NOTICE

All drawings located at the end of the document.

OU4 Solar Evaporation Ponds
Interim Measure/Interim Remedial Action
Environmental Assessment
Decision Document

U.S. Department of Energy
Rocky Flats Environmental Technology Site
Golden, Colorado

February 1995

Revision: Proposed

Part II
Volume 2 - Figures

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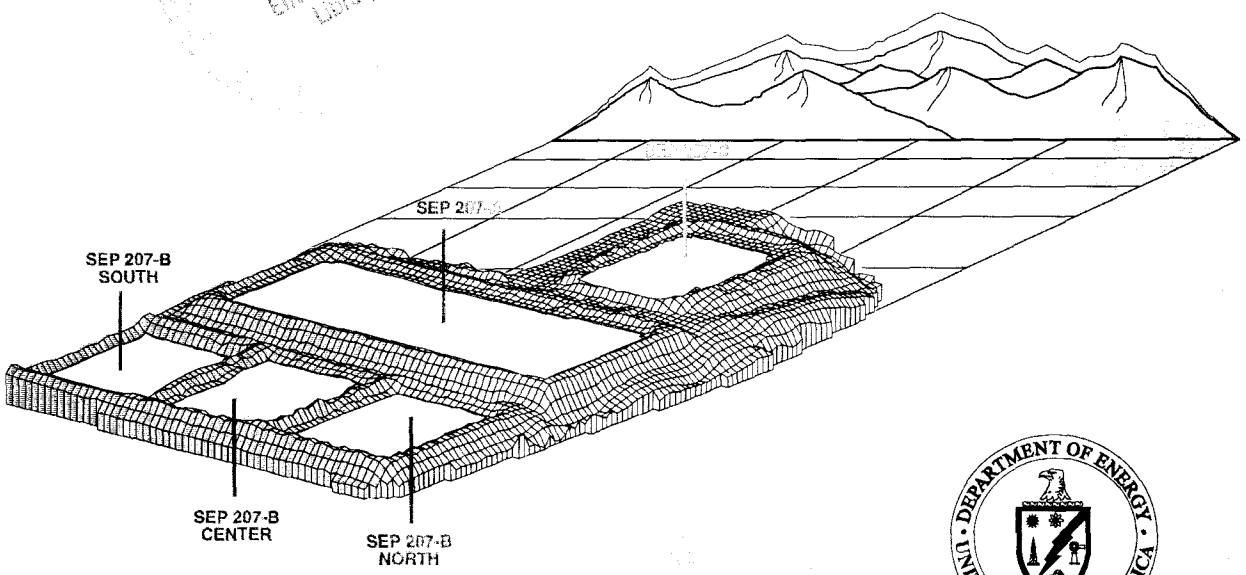

ADMIN RECORD

1/258

DOCUMENT ORGANIZATION

Operable Unit 4 Solar Evaporation Pond
Interim Measure/Interim Remedial Action -
Environmental Assessment Decision Document

Part I	-	Executive Summary and Introduction
Part II	-	Operable Unit 4 Phase I RCRA Facility Investigation/Remedial Investigation Report
		Volume 1 - Sections 1 through 8 (Figures for Section 3 are in Volume 2)
		Volume 2 - Section 3 Figures
		Volume 3 - Appendices A through G
		Volume 4 - Appendices H through L
		Volume 5 - Appendices M through O
		Volume 6 - Appendices P through Q
		Volume 7 - Appendices R through V
		Volume 8 - Appendices W through AA
Part III	-	Interim Measure/Interim Remedial Action Design Analysis
Part IV	-	Recommended Interim Measure/Interim Remedial Action Alternative
Part V	-	Post-Closure Monitoring and Assessment Plan

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SOLAR EVAPORATION PONDS
OU4 IM/IRA ENVIRONMENTAL ASSESSMENT DECISION DOCUMENT

PART II
PHASE I RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION

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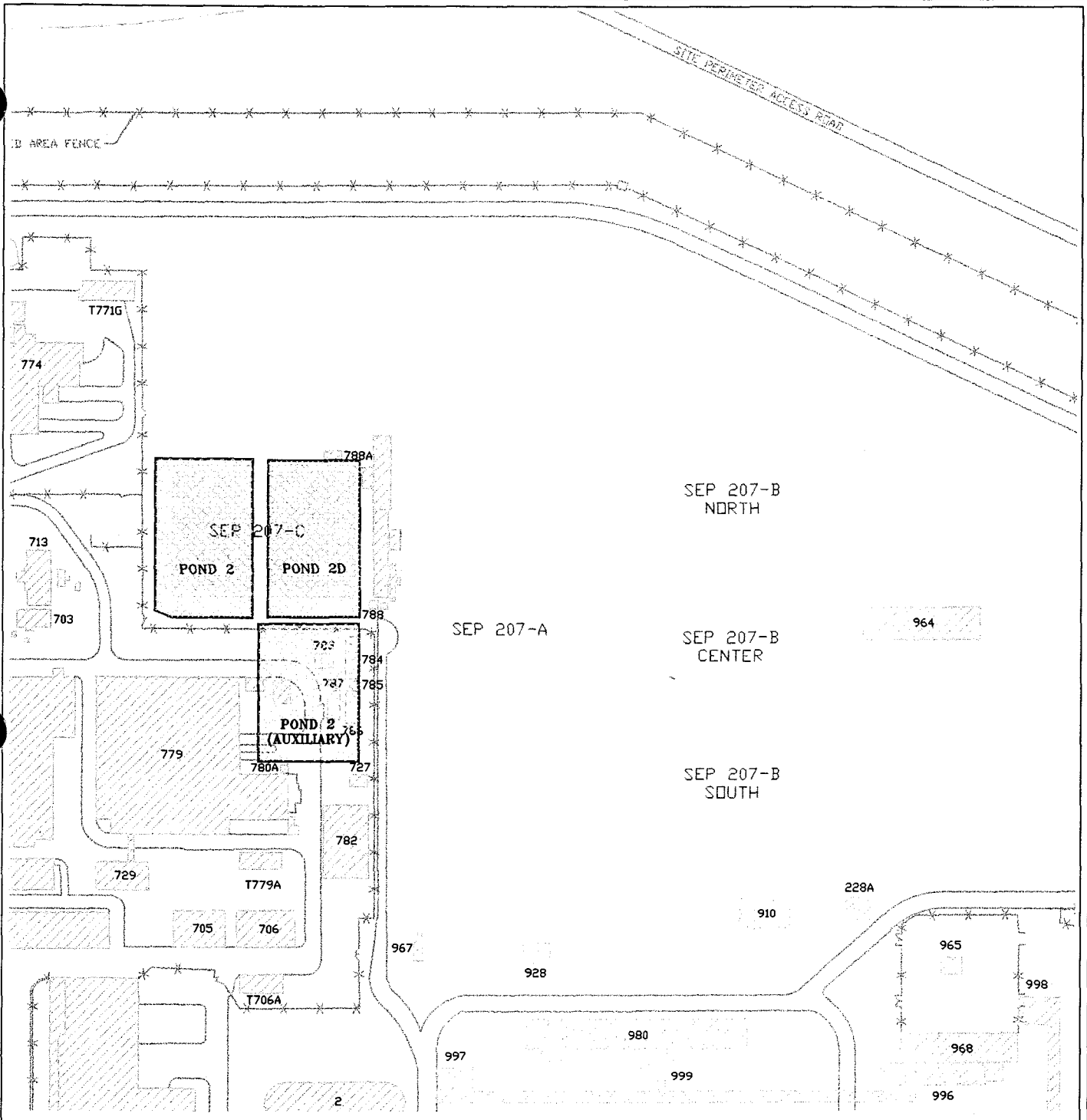


LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Pond (SEP)
- Approximate Locations of Original Ponds

PREPARED FOR
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
GOLDEN, COLORADO

Figure II.3.1-2

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Approximate Locations of Original Ponds

