

CIMARRON CORPORATION LETTER OF TRANSMITTAL

DATE:01/20/2000

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FROM: LaVonna Smith, Quality Assurance Coordinator
 Cimarron Corporation
 P.O. Box 315
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COPY NO.	DATE	DESCRIPTION
1	01/20/2000	PROGRESS REPORT-BURIAL AREA #1 GROUNDWATER EVALUATION

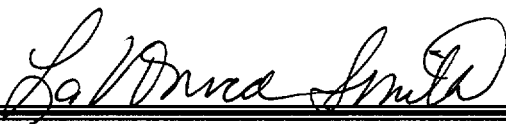
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CIMARRON CORPORATION

P.O. BOX 25861 • OKLAHOMA CITY, OKLAHOMA 73125

S. JESS LARSEN
VICE PRESIDENT

January 20, 2000

Mr. Ken Kalman, Project Manager
Facilities Decommissioning Section
Low-Level Waste & Decommissioning Projects Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

**Re: Docket No. 70-925; License No. SNM-928
Cimarron Corporation
Progress Report-Burial Area #1 Groundwater Evaluation**

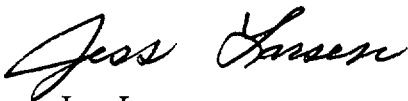
Dear Mr. Kalman:

This letter transmits to you an interim report of the ongoing investigation of groundwater quality, hydrology, and soil activity in the vicinity of former Burial Area #1 (BG-1) at the Cimarron site.

The report presents a status summary on shallow soil sampling, deeper soil coring, and groundwater delineation efforts over the last several months. It also states Cimarron's plan to further study the suitable remedy during the first half of year 2000 and then submit to NRC a proposed remedial plan.

Please feel free to contact me if you require clarification of the interim report that is attached.

Sincerely,



Jess Larsen
Vice President
Attachment

jl012000.le1

NMSSOI Public

PROGRESS REPORT

BURIAL AREA #1 GROUNDWATER EVALUATION

1.0 INTRODUCTION

As discussed in Cimarron's July 1998 "Decommissioning Plan Groundwater Evaluation Report", the shallow groundwater in close proximity to former Burial Area #1 (BG-1) exceeded the approved release criteria of 180 pCi/l total uranium. In the Decommissioning Plan, Cimarron committed to move forward with an investigation of BG-1. In a March 4, 1999 letter to the NRC, Cimarron Corporation presented the results of a magnetometer survey and proposed a subsurface investigation of BG-1. The additional field work was intended to determine the nature of four possible anomalies encountered during the magnetometer survey of BG-1 as well as the lingering groundwater impacts noted in Well #1315. A program comprised of shallow soil borings, deeper soil/rock borings, and soil/groundwater analyses was implemented. Based on the initial findings, additional borings and analyses were completed to better define the areal extent of the existing groundwater contamination.

The purpose of this report is to provide an interim summary of the results from Cimarron's ongoing investigation of groundwater quality, hydrology, and soil activity in the vicinity of BG-1.

2.0 SHALLOW SOIL SAMPLING

The purpose of the shallow soil sampling was to investigate the possible presence of discrete sources of radioactive material that may remain within the former BG-1 area. As shown on Drawing No. 99BG1-LOC, included as Attachment A, twenty-seven shallow soil borings were completed along three lines extending east to west at grid lines 860N, 830N, and 810N. Soil samples were collected from the ground surface to the point of auger refusal. Continuous soil samples were collected and logged by a qualified geologist at one-foot intervals and analyzed for total uranium and natural thorium using the on-site soil counter. The shallow borings varied in depth from 5 feet to 10 feet below the ground surface.

A total of 187 samples were collected and analyzed for total uranium. Results ranged from 1.1 pCi/g to 17.6 pCi/g with a mean of 6.0 pCi/g. The soil samples also were analyzed for natural thorium with the results ranging from 0.7 pCi/g to

2.8 pCi/g, with a mean of 1.5 pCi/g. These findings are consistent with our previous final status survey data.

The four locations identified by the magnetometer survey were cored to depths varying from 3 feet to 13.5 feet below the ground surface. A total of 39 samples were analyzed for total uranium with results ranging from 1.4 pCi/g to 11.3 pCi/g, with a mean of 6.6 pCi/g. Buried objects encountered at the different locations included several pieces of steel and concrete with metal reinforcement rods, wire, and a section of 1-inch PVC pipe. None of the objects found were considered to have been artifacts from the former burial area.

All analytical results for this phase of the investigation indicated only residual concentrations of uranium in soils far below the BTP Option #1 guideline value of 30 pCi/g above background.

3.0 DEEPER SOIL CORINGS

The purpose of the deeper soil corings was to profile the sandstone (rock) within the perimeter of the former burial area and in the alluvium north and northeast of the BG-1 area. The alluvium and rock corings were completed to depths ranging from 15 to 35 feet below ground surface into the underlying mudstone (designated in past reports as Mudstone "B"). Continuous one-foot discrete samples were collected for lithology determination as well as to measure the residual uranium.

The first two coring locations shown as TMW-1 and TMW-2 on Drawing No. 99BG1, included as Attachment B, were continuous corings drilled to depths of 30 and 35 feet, respectively. The average total uranium soil concentrations for the one-foot composite samples were 6.1 pCi/g for TMW-1 and 5.8 pCi/g for TMW-2. These results are indicative of background total uranium concentrations in soils at the Cimarron Site.

Four additional locations labeled TMW-3, TMW-4, TMW-5, and TMW-6, as shown on Drawing No. 99BG1, were completed to depths of 15, 19, 25, and 30 feet, respectively. Analytical results of the soils collected from borings TMW-4, TMW-5, and TMW-6 indicated background levels of total uranium. Several one-foot composite samples collected for boring TMW-3 indicated residual activity above background but below the BTP Option #1 guideline of 30 pCi/g. The analyses for these four borings ranged from 4.2 pCi/g to 29.5 pCi/g total uranium.

