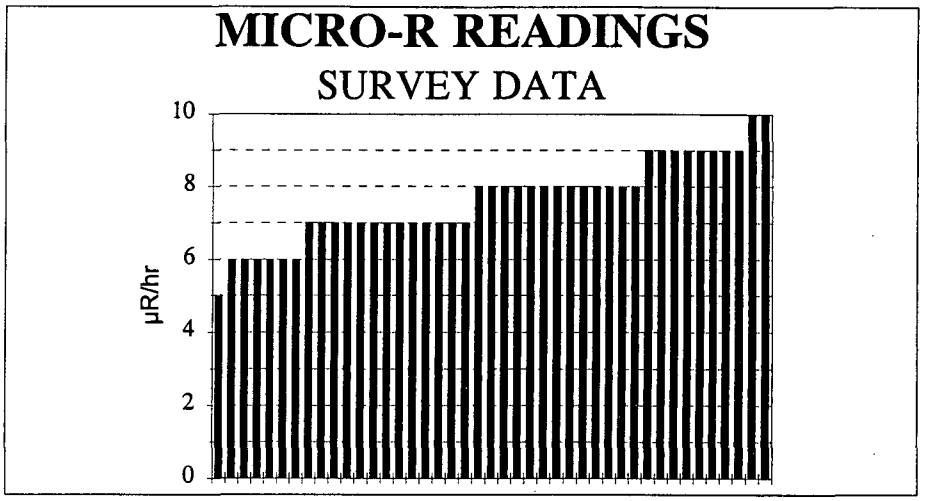
FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'B' (GRID SURVEY SAMPLES)
CIMARRON SOIL COUNTER
THORIUM SOIL SAMPLE RESULTS
SITE BACKGROUND OF 1.5 pCi/g Th NOT SUBSTRACTED
JANUARY, 1995