Figure II.3.1-3

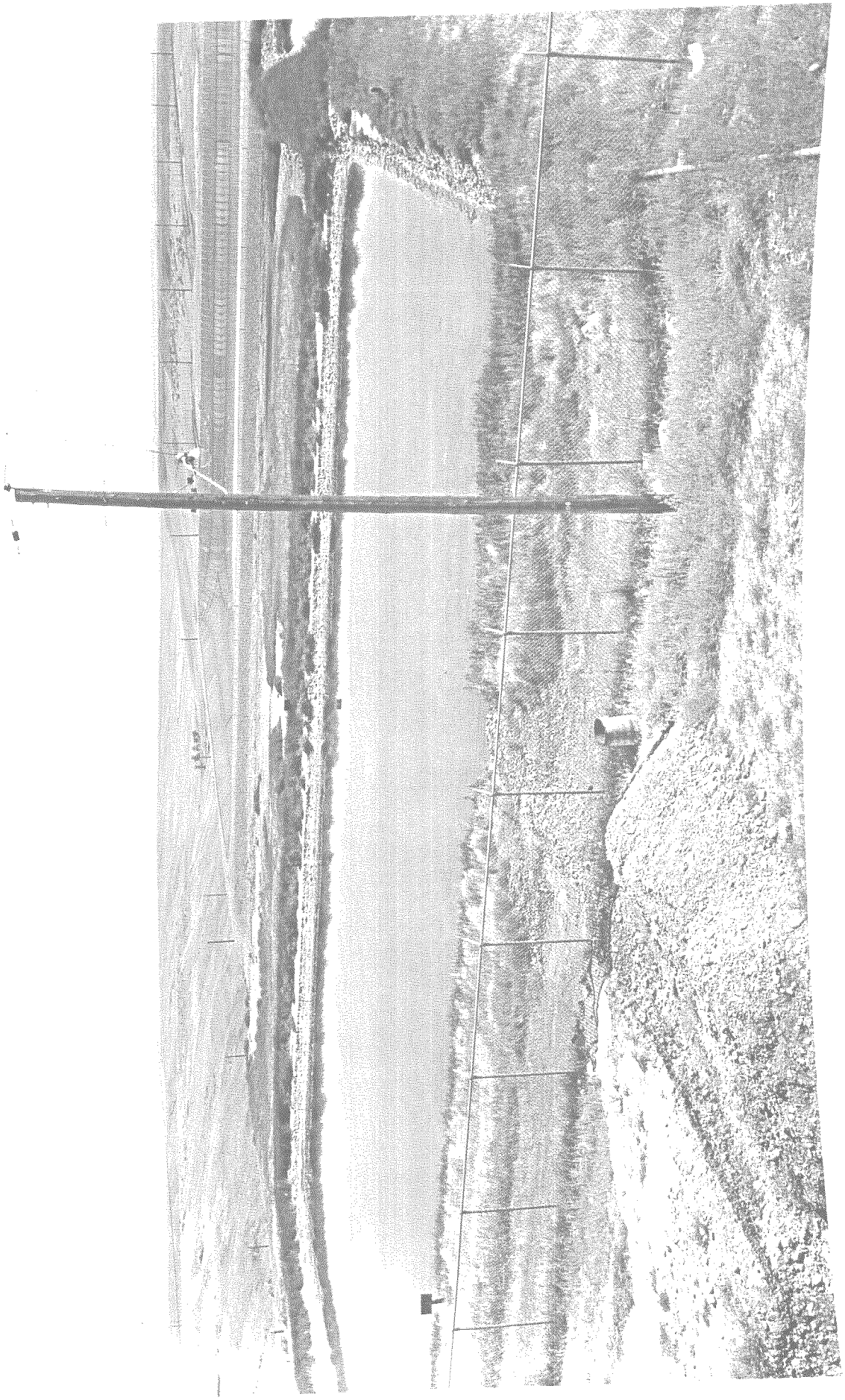


Figure II.3.1-4

September 1958 Photograph

Figure II.3.1-5

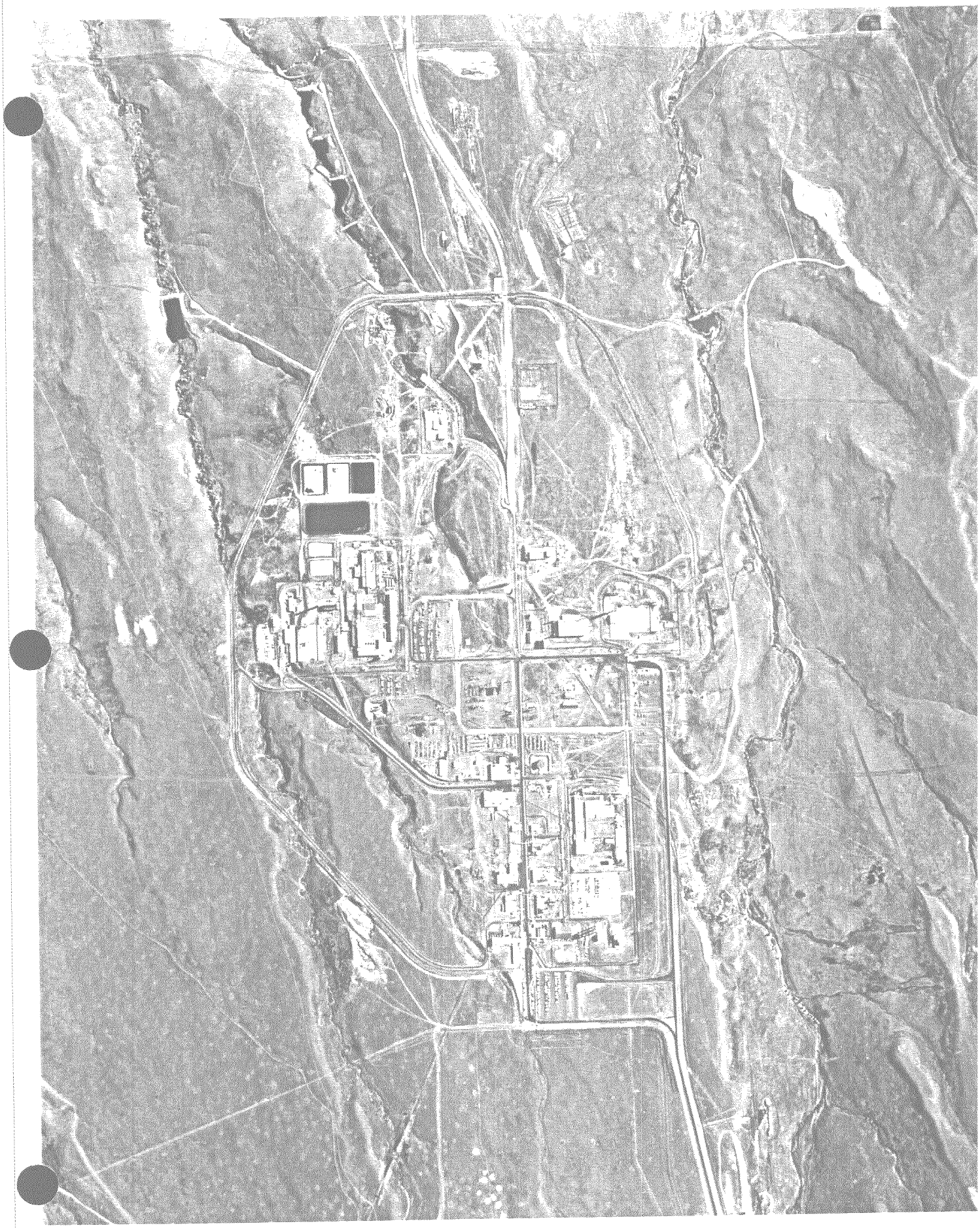


Figure II.3.1-6

July 1966 Photograph

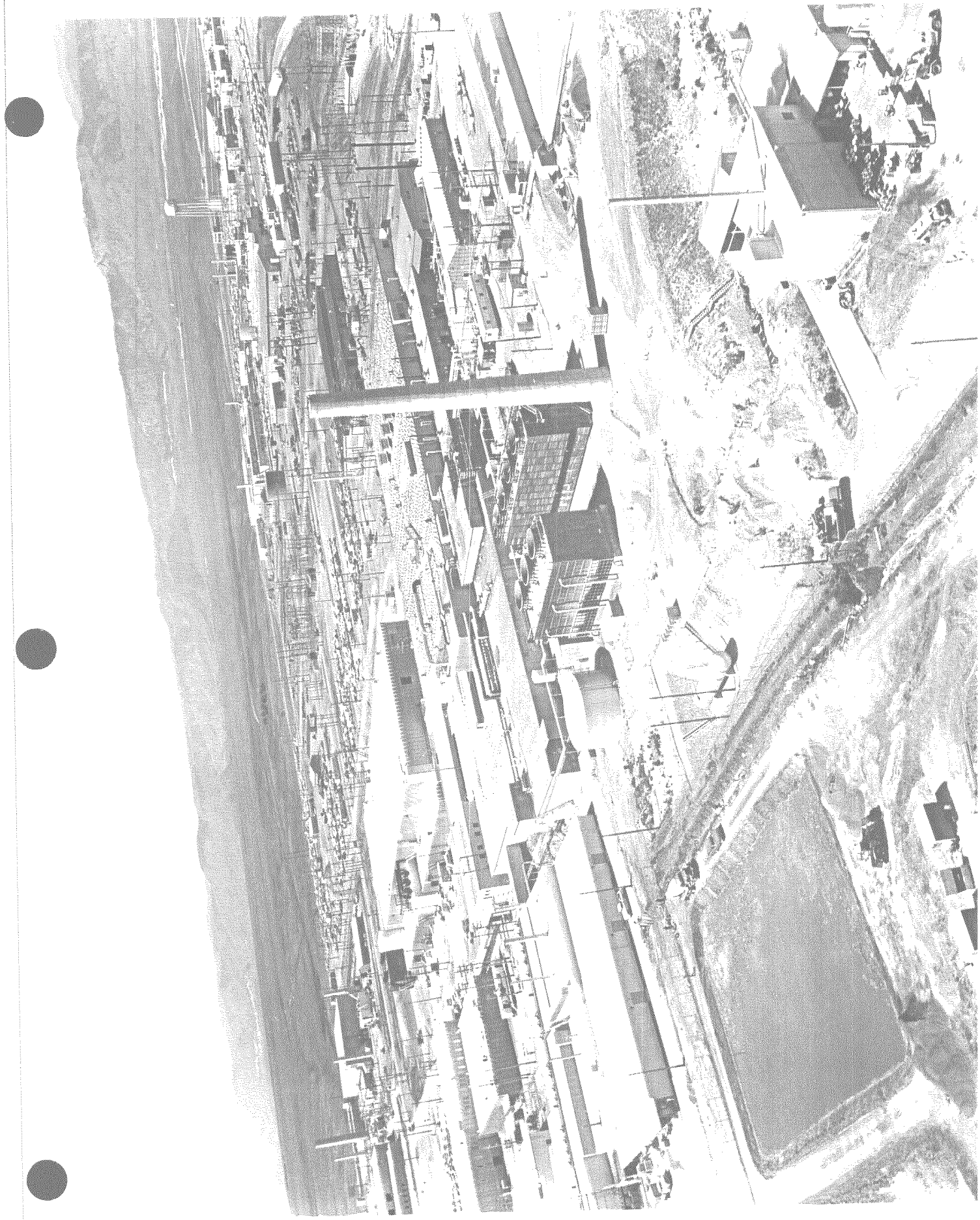


Figure II.3.1-8

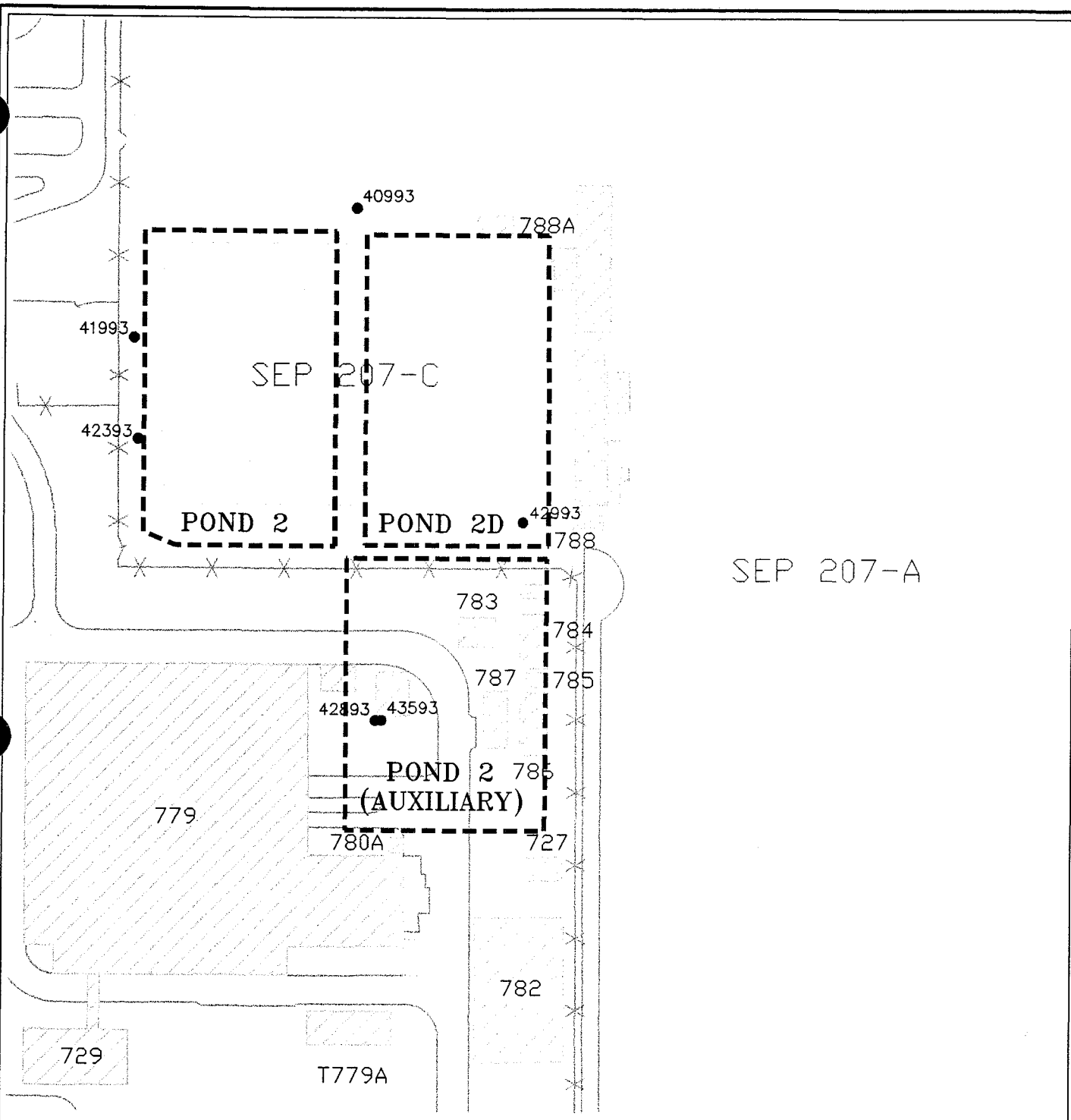
July 1989 Photograph

Figure II.3.1-7

June 1969 Photograph

Figure II.3.1-9

May 1970 Photograph



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Pond (SEP)
- Approximate Boundary of Original Ponds
- 40993 Borehole Location and Identification

50 0 50 100 150 FEET

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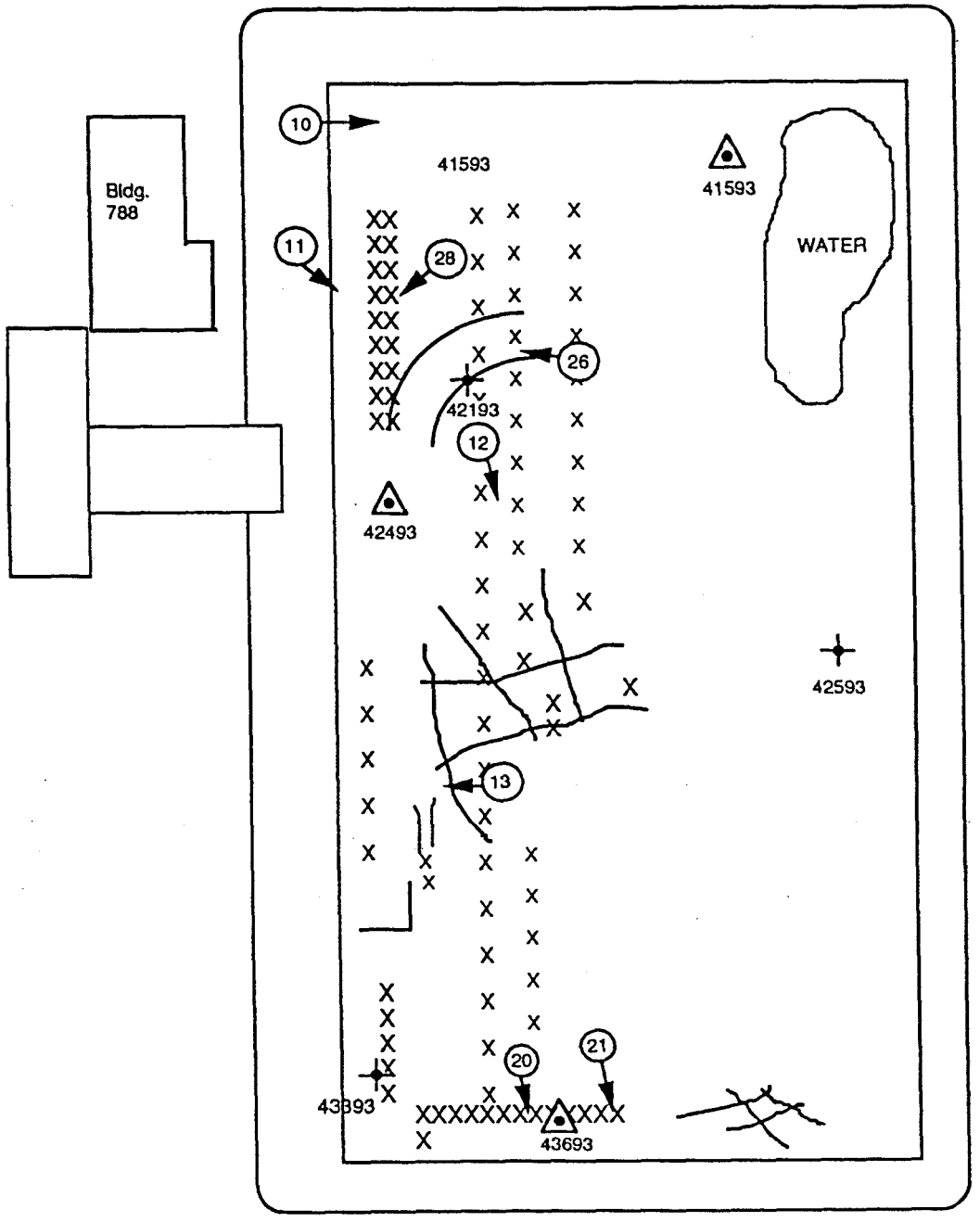
GOLDEN, COLORADO

Figure II.3.1-15

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Locations of Boreholes Investigating Original Ponds Area



12 = Camera Vantage Point and Exposure Number

X = Mud Crack or Bubbling

= Distinct Individual Crack

43693 = Proposed Vadose Zone Borehole Location

43393 = Proposed Borehole Location

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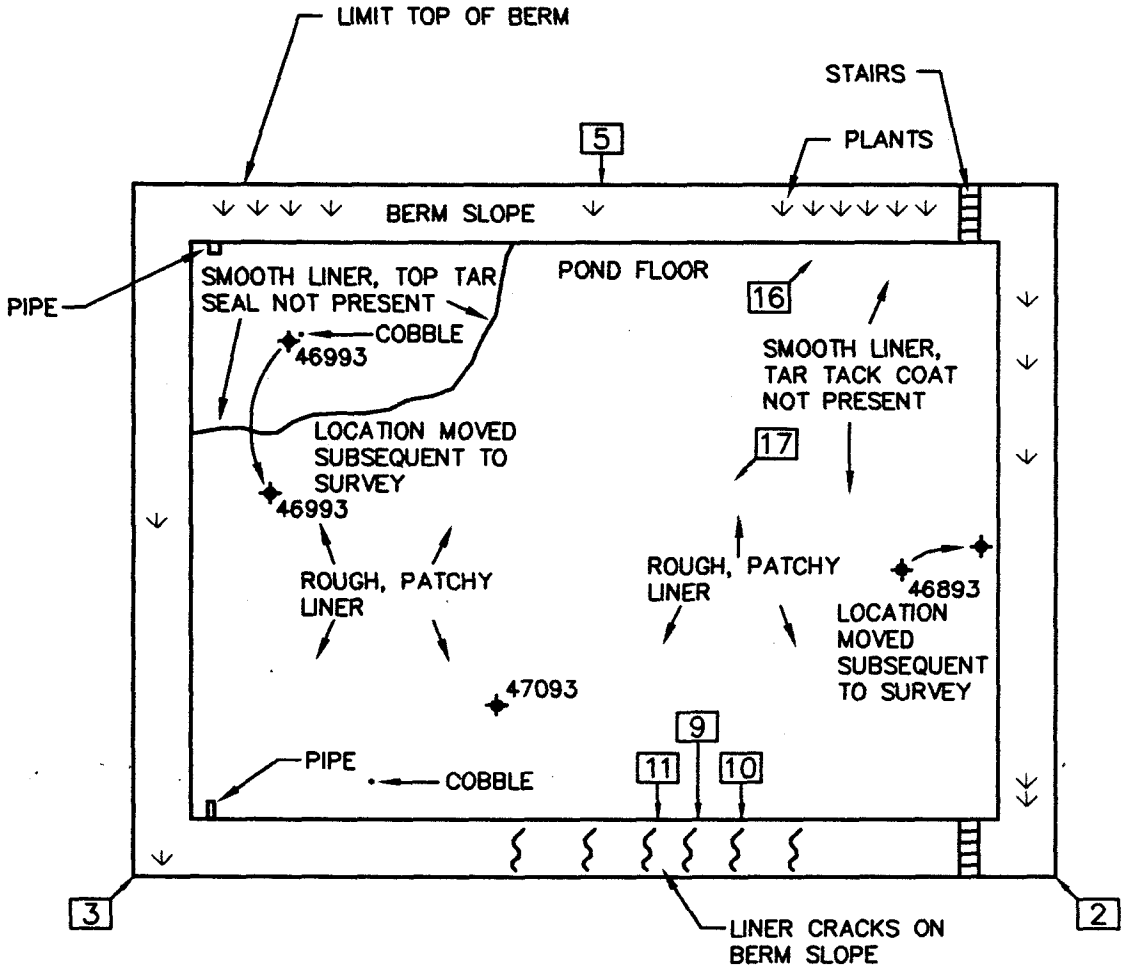
GOLDEN, COLORADO

Figure II.3.1-16

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Sketch of SEP 207-A
Visual survey Results



Not To Scale
(Approximately 1"=50')

LEGEND

1 — Camera Vantage Point and Photograph Number (EG&G Roll No. 45142)

47093 — Approximate Borehole Location

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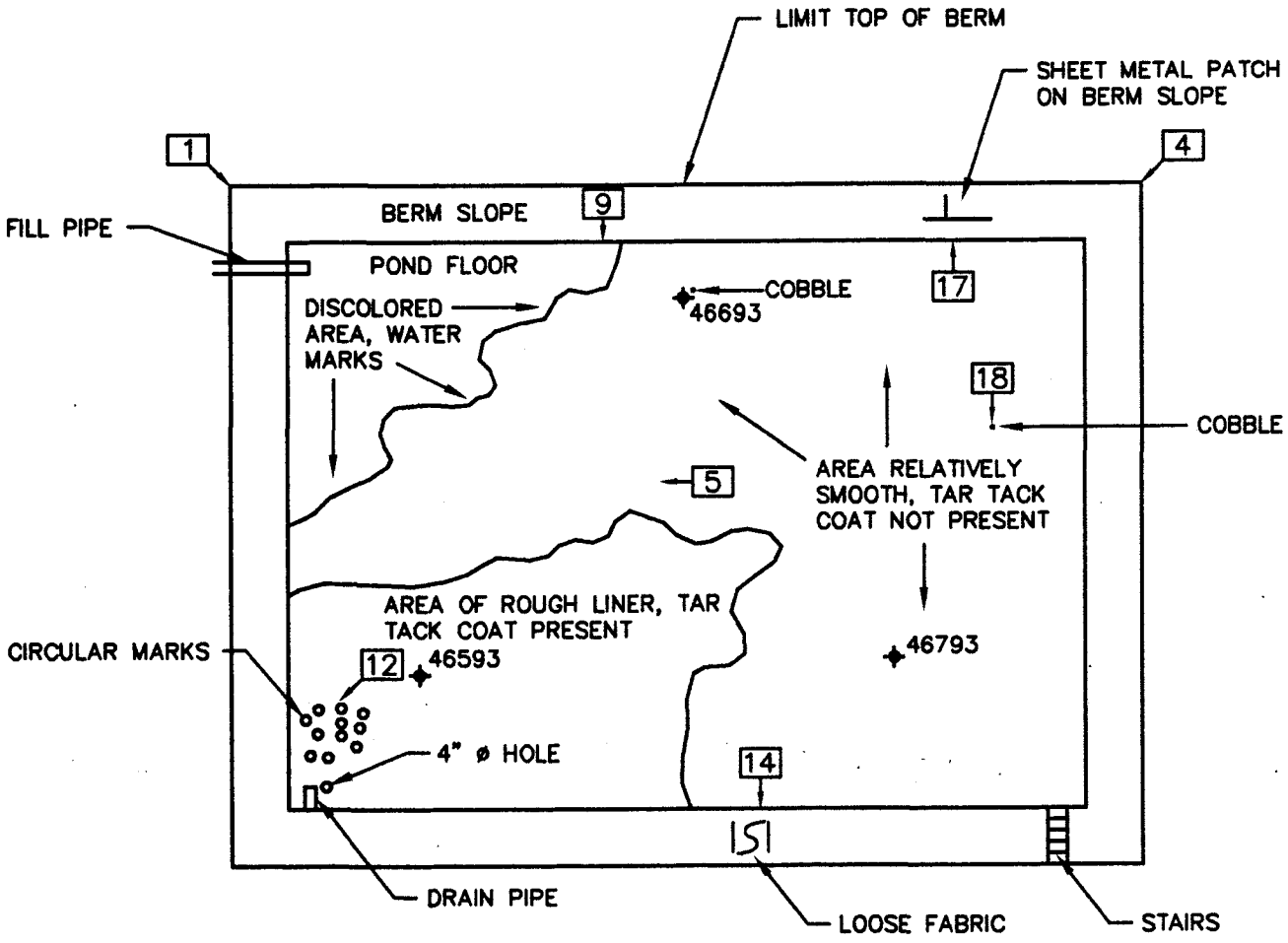
Figure II.3.1-17

