CHASE ENVIRONMENTAL GROUP, INC.
environmental engineering and consulting

FINAL STATUS SURVEY PLAN FOR UNAFFECTED AREAS

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

License Number: SNM-928

Prepared for:

Kerr-McGee Corporation
Oklahoma City, Oklahoma

October 1994

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FINAL STATUS SURVEY PLAN
FOR UNAFFECTED AREAS

CIMARRON CORPORATION FACILITY
CRESCENT, OKLAHOMA

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REFERENCES

1. Cimarron Corporation Special Nuclear Material License, SNM-928, Docket No. 070-00925, Amendment No. 9, dated December 28, 1992.

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

3. NRC letter February 5, 1993 from Mr. Richard E. Cunningham, NRC, to Mr. J. C. Stauter, Cimarron Corporation.

4. Radiological Characterization Report for Cimarron Corporation's Former Nuclear Fuel Fabrication Facility, Crescent, Oklahoma. Chase Environmental Group, Inc., October, 1994.

5. Confirmatory Radiological Survey of the Former Burial Ground, Cimarron Corporation Facility, Crescent, Oklahoma. B. M. Smith, Oak Ridge Associated Universities, July, 1992.

6. Branch Technical Position for Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations. 46 Federal Register 52061, October 23, 1981.

FINAL STATUS SURVEY PLAN FOR UNAFFECTED AREAS

1.0 Purpose

This plan, in accordance with the requirements of NUREG/CR 5849, is being submitted as a final status survey plan for the unaffected areas of this site. It is this survey which will provide the data to demonstrate that all radiological parameters are satisfied for unrestricted use for the site unaffected areas. Per NUREG/CR 5849, unaffected areas are areas "not expected to contain residual radioactivity, based upon knowledge of site history and previous survey information".

The purpose of this plan is to briefly discuss the characterization data generated to date for the designated unaffected areas and recommend additional surveying and sampling for these areas. Based upon the survey and sample results, Cimarron Corporation will submit a final status survey report to the NRC with a license amendment request to delete the unaffected areas from the Cimarron Facility License, SNM-928.

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 Kerr-McGee Corporation, whose principal address is Kerr-McGee Center, Oklahoma City, Oklahoma, possessed the Special Nuclear Materials (SNM) Licenses required to operate the two facilities. The 1,100 acre Cimarron Facility site was originally licensed under two SNM Licenses. License SNM-928[1] was issued in 1965 for the Uranium Plant (U-Plant) 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 for 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 No. SNM-1174 and contained within the bounds of the U-Plant from License SNM-928.

The tasks involving characterization, decontamination and decommissioning for the U-Plant, which were initiated in 1976, are still ongoing. The goal of the decommissioning effort is to release the entire 1,100 acre site for unrestricted use. Based upon historic knowledge of site operations and the characterization

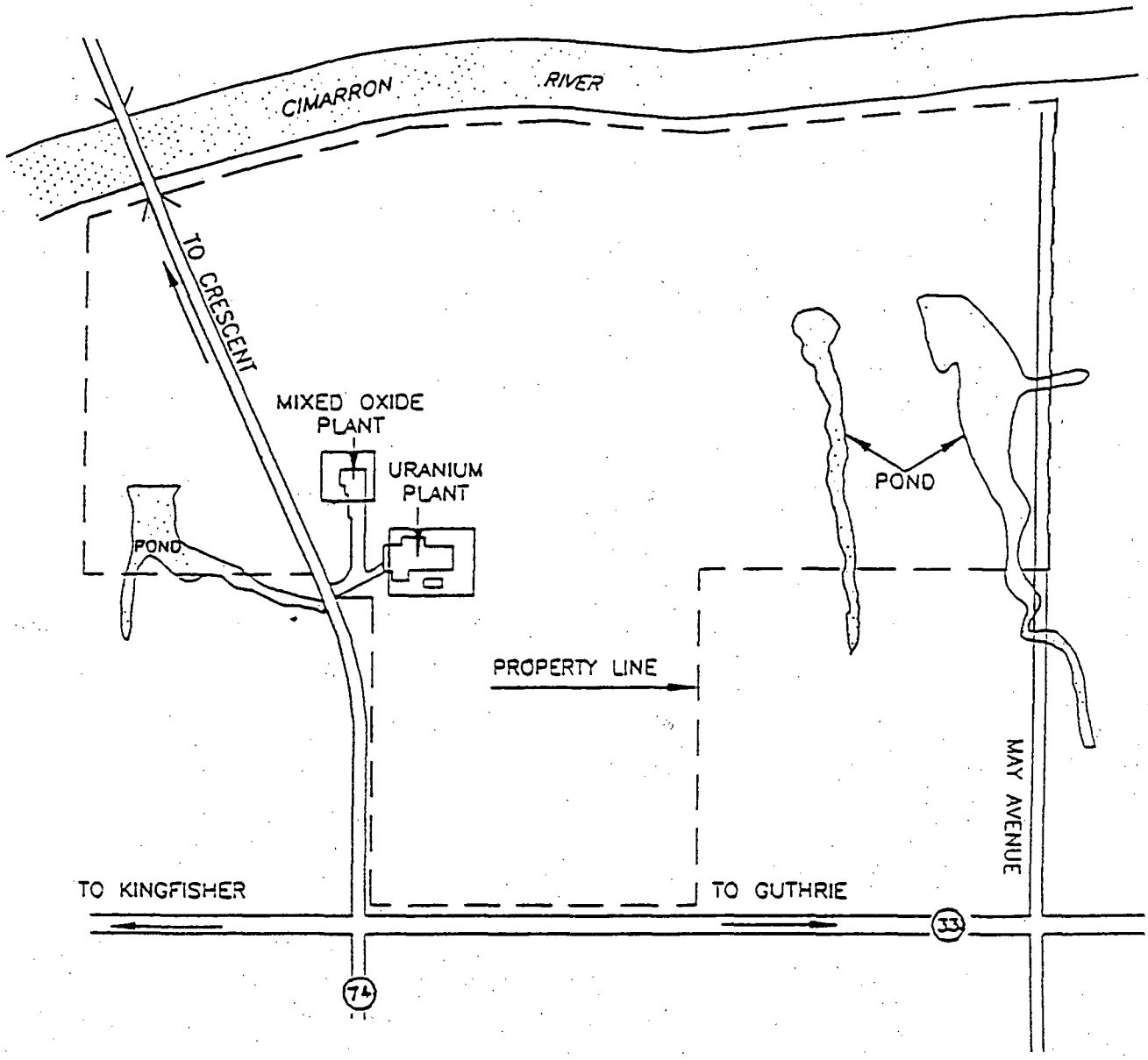
work completed to date, the site can now be divided into affected and unaffected areas. The Site Characterization Report (October 1994)[4] details the extensive survey and soil sampling completed to date for the entire 1,100 acre site.