Groundwater samples were collected from deep borings TMW-1 through TMW-6 and analyzed using the on-site low background alpha/beta proportional counter. These analyses were used as a semi-quantitative indicator of residual total

uranium in groundwater. Additionally, a groundwater sample from Well #1315 was analyzed on-site for comparison to the TMW groundwater samples. The concentration of total uranium in groundwater monitored by Well #1315 had recently been determined through an analysis by CORE Laboratories. The on-site analyses indicated groundwater collected from boring TMW-1 and TMW-4 had concentrations of uranium similar to or slightly above Well #1315, whereas groundwater samples from TMW-2, TMW-5, and TMW-6 showed uranium concentrations substantially below Well #1315 at levels similar to background. Concentrations in groundwater samples from TMW-3 were substantially above the most recently recorded activity in Well #1315. As a result of these preliminary analyses, the focus of the investigation was moved to the area north of TMW-1.

4.0 GROUNDWATER INVESTIGATION

Because the sample analysis for TMW-3 indicated the plume had migrated beyond the excavated area, additional borings were drilled in an effort to search for a possible source in the vicinity of a magnetic anomaly near the northeast corner of BG-1. Additionally, supplemental borings and temporary monitor wells were installed to the north and northwest to further characterize the plume.

Soil samples and groundwater "grab" samples were collected from the additional borings and temporary monitor wells for on-site analyses. It should be noted water samples collected from soil borings were, in effect, collected from the entire shallow saturated interval penetrated by the augers.

Based on the on-site analytical results, the decision was made to complete several of the TMW's as temporary 2-inch monitoring wells for future measurements of groundwater elevations and quality. The temporary wells were fully completed with a filter pack, bentonite seal, and grouted to the surface. The completed wells were TMW-1, -2, -5, -6, -7, -8, and -9. All other borings and abandoned TMW's were drilled out and grouted with a cement/bentonite slurry to the surface.

Groundwater samples from Wells #1315 and #1316 were sampled and shipped off-site to Core Laboratories for total uranium analyses. Concurrently, groundwater samples from the seven TMW designated wells also were sampled and shipped to Core Laboratories.

The construction of Well TMW-13 (shown on Drawing No. 99BG1) was completed following this initial sampling event. Since that time, a water sample from TMW-13 has been collected and shipped to an off-site laboratory but results

will not be available before submittal of this report. For the purposes of this report, the analytical data from the on-site laboratory were used to determine the groundwater quality in Well TMW-13.

Data collected in the field from the visual classification of the soil and rock materials extracted from the borings, as well as groundwater levels collected from the monitor wells, were used to depict the shallow geologic cross-section maps included as Attachment C. These two cross-sections are very similar to the original geologic cross section diagram included in the 1988 "Site Investigation Report", prepared by James Grant and Associates. The well locations along the line of cross-section and the cross-sections are shown on Drawing Nos. 99BG1-XSEC, 99BG1-XSEC-AA' and 99BG1-XSEC-BB'.

These cross-sections depict the approximate point of contact between the sandstone and the alluvium. The abrupt alluvium/bedrock contact is also reflected on the potentiometric surface as a series of closely spaced contours representing the gradient separating the bedrock to the south and the alluvium to the north. The potentiometric surface map is shown on Drawing No. 99BG1-PS, included as Attachment D.

A combination of groundwater analytical data from Core Laboratories and the onsite laboratory was used to develop an isoconcentration plume map which illustrates the total uranium in groundwater as shown on Drawing No. 99BG1-WA, included as Attachment E. The contour intervals of 1,000 pCi/L depict total uranium concentrations near the center of the plume at approximately 11,800 pCi/l which is substantially above what is presently shown for groundwater monitored in the area near Well #1315.

The potentiometric surface map (Attachment D) depicts shallow groundwater flow to the north and northeast in the larger BG-1 area but locally to the northwest in the vicinity of the plume. The apparent northwest/southeast orientation of the plume appears to substantiate the groundwater flow direction.

5.0 INVESTIGATION CONCLUSIONS

As discussed in the Cimarron Characterization Report, BG-1 was constructed in 1965 for the disposal of radioactive material. BG-1 was closed and capped in 1970. In 1985, remediation began on the former disposal area with all contaminated materials in the four disposal trenches completely removed. Generally, the base of the excavated trenches (i.e., 7 to 8 feet) followed the natural slope of the bedrock as shown on Drawing No. 99BG1-XSEC-AA.

The excavations were open from 1986 through 1992. During that time, the buried waste was removed, final status surveys were completed, confirmation surveys by ORAU were performed, and the final report was issued. License Amendment #9, allowing backfilling of the area was issued by the NRC on December 28, 1992. By July 1993, clean soil had been transported to BG-1 and placed into the excavated area for final contouring.

Monitoring Well #1315 was installed in 1985 and the well sampling that immediately followed the installation indicated the presence of elevated uranium in groundwater at a concentration of over 8,000 pCi/l. As discussed above, the extended period of time the excavations were open may have contributed to the uranium concentrations in the shallow groundwater. Drawing No. 99BG1-TR, included as Attachment E, shows the former trenches and the open excavation in relation to the groundwater contamination. Indications are that the transmissivity characteristics of the alluvium in the vicinity of the alluvium/bedrock contact may have mitigated the migration of the plume in the alluvial material.

The soil samples collected from each boring during this most recent work provide additional evidence that all sources have been removed. However, the soil sampling did confirm the presence of residual activity in the subsurface resulting from the slow migration of a groundwater plume toward the northwest. The average total uranium soil concentration was calculated for the TMW soil borings for the area that represents the center of the groundwater contamination and for the other areas investigated by these borings. The center of the groundwater contamination, which are represented by TMW-#3, #9, #10, #11, and #12, shows an average total uranium concentration in soil of 12.1 pCi/g. TWM-#1, #2, #4, #5, #6, #7, and #8, which represents other areas of investigation, shows an average total uranium concentration in soil of 5.8 pCi/g. This level is indicative of site background. The concentrations in the soils ranged from 2.1 pCi/g to 32.4 pCi/g. All analytical results were below the BTP #1 guideline value of 30 pCi/g total uranium above background (i.e., equivalent to 34 pCi/g).