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Sketch of SEP 207-B Center
Visual Survey Results



Not To Scale
(Approximately 1"=50')

LEGEND

1 — Camera Vantage Point and Photograph Number (EG&G Roll No. 45142)

46793 — Approximate Borehole Location

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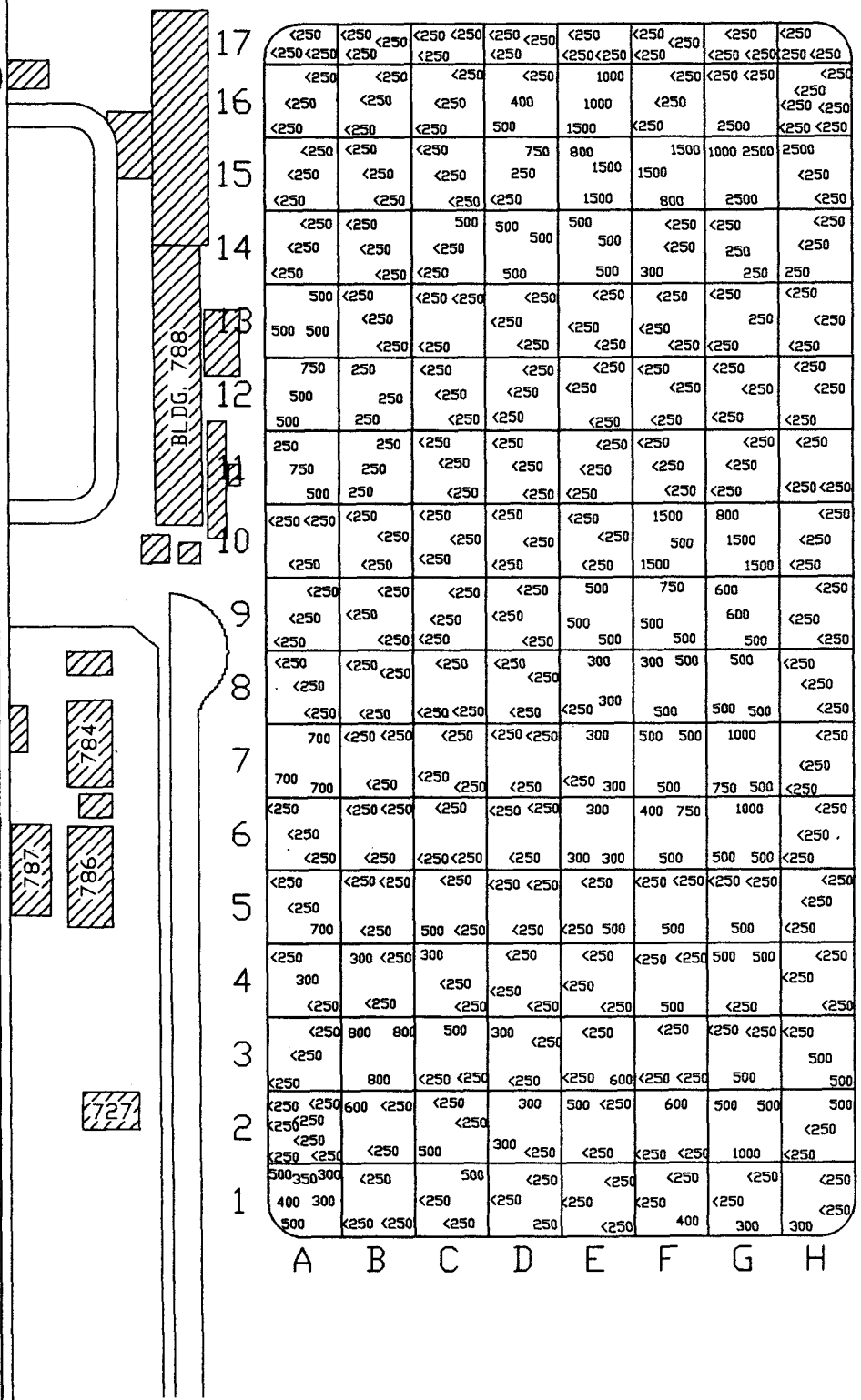
GOLDEN, COLORADO

Figure II.3.1-18

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Sketch of SEP 207-B North
Visual Survey Results



LEGEND

- Paved Roads
- Buildings
- 500 Radiological Reading

NOTES

1. SEP 207-A Survey was completed by E.G.&G.
2. Total Alpha Survey was conducted using Ludlum 12-1A Meter and Air Proportional Detector.
3. Instrument Readings <250 CPM are considered below Action Limits per RFP Standard Operating Procedures.

Approximate Scale: 1 Inch = 75 Feet

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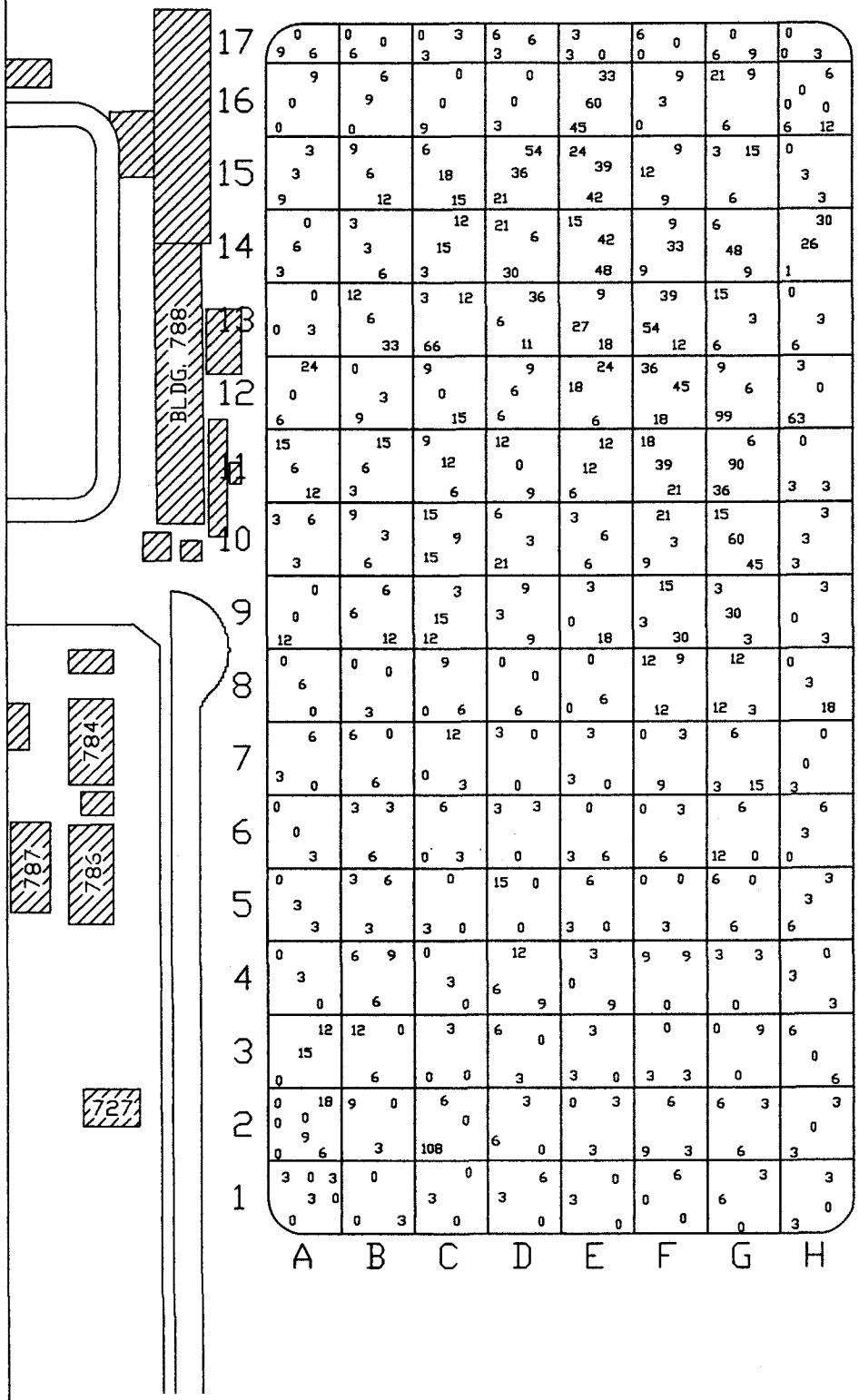
GOLDEN, COLORADO

Figure II.3.1-19

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-A Total Alpha Radiation
Survey Results



LEGEND

- Paved Roads
- Buildings
- 3 Radiological Reading

NOTES

1. SEP 207-A survey was completed by E.G.&G.

Approximate Scale: 1 Inch = 75 Feet

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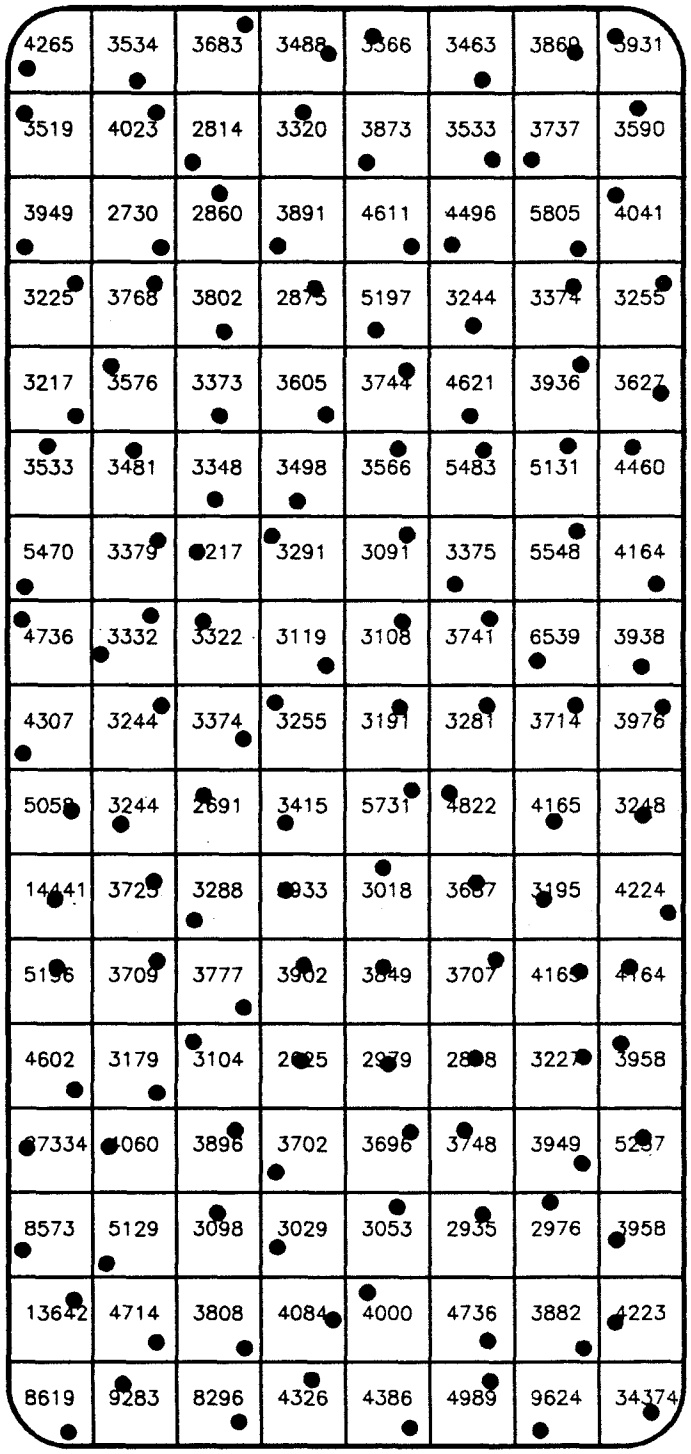
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
GOLDEN, COLORADO

Figure II.3.1-20

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-A Removable (Smear) Alpha Radiation Survey Results



LEGEND

5805 **FIDLER Reading In Counts Per Minute (cpm)**

● **Location Where FIDLER Reading Was Taken**

NOTES

1. **FIDLER Survey Conducted By E.G.&G.**
2. **Calculated Background = 3618 cpm.**

Approximate Scale: 1 Inch = 60 Feet

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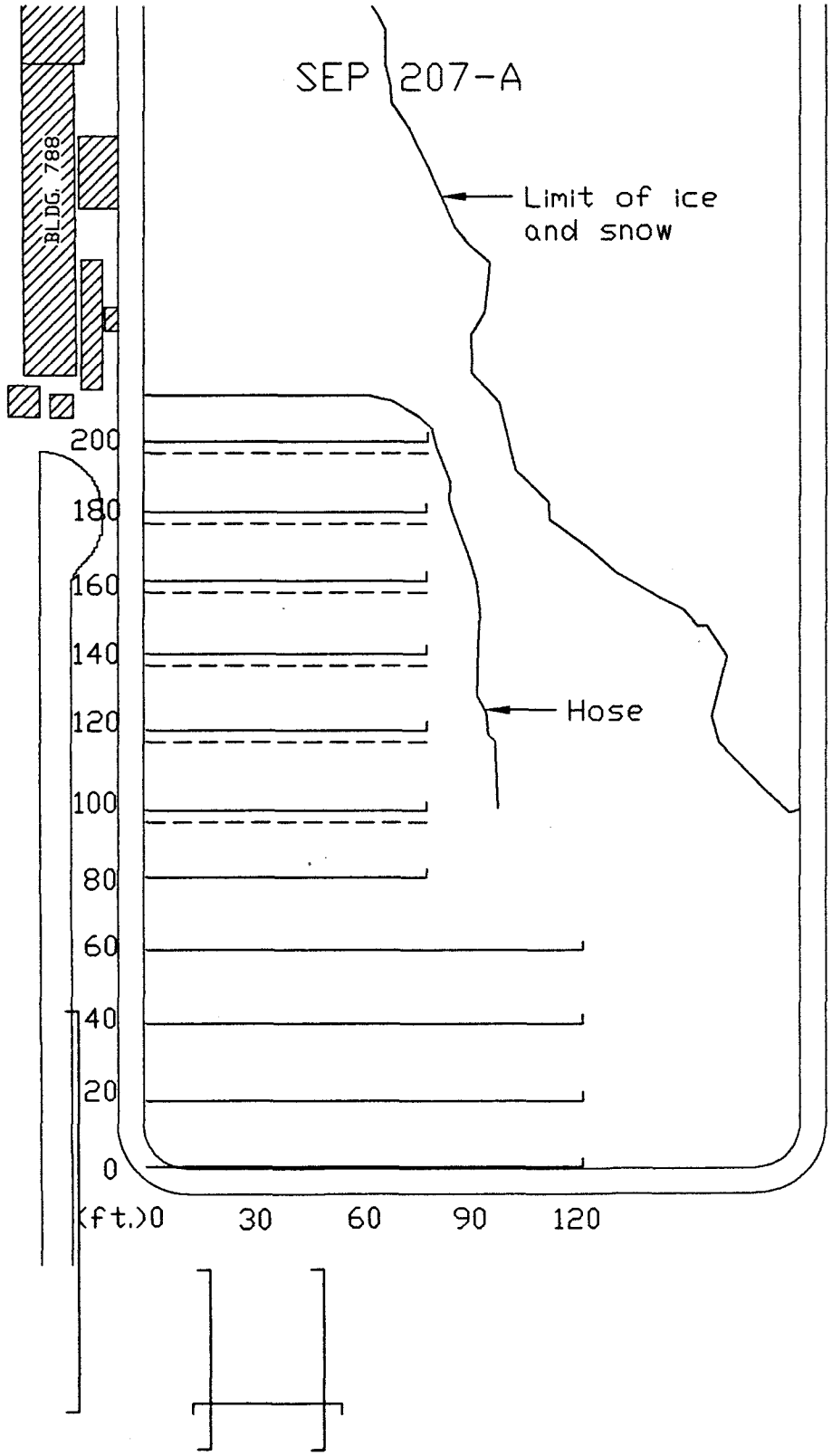
GOLDEN, COLORADO