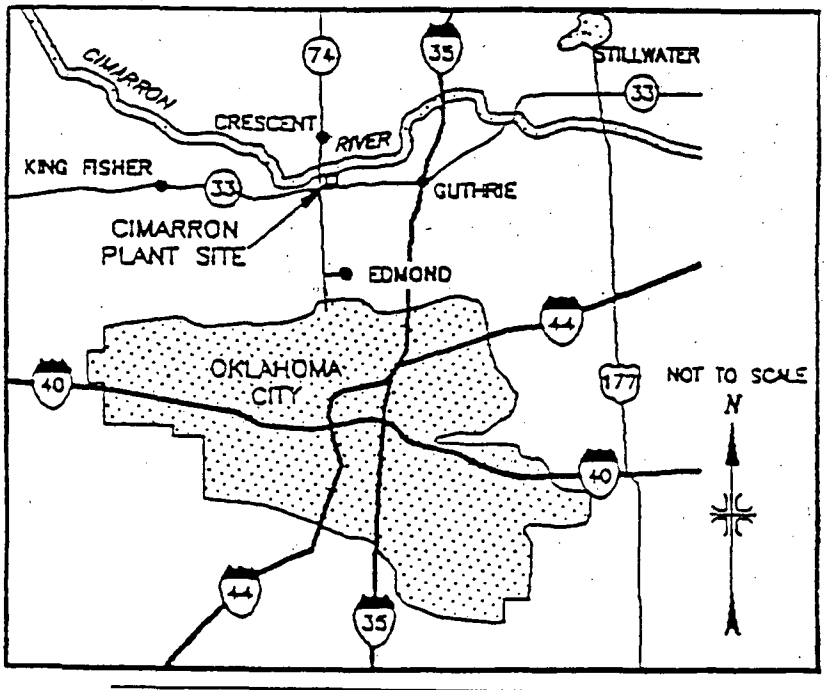
3.0 Site Description

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 1,100 acre site is located in an area of low, rolling hills and incised drainages. Local elevations range between about 940 feet along the river to 1,010 feet Mean Sea Level at the plant. The county is primarily rural with an economy primarily based upon agriculture. The entire site is owned by Kerr-McGee Corporation, the parent company of Cimarron Corporation.

4.0 Facility Description

The 1,100 acre site, at one time, has included several one-story sheet metal buildings, five process related collection ponds, two original sanitary lagoons, one new sanitary lagoon, a waste incinerator, several uncovered storage areas, reservoirs and three burial grounds. These areas (referred to as "units") are currently at differing stages of completion with respect to decommissioning. Also included on the site is the decommissioned MOFF building and surrounding restricted area. The general layout of the site is shown on Drawing No. 94MOST-RF7. With the exception of Reservoirs #2 and #3, which were used for process make-up water only, all remaining units discussed above are considered affected areas. Also included within these affected units are several drainage areas and the site road to the old burial area (Burial Area #1). The remainder of the site is considered unaffected by past site operations and should satisfy current NRC guidelines for unrestricted use. The affected areas are shown on Drawing No. 94MOST-RF2. This plan addresses the majority of the unaffected area. The remainder of the Cimarron site (affected and unaffected are





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Cimarron Corporation
Crescent Oklahoma Facility
Location Map
Figure 3.1

Only a small portion of the licensed 1,100 acre Cimarron site was actually utilized for processing of fuel, product storage, liquid waste evaporation, waste storage, and on-site waste disposal. A majority of the 1,100 acre site area was not contaminated by licensed radioactive material as there is no known instance in which licensed material, including waste from licensed processing, was placed in or discharged to any of the designated unaffected areas. The Cimarron Characterization Report indicates that these areas do not contain residual radioactivity. Additional surveys and sampling are proposed herein to provide final confirmation in order to obtain a release of the unaffected areas from License SNM-928.

6.0 Radiological Survey Overview

6.1 Characterization Data:

As discussed above, only a small portion of the licensed 1,100 acre Cimarron site was utilized for the processing of fuel, product storage, liquid waste evaporation, waste storage and on-site waste disposal. A Micro-R Survey was performed in 1979 to provide an initial characterization (scoping survey) of the entire site. The results of this survey are plotted on Drawings No. 79PRSAUR-0 and 79PRSBUR-0. All survey readings were, in general, at background levels as shown on referenced Drawing No. 79PRSAUR-0. Survey results shown on Drawing No. 79PRSBUR-0, which included the restricted area, show several areas within the restricted area with levels above background. These areas are not included as part of the unaffected areas.

Cimarron personnel completed an extensive pre-remediation soil sampling program for the restricted area surrounding the Uranium Building in 1990. This soil sampling program was conducted on a 10m x 10m grid with samples collected from 0 to 4 feet in depth. The analytical results are shown on Drawings No. 90PRUYSS-0 through 90PRUYSS-4. This sampling event was also used to delineate affected versus unaffected areas. As shown on the drawings, all areas of elevated radioactivity fall within the affected area.

The areas on the site which have been characterized and/or decontaminated fall within the designated affected areas and are discussed in detail in the Characterized Report. These areas are briefly discussed below:

- Uranium Process Buildings and Equipment - The decontamination and decommissioning of the uranium processing equipment and buildings began in 1977. Equipment has either been decontaminated and/or removed,

or is in the final process of being decontaminated and/or removed. A number of the walls and floor sections have been removed. Surfaces have been washed, scraped, chipped and/or scabbled to remove surface contamination. Subfloor drains and contaminated soils have also been excavated and removed. Some of these areas have been released by the NRC for backfilling. The Uranium Building (Building #1) is still in the process of being decontaminated. The general layout of this building is shown by Figure 6.1. The Liquid Storage Building (Building #2) has been dismantled and removed. The Solvent Extraction Building (Building #3) and the Vaporizer Room concrete floor have also been dismantled and removed. The Uranium Warehouse building (Building #4), which was not used as part of the fuel cycle process, is currently being utilized by Kerr-McGee for nonnuclear process development.

- Burial Area #1 - This burial area was constructed in 1965 and was opened for disposal of radioactive waste in 1966, including thorium-contaminated waste from the Kerr-McGee Cushing Facility. Burial Area #1 was closed and capped in 1970. From 1986 through 1988 the trenches were excavated and the previously disposed waste was shipped off-site for disposal to a licensed LLRW disposal facility. Based upon confirmatory surveys[5], the NRC released Burial Area #1 for backfilling with clean soil on December 28, 1992.

- Burial Area #2 - This area was utilized in the 1970's for the disposal of on-site generated industrial solid waste. During an investigation of this area in 1990, there were indications that radioactive waste materials may be present in this burial area. Remediation of this area began in 1991. Additionally, BTP Option #2[6] soil may still be present in this area and will be characterized and removed as required.

- Burial Area #3 - This area was originally constructed for disposal of non-radioactive solid waste materials. However, the 1990 soil sampling program and gamma survey completed within this area indicated that radioactive waste materials may be present in this buried waste. The initial 1990 survey led to a more in-depth characterization of the area, removal of radioactive waste materials, and the need for final characterization of this area in the future.