6.0 CONTINUING INVESTIGATION

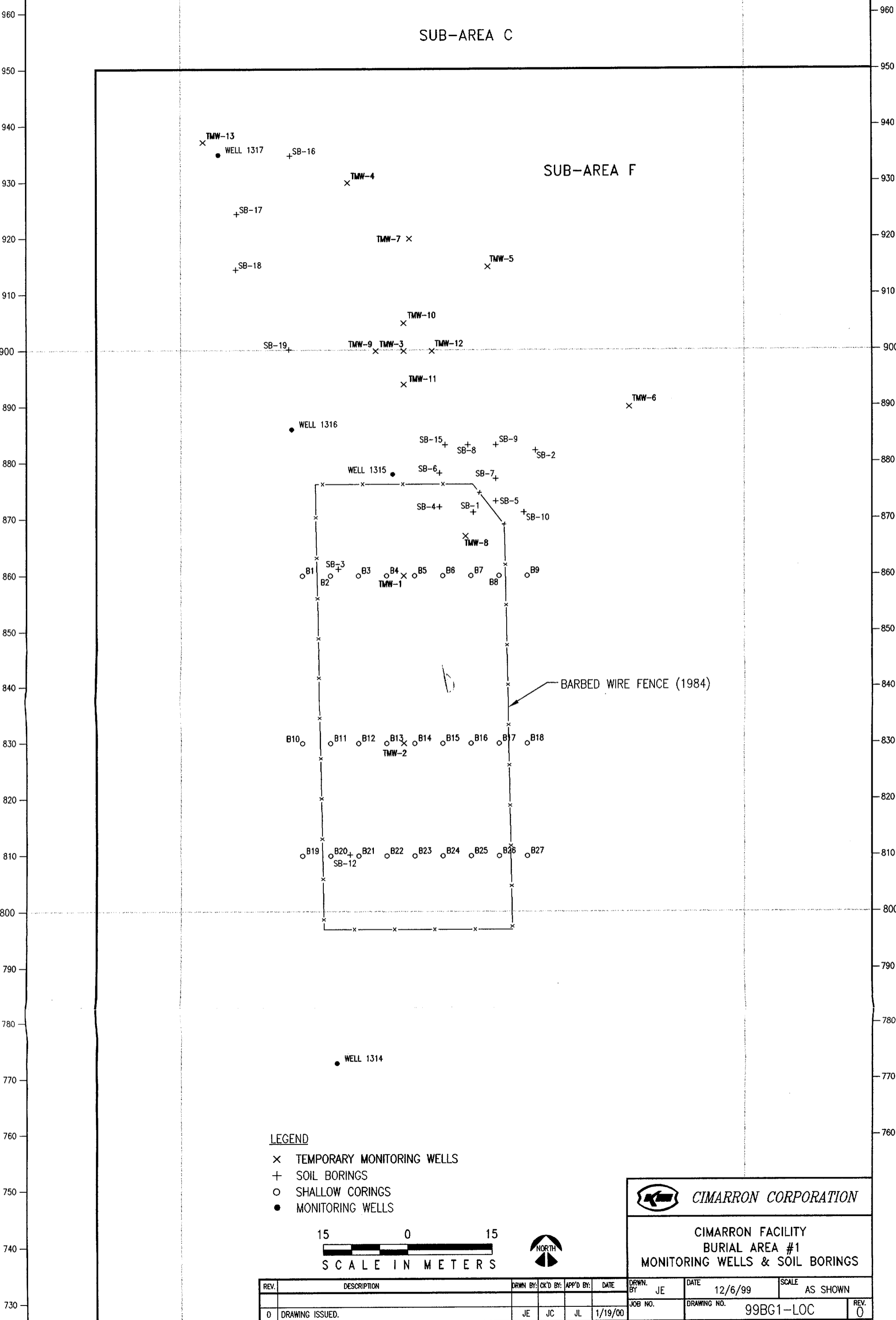
Cimarron Corporation feels confident that all discrete sources have been removed from BG-1. The only remaining item to be addressed is achieving the 180 pCi/l total uranium concentration in groundwater required for license termination. As discussed in Cimarron's March 4, 1999, letter to the NRC, natural attenuation was considered a viable option for achieving the goal of expedient license termination because of the diminishing uranium concentrations in Well #1315. However, because of new information gathered during this recent investigation,

Cimarron intends to expeditiously study the options for accelerating the cleanup of the groundwater near BG-1. The methods under study include:

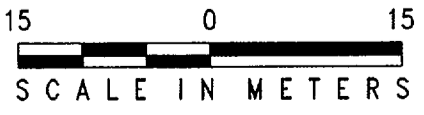
- Groundwater withdrawal and treatment followed by reinjection or appropriate discharge. Any sludge generated would be shipped off site for disposal or stabilized and placed into the on-site disposal cell.
- Insitu chemical stabilization of the soluble uranium within the plume through the injection of a chemical slurry formulated for the subsurface hydrogeologic conditions.
- Insitu chemical stabilization of the entire shallow groundwater formation through the mixing of the soils and groundwater with a formulated chemical constituent. The method would stabilize the soluble uranium and bind it to the surrounding soils.


Prior to implementation of Cimarron's proposed remedial plan, additional studies will be conducted to further define the local geology, water chemistry, plume geometry, costs, and estimated times for achieving the guideline value. These studies are to be performed during the first quarter of year 2000 in hopes of formulating a remediation work plan for submittal to the NRC in the June 2000 timeframe.