Figure II.3.1-21

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-A Gamma (FIDLER)
Radiation Survey Results



LEGEND

- Paved Roads
- Buildings
- 300 MHz GPR Line
- 900 MHz GPR Line
- Construction Yard Field Tests

NOTES

1. Survey Date: 12/92

Not To Scale

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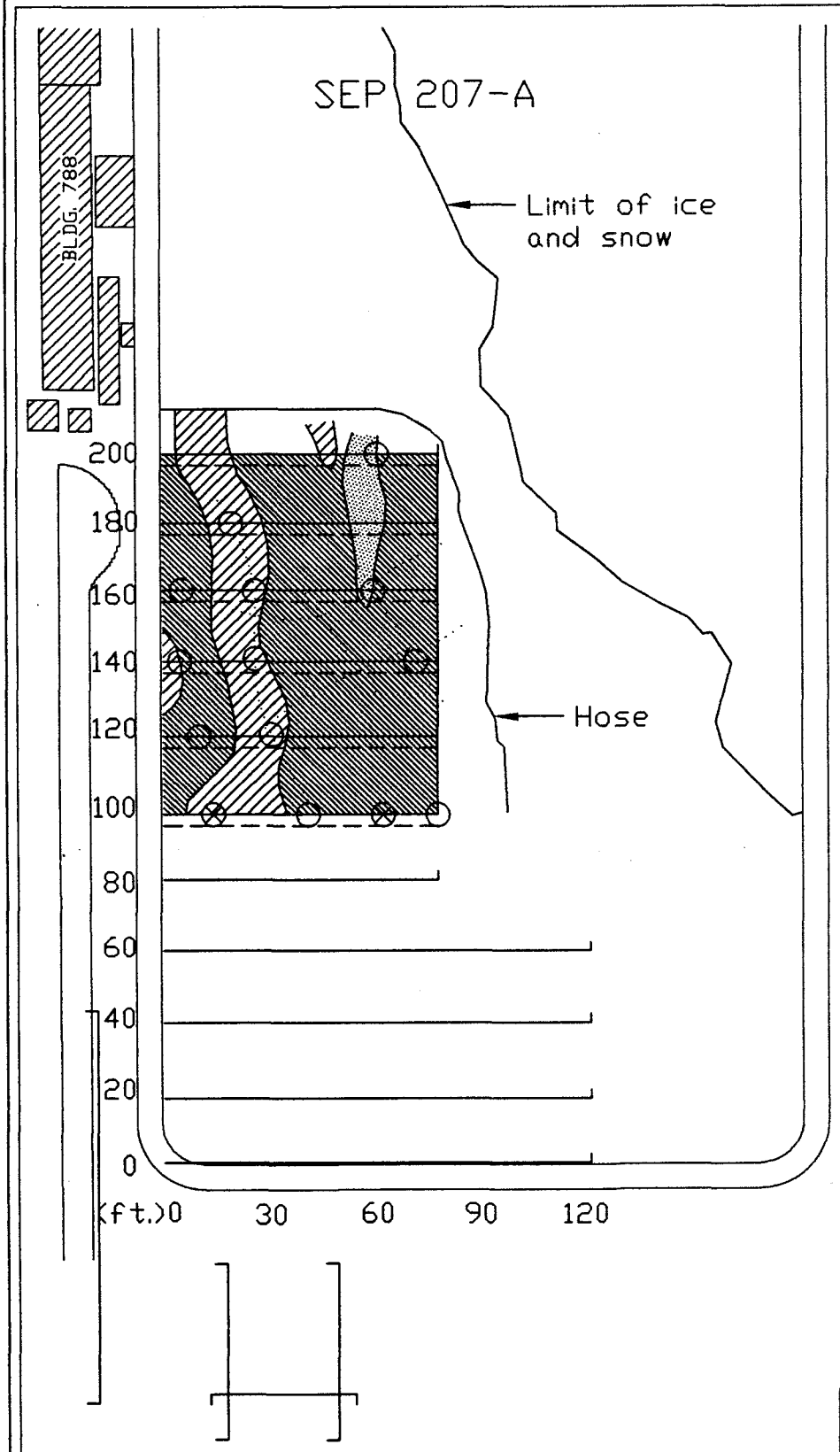
GOLDEN, COLORADO

Figure II.3.1-32

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
GPR Survey
SEP 207-A Area



LEGEND

- Paved Roads
- Buildings
- ZONE 1 Wide Space Layer Zone
- ZONE 2 Near Surface Multi-Layer Zone
- ZONE 3 Synclinal Zone
- Moisture Anomaly
- Possible Metal Object Anomaly
- 300 MHz GPR Line
- 900 MHz GPR Line
- Construction Yard Field Tests
- Location of Cracks in Liner from Visual Survey

NOTES

1. Survey Date: 12/92

Not To Scale

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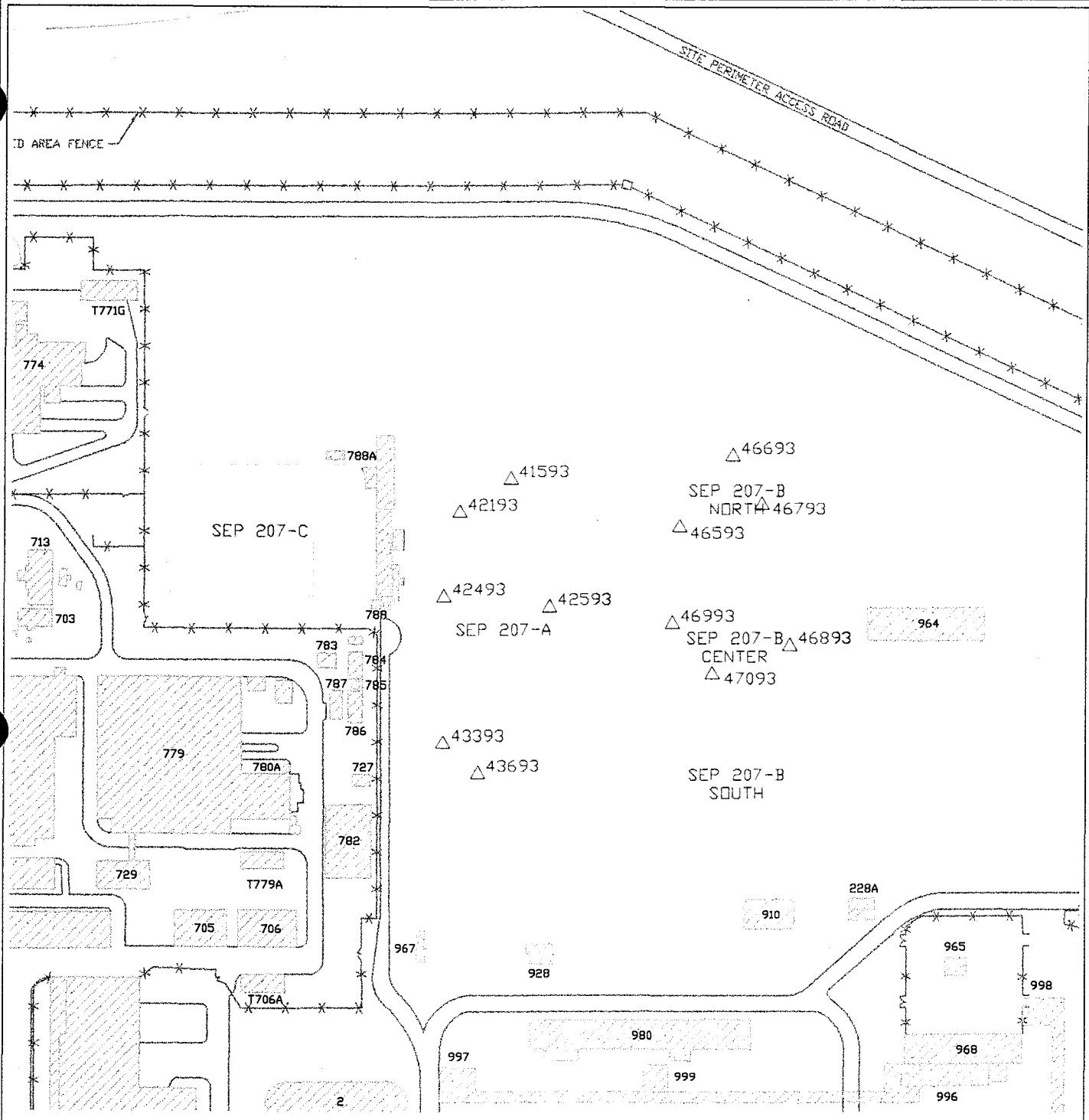
Figure II.3.1-35

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Interpreted GPR Data
SEP 207-A - 900 MHz Antenna


SITE PERIMETER ACCESS ROAD
D AREA FENCE
T771G
774
788A
△41593
△46693
SEP 207-B
NORTH
△42193
△46793
△46593
SEP 207-C
713
△42493
△42593
703
788
△46993
964
SEP 207-A
SEP 207-B
△46893
CENTER
△47093
783
784
787
785
786
△43393
779
780A
727
△43693
SEP 207-B
SOUTH
782
729
T779A
228A
910
705
706
967
928
965
998
T706A
980
968
997
999
996
2
LEGEND
Streams
Paved Roads
Buildings
Fence
Solar Evaporation Ponds (SEP)
△43393 Sampling Location and Identification
100 0 100 200 300 FEET
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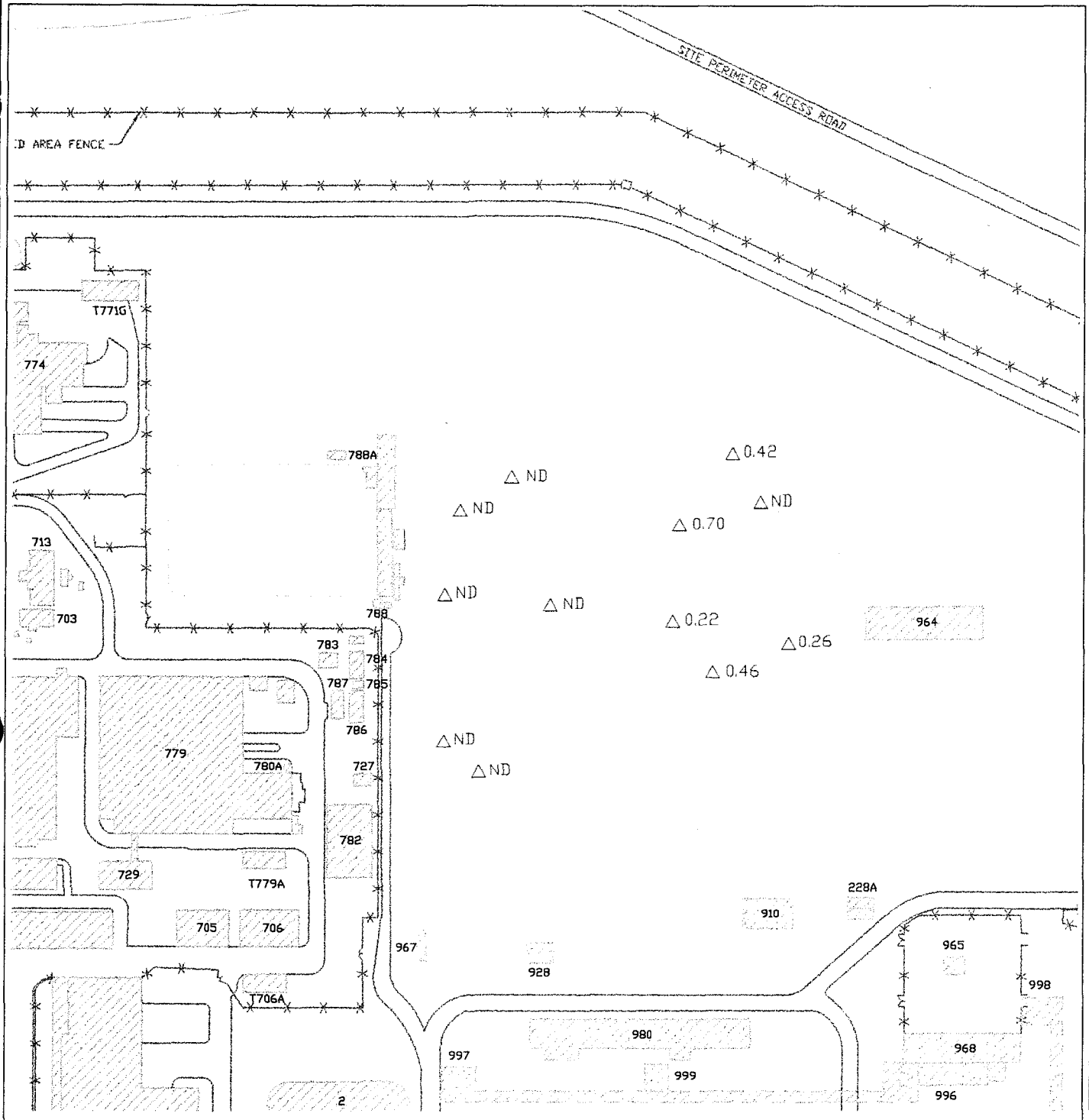
GOLDEN, COLORADO
Figure II.3.1-36
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Liner, Subgrade,
And Subsurface Sampling Locations



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 0.70 Result in mg/kg
- ND Not detected

100 0 100 200 300 FEET

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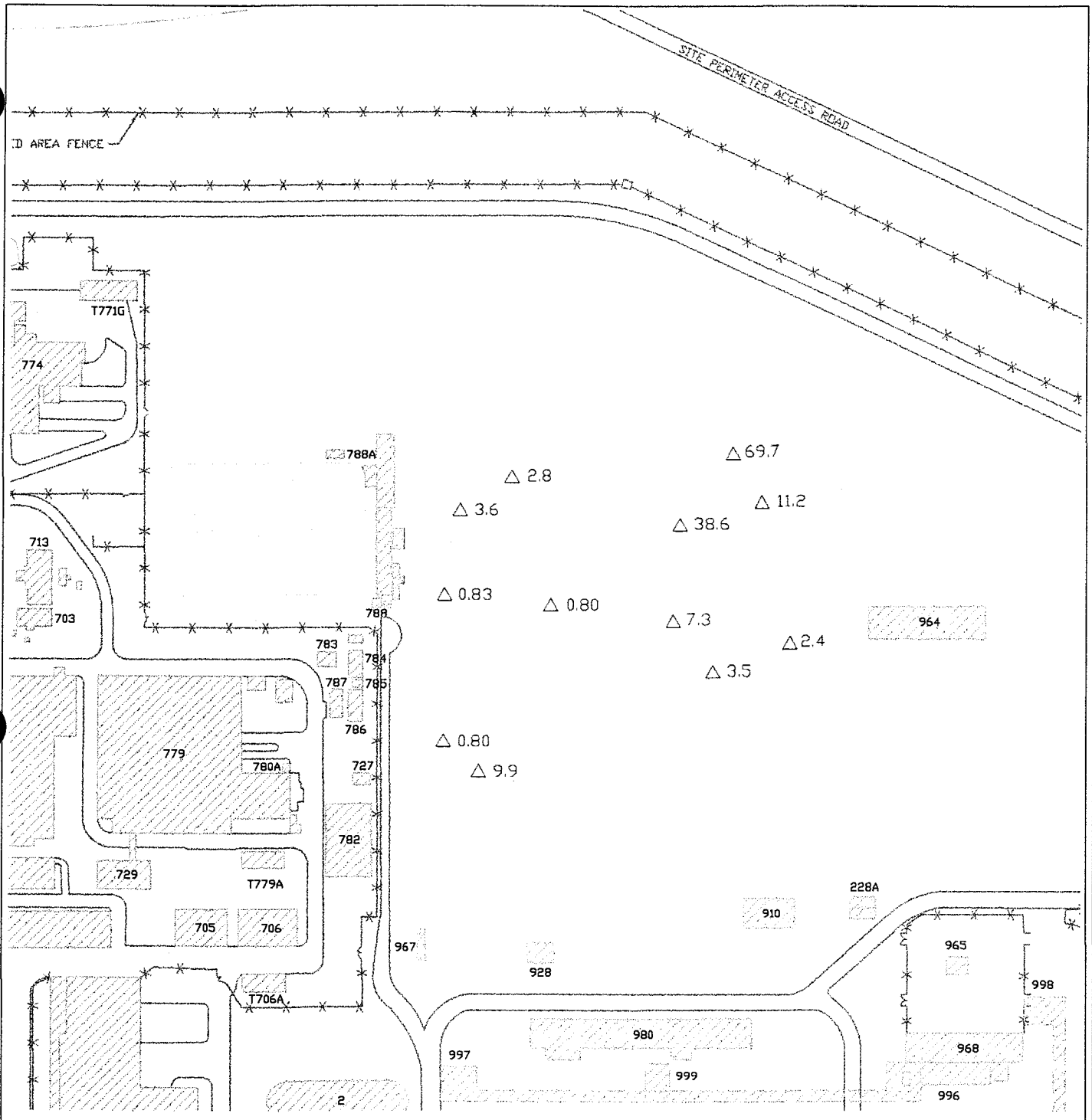
Figure II.3.1-37