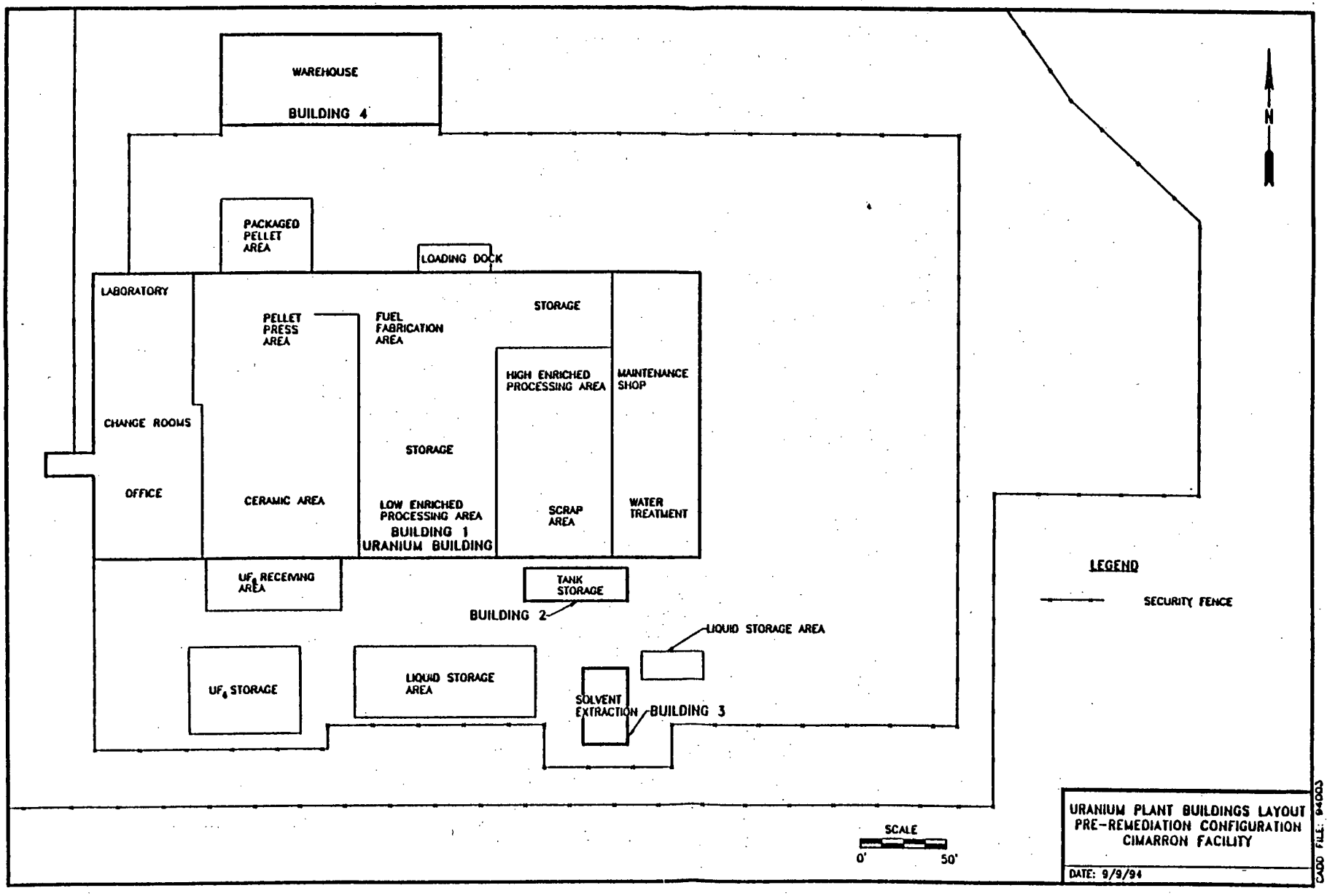
WAREHOUSE
BUILDING 4
PACKAGED PELLET AREA
LOADING DOCK
LABORATORY
PELLET PRESS AREA
FUEL FABRICATION AREA
STORAGE
HIGH ENRICHED PROCESSING AREA
MAINTENANCE SHOP
CHANGE ROOMS
STORAGE
OFFICE
CERAMIC AREA
LOW ENRICHED PROCESSING AREA
SCRAP AREA
WATER TREATMENT
BUILDING 1
URANIUM BUILDING
UF6 RECEIVING AREA
TANK STORAGE
BUILDING 2
LIQUID STORAGE AREA
UF6 STORAGE
LIQUID STORAGE AREA
SOLVENT EXTRACTION
BUILDING 3
N
LEGEND
SECURITY FENCE
SCALE
0'
50'
URANIUM PLANT BUILDINGS LAYOUT
PRE-REMEDIATION CONFIGURATION
CIMARRON FACILITY
DATE: 9/9/94

Figure 6.1

- Trash Incinerator - This incinerator was utilized for the incineration of non-radioactive waste materials released from restricted areas during site operations. It was located just east of the New Sanitary Lagoon. Due to significant concentration of materials due to the incineration, uranium concentrations slightly above background levels were present in the ash. The ash materials were surveyed, and if required, placed in drums and shipped off-site to a commercial LLRW disposal facility in 1992. The incinerator was dismantled in 1992.

- East & West Sanitary Lagoon - These non-lined ponds received all liquid waste from the U-Plant from 1966 through 1970. These lagoons were remediated in 1986, with final surveys conducted by Cimarron personnel in September, 1990. Confirmatory surveys and soil sampling was conducted by ORAU in November, 1990. The NRC authorized backfilling of these two lagoons under Amendment #9 of License SNM-928, issued December, 1992.

- New Sanitary Lagoon - This lagoon is hypalon-lined and was installed in January, 1986, to replace the East and West Sanitary Lagoons. The New Sanitary Lagoon was utilized from early 1986 to October, 1992. This lagoon is now isolated and only rainwater is being collected. This area will be further characterized prior to closure.

- Five Former Waste Water Ponds - The five former waste water ponds, (Uranium Waste Ponds #1 and #2, the Plutonium Evaporation and Emergency Ponds, and the Uranium Emergency Pond), were all closed by the end of 1979. The sludge within the ponds was treated, packaged and transported to a commercial low-level radioactive waste disposal facility. The five ponds were sampled by the NRC in 1977 after remediation and released by letter dated July 10, 1978, prior to backfilling. Follow-up characterization work has been performed on Uranium Waste Pond #1 and #2 areas by Cimarron.

- Drain Lines - The areas occupied by the former drain lines to the Sanitary Lagoons, Evaporation Ponds, Uranium Waste Ponds, and the two lines to the Cimarron River are considered part of the affected area. These drain lines have been removed and the areas have been surveyed.

- Reservoir No. 1 - This reservoir received runoff from the U-Plant restricted area. This reservoir, including the drainage area, has been characterized.

- Drainage Areas - Several drainage areas are also included in the affected areas as they either received drainage from a process area or had concrete which was surveyed and released from the U-Plant placed in these areas for erosion control.

- MOFF Plant and yard - This facility was licensed under SNM-1174 which was terminated by the NRC in February, 1993. The termination of License No. 1174 did not alter SNM License No. SNM-928. Because the land formerly licensed under SNM-1174 is contained within the bounds of SNM-928, the area has been included within the affected area for uranium contamination only.

- On Site Roads - The roads from the U-Plant restricted area to the former Burial Ground #1 area were utilized for the transport of waste to the restricted area stockpile. For this reason, it has been included in the affected area.

Based upon site history and the extensive amount of characterization data generated to date, the Cimarron site has been divided into areas that are considered to be affected and unaffected. The affected and unaffected areas of the site are shown on Drawing No. 94MOST-RF2. Of the 1,100 acre site, approximately 60 acres are considered to be affected areas, with the remaining 1,040 acres being considered unaffected areas. A portion of the 1,040 acres will be sampled and surveyed in accordance with this Plan to demonstrate that these unaffected areas satisfy NRC guidelines for unrestricted use.

6.2 Survey Objective:

The unaffected areas which are included under this plan for additional sampling and surveying are shown on Drawing No. 94MOST-RF3. The unaffected acreage has been sectioned into five areas which are designated as Sections A, B, C, D and E.

The specific objective of this plan is to supplement existing characterization data with additional surveys and soil sampling at systematically selected locations. The radiological parameters for the additional surveys and soil sampling will be compared to the final status survey data as follows:

a. Volumetric Activity of Soil - The guidelines for residual concentrations of uranium in soil is within the acceptable level specified in Table 2, Option #1 Radioactivity Concentration Levels for enriched uranium. This Table is contained in the USNRC Branch Technical Position, "Disposal Onsite of Thorium or Uranium Waste from Past Operations", 46 FR 52601, October, 1981[6]. Concentrations may be averaged over a 100 m^2 grid area. At any discrete location, the maximum radionuclide concentration above background may not exceed 3 times the Option #1 limit. The enriched uranium limit in Table 2 for Option #1 material is 30 pCi/g above background.

b. Gamma Surface Scan - Survey readings in counts per minute at twice background would indicate an area requiring additional sampling. Background measurements for land areas should be taken at locations on-site or in the immediate vicinity of the site which have not been affected by past site operations.

c. Exposure Rate - Exposure rates may not exceed 10 μR/hr above background at 1 m above the surface. The Option #1 limit of 30 pCi/g for enriched uranium is based upon an EPA Cleanup Standard which limits radiation to 10 μR/hr above background from direct external exposure. Exposure rates may be averaged over a 100 m^2 grid area. The maximum exposure rate over any discrete area of less that 100 m^2 may not exceed 20 μR/hr above background. Background exposure rates were determined during a 1988 Oak Ridge Associated Universities (ORAU) survey to average 10 μR/hr. This result is discussed in the Confirmatory Radiological Survey Report of the Former Burial Ground[5].

