



CHASE ENVIRONMENTAL GROUP, INC.
environmental engineering, remediation & consulting

FINAL STATUS SURVEY PLAN FOR PHASE II AREAS

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

License Number: SNM-928

Prepared for:

**Kerr-McGee Corporation
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TABLE OF CONTENTS

1.0	Purpose.....	1
2.0	Background	1
3.0	Site Description.....	3
4.0	Facility Description.....	3
5.0	History of Site Operations	3
6.0	Phase II Radiological Survey Overview	5
6.1	Identification of Contaminants	5
6.2	Site Background Levels	5
6.3	Characterization Data.....	7
6.4	Survey Objective	13
6.4.1	Buildings and Equipment.....	13
6.4.2	Volumetric Activity of Soil	14
6.4.3	Gamma Surface Survey (Open Land Areas)	15
6.4.4	Exposure Rate Survey (Open Land Areas).....	15
7.0	Administration	16
7.1	Organization.....	16
7.2	Training	16
7.3	Radiation Protection Program.....	16
7.4	Cimarron Quality Assurance Program	17
8.0	Phase II Final Status Survey Overview	19
8.1	General.....	19
8.2	Existing Characterization Data	19
8.3	Survey Plan Grid Areas	19
8.4	Surveys (Open Land Areas)	21
8.5	Soil Sample Locations	21
8.6	Building/Surface Surveys	22
8.6.1	Emergency Building (Interior)	22
8.6.2	Emergency Building (Exterior)	23
8.6.3	Emergency Building (Tanks)	23
8.6.4	MOFF Building (Exterior).....	24
8.6.5	Building #4 (Interior and Exterior).....	24
8.6.6	Paved Surfaces/Concrete Walkways	24

8.7	Concrete Rubble Utilized for Erosion Control.....	24
8.8	Reservoir #1 - Sediment/Water Sampling	25
8.9	Instrumentation	26
8.9.1	Survey Instrumentation	27
8.9.2	Unshielded 3" x 0.5" NaI Gamma Detector.....	27
8.9.3	Soil Counter (Gamma Spectroscopy)	27
9.0	Data Validation.....	28
9.1	Field Survey Data (Portable Instrumentation).....	28
9.2	Laboratory Analytical Data (On-site).....	28
10.0	Report	29

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

1.0 Purpose

This Plan is the second phase (Phase II) of the Final Status Survey Plan being submitted by Cimarron Corporation to the NRC for areas of the Cimarron site as part of the on-going 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. Phase I has been submitted to and approved by the Nuclear Regulatory Commission (NRC) and was titled "Final Status Survey Plan for Unaffected Areas". The results of this Phase II survey will provide the data to demonstrate that all radiological parameters are satisfied for unrestricted release of all Phase II areas. The Final Status Survey Plan for Phase II includes both affected and unaffected areas of the Cimarron site.

This Plan describes the characterization data generated to date for both affected and unaffected areas. Where required, this Plan also provides a description of additional surveying and sampling to be conducted in certain areas. All of the existing characterization data and any additional characterization data will be compiled and submitted in a final status survey report to the NRC. This report will be submitted in conjunction with a license amendment request for the unrestricted release of all Phase II areas from Cimarron 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 840 acre Cimarron Facility site was originally licensed under two separate SNM Licenses. License SNM-928¹ was issued in 1965 for the Uranium Plant (U-Plant) and License SNM-1174² was issued in 1970 for the Mixed Oxide Fuel Fabrication (MOFF) Facility. Both facilities operated through 1975, at which time they were shut down and decommissioning work was initiated.

Decommissioning efforts at the MOFF Facility were completed in 1990 and Cimarron Corporation applied to the NRC on August 20, 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 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),⁴ 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 area are shown on Drawing No. 95MOST-RF3.

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 subdivided into smaller sections (i.e. A, B, C, D, etc.).

As presented in the Cimarron Decommissioning Plan,⁵ the Final Status Survey Plan (Phases I, II and III) was discussed in general terms. Each of these three phases will be submitted to the NRC under separate cover for approval.

The first of these three major areas, Phase I, was addressed in the October 1994 Final Status Survey Plan for Unaffected Areas.⁶ This 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 both the Phase I plan and this Phase II plan as applicable. The Phase I plan was approved by the NRC by letter dated May 1, 1995.⁷ The field surveys and soil sample analyses required for Phase I have been completed and the data is being compiled for inclusion with the Final Status Survey Report for Phase I.

The major areas designated as Phase II on Drawing No. 95MOST-RF3, contains both affected and unaffected areas. Phase II includes Burial Area #1 which was released by the NRC, backfilled with clean soil, and seeded. Also included in Phase II are the East and West Sanitary Lagoons, the MOFF Plant building exterior and yard, the Emergency Building, Warehouse Building (Building #4) and surrounding yard, and numerous drainage areas. Specific detailed information regarding the closure of Burial Area #1, the two lagoons, the MOFF building and Building #4 and yard can be found in Sections 7.0, 11.0, 17.0, 14.0 and 13.0 respectively, of the Cimarron Radiological Characterization Report.

3.0 Site Description

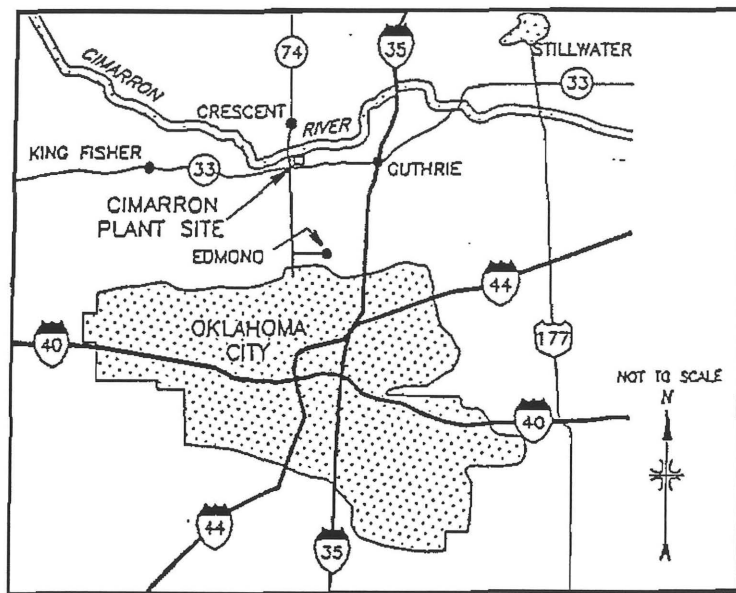
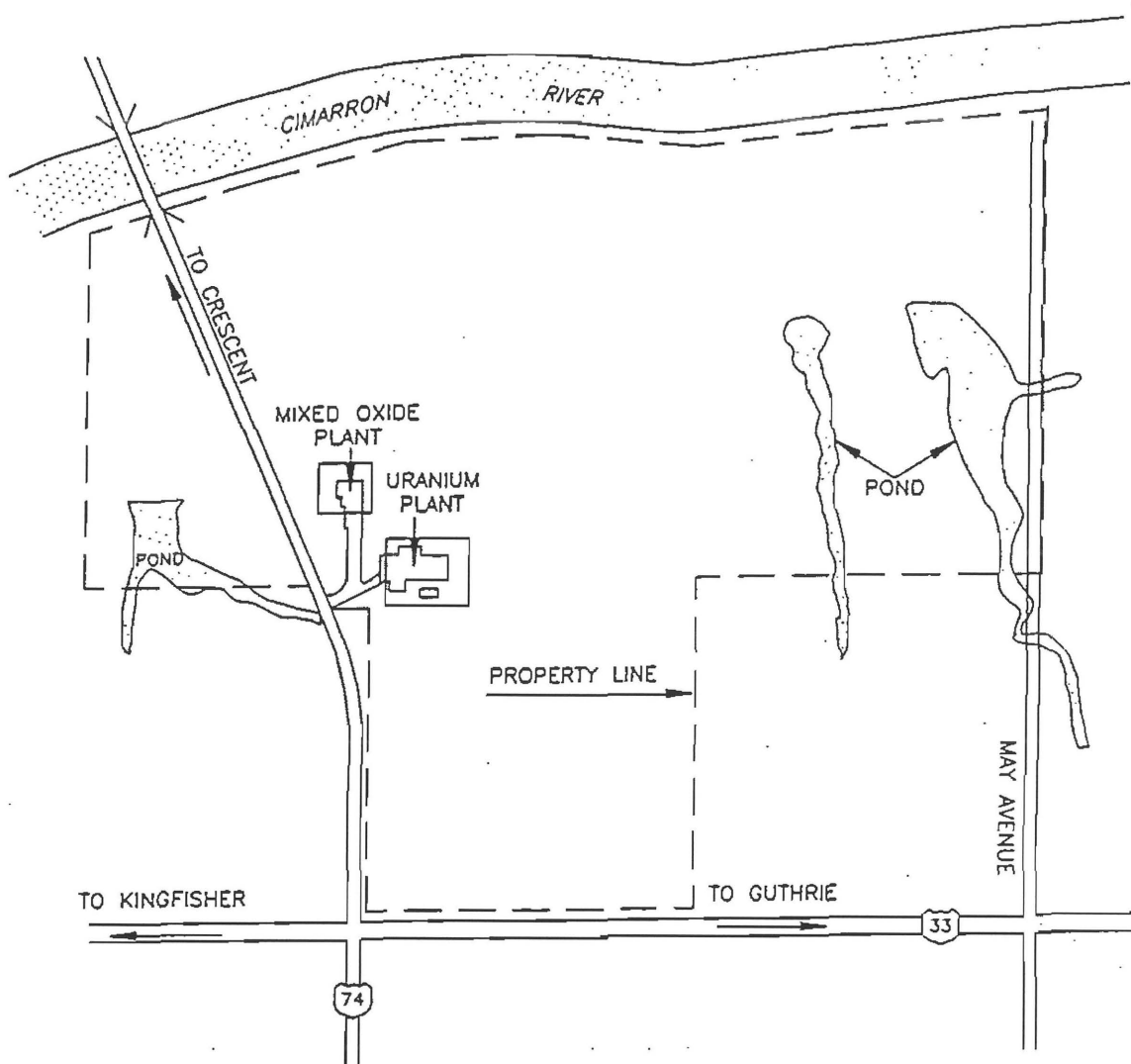
The Cimarron Facility is located in Logan County, Oklahoma, on the south side of the Cimarron River approximately 0.5 miles north of the intersection of Oklahoma State Highways #33 and #74. Figure 3.1 shows the site location. The 840 acre site is located in an area of low, rolling hills and incised drainages. Local elevations range from about 940 feet along the river to 1,010 feet Mean Sea Level at the plant. The county is primarily rural with an economy primarily based upon agriculture and ranching. The entire site is owned by Cimarron Corporation, a wholly owned subsidiary of Kerr-McGee Corporation.