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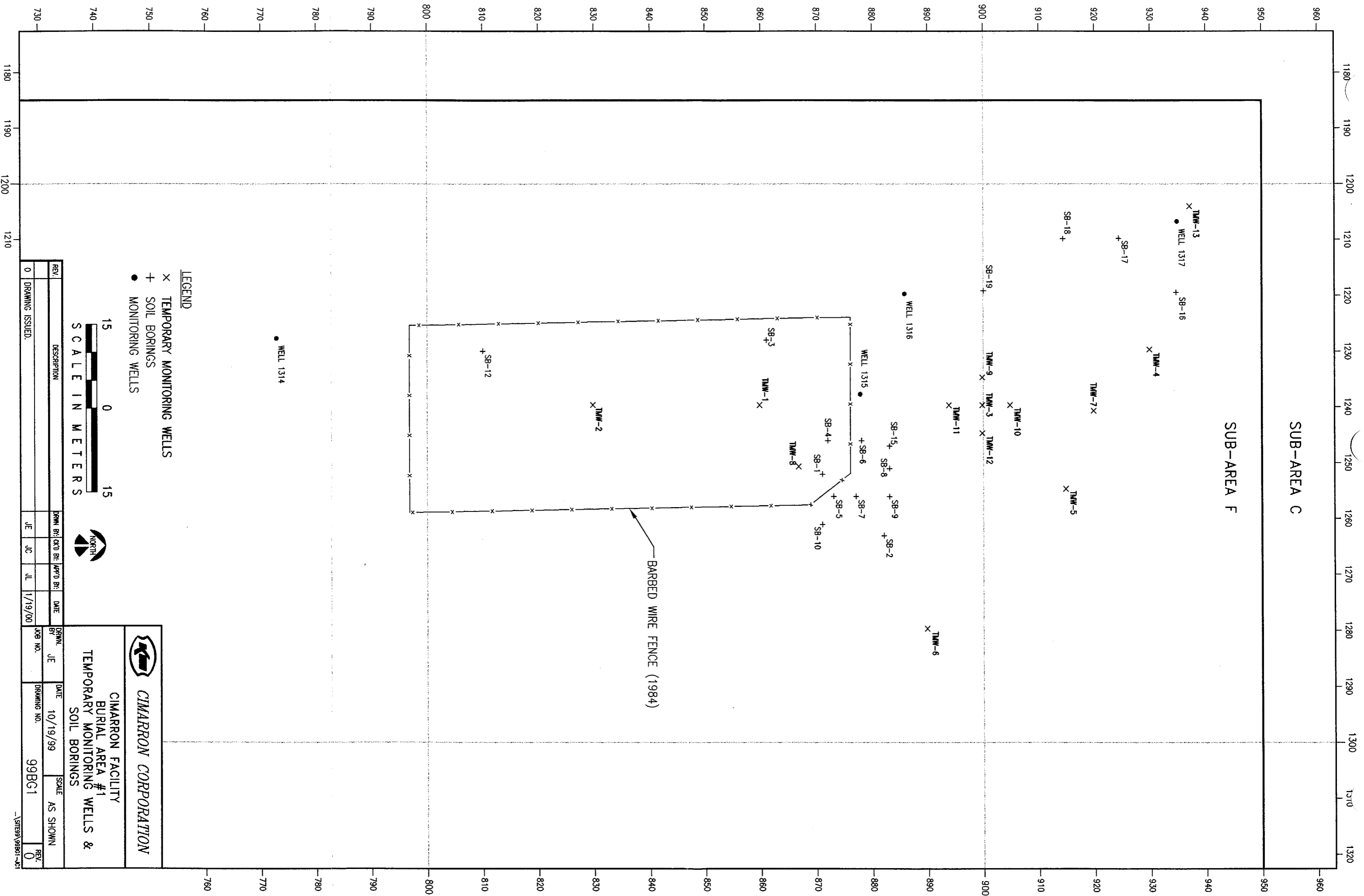
- LEGEND**
- × TEMPORARY MONITORING WELLS
 - + SOIL BORINGS
 - SHALLOW CORINGS
 - MONITORING WELLS



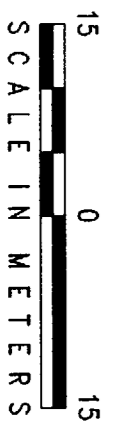
 CIMARRON CORPORATION			
CIMARRON FACILITY BURIAL AREA #1 MONITORING WELLS & SOIL BORINGS			
DRWN. BY: JE	DATE: 12/6/99	SCALE: AS SHOWN	
JOB NO.	DRAWING NO. 99BG1-LOC	REV. 0	

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- LEGEND**
- × TEMPORARY MONITORING WELLS
 - + SOIL BORINGS
 - MONITORING WELLS