6.3 Identification of Contaminants:

Based upon the knowledge of past site operations, the results of a preliminary characterization survey, and other measurements, the radiological contaminants on the site consist of U-238 and U-235. 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 is approximately 2.7 weight percent. However, there is no evidence of residual contamination in the unaffected areas.

Burial Area #1 is located within the affected area and received thorium contaminated waste from the Cushing Facility. This Burial area was opened in 1965 and closed in 1970. Due to settling problems, Kerr-

McGee made the decision to excavate the area and ship all the waste to a licensed low-level disposal facility. The excavation and removal of all waste occurred between 1986 and 1988. Confirmatory soil sampling and surveys by ORAU were completed in December, 1991, with a final report issued in July, 1992. Based upon this report, the NRC released Burial Area #1 for backfilling with clean soil through the issuance of Amendment #9 of License SNM-928. Additionally, during the excavation of Burial Area #2, waste containing thorium at a concentration of 150 pCi/g was discovered. This material has been excavated, packaged and shipped off site to a low level radioactive waste (LLRW) disposal facility. As thorium was never processed on-site, there is no need to sample for thorium in the unaffected areas.

6.4 Site Background Levels:

Background exposure rates average 10 μR/h for the Cimarron site as determined during a 1988 ORAU survey. Six readings were taken at locations off-site but within the vicinity of the facility. The readings were taken at 1 meter above the surface.

Natural soil background for uranium has been verified numerous times by the Cimarron Counting Laboratory located on-site. One example is the data derived from the 1991 Cimarron annual environmental soil samples. Eleven (11) locations on the Cimarron site and surrounding areas were sampled (sample locations #1401 through #1418). From each of the eleven (11) locations, a composite was created from soils collected at the surface and at a depth of ten (10) inches. A total of twenty-two (22) samples were analyzed by the Cimarron Laboratory. Sixteen (16) samples from eight (8) locations, 0.5 and 1.0 miles from the plant, were utilized for determining background. The sample analytical results indicated average background concentrations of 6.5 pCi/g total uranium and 1.7 pCi/g thorium. The sample analytical results for total uranium ranged from 3.03 pCi/g to 10.96 pCi/g and from 0.83 pCi/g to 2.45 pCi/g for thorium. Additional sampling continues to confirm that background is approximately 6.0 pCi/g total uranium and 1.5 pCi/g thorium.

Background levels will be subtracted from total activity concentrations to determine the net residual activity concentration. Instruments utilized to determine total activity concentrations shall have sensitivities equal to or greater than those utilized for background determination.

Per NUREG/CR-5849, 6 to 10 measurements for the parameters of concern will be performed at background locations which were unaffected by site operations. The background sample locations will be

selected from the predominant upwind direction at the outer boundary of the site near the property line.

7.0 Administration

7.1 Organization:

The final survey of the unaffected areas will be performed by a team composed primarily of qualified personnel from the Cimarron Facility with contractor assistance if required. The team will operate under the general direction of the Project Manager. The Project Manager will have the authority to make appropriate changes to the survey plan as the survey progresses.

Field measurements of radiological parameters and sample collection will be under the direction of the Health Physics Supervisor who will report to the Project Manager. He/she will also oversee the activities of any contract field assistance.

Additionally, laboratory activities for in-house analysis will be under the direction of the Health Physics Supervisor. He/she will also oversee the activities of any contract laboratory assistance. All activities required under this plan will be performed in accordance with the Cimarron Radiation Protection Procedures. These procedures are specific with respect to survey and analytical equipment operation.

7.2 Training:

Cimarron Corporation provides continuing training for Cimarron personnel and others (i.e., contractors) who may be exposed to radioactive materials. All members of the final status survey team will attend an in-house training session prior to commencement of work under this plan. The survey procedures and quality assurance requirements will be reviewed during this training session.

7.3 Radiation Protection:

Cimarron Corporation maintains a radiation protection program in accordance with all regulatory requirements. While the unaffected areas subject to this plan have been demonstrated by characterization surveys to be free of contamination, Cimarron staff will exercise appropriate radiation protection precautions throughout the conduct of this survey.

8.0 Final Survey Procedure

8.1 General:

As discussed in previous sections, the unaffected areas have been divided into five individual tracts of land encompassing the major portion of the 1,040 acre unaffected area. These tracts include only open land and contain no building structures. Each of the five individual tracts of land will be surveyed and soil samples taken as generally described herein.

8.2 Instrumentation:

The portable instrumentation available at Cimarron for use during the Final Status Survey are listed in Table 8.1 along with the detector sensitivities for the instrumentation (MDA).

Calibration of field instrumentation will be maintained in accordance with appropriate Cimarron Radiation Protection Procedures. Instrument operational and background checks will be performed as specified by these procedures.

The soil sample analyses will be performed with the on-site multi-channel analyzer utilizing an EG&G Ortec Abcam Computer Analysis Program. The detector is a 4"x 4"x 16" sodium iodide crystal. The lead lined cabinet measures 25" wide by 44" tall by 25" deep. A 500 ml sample bottle of soil is placed on a turntable inside the lead lined cabinet and rotated at approximately one RPM during counting. The detector is mounted 2.5 inches from the center of the rotating sample. The count data obtained from the emitted radiations of the soil sample is printed out for documentation.

Quality assurance measures to ensure proper equipment function and precise results include Cs-137 source centroid checks, Chi-square tests, background count trending and efficiency determinations.

Peak centroid checks are performed prior to sample counting using an NIST traceable Cs-137 pencil source. This check ensures that the energy calibration remains constant with respect to the Cs-137 peak and indicates when adjustment of the detector high voltage supply may be necessary.

Chi-square tests are performed upon initial equipment set-up, after repairs and/or maintenance are performed, and after relocation or movement of the detector and/or electronics. In addition, Chi-square

TABLE 8.1

RADIATION MONITORING INSTRUMENTS

INSTRUMENT TYPE	NUMBER AVAILABLE	RADIATION DETECTED	SCALE RANGE	BKG	TYPICAL MDA 95% CONFIDENCE LEVEL
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	<.01 mR/h	<0.2 mR/h
3" x 1/2" Nal Scintillation Detector Digital Scaler	3	Gamma	0 - 500,000 cpm	3,000 cpm shielded 6,800 cpm unshielded	N/A
435 cm gas flow (43-27) Digital Scaler	1	Alpha	0 - 500,000 cpm	<10 cpm	20 dpm/100 cm^2
100 cm gas flow (43-68) Digital Scaler	1	Alpha	0 - 500,000 cpm	<10 cpm	100 dpm/100 cm^2
60 cm 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
60 cm^2 Personnel Room Monitor (RM-3C)	5	Alpha	0 - 50,000 cpm	<100 cpm	350 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	200 cpm
Ludlum 2 GM Tube (Pancake)	2	Beta, Gamma	0 - 500,000 cpm 720 cpm = 0.2 mR/h	<200 cpm	200 cpm
Tennelec LB5100 Computer Based Auto Sample Counter	1	Alpha Beta	0 - 99,999,999 cpm	<0.3 cpm 1.5 cpm	0.41 dpm 1.54 dpm
Ludlum Dirt Probe 1 1/2" x 4" Nal (T1) Detector	2	Gamma	0 - 500,000 cpm	20,000 cpm	N/A
Soil Counter - Computer Linked 4" x 4" x16" Nal (T1) Detector	1	Gamma	---	6 pCi/g U 1.5 pCi/g Th	3.32 pCi/g U 0.66 pCi/g Th
100 cm Gas Flow Digital Scaler	2	Beta, Gamma	0 - 10,000 cpm	<300 cpm	570 dpm/100 cm^2
Ludlum 2" GM Tube (Pancake)	1	Alpha-Beta Gamma	0-500,000 cpm	<200 cpm	N/A

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tests are performed on a monthly basis. The Chi-square test is an indication of deviation from the Gaussian distribution and can reveal problems due to faulty instrumentation.