4.0 Facility Description

The process facilities included one 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. These 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. With the exception of Reservoirs #2 and #3, which were constructed for process make-up and potable water, all units discussed above are considered affected areas. Included within the affected areas are several drainage ways and the site road to the old burial area (Burial Area #1). However, the majority of the 840 acre site was never used during nuclear fuel fabrication operations. Licensed material, including wastes generated from licensed activities, was never placed in or discharged to any of the designated unaffected areas. The current status of the Cimarron site decommissioning efforts are discussed at length in both the Characterization Report and the Decommissioning Plan.

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



NOT TO SCALE



**Cimarron Corporation
Crescent Oklahoma Facility
Location Map
Figure 3.1**

6.0 Phase II Radiological Survey Overview

The purpose of this section is to discuss briefly the status of the on-going site decommissioning for areas included in Phase II and to present the radiological criteria and guideline values utilized during decommissioning. The affected and unaffected areas, which are included in Phase II, are shown on Drawing No. 95MOST-RF3. These areas are included along with data discussions and/or additional sampling and survey requirements. The Phase II area has been divided into five areas which are designated as Sections F, G, H, I, and J.

6.1 Identification of Contaminants

Based upon the knowledge of past site operations, the results of numerous characterization efforts to date, and other independent characterization 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 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. ORAU⁸ 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.

6.2 Site Background Levels

Natural background 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. Results for Cimarron's annual environmental samples have been reported to the NRC in Cimarron Corporation's Annual Environmental Reports. These reports include sample analysis results for soil samples collected from off-site locations showing activity levels which are representative of background levels in surrounding soils.

As further validation for background, Cimarron personnel collected and analyzed 28 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, 1995,⁹ which was in regard to the release of the south U-Yard for backfilling. This response provided results 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 ± 2.6 (2σ) pCi/g. By applying a correction factor of 0.67/1.5 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 ± 1.0 (2σ) pCi/g. The release of the South U-Yard for backfilling and confirmation of Cimarron's background determination was included in the NRC's July 7, 1995, letter.¹⁰

Based upon the measurements performed on the Cimarron soil 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 (naturally enriched) for the 28 background samples. The above statement can be interpreted with respect to Cimarron soil counter results reported in terms of 2.7% enriched activity. The conversion factor 1.5/0.67 can be applied to the average concentration to obtain a value for naturally enriched total uranium reported as 2.7% enriched. Application of the conversion factor results in an average uranium concentration of 4.0 pCi/g.

When using the Cimarron soil counter results, the average values of 4.0 pCi/g total uranium and 1.5 pCi/g total thorium will be used when the soil analytical results are compared to guideline values after background is subtracted.

Background exposure rates have been established at the Cimarron site by taking micro-R readings at off-site sample locations, in addition to Cimarron site areas which are unaffected by past operations. Site background exposure rates of approximately 7 μ R/h have been observed in background areas by Cimarron personnel utilizing a Ludlum Micro-R survey meter. Site background exposure rates of approximately 7 μ R/h have also been determined by ORISE personnel utilizing similar instrumentation. In addition, site background exposure rates have been determined by ORISE personnel utilizing a pressurized ion chamber (PIC).¹¹ Based on the PIC measurements, the site background was determined to be approximately 10 μ R/hr. Based upon these numerous background assessments performed by both Cimarron and ORISE personnel, the background exposure rate at the Cimarron site ranges from 7 to 10 μ R/h.

6.3 Characterization Data:

As discussed earlier, the Cimarron site has been subdivided into units. These units are naturally distinguishable or have a common history of characterization and decommissioning activities. Throughout most of the decommissioning process at the Cimarron site, a unit was characterized, remediated (if required), and resurveyed. The description of the decommissioning activities and final survey data were then submitted to the NRC for review and approval. After review of the submittal, the NRC either released the unit or contracted with ORISE (previously ORAU) to perform a confirmatory survey. Based upon the ORISE confirmatory survey (if requested by the NRC), the NRC would either release the unit or require additional remediation. The units which have been released by the NRC and are contained in this Phase II Plan are discussed in this section. Cimarron personnel continue to remediate and/or survey remaining units on site utilizing the same NRC-approved procedures. After a plan has been approved by the NRC, the required final survey data is then compiled and submitted as a final report to the NRC.

As discussed in Section 2.0, the Phase II areas include both affected and unaffected areas, as well as several areas which have been previously released by the NRC. The affected areas included within this Phase II Plan are discussed briefly below.

- Burial Area #1 - This burial area was constructed in 1965 and was opened for disposal of Cimarron site generated radioactive waste in 1966. This burial area also received thorium-contaminated waste from the Kerr-McGee Cushing Facility. Decontamination and decommissioning activities are further discussed in Section 7.0 of the Characterization Report. Burial Area #1 was closed and capped in 1970. As a result of settlement over some of the Burial Area #1 trenches, an investigation was initiated in 1984 to determine appropriate remedial action. In February, 1985, several monitoring wells were installed at the burial area; one up-gradient and three down-gradient to the burial area. In May 1985 soil samples were obtained from nine bore holes around the perimeter of this area to a maximum depth of twelve feet. A bore hole gamma scan was conducted in 1986 on four trenches and surrounding areas contained within the bounds of Burial Area #1. The decision was made to excavate and remediate Burial Area #1 based upon the slumping over the burial area and the borehole sampling data. From 1986 through 1988 the trenches were excavated and the waste was shipped off-site for disposal at a licensed LLRW disposal facility. The NRC released

Burial Area #1 for backfilling with clean soil on December 30, 1992¹² based upon the confirmatory surveys performed by ORAU. The confirmatory surveys performed by ORAU personnel and approved by the NRC, as well as the final surveys performed by Cimarron Corporation personnel demonstrate that this unit meets the guidelines for unrestricted release.

- MOFF Plant and Yard - This facility was licensed under License No. SNM-1174, which was terminated by the NRC on February 5, 1993. This license termination was in response to the request submitted to the NRC by Cimarron Corporation.¹³ The following was stated in the February 5, 1993 NRC letter:

“The staff has determined that (1) all special nuclear material relating to this license has been properly disposed, (2) reasonable effort has been made to eliminate residual radioactive contamination, and (3) a radiation survey has been performed, and confirmed by the NRC, which demonstrates that the premises are suitable for release for unrestricted use.”