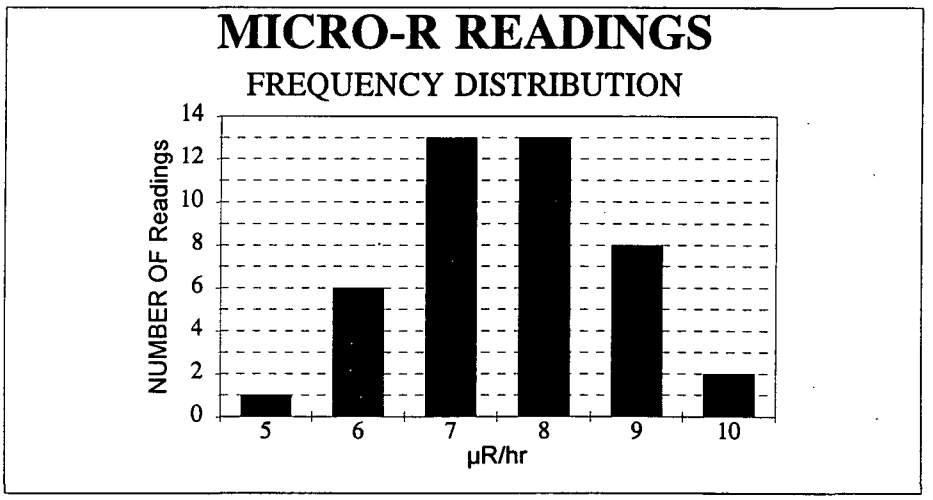




NUMBER OF SAMPLES	45
AVERAGE SAMPLE	1.3
MINIMUM SAMPLE	0.8
MAXIMUM SAMPLE	1.8
STANDARD DEVIATION	0.3

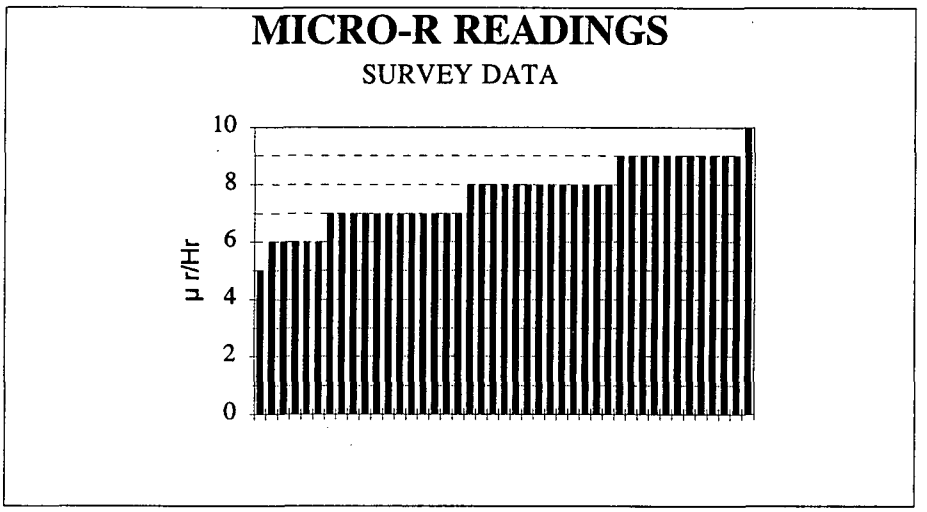
FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'B' (GRID SURVEY READINGS)
MICRO-R METER READINGS AT SURFACE
LUDLUM MODEL 19 S/N 111299
RESULTS IN μ R/hr
SITE BACKGROUND 7-10 μ R/hr
JANUARY, 1995

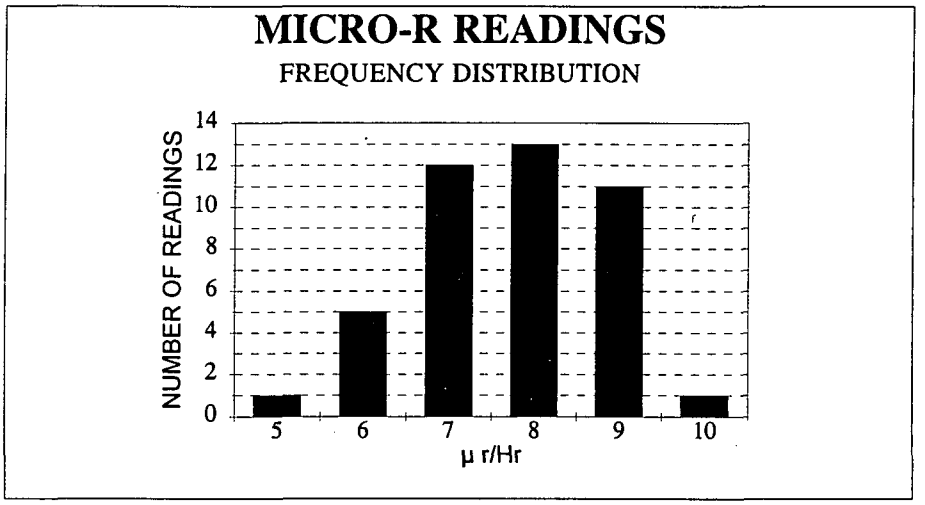




NUMBER OF READINGS	**43**
AVERAGE READINGS	**8**
MINIMUM READINGS	**5**
MAXIMUM READINGS	**10**
STANDARD DEVIATION	**1**

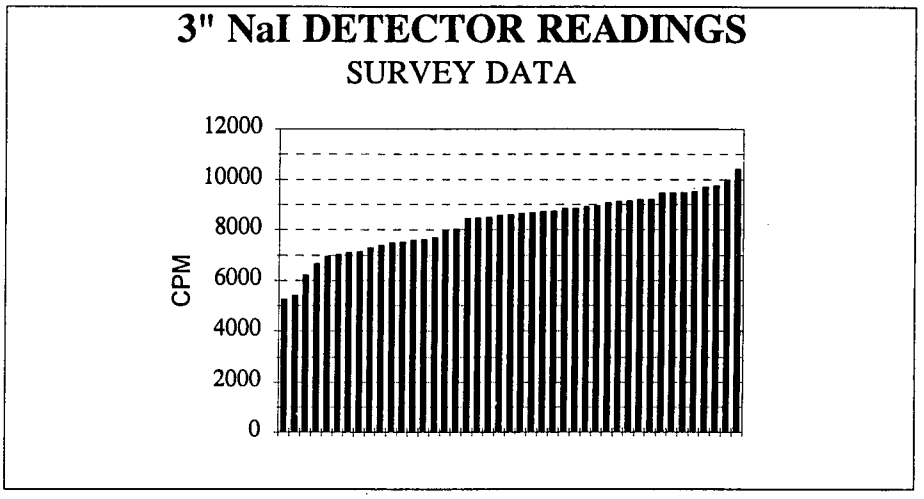
UNAFFECTED AREA 'B' CHARACTERIZATION
SUB-AREA 'B' (GRID SURVEY READINGS)
MICRO-R METER READINGS AT 1 METER ABOVE SURFACE
LUDLUM MODEL 19 S/N 111299
RESULTS IN μR/hr
SITE BACKGROUND 7-10 μR/hr
JANUARY, 1995