Background counts are obtained daily when the soil counting system is in use. Trending of background data provides indications of interferences due to sources of radioactivity located near the counting system and possible problems with the instrumentation.

Quality assurance measures also include the counting of three soil standards. These standards are derived from actual soil matrices from the Cimarron Facility. Concentrations for the standards are based upon analysis results from independent off-site laboratories. The soil standards were selected to ensure counting reproducibility over the range of concentrations found at the Cimarron Facility. Concentrations of total uranium in the three soil standards are approximately 28 pCi/g, 135 pCi/g, and 290 pCi/g. The standards are counted daily when the soil counter is in use.

Control charts are maintained to ensure that quality assurance parameters remain within normal limits. Results outside 2 sigma are investigated to ensure that they are due to normal statistical deviation. Values outside 3 sigma require additional investigation as they are not likely to be based upon normal statistical fluctuations.

As part of Cimarron Corporation's quality assurance program, split soil samples are routinely sent off-site to independent laboratories for comparison with on-site analysis results. Two soil samples from each of the five (5) unaffected areas (total of 10) will be split for submission to an independent off-site laboratory for confirmatory analysis.

8.3 Survey Plan

8.3.1 Grid Areas:

For purposes of identification, the five unaffected areas are designated as Areas A through E, as shown on Drawing No. 94MOST-RF3. The 100m x 100m grid system shown on this drawing will be utilized for locating soil sampling and survey points for this plan. The 0.0 grid point is located just south and slightly west of the main Uranium Building at N9730.41072, E10064.44825.

8.3.2 Survey Locations:

The five unaffected areas, addressed by this plan, each border a portion of the affected areas of the site as shown on Drawing No. 94MOST-RF3. The border of the five unaffected areas located adjacent to affected areas will be 100% surveyed at 1m above the surface for gamma utilizing a Micro-R meter. Additionally, these borders will be scanned with a 3" x 1/2" unshielded NaI Scintillation Detector and the readings recorded in counts per minute. The specific instruments to be used will be selected by the Health Physics Supervisor. The technician will walk the border and survey an area approximately 2 meters in width. The highest reading found within each approximate ten (10) meter distance is to be recorded. Survey performance, documentation, and record retention will be in accordance with the Cimarron Radiation Protection Procedures. Should any of these survey readings exceed the limit discussed in Section 6.2, their location will be flagged for subsequent soil sampling.

Additionally, within each of the five unaffected areas, at the intersect of each 100m grid location, a survey will be completed at 1m above ground surface for ambient radiation using a Micro-R meter and an unshielded 3" x 1/2" NaI detector.

8.3.3 Soil Sample Locations:

A surface soil sample, 0 to 6 inches deep, will be obtained from each 100m grid intersect located within each of the five unaffected areas. Within each unaffected area, the following number of soil samples will be collected, composited and analyzed by the Cimarron Facility on-site laboratory.

Unaffected Area	No. Soil Samples
A	69
B	63
C	66
D	14
E	82

The number of samples may vary in areas C, D and E as several of the northern grid intersects (shown on Drawing 94MOST-RF3) may be within the Cimarron River. In addition, actual site conditions (i.e. Highway #74) may dictate that sample locations be adjusted slightly from those locations shown on the Drawings.

Soil samples will also be collected and analyzed on-site for each border survey location which exceeds the limits specified in Section 6.2 for either the μR/hr survey or the unshielded detector survey.

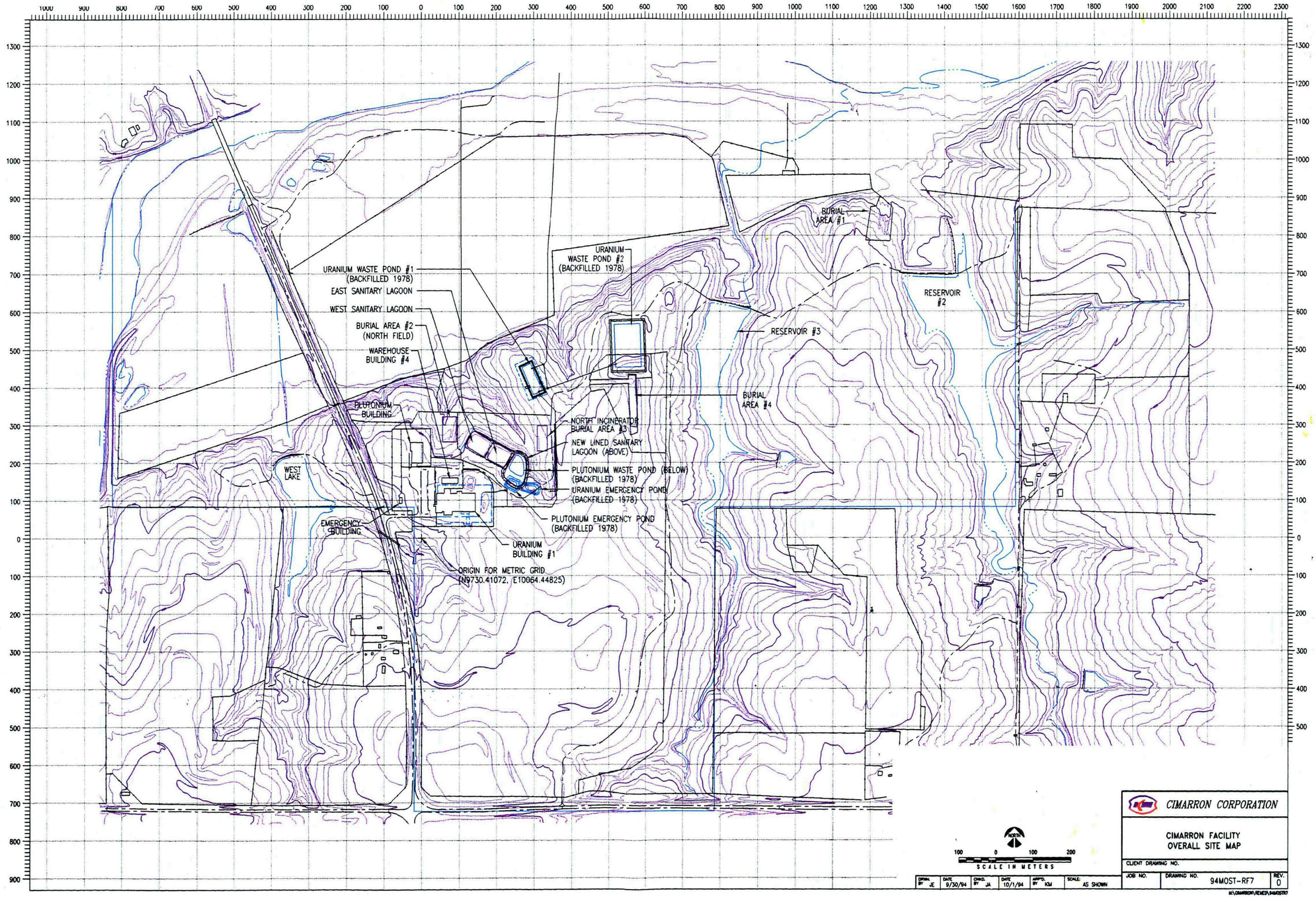
9.0 Data Interpretation

The measured survey data in μR/hr and cpm for each area will be reviewed along with the 1979 survey data for comparison. Background will be subtracted to determine net measurements.