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Liner Sampling Results
Beryllium



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 0.80 Result in mg/kg

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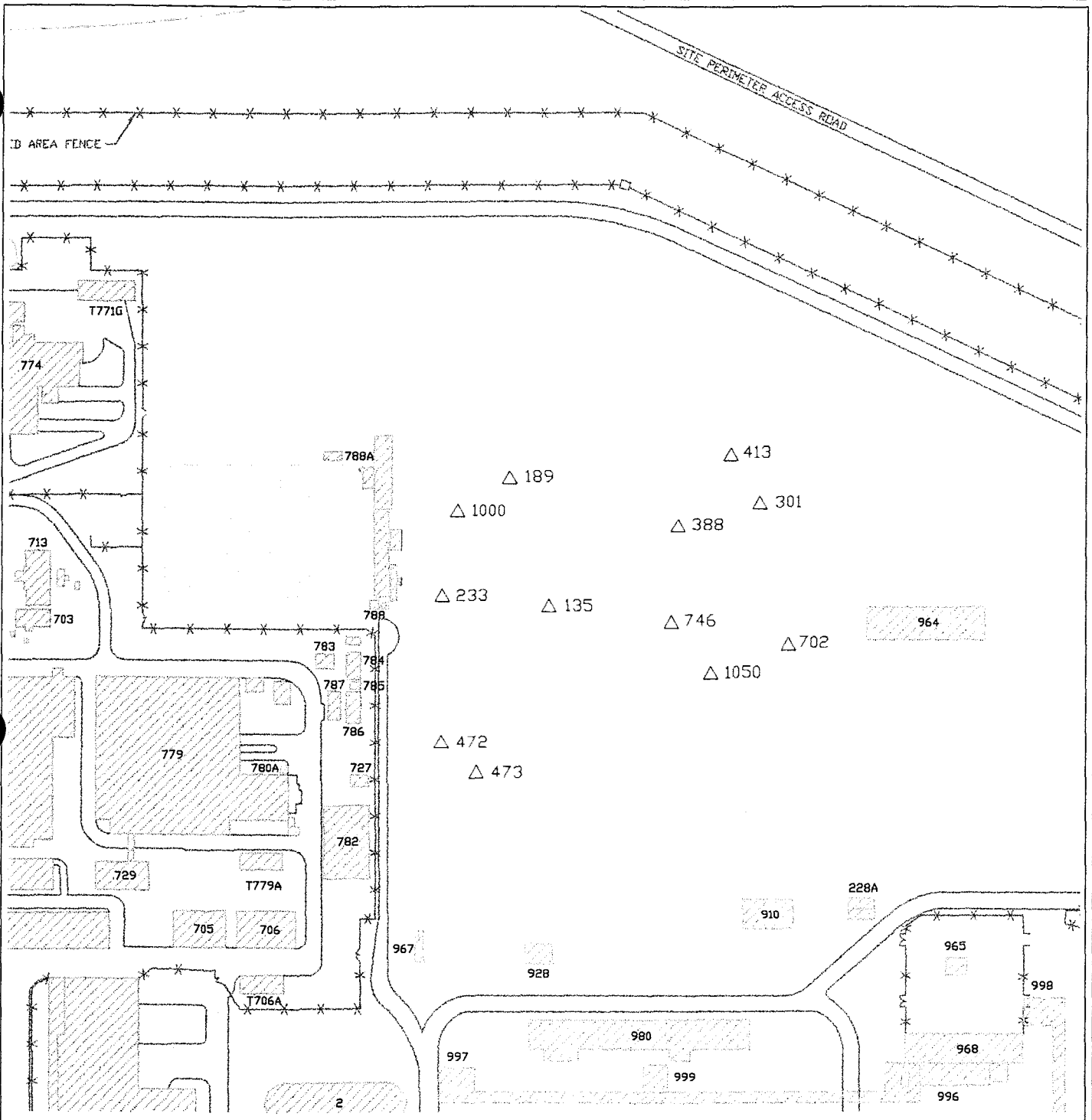
Figure II.3.1-38

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Liner Sampling Results
Cadmium



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 472 Result in mg/kg

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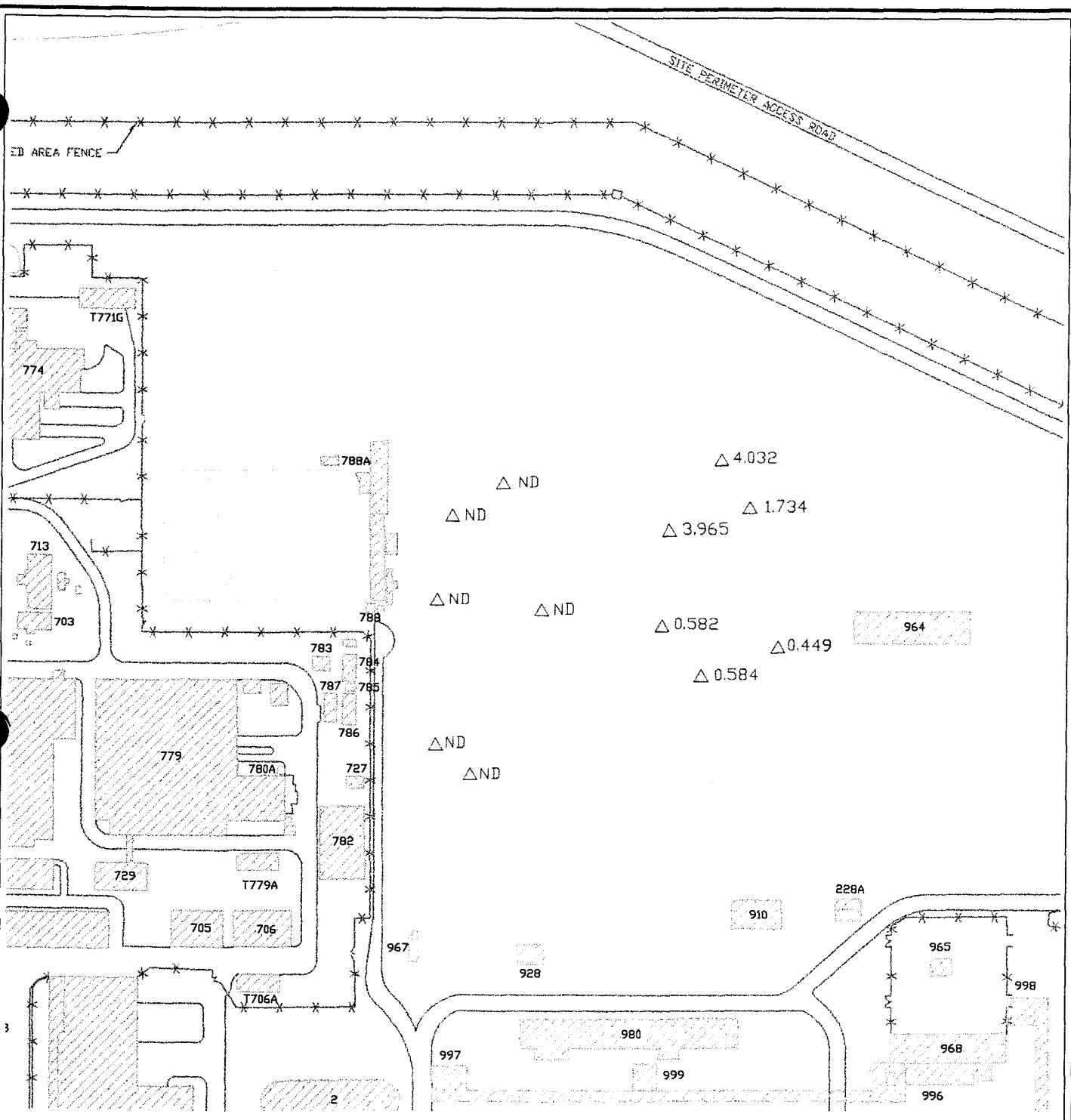
Figure II.3.1-39

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Liner Sampling Results
Sodium



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 0.449 Result in pCi/g
- ND Not Detected

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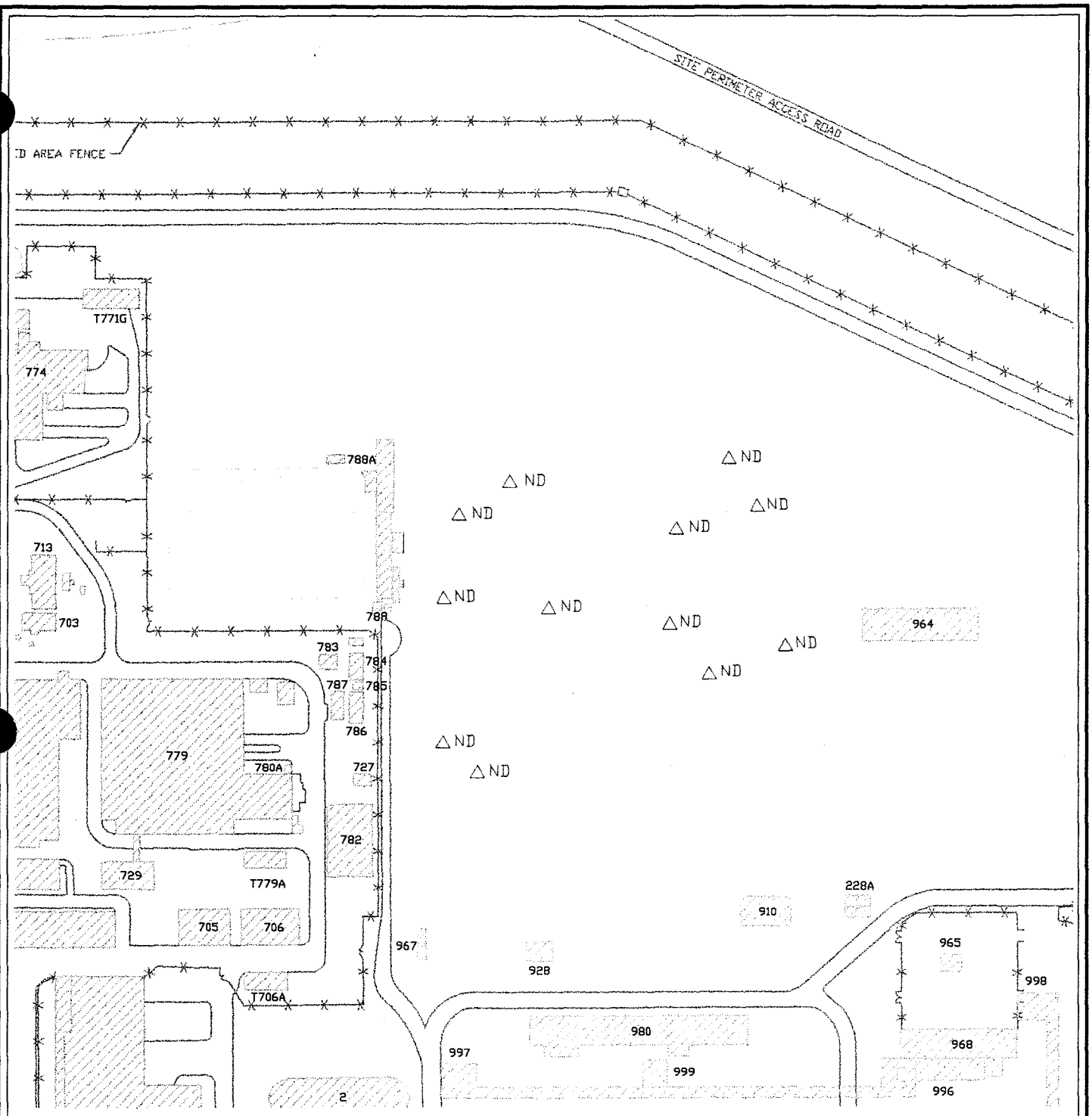
Figure II.3.1-40

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Liner Sampling Results
Americium 241



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- ND Not Detected

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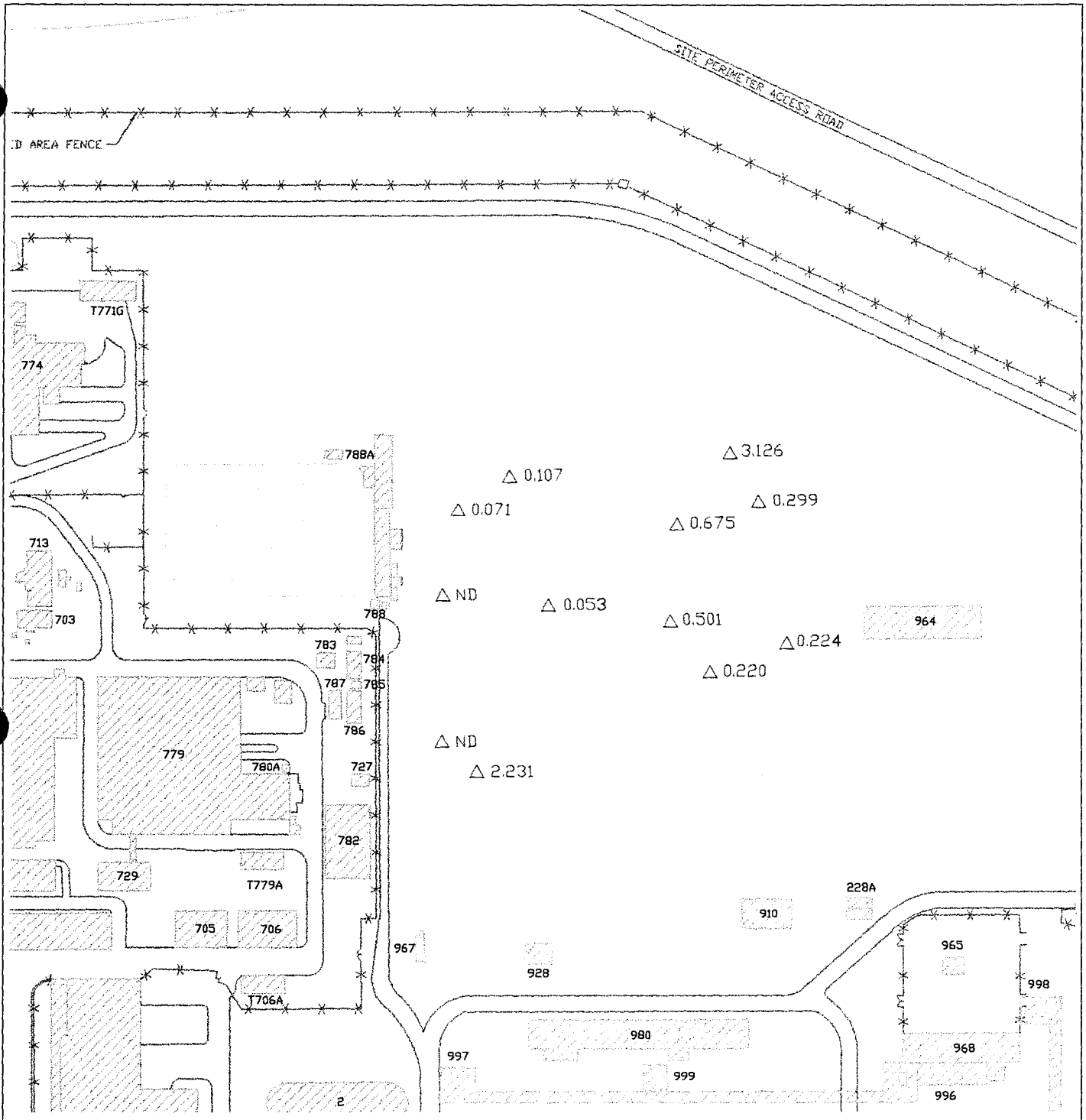
Figure II.3.1-41

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Liner Sampling Results
Cesium-134



100 0 100 200 300 FEET

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 2.231 Result in pCi/g
- ND Not Detected