The MOFF Plant exterior and associated areas were not released from License No. SNM-928 when License No. SNM-1174 was terminated on February 5, 1993. The following was also stated in the February 5, 1993 NRC letter which terminated License No. SNM-1174:

“Because the land formerly licensed under License No. SNM-1174 is contained within the bounds of License No. SNM-928, a second confirmatory survey of the former Mixed-Oxide Facility and associated grounds may be made at the time of termination of the Uranium Facility license.”

A detailed confirmatory survey was performed on the MOFF Plant and all associated areas by ORAU. The Interim Confirmatory Survey Report was issued by ORAU on January 31, 1989¹⁴ and the Final Confirmatory Survey Report was issued in January 1991.¹⁵ The following guideline values were utilized during this confirmatory survey process and are stated on Page 9 of the January 1991 ORAU Final Confirmatory Survey Report:

"Residual soil activity guidelines for this site are:

Total uranium	30 pCi/g
Total plutonium	25 pCi/g
Total Americium-241	30 pCi/g"

The Confirmatory Survey performed by ORAU included surface alpha, beta-gamma, and gamma scans, measurement of fixed and removable contamination levels, exposure rate measurements, and the determination of radionuclide concentrations in soil, concrete, and paint samples. The following ORAU summary is stated on Page 10 of the January 1991 ORAU Final Confirmatory Survey Report:

"Based on the results of the confirmatory survey, it is ORAU's opinion that the decontamination efforts have been successful in satisfying the guideline levels and that the licensee's documentation adequately describes the final radiological status of the site."

The NRC issued an Environmental Assessment and Finding of No Significant Impact (FONSI) on February 5, 1993¹⁶, to support the termination of License No. SNM-1174 for the MOFF Plant and associated areas at the Cimarron Facility. The following NRC conclusion appears on Page 2 of this document:

"Based on the data provided by Cimarron Corporation along with the results of confirmatory measurements provided by an NRC contractor (Oak Ridge Associated Universities), the Mixed Oxide Facility and associated grounds have been decontaminated and decommissioned below guidelines required for unrestricted use by the NRC. It is NRC's judgment that the applied guidelines adequately protect the public health and safety, and the environment."

The FONSI and Notice of Opportunity for Hearing¹⁷ appeared in the Federal Register on February 12, 1993. The following section appears in items (2) and (3) on page 8432 of this Federal Register notice:

"(2) There is limited contamination of the surrounding soils. The average uranium content of the exterior soils is two to three times background levels but about two orders of magnitude below NRC soil guidelines for disposition of contaminated soils with no restrictions. The average

plutonium content of the exterior soils is indistinguishable from background and over two orders of magnitude below NRC soil guidelines for disposition of contaminated soil with no restrictions. Two soil samples showed americium contents that were above background but about one order of magnitude below NRC soil guidelines for disposition of contaminated soil with no restrictions. The average gamma dose rate at 1 meter above the soil is indistinguishable from background.

(3) The surface contamination levels of plant interior and exterior surfaces are, on the average, three orders of magnitude below NRC decontamination guidelines.”

The confirmatory surveys performed by ORAU personnel and approved by the NRC, as well as the final surveys performed by Cimarron Corporation personnel in support of License No. SNM-1174 termination were comprehensive and demonstrate that this unit meets the guidelines for unrestricted release.

- East & West Sanitary Lagoon - These ponds received all liquid process waste from the Uranium Plant from 1966 through 1970. Decontamination and decommissioning of this area is discussed in Section 11.0 of the Characterization Report. In 1970, all liquid process wastes from the Uranium Plant were diverted to other lined uranium evaporation ponds located on-site. From 1970 until 1985, the MOFF Plant septic tank, the Uranium Plant septic tank, the Uranium Plant laundry, the Uranium Plant lab, the Uranium Plant dock drain, and numerous floor drains in the Uranium Plant discharged into the East and West Sanitary Lagoons. In early 1986 both the East and West Sanitary Lagoons were removed from service. Both Lagoons had been previously isolated to prevent discharge to the Cimarron River in 1977. These lagoons were remediated in 1986, and final surveys were conducted by Cimarron personnel in September, 1990. Confirmatory surveys and soil sampling was conducted by ORAU¹⁸ in November 1990. The NRC authorized backfilling of the East and West Sanitary Lagoons under Amendment #9 of License SNM-928. Decontamination, decommissioning, and the final release survey of this area are considered complete by Cimarron Corporation.
- Warehouse Building #4 - The warehouse is a sheet-metal building (50 ft. x 160 ft.) which was never used to process radioactive materials. However, clad fuel assemblies were inspected and packaged for a short period of time within this building. Cimarron personnel requested permission from the NRC on September 18,

1979, to use the building for coal liquification processing. Approval was granted on December 28, 1979, by the NRC.¹⁹ However, a license amendment was not issued. This building remains under Uranium License SNM-928.

Final release surveys were completed on the inside and outside surface of this building in 1980. The results of the floor survey showed an average fixed activity of 500 dpm/100 cm² alpha with a maximum fixed activity of 2,254 dpm/100 cm² alpha. The walls, fixtures and other surfaces showed an average fixed activity of less than 500 dpm/100 cm² alpha with a maximum fixed activity of 2,500 dpm/100 cm² alpha. The NRC gave approval on March 28, 1980²⁰ to use Building #4 for non-nuclear purposes. The survey conducted in 1980 was for alpha only. Additional surveys were conducted for both the inside and exterior of the building in 1993 for both alpha and beta/gamma. This survey revealed several small areas with elevated levels of beta activity in the concrete floor which required decontamination. An alpha survey performed at the same time showed a maximum fixed activity of 500 dpm/100 cm² and average of 200 dpm/100 cm². (It should be noted that in the April 1995 Decommissioning Plan this unit was included in Phase III.)

- Yard Area Surrounding Building #4 - The restricted area surrounding Building #4 has been extensively characterized and remediated. A random soil sampling program was undertaken in late 1989, with the analysis completed by February 1, 1990. The soil sampling program was completed with corings taken from 0 to 2 ft. in this area. In order to further characterize this area, in 1993 an extensive soil sampling program was completed on a 5m x 5m grid at depths of 0 to 4 ft. The analytical data is included in Section 13.0 of the Characterization Report. Based upon this characterization, the area around Building #4 was remediated.

Both Option #2 and #4 soils were removed from this area. Option #2 soil was placed in the stockpile for on-site disposal. Option #4 soil was packaged for shipment to an off site disposal facility.

Soil sampling was performed after remediation of this area. Soil sampling was performed at a depth of 0 to 6 in. on a 10m x 10m grid prior to backfill. Following NRC staff review, verbal permission was received by Cimarron personnel from the NRC (phone conversation between Mr. Gary Comfort, NRC Headquarters, and Dr. Ed Still, Kerr-McGee) to backfill the area around Building #4 in 1993. The area was backfilled soon after NRC verbal approval. After backfilling, the surface soil was sampled and final surveys

were completed. (It should be noted that in the April 1995 Decommissioning Plan this unit was included in Phase III.)

- Drain Lines - The areas occupied by the two former drain lines from the Sanitary Lagoons and Uranium Waste Ponds, to the Cimarron River are considered part of the affected area. These drain lines were removed and the areas were characterized at the time of removal or subsequent to drain line removal. The decontamination and decommissioning of these drain lines and the associated land areas are discussed in detail in Section 15.0 of the Characterization Report.
- Reservoir No. 1 - This reservoir (West Lake) received run-off from the U-Plant Yard area and is included in the environmental sampling program for the site. In 1991, several sludge samples were collected from within the lake and analyzed. Also, the drainage area leading to the reservoir was characterized and remediated. This area is discussed further in Section 16.0 of the Characterization Report.
- Drainage Areas - Several drainage areas are also included in affected areas due to the fact that they either received drainage from a process area or had concrete rubble released from the U-Plant placed in these areas for erosion control. The drainage areas included in the Phase II Final Status Survey Plan are shown on Drawing No. 95MOST-RF3. The final survey of these areas will be performed in accordance with the criteria discussed in Section 6.4. These areas are also discussed further in Section 16.0 of the Characterization Report. In addition, the concrete that was surveyed and released to drainage areas for erosion control is discussed in Section 2.2 of the Decommissioning Plan.
- On-Site Roads - The roads from the U-Plant restricted area to the former Burial Ground #1 were utilized for the transport of waste materials. This road has been included in the affected area and it will be surveyed as such during this final status survey. The survey will be performed in accordance with the criteria discussed in Section 6.4.
- Environmental Data - Several of the areas addressed under Phase II include locations where environmental monitoring is currently performed. Environmental samples are collected from these locations in accordance with the Cimarron environmental sampling program and submitted to off-site laboratories for independent analysis. In addition to annual environmental reports which are submitted to the NRC, a description of the environmental monitoring

program and summary of results was incorporated into the Characterization Report. Additionally, the Decommissioning Plan contained an evaluation of the 1994 annual environmental monitoring results.