Soil sample data will also be compared to the Option #1 unrestricted release limit of 30 pCi/g for enriched uranium. In the event that concentrations are above the stated release limits, additional surveys and sampling will be performed within the surrounding area. Weighted average values for exposure rates and soil concentrations will be determined in accordance with NUREG/CR-5849. If the average weighted value (at a 95% confidence level) exceeds the guideline value, that portion of the unaffected area will become an affected area and will be addressed in the site decommissioning plan.

10.0 Report

A report will be prepared which describes the results of the Final Status Survey for the five unaffected areas. This report will be submitted to the NRC with a license amendment request for release of these unaffected areas from License SNM-928.



CIMARRON CORPORATION

CIMARRON FACILITY
OVERALL SITE MAP

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APPD. BY	SCALE:
JE	9/30/94	JA	10/1/94	KM	AS SHOWN

JOB NO.	DRAWING NO.	REV.
	94MOST-RF7	0

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URANIUM WASTE POND #1 (BACKFILLED 1978)

EAST SANITARY LAGOON

WEST SANITARY LAGOON

BURIAL AREA #2 (NORTH FIELD)

WAREHOUSE BUILDING #4

PLUTONIUM BUILDING

WEST LAKE

EMERGENCY BUILDING

URANIUM WASTE POND #2 (BACKFILLED 1978)

BURIAL AREA #1

RESERVOIR #2

RESERVOIR #3

BURIAL AREA #4

NORTH INCINERATOR BURIAL AREA #3

URANIUM EMERGENCY POND (BACKFILLED 1978)

PLUTONIUM EMERGENCY POND (BACKFILLED 1978)

URANIUM BUILDING #1

ORIGIN FOR METRIC GRID (N9730.41072, E10064.44825)

NORTH

100 0 100 200

SCALE IN METERS

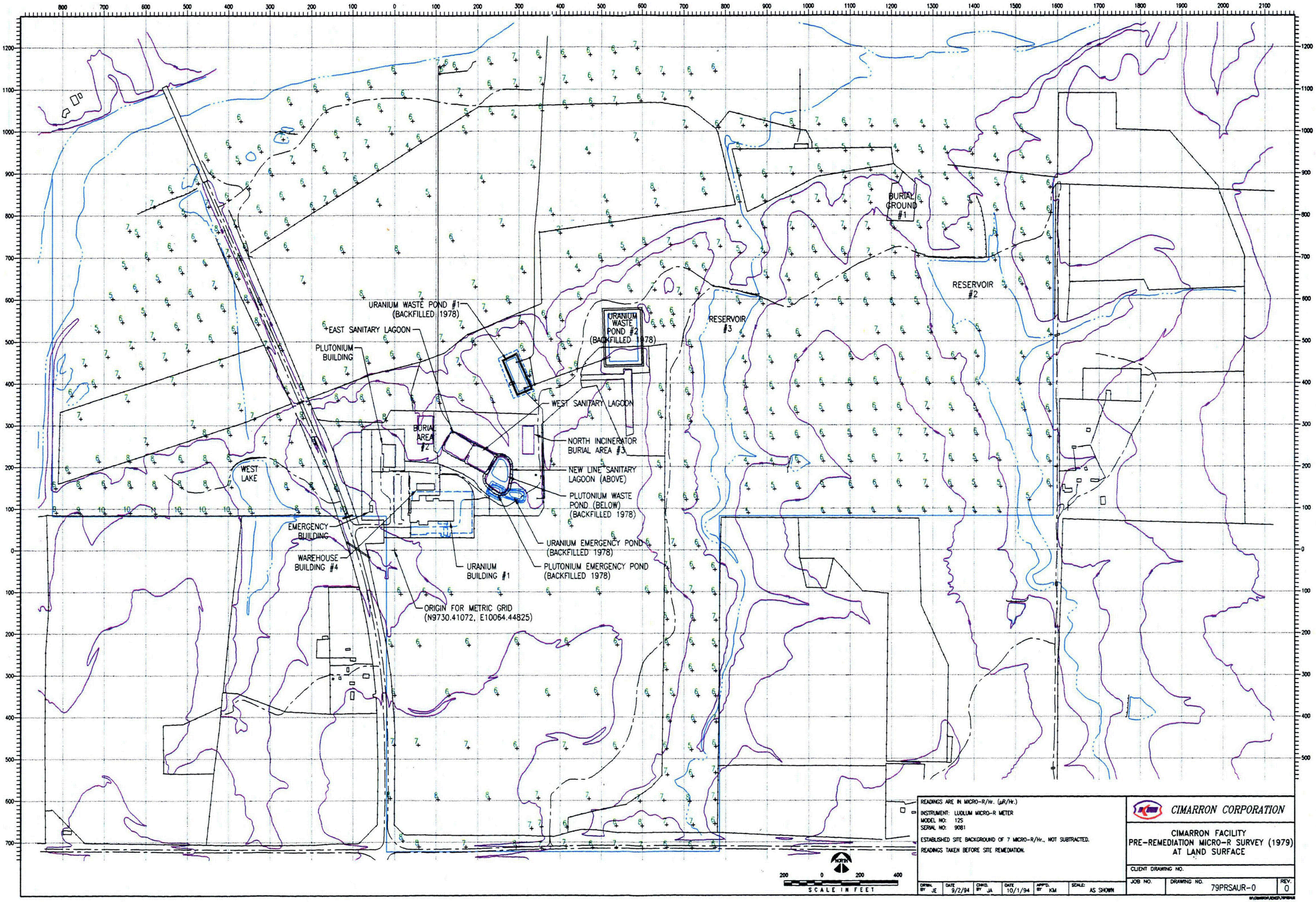
CIMARRON CORPORATION

CIMARRON FACILITY
AFFECTED AREAS MAP

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APPD. BY	SCALE:
JE	10/10/94	JA	10/10/94	KM	AS SHOWN

JOB NO.	DRAWING NO.	REV.
	94MOST_RF2	0



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.