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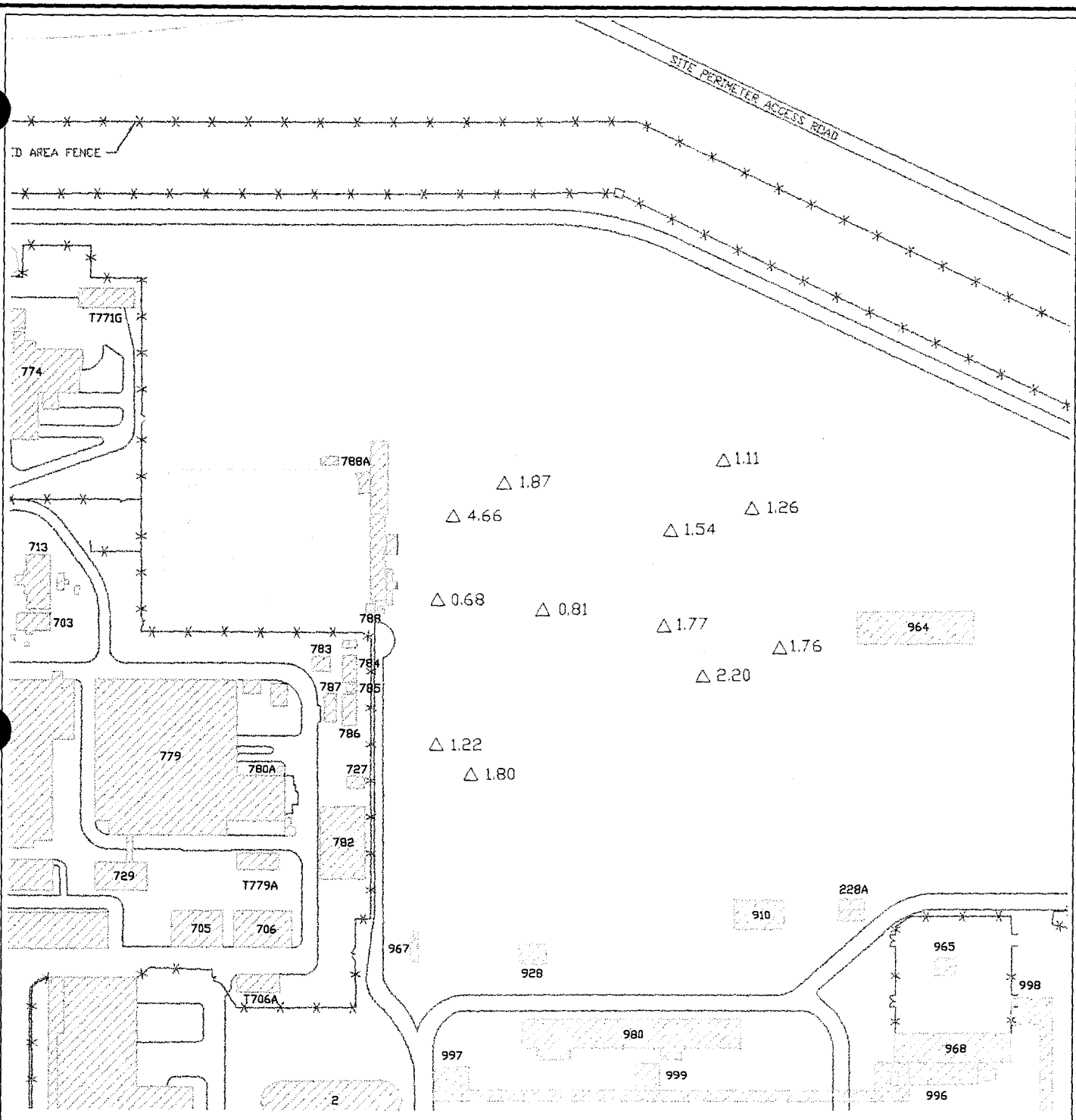
Figure II.3.1-42

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Liner Sampling Results
Plutonium 239/240



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 1.22 Result in pCi/g

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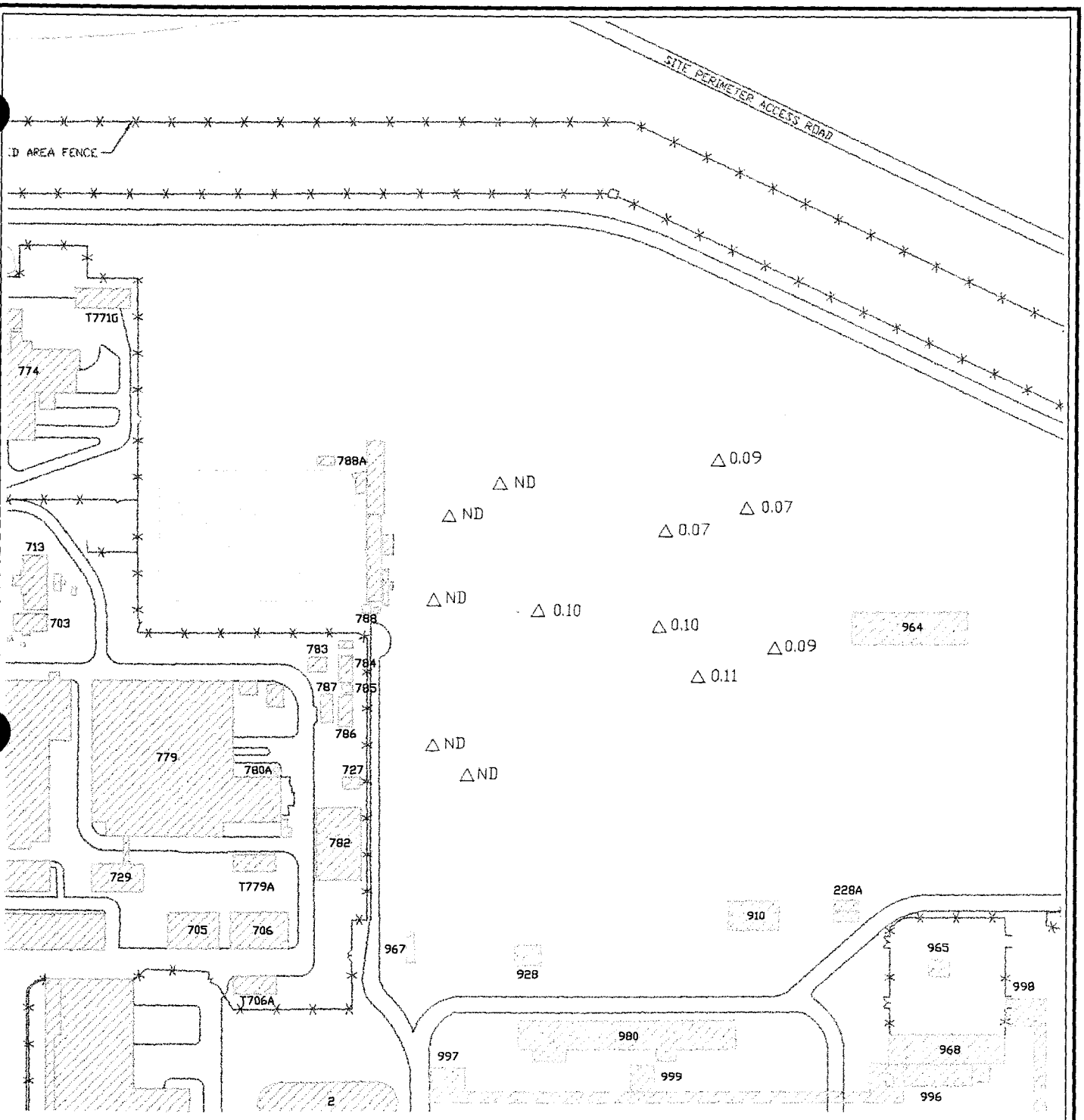
Figure II.3.1-43

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Liner Sampling Results
Uranium 233/234



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 0.70 Result in pCi/g
- ND Not Detected

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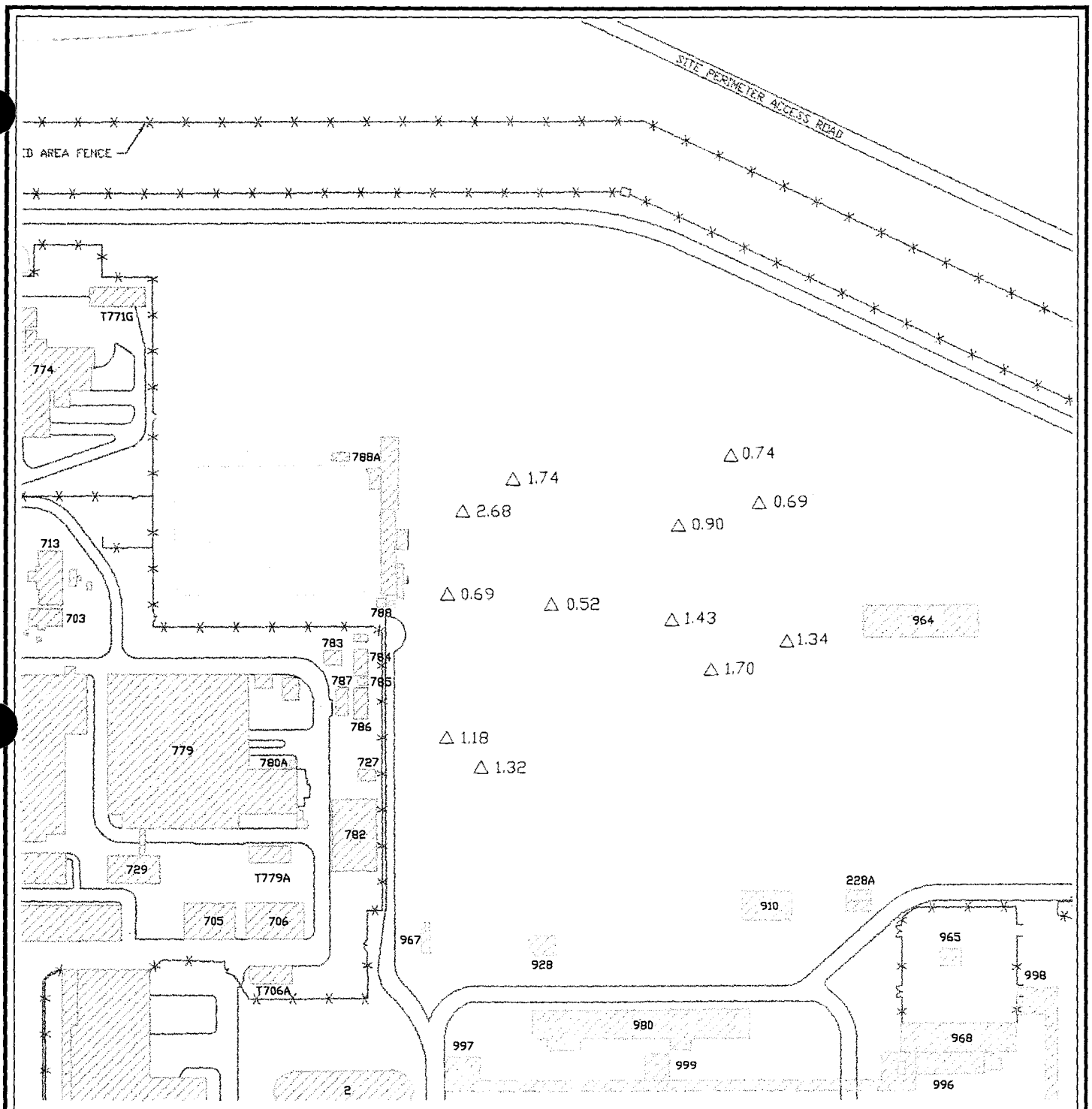
Figure II.3.1-44

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Liner Sampling Results
Uranium 235



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 1.18 Result in pCi/g

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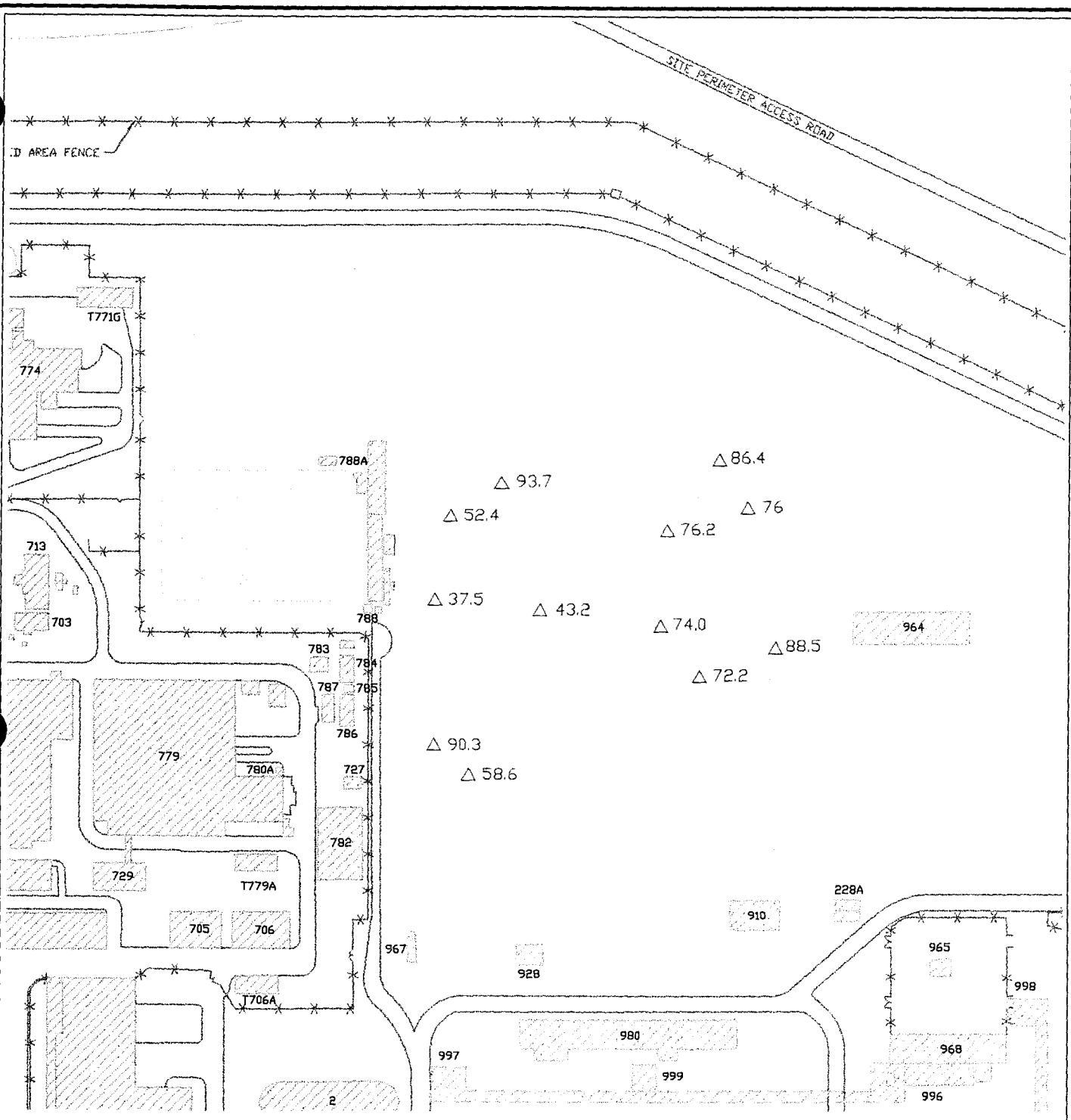
Figure II.3.1-45

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Liner
Uranium 238



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 58.6 Result in mg/kg

Note: Results in Red Exceed Background Level of 93.87 mg/kg

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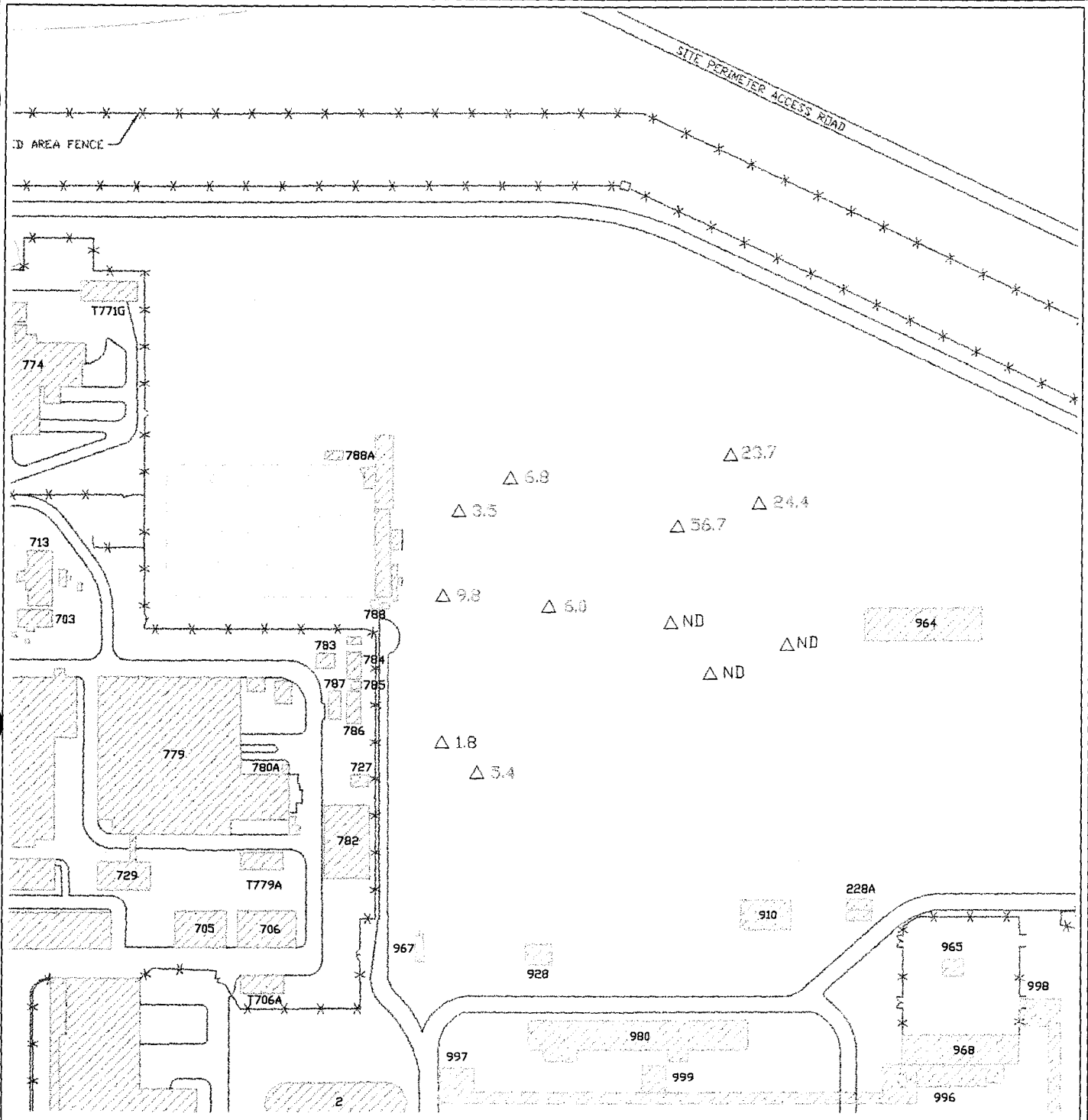
Figure II.3.1-46