The environmental monitoring locations included under the Phase II Plan include 12 groundwater wells, three surface water sampling locations, two soil sampling locations and one vegetation sampling location. Sample analytical results from these sampling locations will be evaluated in the Phase II final status survey report. The evaluation will include recommendations for the disposition of the environmental monitoring locations located within the Phase II areas. Cimarron Corporation will continue to monitor all environmental sampling locations in accordance with the environmental monitoring plan and until such time as the facility license is terminated.

6.4 Survey Objective:

The purpose of this section is to discuss methods for the generation of additional survey and soil sampling data to supplement existing final status survey data for Phase II areas. The guidance promulgated in NUREG/CR-5849²¹ will be utilized throughout the conduct of the Final Status Survey. The additional data will be presented in the Final Status Survey Report for Phase II to demonstrate that all radiological parameters are satisfied for unrestricted release. This report will be submitted to the NRC in conjunction with a license amendment request to remove the Phase II areas from License SNM-928.

The radiological parameters for the surveys and soil sampling will be compared to the criteria described below:

6.4.1 Buildings and Equipment

Release limits for contamination on all buildings and equipment will comply with License SNM-928 and are identical to the limits specified in Table 1 of the NRC's "Guidance for Decommissioning of Facilities and Equipment Prior to Release for Unrestricted Use".²²

Surface contamination on a building interior or exterior surface that is between 1 and 3 times the stated limit is acceptable, provided that the weighted average radioactivity within a 1 m² area containing the elevated activity is within the stated limit.

Surface contamination on an exterior paved surface that is between 1 and 3 times the stated limit is acceptable provided that the weighted average radioactivity within a 100 m² area containing the elevated activity is within the stated limit.

6.4.2 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.²³ 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. The average 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 are greater than 11.5 pCi/g will be further investigated. In many cases, remediation of a small area is more appropriate than reclassification of an entire area.

For an unaffected area hot-spot averaging will be performed for all locations, within 100 m² 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 100m² grid area may not exceed three times the BTP Option #1 limit (90 pCi/g total uranium above background).

On-site disposal of BTP Option #2 material in a designated earthen cell was approved by the NRC through the issuance of Amendment #10 to License SNM-928.²⁴ Current authorization is for the burial of 500,000 ft³ of Option #2 materials. The average concentration of radioactive material that may be buried on site is 100 pCi/g total uranium above background (this assumes that the uranium is 100% soluble), and up to 250 pCi/g total uranium

above background for insoluble uranium. The average concentrations of thorium and plutonium in the soil earmarked for disposal cannot exceed 10 pCi/g and 1 pCi/g respectively. Hot-spot averaging can be applied to any location within a 100 m² grid area which contains soil concentrations in excess of the limits stated above. For example, the maximum total uranium soil concentration within a 100m² grid area may not exceed three times the BTP Option #2 limit for soluble uranium (300 pCi/g above total uranium background).

6.4.3 Gamma Surface Survey (Open Land Areas)

On occasion, Cimarron personnel utilize a shielded or unshielded 3" X 0.5" sodium iodide (NaI) detector as an additional screening device for qualitative identification of residual contamination in soil. This type of detector has been utilized primarily in affected areas to assist in remediation activities.

The shielded or unshielded detector may be utilized during the initial survey for Phase II to identify elevated areas. When this type of detector is used, any survey instrument reading (in counts per minute) greater than twice background is used as an indication that an area requires additional investigation. As stated above, this instrument is only utilized for qualitative measurements. Quantitative measurements of residual contamination levels in soil is performed with the Cimarron soil counter.

6.4.4 Exposure Rate Survey (Open Land Areas)

For either affected or unaffected areas, the average exposure rate guideline for release is 10 µR/hr above background, at 1 meter above the surface. Exposure rates may be averaged over a 100 m² grid area as described in NUREG/CR-5849. The maximum exposure rate at any discrete location within a 100 m² 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 m² grid area with exposure rates greater than 20 µR/hr above background will be delineated and remediated if required. As stated by ORISE,¹¹ background at the Cimarron site averages approximately 10 µR/hr.

7.0 Administration

The current organizational structure will remain in place throughout the duration of the decommissioning process. The Cimarron site RSO/Health Physics Supervisor, QA/QC Manager, Project Manager and other support personnel report directly to the Site Manager. The Site Manager reports directly to a Vice President of Cimarron Corporation.

7.1 Organization

The final survey of the affected areas and the remaining unaffected areas will be performed by a final survey team consisting of qualified personnel from the Cimarron site. Contractor assistance may be utilized if required. The final survey team will operate under the general direction of the Cimarron Site Manager who reports directly to a Vice President of Cimarron Corporation. The Vice President will have the authority to make appropriate changes to the survey plan as the survey progresses.

The selection of field measurement equipment and sample collection techniques will be under the direction of the RSO/Health Physics Supervisor who will report to the Cimarron Site Manager. Actual field measurements and sample collection will be under the direction of the Project Manager. Additionally, the Project Manager will also oversee the field activities of any contractor support personnel.

Cimarron site laboratory activities will be under the direction of the RSO/Health Physics Supervisor. The RSO/Health Physics Supervisor will provide oversight for any contract laboratory assistance. All activities required under the Final Survey Plan will be performed in accordance with the Cimarron Corporation Quality Assurance Program.

7.2 Training

Cimarron Corporation provides continuing training for 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 will attend an in-house training session prior to commencement of work under the final survey plan. All survey procedures and quality assurance requirements will be reviewed during this training session.

7.3 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-928¹ and By-Product License 35-12636-02.²⁵ The Cimarron Radiation Protection Program currently in place for all decommissioning activities is administered through the use of the following documents:

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

It is the policy of Cimarron Corporation to perform all work in strict compliance with 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 the associated elements. Assessments of program effectiveness are also performed periodically by the Cimarron RSO/Health Physics Supervisor. Additionally, the program is inspected for compliance with applicable rules and regulations by the Oklahoma Department of Health, NRC Region IV, ORISE and NRC Headquarters staff.

7.4 Cimarron Quality Assurance Program

The Cimarron Corporation Quality Assurance Plan and Procedures are an integral part of the Cimarron Radiation Protection Program. A principal component of this Program is the affirmation 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 such 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 Quality Assurance Program 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 Quality Assurance Program satisfies all of the applicable requirements of ASME NQA-1.²⁶

Written procedures, designated as special work permits, are prepared, reviewed and approved for activities involved in carrying out the decommissioning process. The work permit designates 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 field logs for all samples in accordance with the Cimarron Quality Assurance Program. 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 Quality Assurance Program. Samples sent to an off-site independent laboratory for analysis are accompanied by a chain of custody form in accordance with the Cimarron Quality Assurance Program. 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. Investigation and correction of recognized deficiencies are performed when identified to validate the data.

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

8.0 Phase II Final Status Survey Overview

Existing characterization survey and soil sampling data will be utilized when available from past characterization efforts. This existing characterization data will be reviewed in light of the guidance contained in NUREG/CR-5849 to determine applicability. Existing characterization data utilized in the Final Survey Plan (Phase II) will either be sufficient to meet the criteria contained in NUREG/CR-5849 or will have a technical justification explaining why the data is determined to be adequate. Areas identified as not having adequate characterization data based upon the review of the existing characterization data, will be characterized in accordance with NUREG/CR-5849. The following sections describe the general approach to be taken in completing the Final Survey for Phase II areas.

8.1 General

Cimarron Corporation has divided the entire 840 acre site into three major areas which contain both affected and unaffected areas. Each of these three 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). This plan is for Phase II areas only.

8.2 Existing Characterization Data

The Phase II areas contain the designated affected areas of Burial Area #1, MOFF Building exterior and yard, Building #4 and yard area, East and West Sanitary Lagoons, the two pipelines which connected the Sanitary Lagoons and U-Ponds to the Cimarron River, Emergency Building, Reservoir #1, several drainage areas and an on-site road. These areas are further discussed in Section 6.3 and in the Characterization Report.

8.3 Survey Plan Grid Areas

For purposes of identification, the affected and unaffected areas included in Phase II are shown on Drawing No. 94MOST-RF3. The Phase II area has been further divided into sub-areas for data tracking and are shown on this drawing as F, G, H, I, and J. Additionally, each sub-area has been shown on expanded scale drawings (No. 95MOST-RF3F through -RF3J) for clarity. The 100m grid system shown on this drawing will be utilized for locating soil sampling and survey points. The 0.0 grid point is located just south and slightly west of the main Uranium Building as shown on Drawing No. 95MOST-RF3. This grid point will be tied into a permanent marker for future reference.