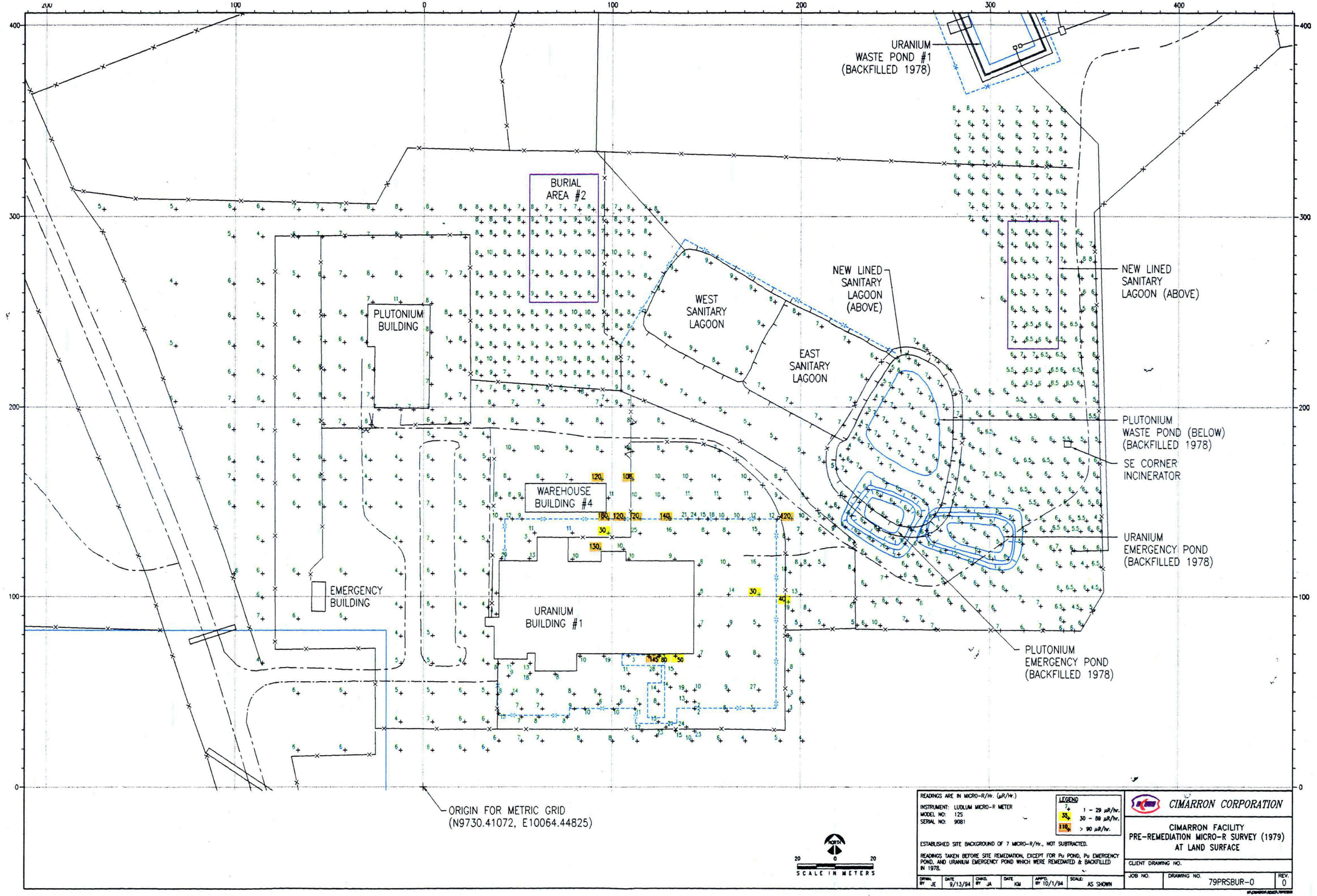
CIMARRON CORPORATION

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

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APPD. BY	SCALE:
JE	9/2/94	JA	10/1/94	KM	AS SHOWN

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



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, EXCEPT FOR Pu POND, Pu EMERGENCY POND, AND URANIUM EMERGENCY POND WHICH WERE REMEDIATED & BACKFILLED IN 1978.

LEGEND
7 1 - 29 μR/Hr.
35 30 - 89 μR/Hr.
110 > 90 μR/Hr.

CIMARRON CORPORATION

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

CLIENT DRAWING NO.

DRWN. BY	DATE	CHKD. BY	DATE	APPD. BY	DATE	SCALE:
JE	9/13/94	JA	KM		10/1/94	AS SHOWN

JOB NO.	DRAWING NO.	REV.
	79PRSBUR-0	0

URANIUM WASTE POND #1 (BACKFILLED 1978)

NORTH INCINERATOR BURIAL AREA #3

BURIAL AREA #2

NEW LINED SANITARY LAGOON (ABOVE)

PLUTONIUM BUILDING

WEST SANITARY LAGOON

EAST SANITARY LAGOON

PLUTONIUM WASTE POND (BELOW) (BACKFILLED 1978)

SE COR INCINERATOR

WAREHOUSE BUILDING #4

PLUTONIUM EMERGENCY POND (BACKFILLED 1978)

URANIUM BUILDING #1

URANIUM EMERGENCY POND (BACKFILLED 1978)

EMERGENCY BUILDING

300

200

100

0

NORTH

20 0 20

SCALE IN METERS

READINGS ARE IN PICO-CURIES PER GRAM URANIUM (pCi/g U).
CIMARRON GAMMA SPEC SOIL COUNTER.
SITE SOIL BACKGROUND OF APPROXIMATELY 6 pCi/g U, NOT SUBTRACTED.

SAMPLES TAKEN ON 10 METER X 10 METER GRID.
SAMPLES TAKEN BEFORE REMEDIATION.

LEGEND
6 1 - 29 pCi/g U
53 30 - 89 pCi/g U
109 > 90 pCi/g U

DRWN. BY	DATE	CHKD. BY	DATE	APPD. BY	SCALE:
JE	9/14/94	JA	10/1/94	KM	AS SHOWN

CIMARRON CORPORATION

CIMARRON FACILITY
URANIUM PLANT AREAS
PRE-REMEDIATION SOIL SAMPLE RESULTS (1990)
SOIL SAMPLE ALIQUOT: 0"-6" DEEP

CLIENT DRAWING NO.

JOB NO.	DRAWING NO.	REV.
	90PRUYSS-0	0

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URANIUM WASTE POND #1 (BACKFILLED 1978)

NORTH INCINERATOR BURIAL AREA #3

BURIAL AREA #2

NEW LINED SANITARY LAGOON (ABOVE)

PLUTONIUM BUILDING

WEST SANITARY LAGOON

EAST SANITARY LAGOON

PLUTONIUM WASTE POND (BELOW) (BACKFILLED 1978)

SE COR INCINERATOR

WAREHOUSE BUILDING #4

PLUTONIUM EMERGENCY POND (BACKFILLED 1978)

URANIUM BUILDING #1

URANIUM EMERGENCY POND (BACKFILLED 1978)

EMERGENCY BUILDING

READINGS ARE IN PICO-CURIES PER GRAM URANIUM (pCi/g U).
CIMARRON GAMMA SPEC SOIL COUNTER.
SITE SOIL BACKGROUND OF APPROXIMATELY 6 pCi/g U, NOT SUBTRACTED.
SAMPLES TAKEN ON 10 METER X 10 METER GRID.
SAMPLES TAKEN BEFORE REMEDIATION.

LEGEND
1 - 29 pCi/g U
30 - 89 pCi/g U
> 90 pCi/g U

NORTH
20 0 20
SCALE IN METERS

DRWN. BY	DATE	CHKD. BY	DATE	APPD. BY	SCALE
JE	9/14/94	JA	10/1/94	KM	AS SHOWN

CIMARRON CORPORATION

CIMARRON FACILITY
URANIUM PLANT AREAS
PRE-REMEDIATION SOIL SAMPLE RESULTS (1990)
SOIL SAMPLE ALIQUOT: 6"-1' DEEP

CLIENT DRAWING NO.

JOB NO.	DRAWING NO.	REV.
	90PRUYSS-1	0

URANIUM WASTE POND #1 (BACKFILLED 1978)

NORTH INCINERATOR BURIAL AREA #3

BURIAL AREA #2

NEW LINED SANITARY LAGOON (ABOVE)

PLUTONIUM BUILDING

WEST SANITARY LAGOON

EAST SANITARY LAGOON

PLUTONIUM WASTE POND (BELOW) (BACKFILLED 1978)

SE COR INCINERATOR

WAREHOUSE BUILDING #4

PLUTONIUM EMERGENCY POND (BACKFILLED 1978)

URANIUM EMERGENCY POND (BACKFILLED 1978)

URANIUM BUILDING #1

EMERGENCY BUILDING

300

200

100

0

READINGS ARE IN PICO-CURIES PER GRAM URANIUM (pCi/g U).
CIMARRON GAMMA SPEC SOIL COUNTER.
SITE SOIL BACKGROUND OF APPROXIMATELY 6 pCi/g U, NOT SUBTRACTED.

SAMPLES TAKEN ON 10 METER X 10 METER GRID.
SAMPLES TAKEN BEFORE REMEDIATION.

LEGEND
6 1 - 29 pCi/g U
53 30 - 89 pCi/g U
109 > 90 pCi/g U

NORTH

20 0 20
SCALE IN METERS

CIMARRON CORPORATION

CIMARRON FACILITY
URANIUM PLANT AREAS
PRE-REMEDIATION SOIL SAMPLE RESULTS (1990)
SOIL SAMPLE ALIQUOT: 1'-2' DEEP

CLIENT DRAWING NO.