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Barium


SITE PERIMETER ACCESS ROAD
D AREA FENCE
T771G
774
788A
△ 6.8
△ 23.7
△ 3.5
△ 24.4
△ 56.7
713
703
△ 9.8
△ 6.0
△ ND
△ ND
△ ND
964
788
783
784
787
785
786
△ 1.8
△ 3.4
779
780A
727
782
729
T779A
705
706
967
928
910
228A
965
998
968
996
980
997
999
T706A
2
100 0 100 200 300 FEET
LEGEND
Streams
Paved Roads
Buildings
Fence
Solar Evaporation Ponds (SEP)
△ Sampling Location
6.0 Result in mg/kg
ND Not Detected
N
Note: Results in Red Exceed Background Level of 2.3 mg/kg
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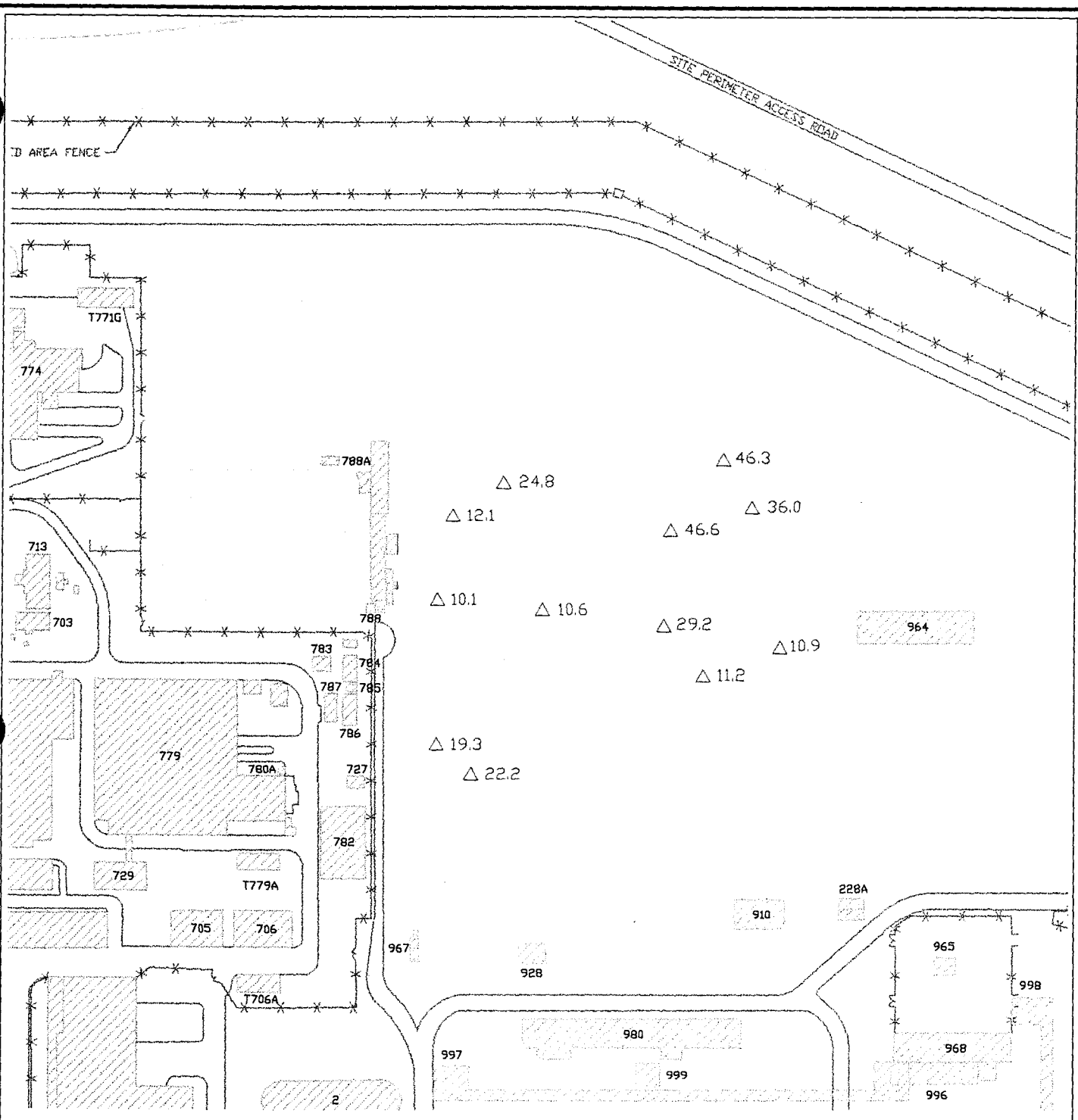
GOLDEN, COLORADO
Figure II.3.1-47
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Cadmium



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 36.0 Result in mg/kg

Note: Results in Red Exceed Background Level of 83.2 mg/kg

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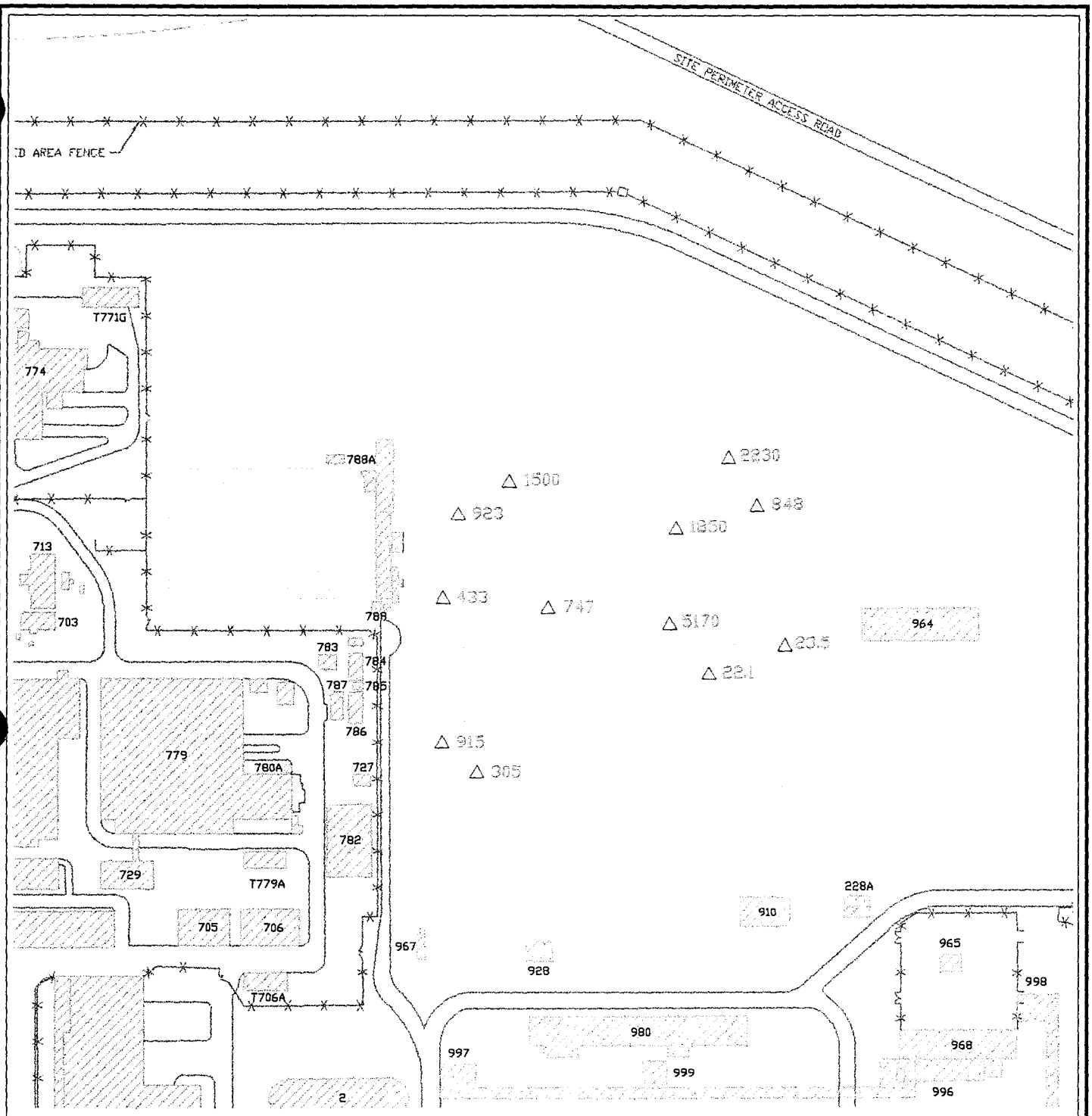
GOLDEN, COLORADO

Figure II.3.1-48

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Lithium



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 20.5 Result in mg/kg

Note: Results in Red Exceed Background Level of 7.1 mg/kg

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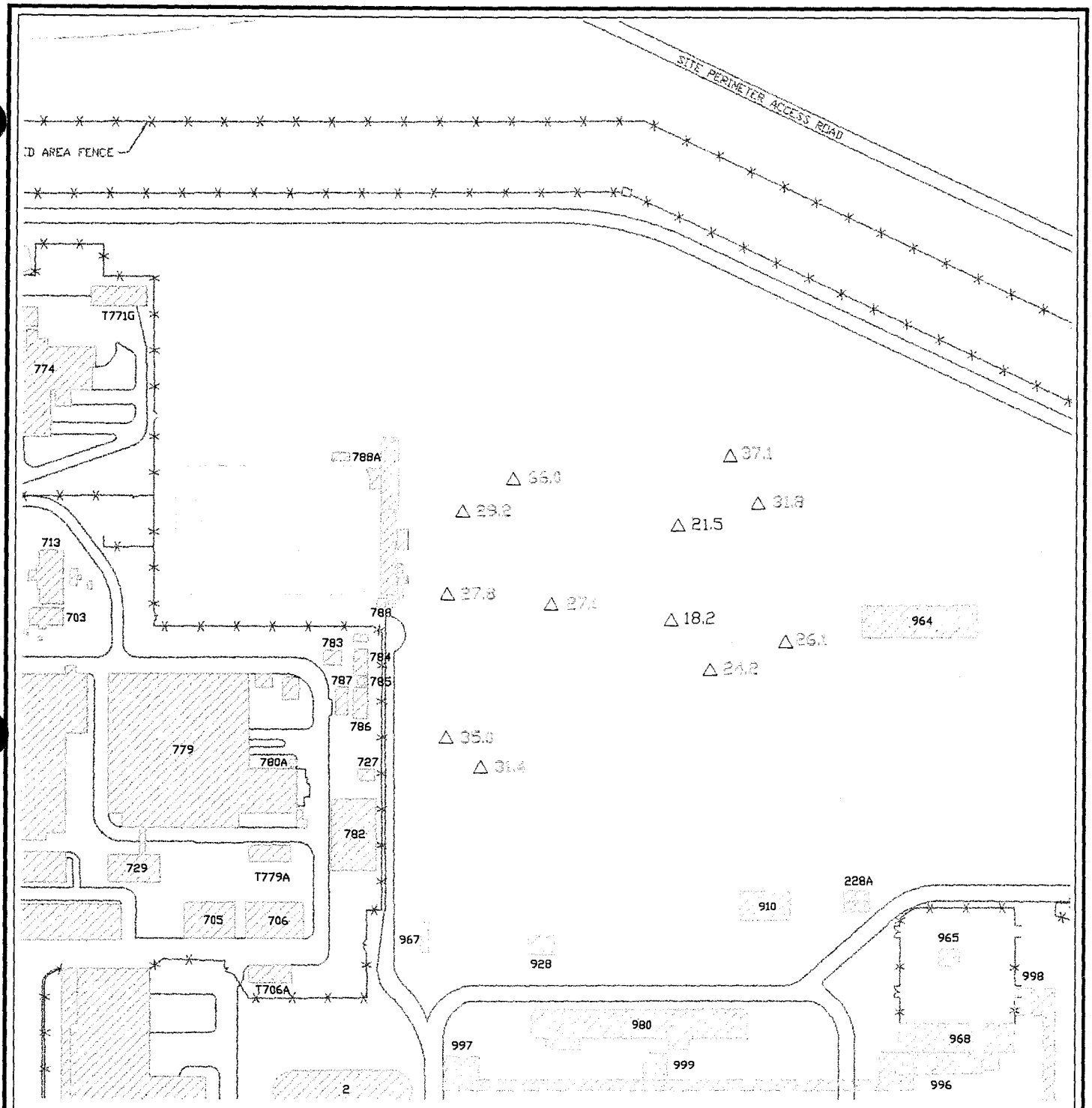
GOLDEN, COLORADO

Figure II.3.1-49

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Nitrate/Nitrite

58



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 35.0 Result in mg/kg

100 0 100 200 300 FEET

Note: Results in Red Exceed Background Level of 23.64 mg/kg

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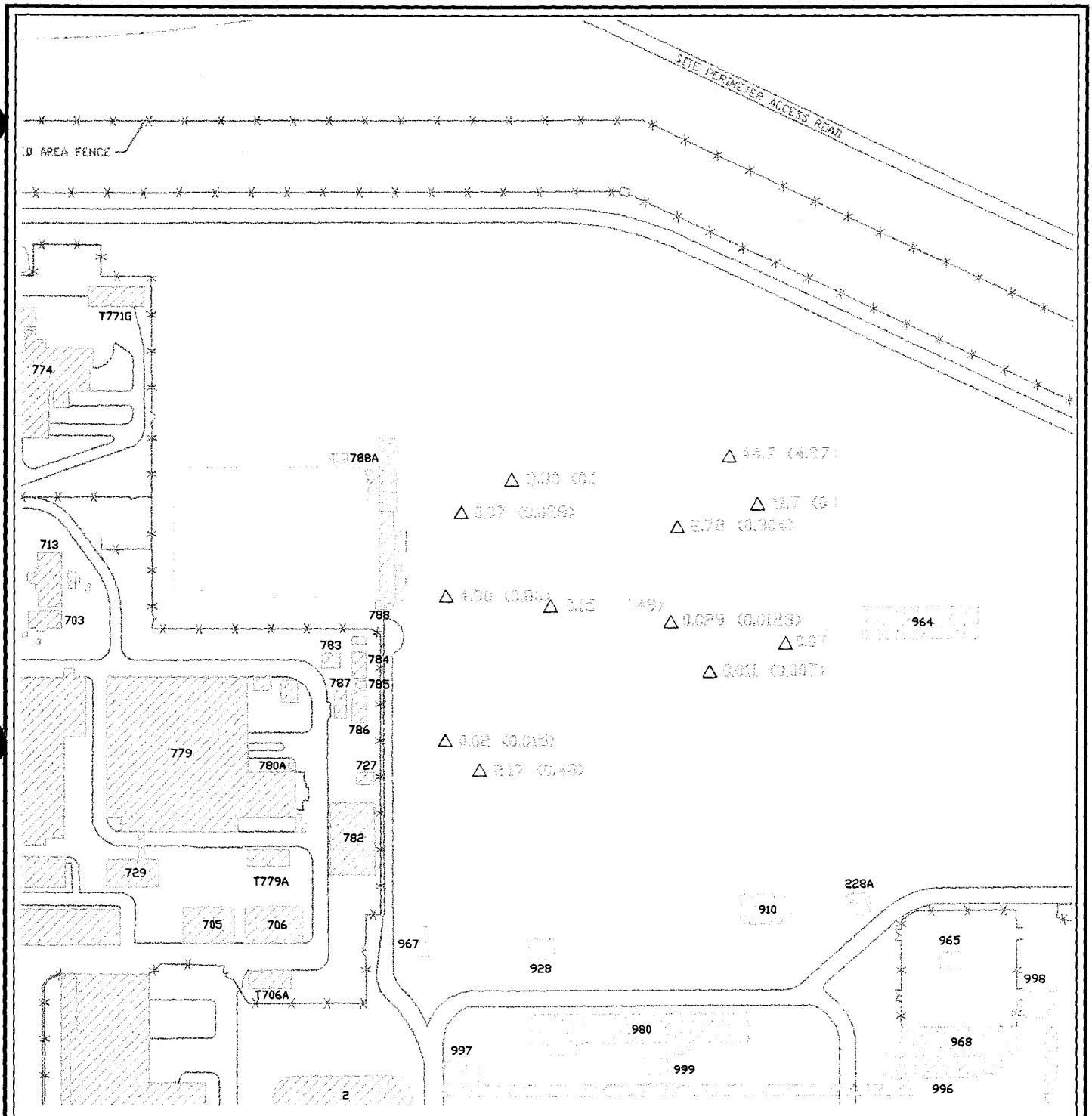
Figure II.3.1-50