TABLE 8.1
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" NaI 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" NaI Scintillation Detector Digital Scaler	3	Gamma	0 - 500,000 cpm	3,000 cpm avg shielded 9,000 cpm avg unshielded	250 cpm 500 cpm
435 cm ² gas flow (43-27) Digital Scaler	1	Alpha	0 - 500,000 cpm	<10 cpm	20 dpm/100 cm ²
100 cm ² gas flow (43-68) Digital Scaler	1	Alpha	0 - 500,000 cpm	<10 cpm	100 dpm/100 cm ²
60 cm ² gas flow (43-4) Digital Scaler	1	Alpha	0 - 500,000 cpm	<10 cpm	200 dpm/100 cm ²
60 cm ² Count Rate Meter (PRM-6)	6	Alpha	0 - 500,000 cpm	<100 cpm	350 dpm/100 cm ²
50 cm ² Personnel Room Monitor (Ludlum 177)	3	Alpha	0 - 500,000 cpm	<100 cpm	500 dpm/100 cm ²
5" Slide-Drawer Counter	1	Alpha	0 - 500,000 cpm	<0.3 cpm	2 dpm
Eberline 2" GM Tube (Pancake)	1	Beta, Gamma	0 - 500,000 cpm 720 cpm = 0.2 mR/h	<200 cpm	70 cpm
Ludlum 2" GM Tube (Pancake)	2	Beta, Gamma	0 - 500,000 cpm 720 cpm = 0.2 mR/h	<200 cpm	70 cpm
Tennelec LB5100 Computer Based Auto Sample Counter	1	Alpha Beta	0 - 99,999,999 cpm	<0.3 cpm 1.5 cpm	0.4 dpm 1.5 dpm
Ludlum Dirt Probe 1 1/2" x 4" NaI (T1) Detector	2	Gamma	0 - 500,000 cpm	20,000 cpm	700 cpm
Soil Counter - Computer Linked 4" x 4" x16" NaI (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

There are three buildings located within the Phase II areas with only one requiring additional surveying and/or sampling. This building is the Emergency Building.

8.4 Surveys (Open Land Areas)

In general, the affected areas will be 100% surveyed and the unaffected areas will be 10% surveyed. The specific instruments to be used will be selected by the RSO/Health Physics Supervisor. The instrumentation available for use by site personnel and the minimum detectable activity (MDA) for those instruments available for use by Cimarron personnel are listed in Table 8.1. Where possible, in selecting an instrument for surveying, the MDA for the instrument should be $\leq 75\%$ of the guideline value.

Where possible, 10m x 10m grid areas will be surveyed by technicians who will survey the grid by traversing back and forth within the grid area. In some cases, affected and unaffected areas may be less than ten (10) meters in width. Each traverse performed by the technician covers an area approximately 2 meters in width. The highest reading found within each approximate ten (10) meter length or 10m x 10m grid area will be recorded. Survey performance, documentation, and record retention will be in accordance with the Cimarron Radiation Protection Program. In the event that any of these survey readings exceed the limits discussed in Section 6.4, their location will be flagged for subsequent survey and/or soil sampling. The procedures to be followed for both the affected and unaffected areas will be specified in Cimarron site Special Work Permit(s).

8.5 Soil Sample Locations

The soil sampling frequency will be specified in the Cimarron Special Work Permit(s). For unaffected areas, thirty surface soil samples (0 to 6 inches deep) will be collected within the boundary of the five unaffected sub-areas noted for Phase II. The thirty samples to be obtained from each of the five (5) designated unaffected areas will be selected from the 10m x 10m grid intersect points within each unaffected sub-area utilizing a random number generator. All soil samples will be analyzed for total Uranium using the on-site counter.

Where practicable, for affected areas, surface soil samples will be collected at 5 meter intervals along the length of roads and drainage ways when the width of such affected areas are less than 5 meters. It should be noted that the roads and drainage ways designated as affected

areas on Drawing No. 94MOST-RF3, are shown at approximate 10m widths for clarity.

The actual field widths for these areas will determine the sampling frequency. For larger areas, 5 meter grids will be established and surface soil samples will be collected at each grid intersect where practicable. All soil samples collected will be analyzed for total uranium using the on-site counter.

For each of the five designated areas, two soil samples (for a total of ten) will be split for submittal to an off-site independent laboratory for confirmatory analysis. Additionally, the ten quarterly split samples, required by Cimarron Radiation Protection Procedure KM-CI-RP-47, will include soil samples from the designated Phase II areas when practicable.

Based upon the analysis results, additional sampling at different locations or depths may be required. Additionally, exposure rates are taken at each soil sample location and measured at the surface and at 1m above the surface. All areas with elevated exposure rates (greater than twice background) will be investigated.

8.6 Building/Surface Surveys

The survey measurements for surface activity will consist of a combination of surface scans, direct measurements and measurements of removable activity.

The maximum radioactive contamination on surfaces of buildings on the Cimarron site which may be released without restriction are based upon the "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use" which are discussed in Section 6.4.1.

8.6.1 Emergency Building (Interior)

This building has been used to house the on-site soil counter and to store records and soil samples at varying periods since the suspension of site operations. At a minimum, the floor and walls in the area where radioactive materials were stored and/or handled will be 100% scanned, including counter tops, sinks, drains, and shelving. These areas will be scanned for both alpha and beta/gamma. The coverage for ceilings will be dependent upon the number of locations of elevated activity (exceeding the guideline values) identified within the lower scanned areas.

Residual activity identified will be compared to the guideline value (Section 6.4.1) to determine if remediation is required.

Once all identified elevated areas are evaluated and remediated as necessary, systematic measurements of surface activity will be performed in accordance with NUREG/CR-5849. The number of data points will be determined for the survey such that the 95% confidence level is achieved. In general, systematic measurements are to be performed on a 2m x 2m grid spacing on floors and wall surfaces in areas where radioactive materials were stored or handled. Systematic measurements for both alpha and beta/gamma will be performed. All ceilings will have a minimum of 30 total measurements taken at random locations within the building. For data evaluation the entire building interior will be considered one unit.

Smears for removable surface activity will be obtained at locations where direct measurements were taken.

8.6.2 Emergency Building (Exterior)

Exterior building surfaces typically have a low potential for residual contamination; however, there are several building exterior surfaces which will be surveyed. The building roof drainage points, window ledges, ventilation points and entry doors will be scanned for beta/gamma. Systematic surface measurements will be performed at elevated locations discovered during surveying or at a minimum of 30 locations randomly selected on the roof, sides and walkways.

8.6.3 Emergency Building (Tanks)

The emergency building has several small underground tanks that were associated with emergency decontamination and emergency site operations. These tanks are:

- Fresh Water Tank - supplied wash water for personnel decontamination purposes;
- Discharge Collection Tank - used to collect discharge from personnel decontamination;
- Septic Tank - used by personnel manning the Emergency Building during periods when the building was occupied.

These tanks will be removed, surveyed, and a sludge sample collected (if present). Prior to backfilling, soil collected from the excavation will be analyzed on site for total uranium.

8.6.4 MOFF Building (Exterior)

The decontamination, decommissioning and license termination of the MOFF Plant are discussed in Section 6.3. The final surveys are considered final and complete for this area.

8.6.5 Building #4 (Interior and Exterior)

The decontamination and final survey of the interior and exterior surfaces of this building are considered complete. This building has been utilized since 1980 for non-radioactive material research and development. The building roof and sides were surveyed in 1993. Research and process equipment that is located within the building and yard area will be randomly surveyed prior to removal. This unit will be treated as an unaffected area.

8.6.6 Paved Surfaces/Concrete Walkways

Affected areas will be scanned receiving 100% coverage and unaffected areas will receive 10% coverage. Areas of suspected activity identified during scanning will be evaluated further to determine their activity level and area of extent.

8.7 Concrete Rubble Utilized for Erosion Control

Several areas located in this reference area (Phase II) include concrete rubble which has been previously released from the restricted area for use on-site for erosion control. Cimarron Corporation intends to demonstrate that the residual contamination present in the concrete rubble being used for erosion control in drainage ways is less than the BTP Option #1 limit for enriched uranium. This demonstration requires knowledge of the residual contamination present and calculations to estimate the average radionuclide concentration. Both field instrumentation and laboratory instrumentation will be utilized to analyze the concrete rubble and sediment samples taken downstream of the drainage areas. An analysis will be performed as detailed in Section 2.3 of the Decommissioning Plan to demonstrate that the concrete rubble contains levels of average uranium less than the BTP Option #1 limit of 30 pCi/g.