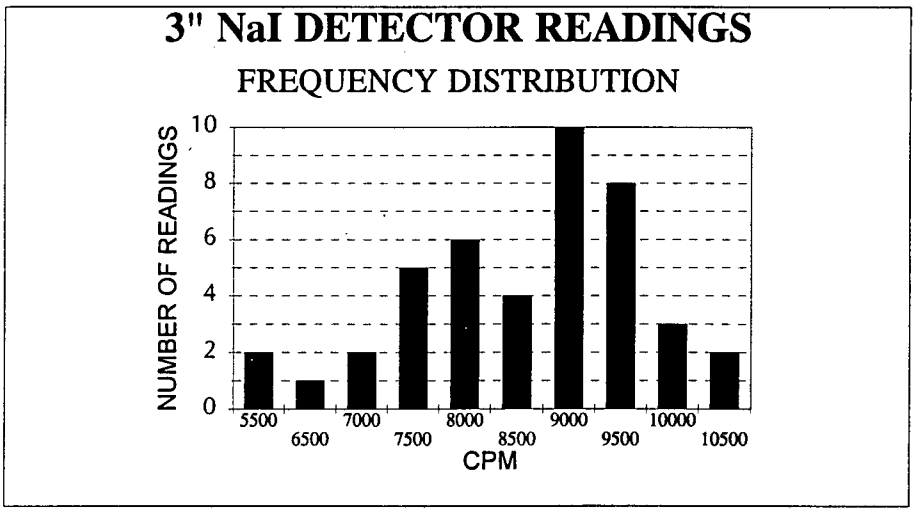




NUMBER OF READINGS	**43**
AVERAGE READING	**8**
MINIMUM READING	**5**
MAXIMUM READING	**10**
STANDARD DEVIATION	**1**

FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'B' (GRID SURVEY READINGS)
GROSS GAMMA READINGS IN CPM
LUDLUM 2220 S/N 48395
UNSHIELDED 3" X 1/2" NaI DETECTOR
BACKGROUND AVERAGE: 8850 CPM
JANUARY,1995





NUMBER OF READINGS	**43**
AVERAGE READING	**8307**
MINIMUM READING	**5259**
MAXIMUM READING	**10431**
STANDARD DEVIATION	**1164**

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'B' BOUNDARY
SWP - 940001

DATE: 1/31/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
620E - 230N	8106	7	7
620E - 240N	8196	8	6
620E - 250N	7806	8	6
620E - 260N	7590	7	6
620E - 270N	7380	8	8
620E - 280N	7542	8	7
620E - 290N	7524	7	7
620E - 300N	7020	7	7
620E - 310N	7228	8	8
620E - 320N	7358	8	7
620E - 330N	7438	7	7
620E - 340N	7674	7	7
620E - 350N	7508	7	7
620E - 360N	8698	8	9
620E - 370N	8636	8	7
620E - 380N	8664	8	9
620E - 390N	8712	9	8
620E - 400N	8856	9	9
620E - 410N	8422	9	7
620E - 420N	8620	9	9
620E - 430N	8812	9	9
620E - 440N	8614	10	9
620E - 450N	8170	9	8
620E - 460N	8272	7	9
620E - 470N	8600	8	9
620E - 480N	8918	9	9
620E - 490N	10514	10	8

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: William F. Rhodes 7-28-95

FILE: FIU2SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'B' BOUNDARY
SWP - 940001

DATE: 1/31/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
620E - 500N	8962	9	9
620E - 510N	8448	9	8
620E - 520N	8452	8	8
620E - 530N	8788	8	8
620E - 540N	8126	8	8
620E - 550N	8070	8	7
620E - 560N	8222	8	9
620E - 570N	8252	8	7
620E - 580N	8190	7	8
620E - 590N	8604	8	8