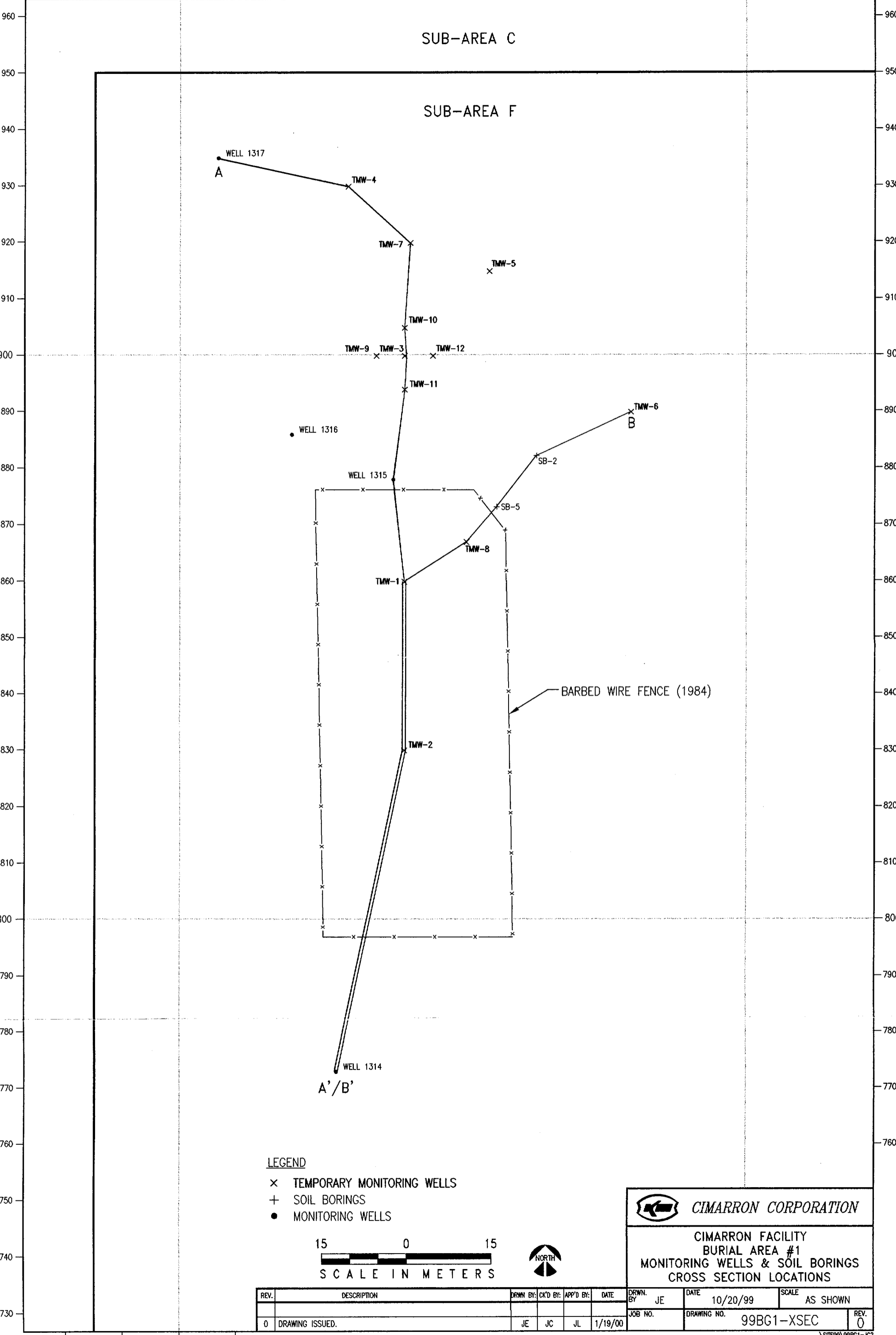


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CIMARRON CORPORATION

**BURIAL AREA #1
TEMPORARY MONITORING WELLS &
SOIL BORINGS**

1180 1190 1200 1210 1220 1230 1240 1250 1260 1270 1280 1290 1300 1310 1320



SUB-AREA C

SUB-AREA F

WELL 1317

A

TMW-9

TMW-3

TMW-12

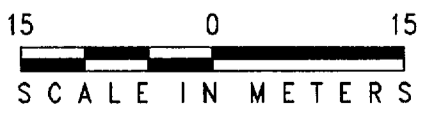
WELL 1316

WELL 1315

A'/B'

LEGEND

- x TEMPORARY MONITORING WELLS
- + SOIL BORINGS
- MONITORING WELLS



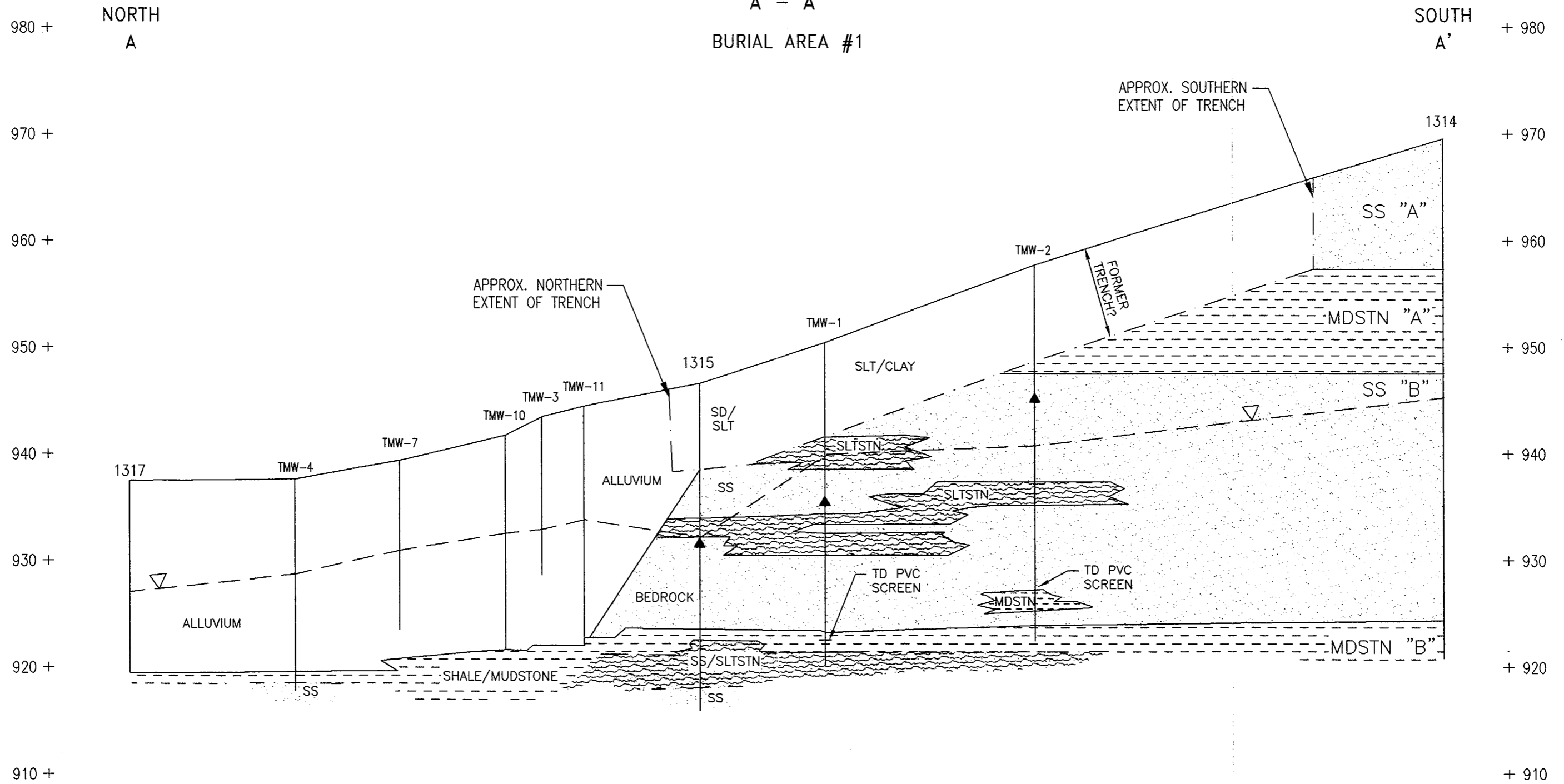
CIMARRON CORPORATION

CIMARRON FACILITY
BURIAL AREA #1
MONITORING WELLS & SOIL BORINGS
CROSS SECTION LOCATIONS

REV.	DESCRIPTION	DRWN BY:	CK'D BY:	APP'D BY:	DATE	DRWN BY:	DATE	SCALE
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							99BG1-XSEC	0

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CROSS SECTION
A - A'
BURIAL AREA #1