8.8 Reservoir #1 - Sediment/Water Sampling

This reservoir and the drainage to the reservoir were characterized in 1991. The data are presented in Section 16.0 of the Characterization Report. The final soil sampling did not reveal any locations with concentrations above the guideline value of 30 pCi/g total uranium above background. However, as the frequency of sampling within the reservoir was less than that suggested by NUREG/CR-5849, additional soil/sediment sampling will be performed. The reservoir area is approximately 5 acres in size.

The sediments in the reservoir will be sampled as follows:

- At appropriate 10m intervals, sediments will be collected across the reservoir in an East/West location at approximately N190 (approximately 8 samples).
- At approximate 10m intervals, sediments will be collected the length of the reservoir in a North/South location at approximately W290 (approximately 11 samples)
- Additionally, in a North/South direction at location approximately W320 on a 50m interval, (approximately 6 samples)
- An additional 5 samples will be collected randomly throughout the reservoir, including the southern inlet to the reservoir.
- Samples are to be taken throughout the depth of the sediments where practicable and composited.
- Samples are to be analyzed for total uranium.

Three water samples are to be collected from the reservoir; one at the southern inlet, one at the eastern drainage inlet, and one at the reservoir discharge. Water samples are to be analyzed for total uranium.

8.9 Instrumentation

The instrumentation to be utilized to generate the characterization data discussed above are calibrated and maintained at the Cimarron site in accordance with the 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 (i.e. temperature and pressure), 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 portable instrumentation available at Cimarron for use during this Final Status Survey are listed in Table 8.1 along with the detector sensitivities for the instrumentation (MDA).

8.9.1 Survey Instrumentation

Portable 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. In addition to the quarterly calibration requirements, source checks are required on a daily basis for all instruments being utilized for characterization work. A calibrated electronic pulse generator is utilized for instrument scale linearity checks.

All calibration and source check records are completed, reviewed, signed off and retained in accordance with Cimarron Quality Assurance Program requirements.

8.9.2 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 this instrument response is for the entire range of detectable energies.

8.9.3 Soil Counter (Gamma Spectroscopy)

The Cimarron 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 for verification of a majority of the decommissioning work completed to date at the Cimarron site. ORISE has conducted an evaluation of the Cimarron Soil Counting 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 Cimarron Soil Counter. ORISE and Cimarron analysis results compared favorably at levels above background as demonstrated by the most recent confirmatory analysis performed for the DAP-3 stockpile. (NRC approval letter dated May 31, 1995)²⁷

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

Standards used for calibration and quality assurance checks for the soil counter have been analyzed by outside laboratories and are NIST traceable through these analyses. Comparisons have been made between the standards as counted using the soil counter and two off-site laboratories. The assigned values for the standards are the average of the results obtained from the off-site laboratories, when the standards were analyzed by more than one laboratory. The standards range in 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 activities based upon the evaluation of net counts from the soil counter. Activities are calculated through the use of efficiency and correction factors obtained using appropriate standards. Soil concentrations are 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 calculated from the analytical data by applying the site average enrichment value of 2.7 weight percent for Uranium-235.

9.0 Data Validation

All survey data for each affected and unaffected area will be reviewed and compared to the criteria discussed in Section 6.4. Items to be reviewed during the data validation process are discussed below.

9.1 Field Survey Data (Portable Instrumentation)

Instrument calibration, data entry records, and data calculations shall be verified by the Project Manager or designee to ensure that:

- Field survey results have been recorded, signed and dated. Any changes are to be crossed out with a single line and initialed by the individual making the change.
- Background and source check readings were obtained each day on which surveys were performed. Calibration sources are traceable to National Institute of Standards and Technology (NIST) standards or some other nationally recognized standard.
- MDA for appropriate instruments shall be recorded.
- Individuals performing the survey have been trained under the Cimarron QA program.
- Statistical analysis has been performed in accordance with NUREG/CR-5849 or some other approved methods to demonstrate that the data for the survey unit (i.e. group of contiguous grids or regions with the same classification of contamination potential) satisfy the guideline values addressed in Section 6.4.
- Required conversions/calculations have been verified.
- All required signatures and dates are in place.
- Instrumentation calibration records are current.

9.2 Laboratory Analytical Data (On-site Counter)

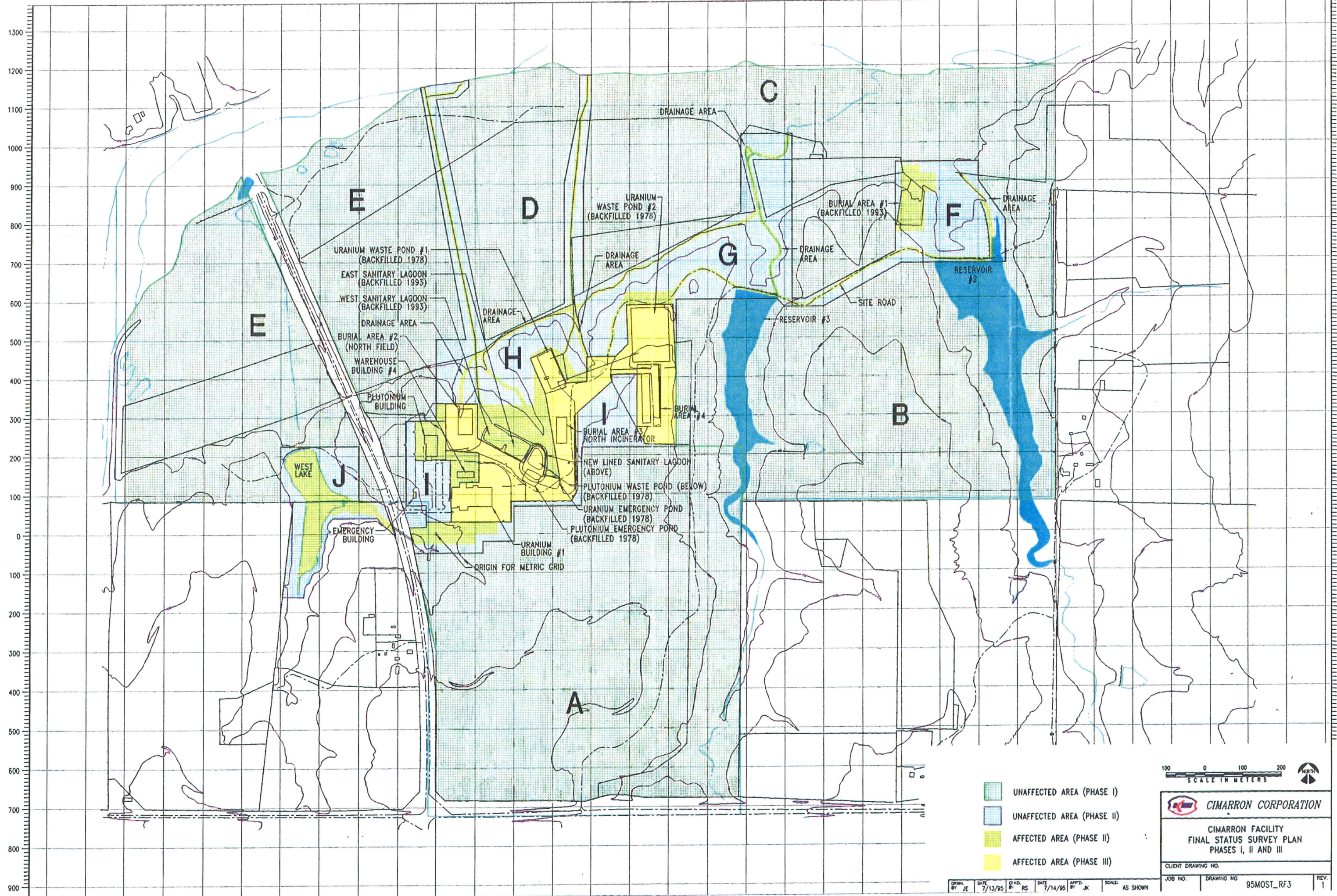
Instrument calibration, data entry records, and data calculations shall be verified by the Project Manager or designee to ensure that:

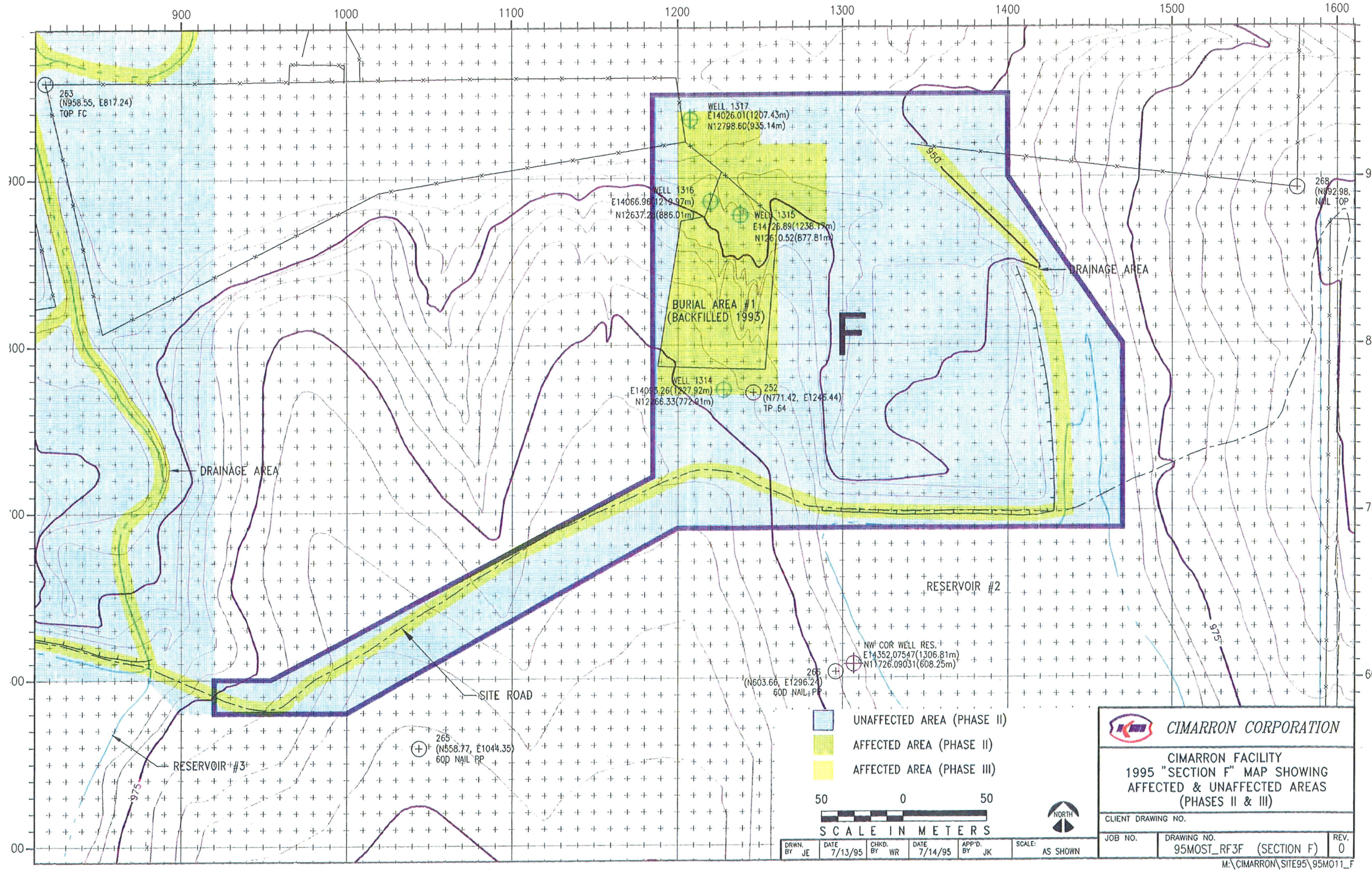
- Instrumentation calibration records are current. Calibration sources are traceable to NIST standards.
- Sampling tracking documentation is complete and records have been filed in the project file.
- Laboratory results have been accurately recorded on laboratory data entry records, and where required, correctly converted to the appropriate units.
- Individuals operating the laboratory equipment are trained under the Cimarron QA program.
- Statistical analysis has been performed in accordance with NUREG/CR-5849 or some other approved method to demonstrate that the data for the survey unit (i.e. group of contiguous grids or regions with the same classification of contamination potential) satisfy the guideline values addressed in Section 6.4.
- Required conversions/calculations have been verified.
- Split samplings (i.e. two identical samples; one sent to an independent laboratory for analysis and the other analyzed on-site) have been performed as required by the Special Work Permit.
- Split sample analysis results have been evaluated and meet acceptance criteria.
- Replicate counting results have been evaluated and meet the acceptance criteria.
- All required signatures and dates are in place.
- Chain of Custody forms are used for all off-site analysis.
- Off-site laboratories have in place a Quality Assurance Program and as part of their program participate in an intercomparison (cross check) program. Participation in the program is to provide an objective measure of the accuracy of the analyses traceable to the National Bureau of Standards (NBS).


Any discrepancies discovered during the data validation process described above will be resolved and the disposition will be noted in the affected record(s). The discrepancy disposition may include additional surveys, sampling, sample analysis/re-analysis and/or remediation. All records generated as a result of the data validation process are retained in accordance with the Cimarron QA Program. The data validation is administered under the direction of the site RSO/Health Physics Supervisor.

10.0 Report

A report will be prepared which describes all results of the Phase II Final Status Survey. This report will be submitted to the NRC in conjunction with a license amendment request to release the Phase II areas from License SNM-928.





**CIMARRON CORPORATION**

CIMARRON FACILITY
1995 "SECTION F" MAP SHOWING
AFFECTED & UNAFFECTED AREAS
(PHASES II & III)