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: Gilbert T. Rhodes 7-28-95

FILE: FIU2SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'B' BOUNDARY
SWP - 940001

DATE: 1/31/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
600N - 620E	8984	9	8
600N - 630E	9026	9	10
600N - 640E	9336	8	9
600N - 650E	9310	8	9
600N - 660E	9268	9	9
600N - 670E	9264	9	8
600N - 680E	9732	8	9
600N - 690E	9728	9	9
600N - 700E	9036	9	8
600N - 710E	9390	9	9
600N - 720E	8618	8	8
600N - 730E	8248	8	8
600N - 740E	7832	7	8
600N - 750E	7438	7	7
600N - 760E	7804	7	7
600N - 770E	7514	7	7
600N - 775E	6522	7	6
600N - 780E	**LAKE** **WATER**		
600N - 790E			
600N - 800E			
600N - 810E			
600N - 820E			
600N - 830E			
600N - 840E			
600N - 850E			
600N - 860E			
600N - 870E			
600N - 880E	6176	6	6

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: Ludlum T. Rhodes 7-28-95

FILE: FIU2SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'B' BOUNDARY
SWP - 940001

DATE: 1/31/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
580N - 900E	7448	7	7
580N - 910E	7628	7	7
580N - 920E	7014	7	8
580N - 930E	6528	8	7
580N - 940E	7082	8	8
580N - 950E	7460	7	7
580N - 960E	7888	8	8
580N - 970E	8438	8	8
580N - 980E	8374	8	9
580N - 990E	8408	9	9
580N - 1000E	8532	8	8

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIU2SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'B' BOUNDARY
SWP - 940001

DATE: 1/31/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
890E - 590N	5594	6	6
1010E - 590N	8748	8	9
1020E - 595N	8770	8	8
1030E - 600N	9012	9	9
1040E - 605N	9324	8	10
1050E - 610N	9470	9	8
1060E - 615N	8032	9	8
1070E - 620N	8016	9	8
1080E - 625N	8338	8	8
1090E - 630N	8710	8	9
1100E - 635N	8716	9	8
1110E - 640N	8546	8	9
1120E - 645N	9058	10	9
1130E - 650N	9246	8	9
1140E - 655N	8842	8	8
1150E - 660N	8656	8	8
1160E - 665N	8430	8	8
1170E - 670N	7918	8	8
1180E - 675N	7742	8	7
1190E - 680N	7286	7	7

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIU2SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'B' BOUNDARY
SWP - 940001

DATE: 1/31/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
690N - 1200E	6676	7	7
690N - 1210E	6364	7	7
690N - 1220E	6488	6	6
690N - 1230E	6636	7	6
690N - 1240E	7138	7	7
690N - 1250E	7068	7	7
690N - 1260E	7018	7	7
690N - 1270E	6684	6	7
690N - 1280E	6698	6	6
690N - 1290E	7246	7	6
690N - 1300E	5402	6	6
690N - 1310E	5842	5	6
690N - 1320E	5910	6	6
690N - 1330E	5648	6	5
690N - 1340E	5422	6	6
690N - 1350E	6328	5	5
690N - 1360E	5744	5	6
690N - 1370E	6538	5	5
690N - 1380E	6222	5	7
690N - 1390E	6206	6	7
690N - 1400E	5566	6	5
690N - 1410E	5980	6	6
690N - 1420E	5784	5	6
690N - 1430E	5790	5	5
690N - 1440E	**LAKE WATER**		
690N - 1450E			
690N - 1460E			

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIU2SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'B' BOUNDARY
SWP - 940001

DATE: 1/31/95

GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
1470E - 700N	6482	5	5
1470E - 710N	6590	7	5
1470E - 720N	6770	7	6
1470E - 730N	7622	7	7
1470E - 740N	7566	7	7
1470E - 750N	7786	7	8
1470E - 760N	7810	7	7
1470E - 770N	7532	8	8
1470E - 780N	7470	8	8
1470E - 790N	7144	8	8
1470E - 800N	6874	6	7

INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: E Ludlum T. Rhodes 7-28-95