DRFTD. BY	DATE	CHKD. BY	DATE	APPD. BY	SCALE	JOB NO.	DRAWING NO.	REV.
JE	9/14/94	JA	10/1/94	KM	AS SHOWN		90PRUYSS-2	0

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URANIUM WASTE POND #1 (BACKFILLED 1978)

NORTH INCINERATOR BURIAL AREA #3

NEW LINED SANITARY LAGOON (ABOVE)

BURIAL AREA #2

PLUTONIUM BUILDING

WEST SANITARY LAGOON

EAST SANITARY LAGOON

PLUTONIUM WASTE POND (BELOW) (BACKFILLED 1978)

SE COR INCINERATOR

PLUTONIUM EMERGENCY POND (BACKFILLED 1978)

URANIUM EMERGENCY POND (BACKFILLED 1978)

WAREHOUSE BUILDING #4

URANIUM BUILDING #1

EMERGENCY BUILDING

158

38 60

268

34

35

300

200

100

0

READINGS ARE IN PICO-CURIES PER GRAM URANIUM (pCi/g U).
CIMARRON GAMMA SPEC SOIL COUNTER.
SITE SOIL BACKGROUND OF APPROXIMATELY 6 pCi/g U, NOT SUBTRACTED.
SAMPLES TAKEN ON 10 METER X 10 METER GRID.
SAMPLES TAKEN BEFORE REMEDIATION.

LEGEND
1 - 29 pCi/g U
30 - 89 pCi/g U
> 90 pCi/g U

NORTH
20 0 20
SCALE IN METERS

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:
JE	9/14/94	JA	10/1/94	KM	AS SHOWN

CIMARRON CORPORATION

CIMARRON FACILITY
URANIUM PLANT AREAS
PRE-REMEDIATION SOIL SAMPLE RESULTS (1990)
SOIL SAMPLE ALIQUOT: 2'-3' DEEP

CLIENT DRAWING NO.

JOB NO.	DRAWING NO.	REV.
	90PRUYSS-3	0

URANIUM WASTE POND #1 (BACKFILLED 1978)

NORTH INCINERATOR BURIAL AREA #3

BURIAL AREA #2

NEW LINED SANITARY LAGOON (ABOVE)

PLUTONIUM BUILDING

WEST SANITARY LAGOON

EAST SANITARY LAGOON

PLUTONIUM WASTE POND (BELOW) (BACKFILLED 1978)

SE COR INCINERATOR

WAREHOUSE BUILDING #4

PLUTONIUM EMERGENCY POND (BACKFILLED 1978)

URANIUM BUILDING #1

URANIUM EMERGENCY POND (BACKFILLED 1978)

EMERGENCY BUILDING

READINGS ARE IN PICO-CURIES PER GRAM URANIUM (pCi/g U).
CIMARRON GAMMA SPEC SOIL COUNTER.
SITE SOIL BACKGROUND OF APPROXIMATELY 6 pCi/g U, NOT SUBTRACTED.

SAMPLES TAKEN ON 10 METER X 10 METER GRID.
SAMPLES TAKEN BEFORE REMEDIATION.

LEGEND
1 - 29 pCi/g U
30 - 89 pCi/g U
> 90 pCi/g U

SCALE IN METERS

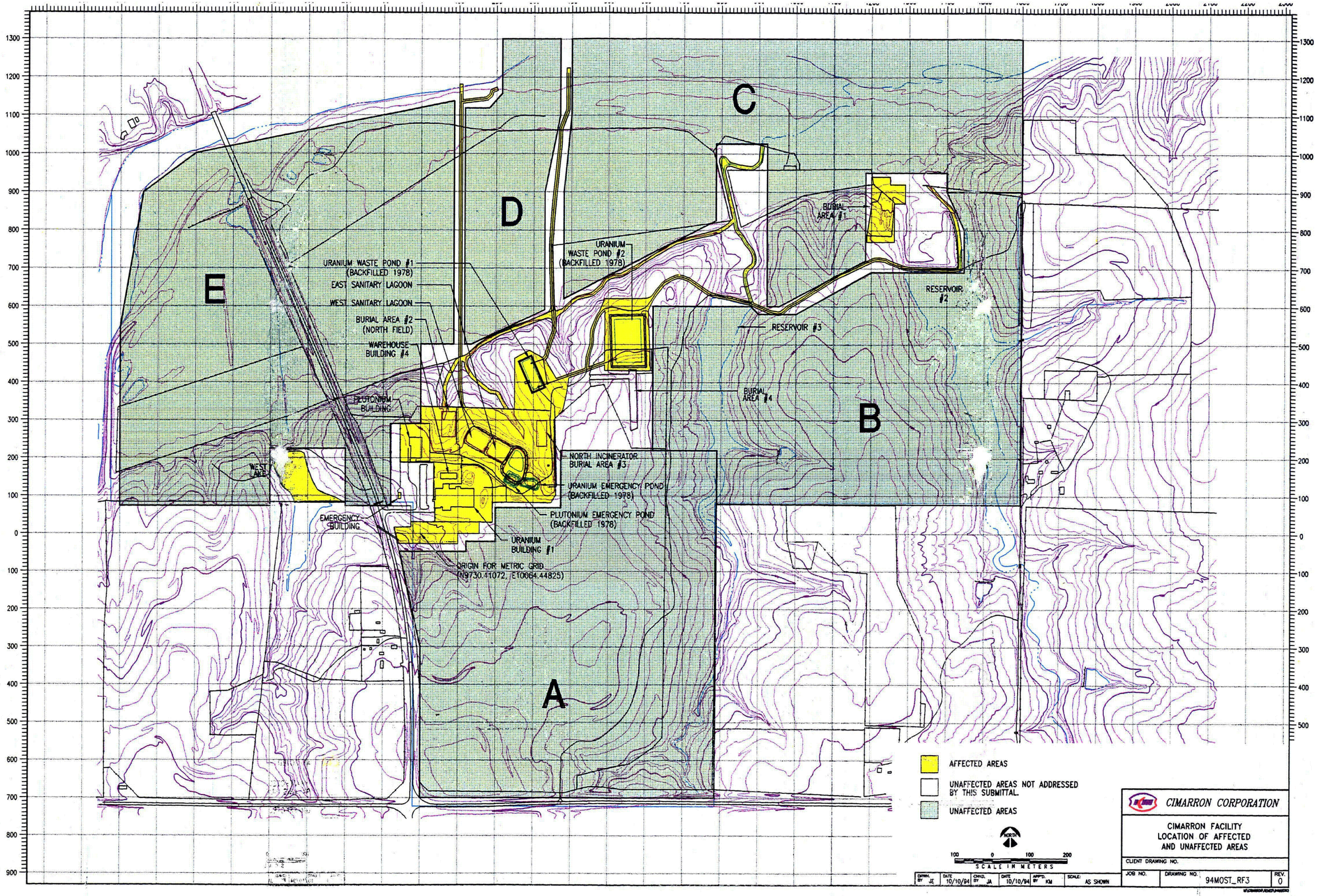
DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE
JE	9/14/94	JA	10/1/94	KM	AS SHOWN

CIMARRON CORPORATION

CIMARRON FACILITY
URANIUM PLANT AREAS
PRE-REMEDIATION SOIL SAMPLE RESULTS (1990)
SOIL SAMPLE ALIQUOT: 3'-4' DEEP

CLIENT DRAWING NO.

JOB NO.	DRAWING NO.	REV.
	90PRUYSS-4	0



CIMARRON CORPORATION

CIMARRON FACILITY
LOCATION OF AFFECTED AND UNAFFECTED AREAS

DRWN. BY	DATE	CHKD. BY	DATE	APP'D. BY	SCALE:
JE	10/10/94	JA	10/10/94	KM	AS SHOWN

CLIENT DRAWING NO.

JOB NO.	DRAWING NO.	REV.
	94MOST_RF3	0