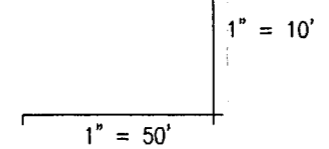
LEGEND

- INFERRED
- ↑ BENTONITE SEAL
- ▽ POTENTIOMETRIC SURFACE

NOTES

WATER LEVELS - 9/2/99

SCALE



CIMARRON FACILITY
BURIAL AREA #1
CROSS SECTION A - A'

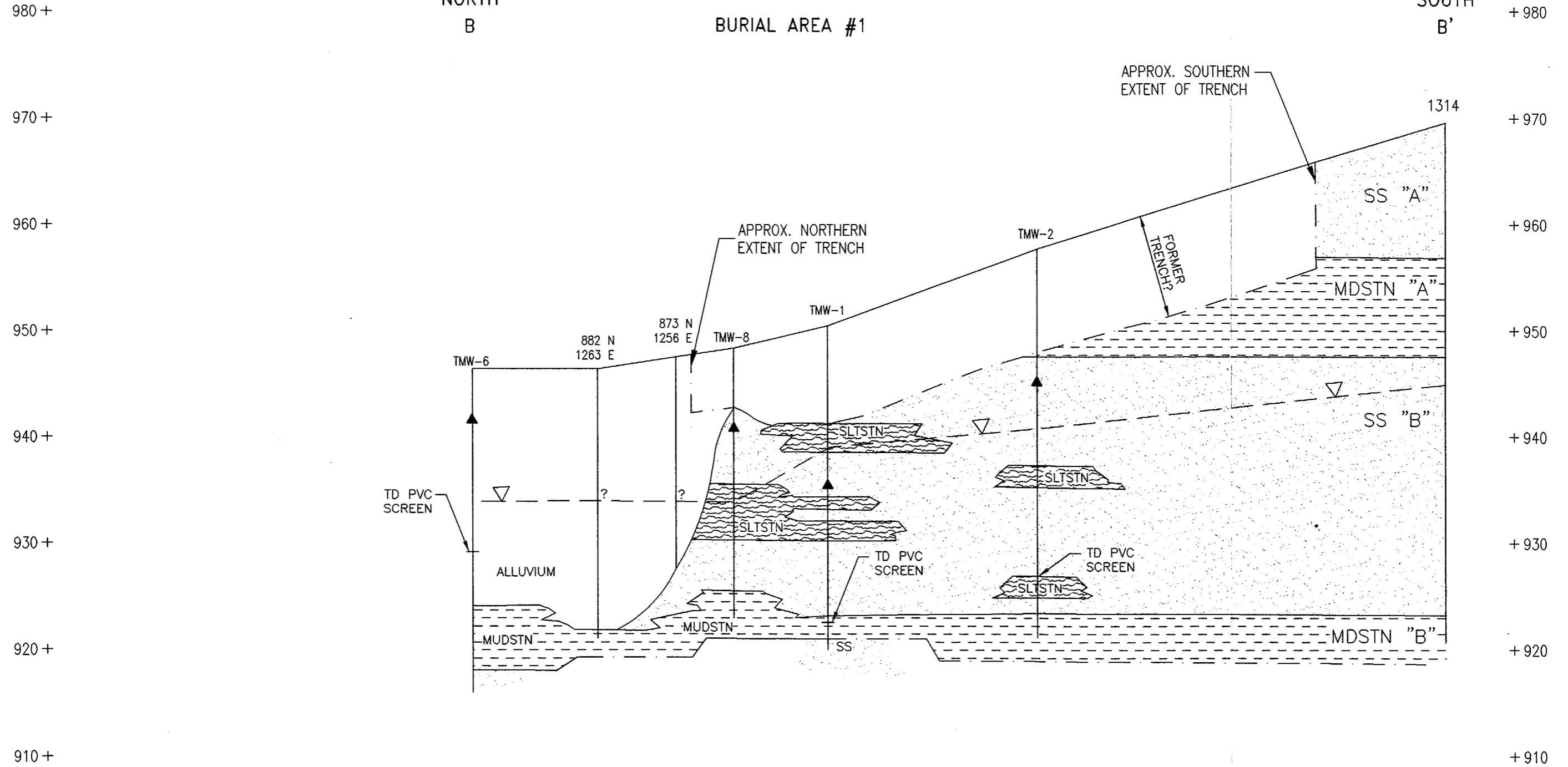
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						JOB NO.	DRAWING NO. 99BG1-XSEC-AA'	REV. 0

CROSS SECTION
B - B'

NORTH
B

BURIAL AREA #1

SOUTH
B'



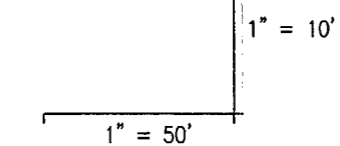
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- INFERRED
- BENTONITE SEAL
- POTENTIOMETRIC SURFACE