FILE: FIU2SS95

FINAL STATUS SURVEY - PHASE I
CIMARRON FACILITY
BOUNDARY SURVEY

SUB-AREA 'B' BOUNDARY
SWP - 940001

DATE: 1/31/95

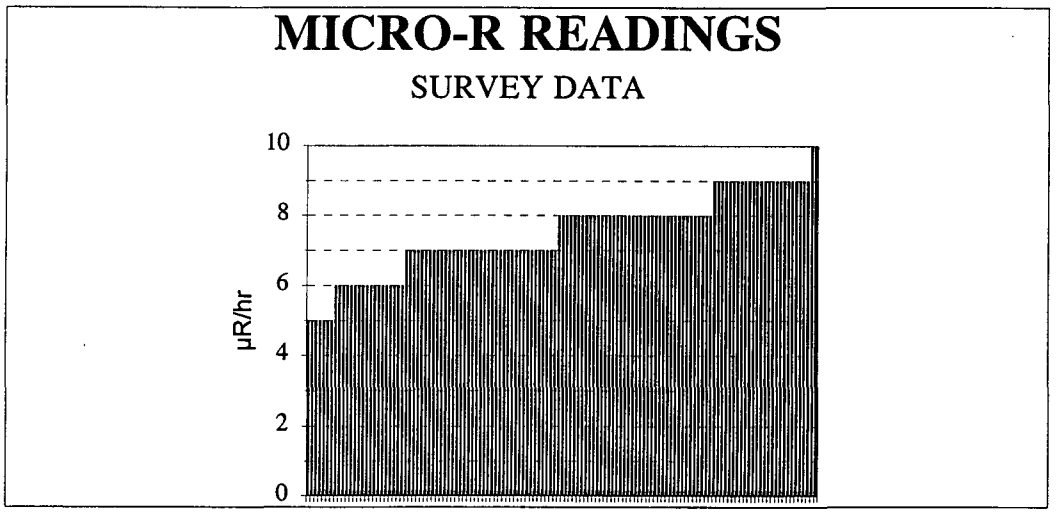
GRID NUMBER	3" NaI DETECTOR C.P.M.	MICRO 'R' 1 METER	MICRO 'R' SURFACE
810N - 1465E	6208	8	7
820N - 1460E	7884	8	8
830N - 1450E	8274	7	8
840N - 1445E	7332	8	8
850N - 1440E	6934	8	7
860N - 1430E	7392	8	7
870N - 1425E	6842	7	7
880N - 1415E	8242	7	7
890N - 1410E	8352	8	8
900N - 1400E	7138	8	7

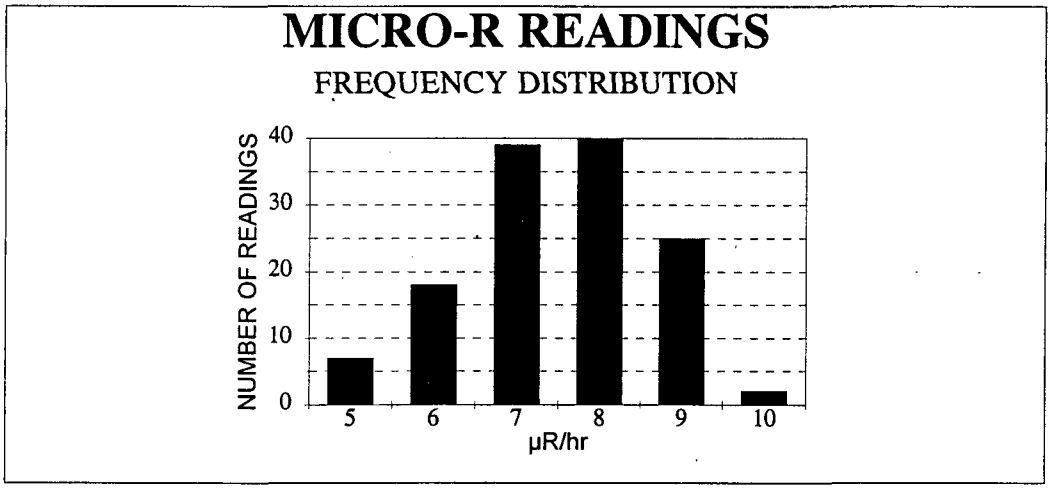
INSTRUMENTS:	RESULTS IN	BACKGROUND/MDA
LUDLUM MICRO 'R' METER - MODEL 19	μR/hr	7-10 / <2
LUDLUM 2220, UNSHIELDED 3" X 1/2" NaI DETECTOR	CPM	8850 AVG / 500