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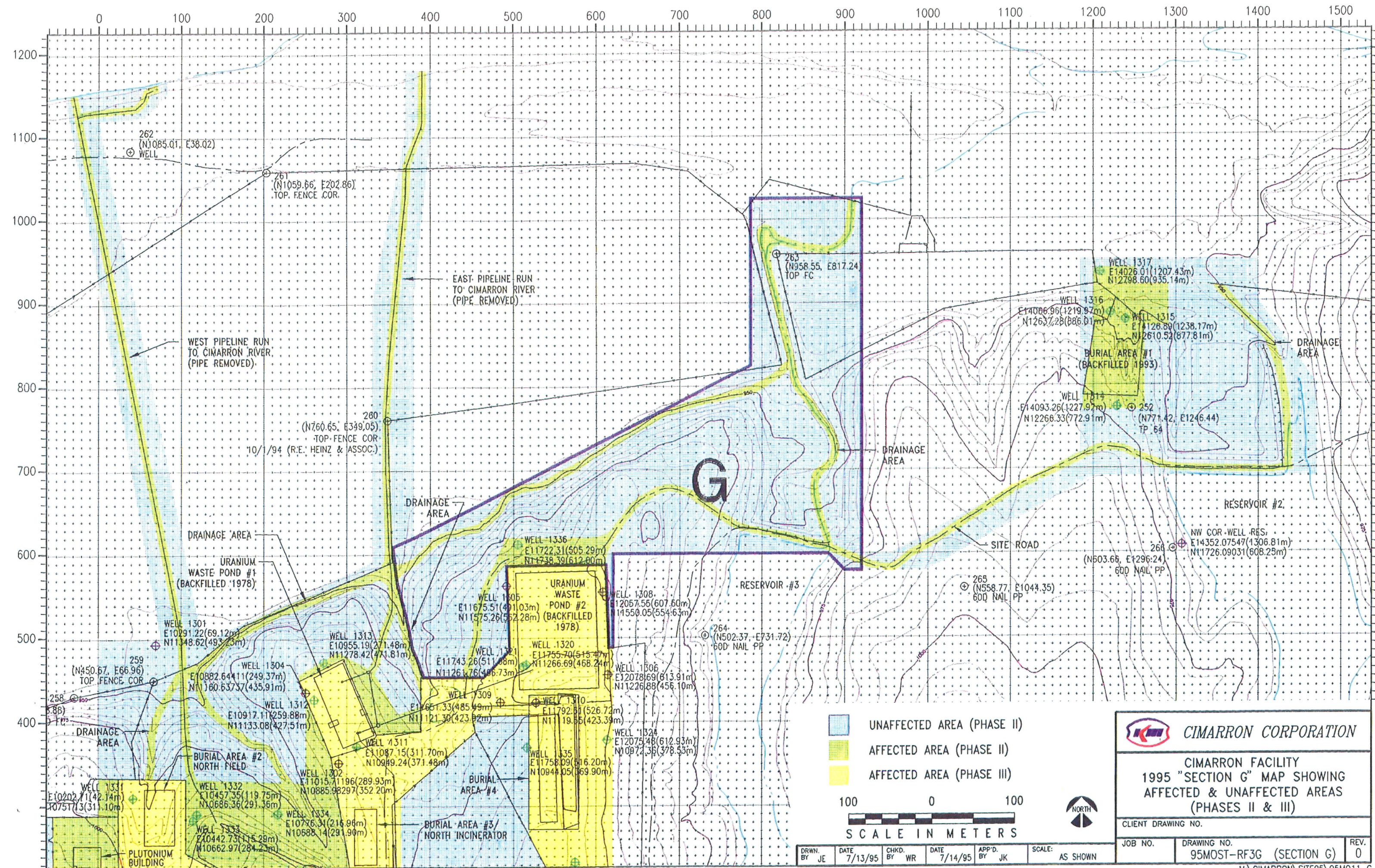
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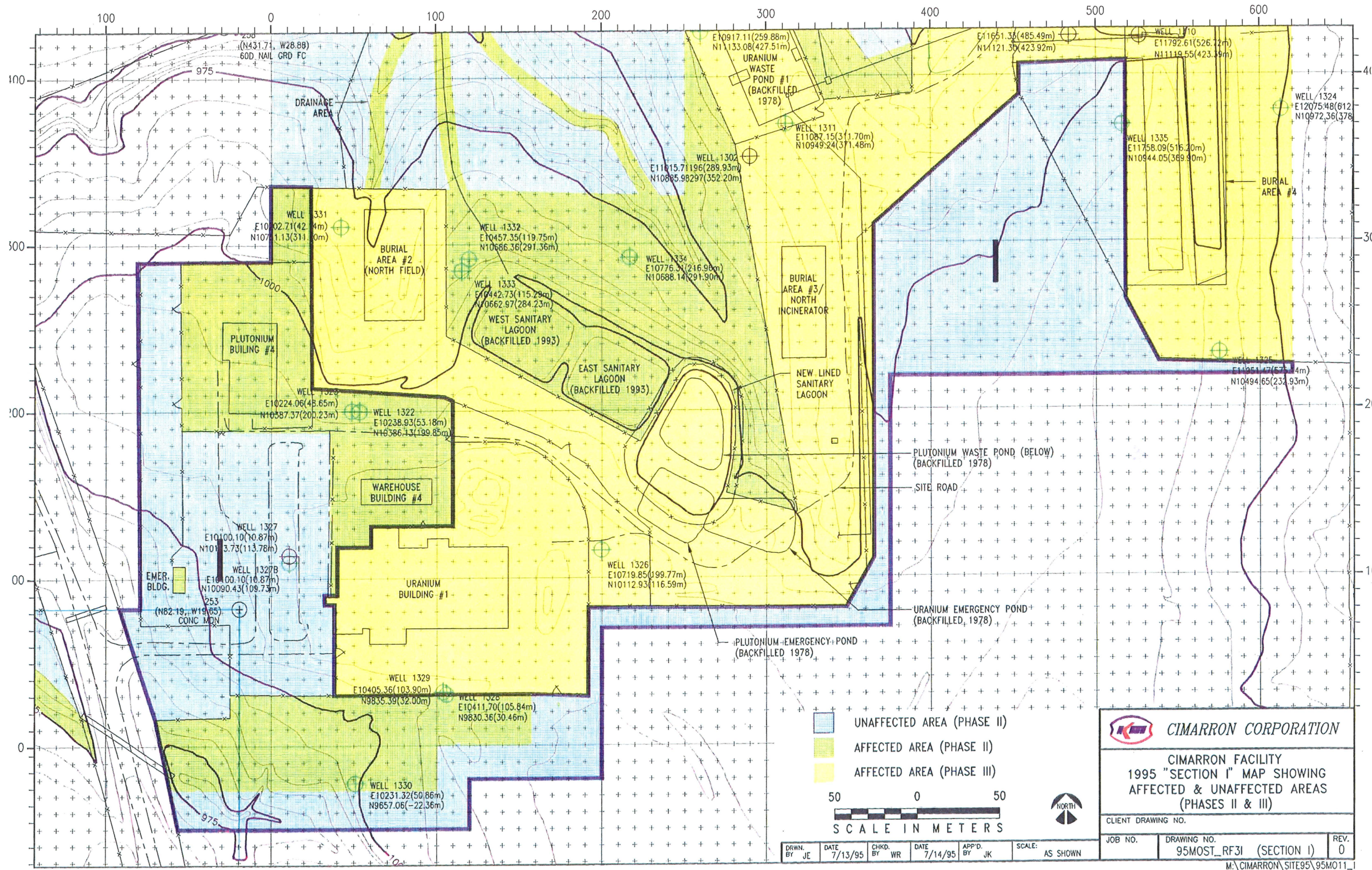
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REV.
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**CIMARRON CORPORATION**

CIMARRON FACILITY
1995 "SECTION I" MAP SHOWING
AFFECTED & UNAFFECTED AREAS
(PHASES II & III)

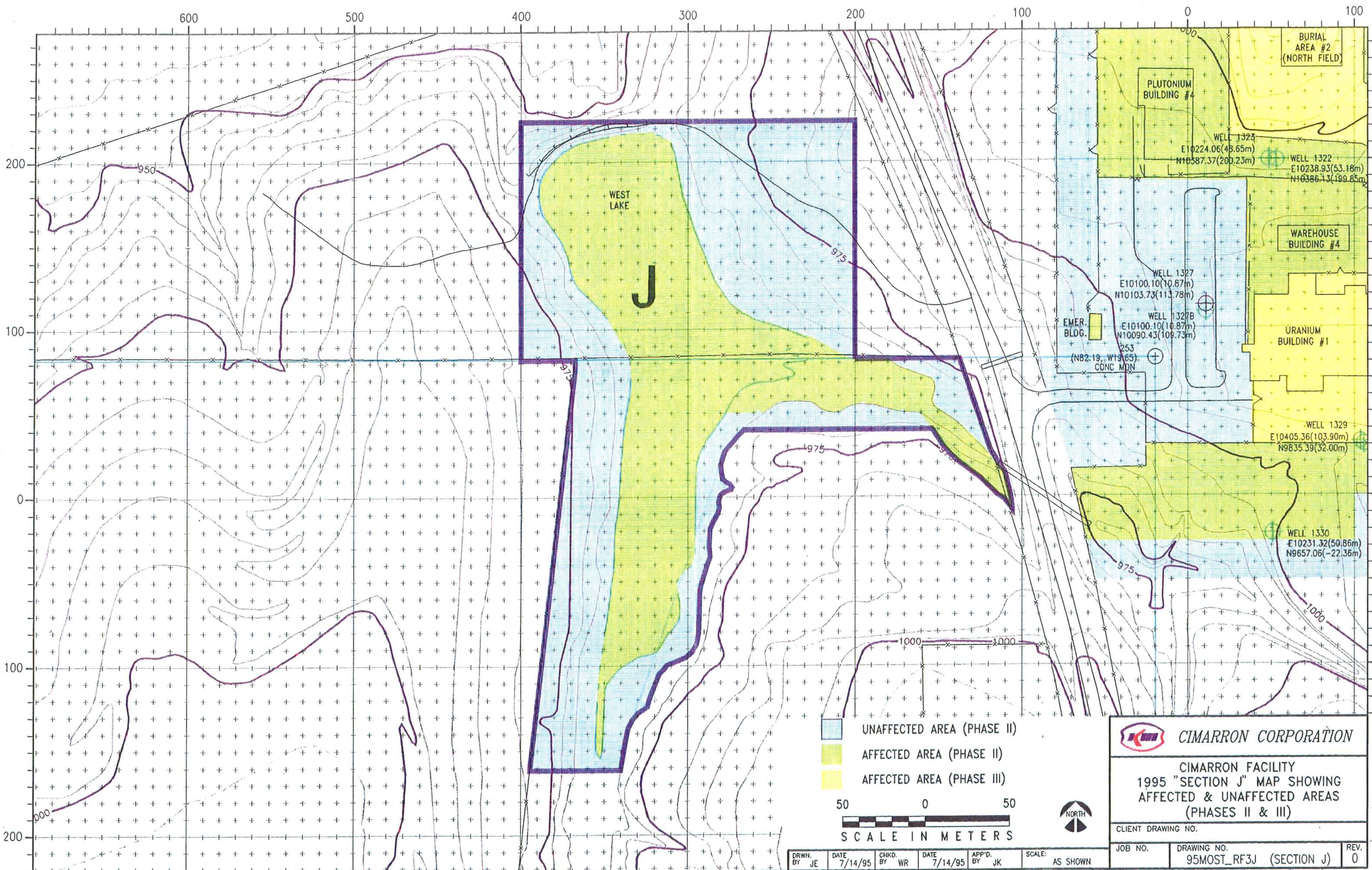
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DRWN. BY JE	DATE 7/14/95	CHKD. BY WR	DATE 7/14/95	APP'D. BY JK	SCALE: AS SHOWN
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 CIMARRON CORPORATION		
CIMARRON FACILITY 1995 "SECTION J" MAP SHOWING AFFECTED & UNAFFECTED AREAS (PHASES II & III)		
CLIENT DRAWING NO.		
JOB NO.	DRAWING NO.	REV.
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