NOTES

WATER LEVELS - 9/2/99

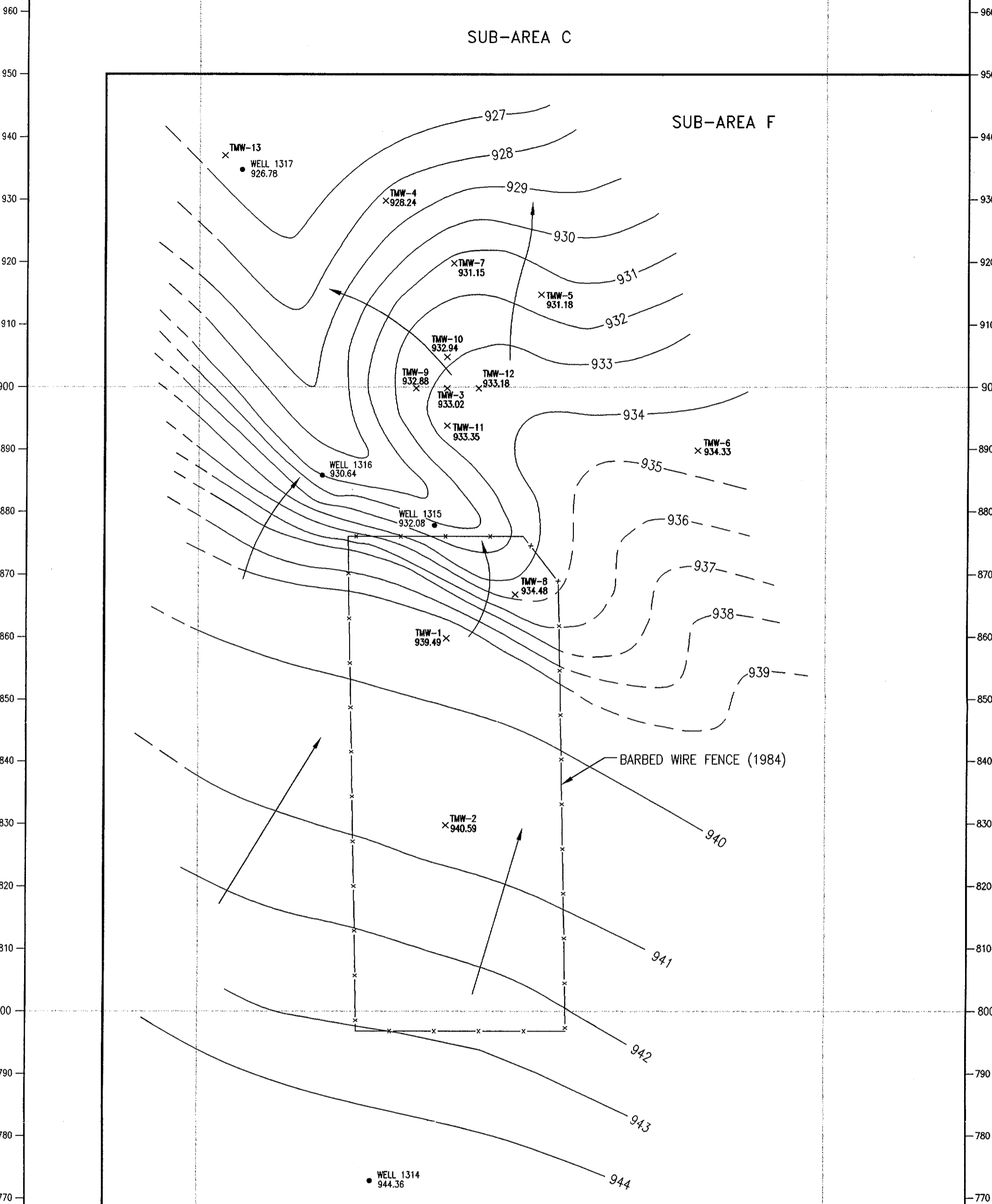
SCALE



CIMARRON FACILITY
BURIAL AREA #1
CROSS SECTION B - B'

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SUB-AREA C

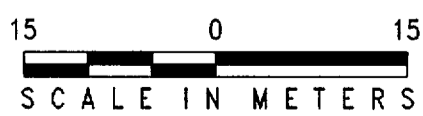
SUB-AREA F

LEGEND

- × TEMPORARY MONITORING WELLS
- MONITORING WELLS

NOTES

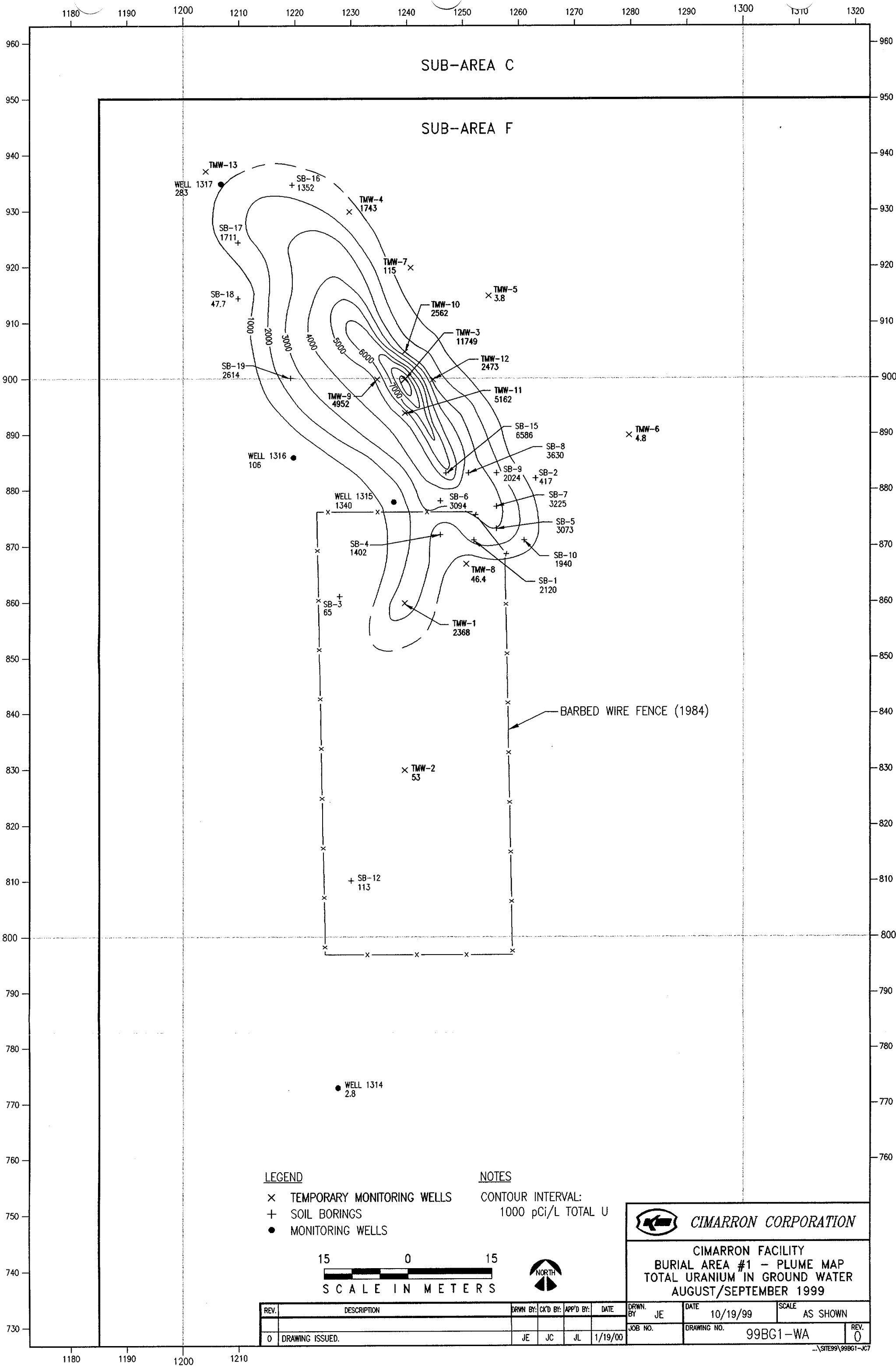
WATER LEVELS WERE TAKEN ON 10/11/99



CIMARRON CORPORATION	
CIMARRON FACILITY BURIAL AREA #1 POTENTIOMETRIC SURFACE MAP	
DRWN. BY: JE	DATE: 10/20/99
SCALE: AS SHOWN	
JOB NO.	DRAWING NO. 99BG1-PS
REV. 0	