REVIEWED BY: William T. Rhodes 7-28-95

FILE: FIU2SS95

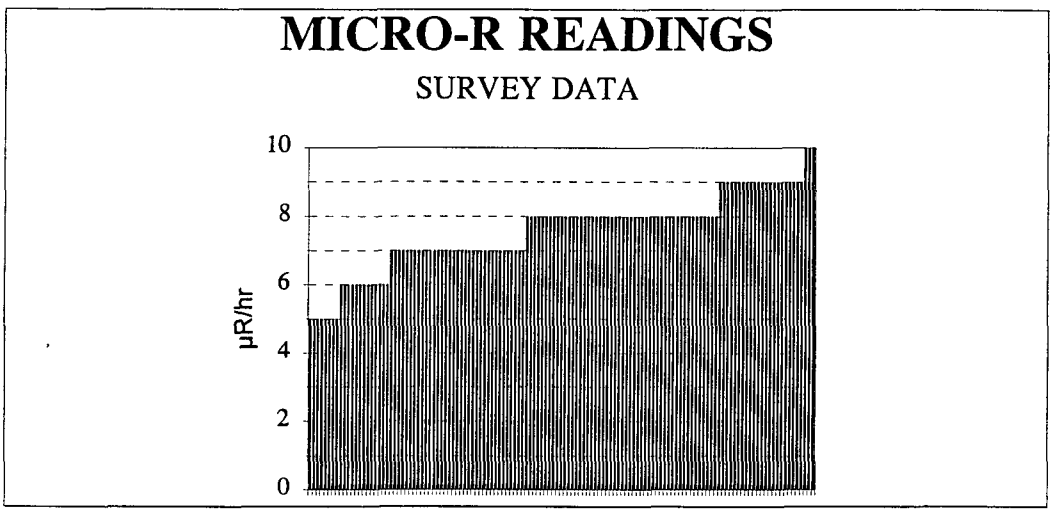
FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'B' (BOUNDARY SURVEY READINGS)
MICRO-R METER READINGS AT SURFACE
LUDLUM MODEL 19 S/N 222399
RESULTS IN μR/hr
SITE BACKGROUND 7-10 μR/hr
JANUARY, 1995