REV.	DESCRIPTION	DRWN BY:	CK'D BY:	APP'D BY:	DATE
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1180 1190 1200 1210



SUB-AREA C

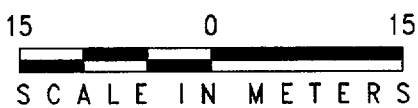
SUB-AREA F

LEGEND

- × TEMPORARY MONITORING WELLS
- + SOIL BORINGS
- MONITORING WELLS

NOTES

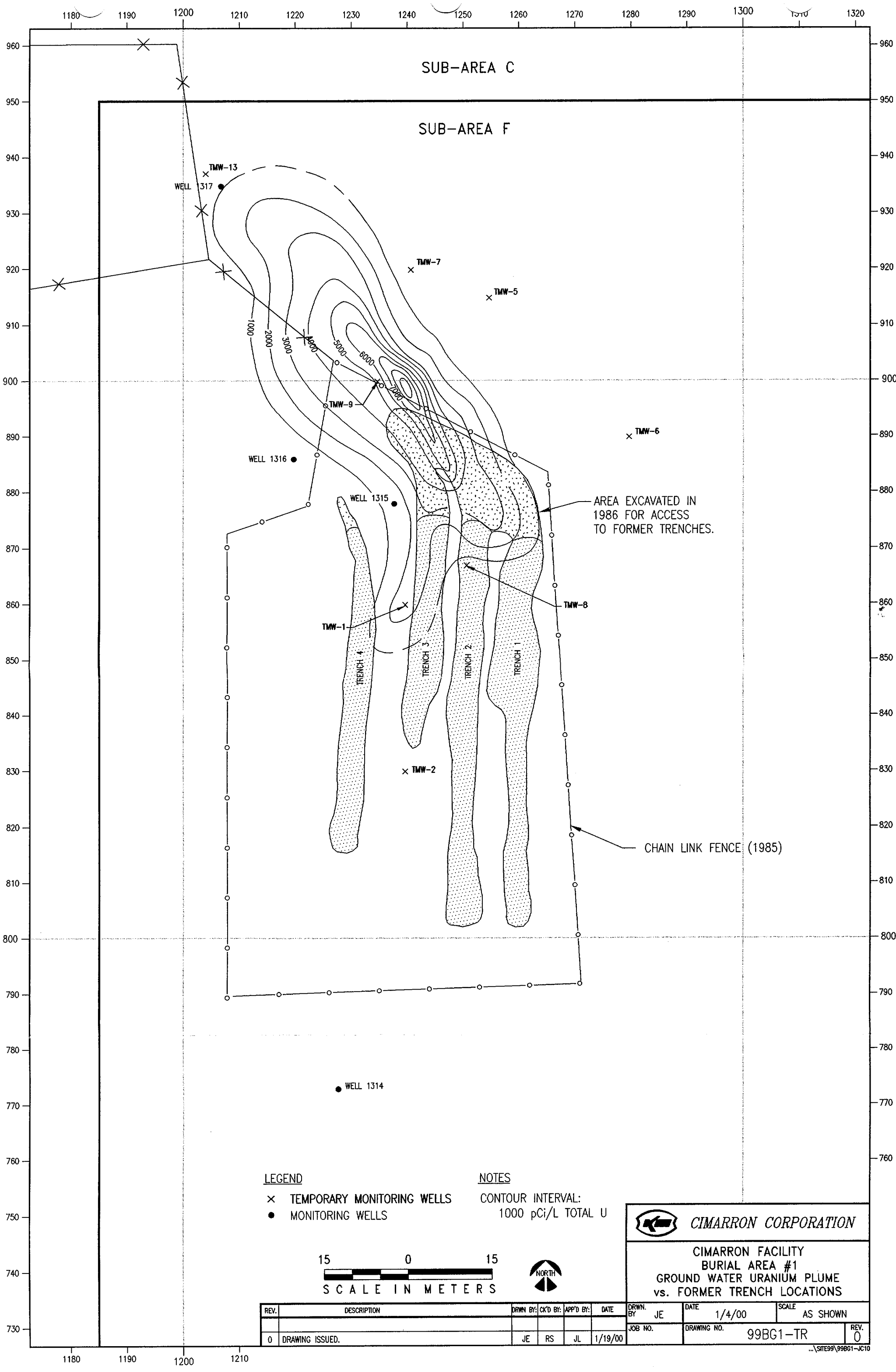
CONTOUR INTERVAL:
1000 pCi/L TOTAL U



CIMARRON CORPORATION

CIMARRON FACILITY
BURIAL AREA #1 - PLUME MAP
TOTAL URANIUM IN GROUND WATER
AUGUST/SEPTEMBER 1999

REV.	DESCRIPTION	DRWN BY:	CK'D BY:	APP'D BY:	DATE	DRWN. BY	DATE	SCALE
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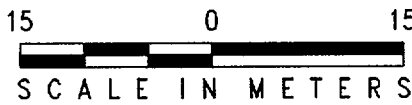


LEGEND

- x TEMPORARY MONITORING WELLS
- MONITORING WELLS

NOTES

CONTOUR INTERVAL:
1000 pCi/L TOTAL U



CIMARRON FACILITY
BURIAL AREA #1
GROUND WATER URANIUM PLUME
vs. FORMER TRENCH LOCATIONS

REV.	DESCRIPTION	DRWN BY:	CK'D BY:	APP'D BY:	DATE	DRWN. BY:	DATE	SCALE
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