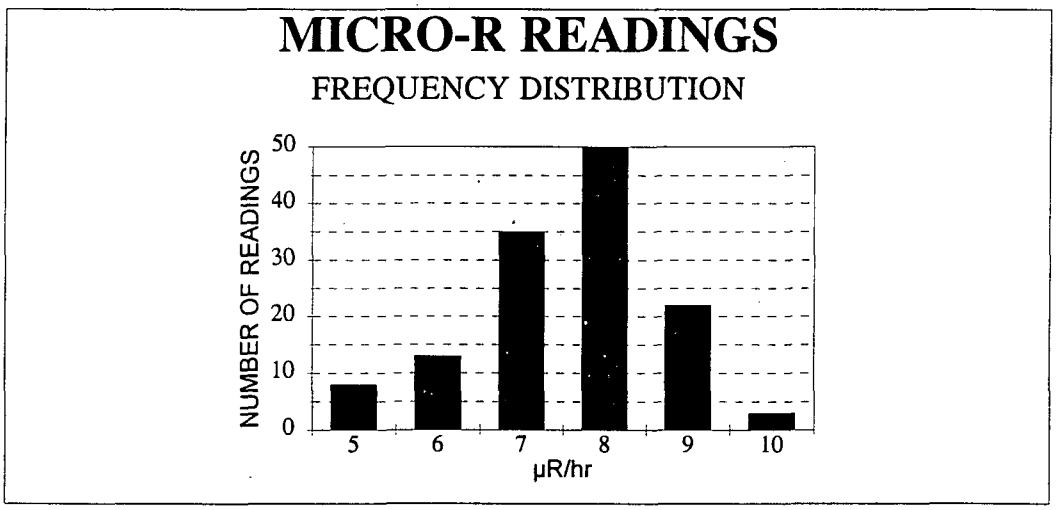




NUMBER OF READINGS	**131**
AVERAGE READING	**7**
MINIMUM READING	**5**
MAXIMUM READING	**10**
STANDARD DEVIATION	**1**

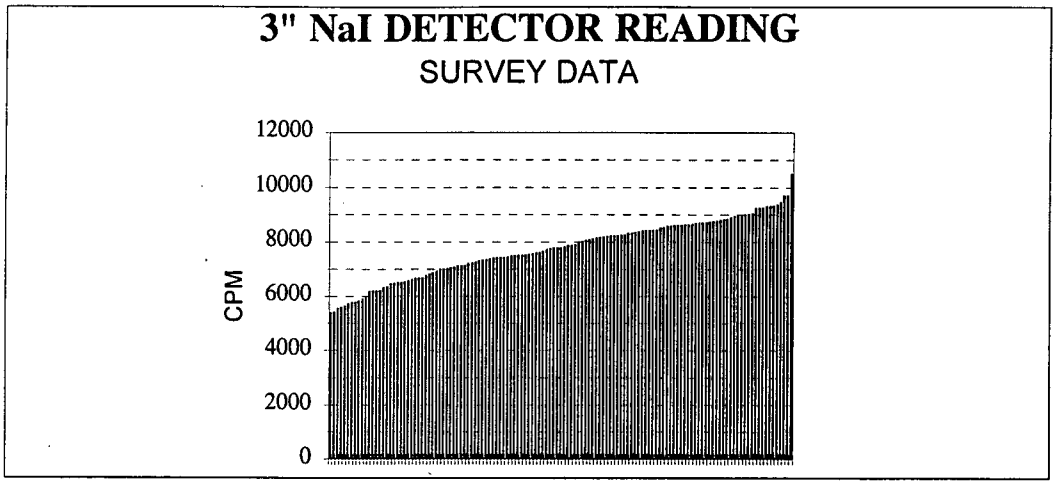
FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'B' (BOUNDARY SURVEY READINGS)
MICRO-R READINGS AT 1 METER ABOVE SURFACE
LUDLUM MODEL 19 S/N 111299
RESULTS IN μR/hr
SITE BACKGROUND 7-10 μR/hr
JANUARY, 1995

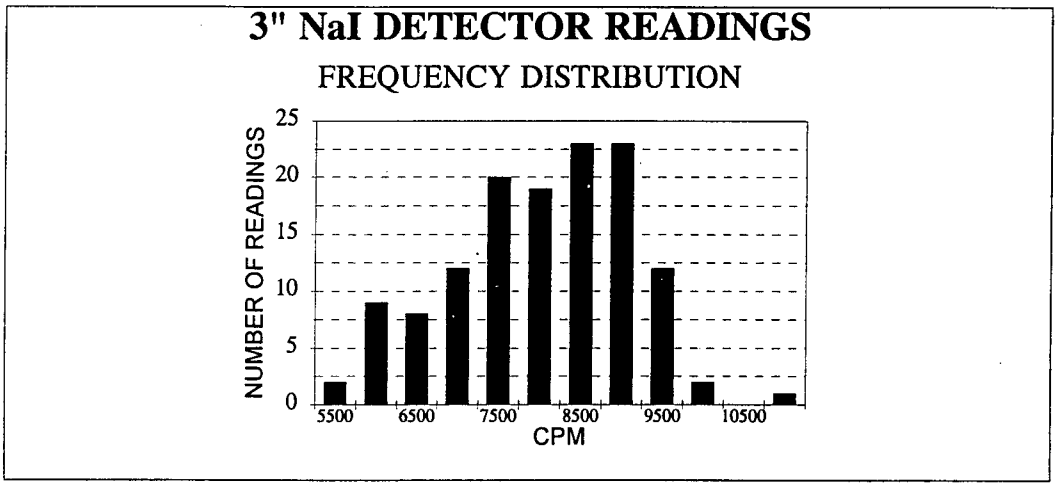




NUMBER OF READINGS	131
AVERAGE READING	8
MINIMUM READING	5
MAXIMUM READING	10
STANDARD DEVIATION	1

FINAL STATUS SURVEY REPORT - PHASE I
SUB-AREA 'B' (BOUNDARY SURVEY READINGS)
GROSS GAMMA READING IN CPM
LUDLUM 2220 S/N 48395
UNSHIELDED 3" X 1/2" NaI DETECTOR
BACKGROUND AVERAGE: 8850 CPM
JANUARY 1995





NUMBER OF READINGS	**131**
AVERAGE READING	**7,757**
MINIMUM READING	**5,402**
MAXIMUM READING	**10,514**
STANDARD DEVIATION	**1,082**