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Zinc



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 2.78 Result in pCi/g
- (0.304) Counting Error

Note: Results in Red Exceed Background Level of 0.01 pCi/g

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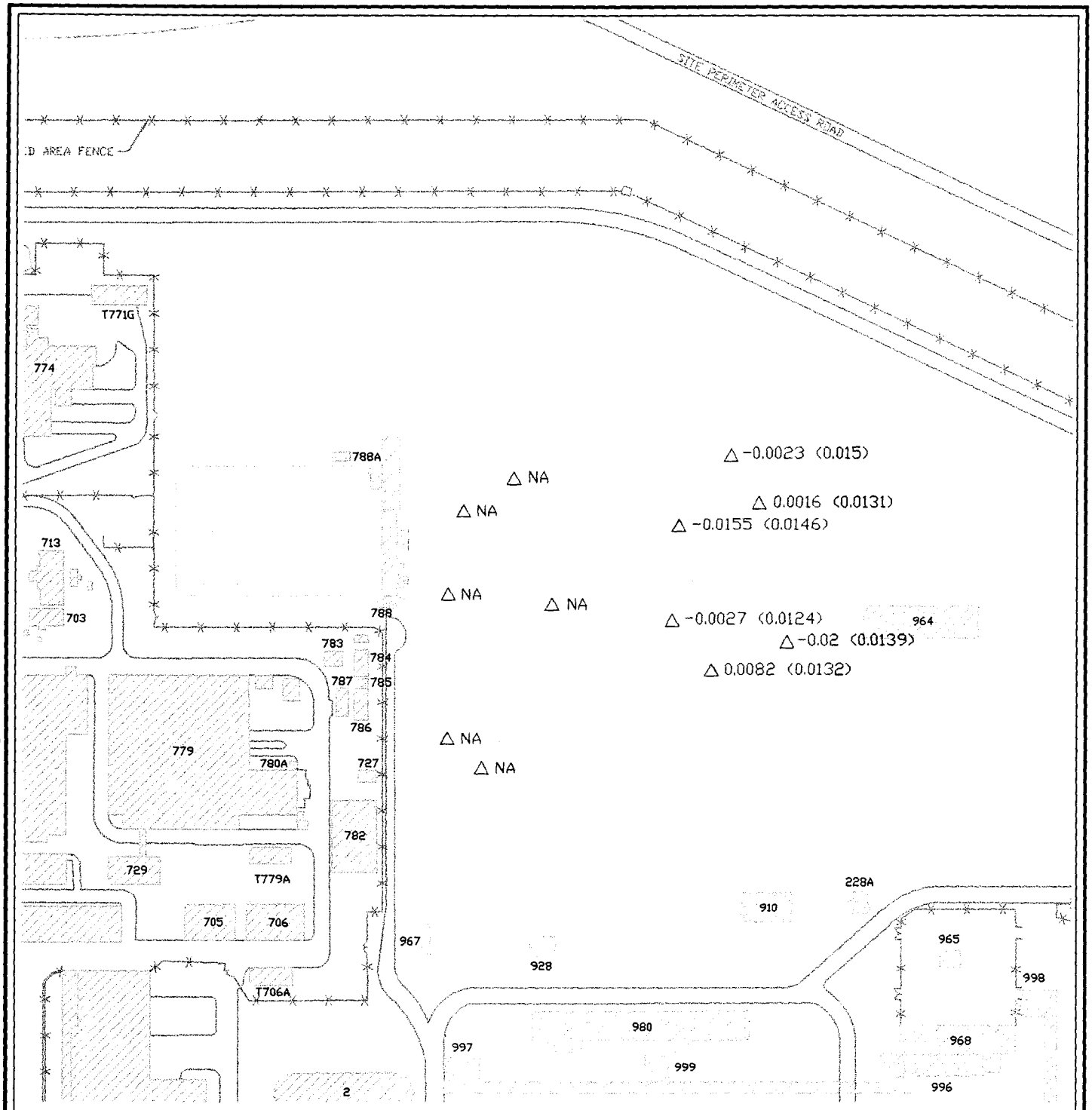
Figure II.3.1-51

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Americium 241



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- -0.0023 Result in pCi/g
- (0.015) Counting Error
- NA Not Analyzed

Note: Background Not Analyzed

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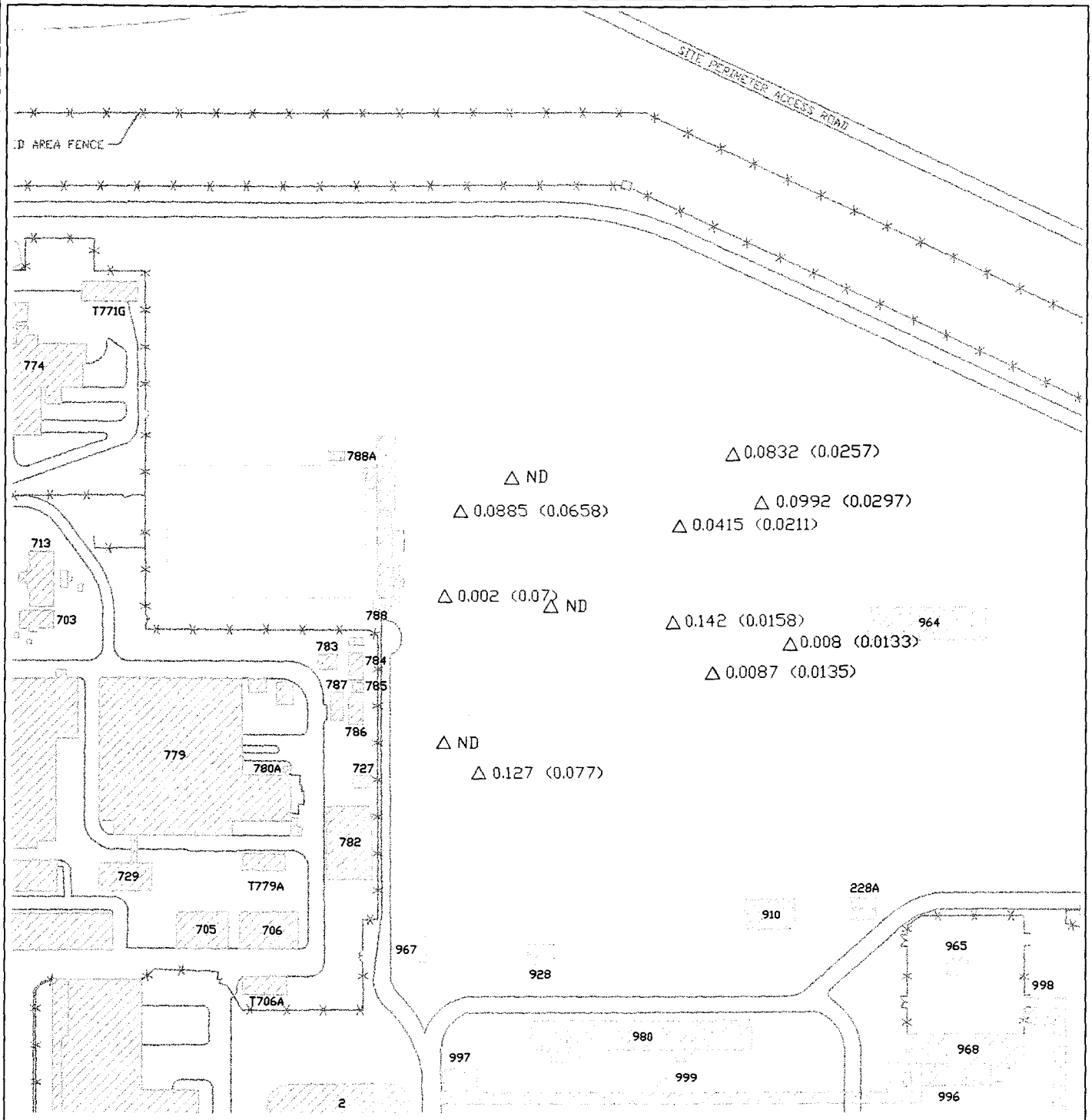
Figure II.3.1-52

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Cesium-134



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 0.008 Result in pCi/g
- (0.0133) Counting Error
- ND Not Detected

Note: Results in Red Exceed Background Level of 0.166 pCi/g

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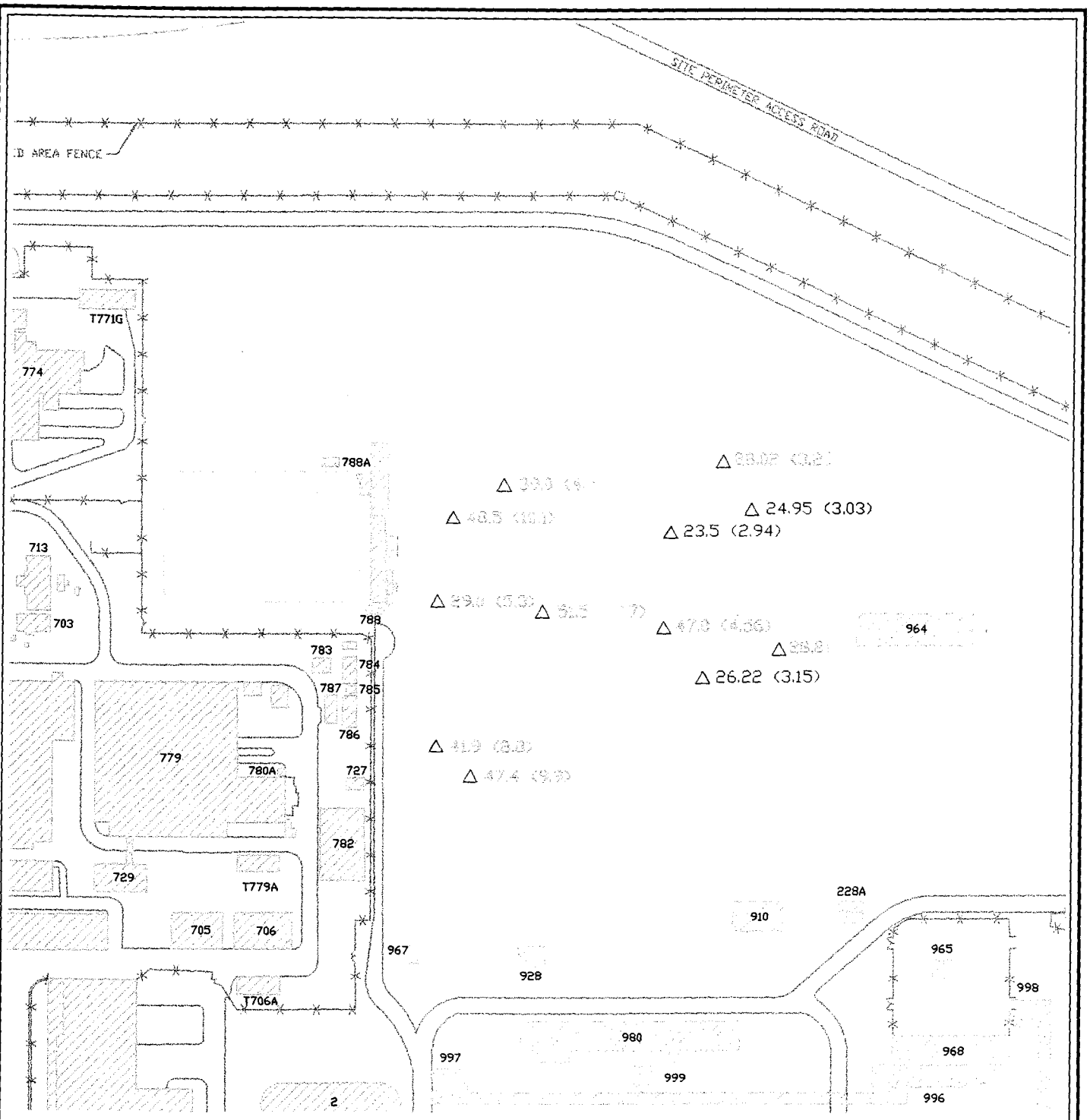
Figure II.3.1-53

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Cesium-137



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 28.02 Result in pCi/g
- (3.25) Counting Error

100 0 100 200 300 FEET

Note: Results in Red Exceed Background Level of 27.99 pCi/g

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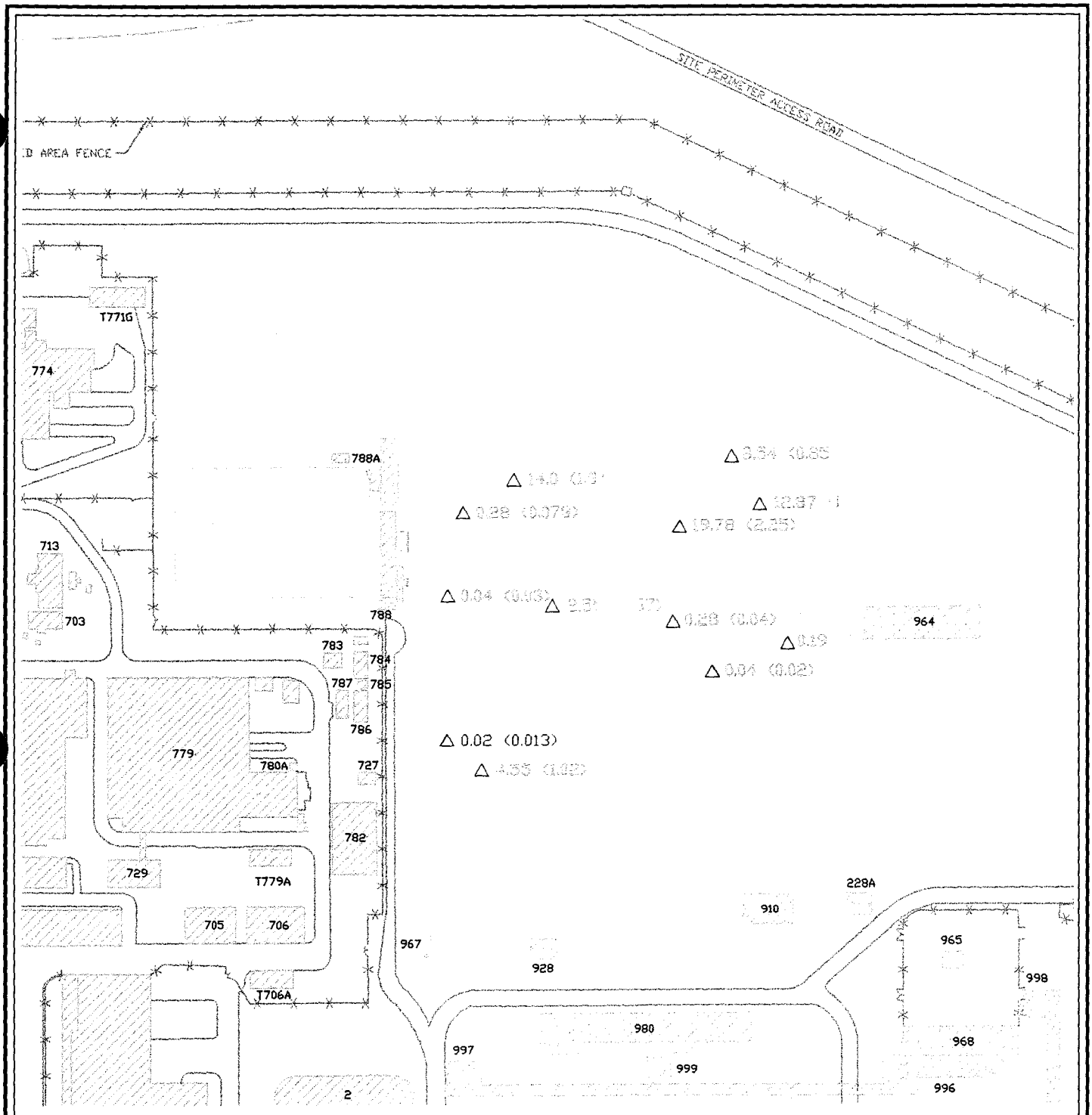
Figure II.3.1-54

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Gross Beta



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 19.78 Result in pCi/g
- (2.25) Detection Limit in pCi/g

Note: Results in Red Exceed Background Level of 0.02 pCi/g

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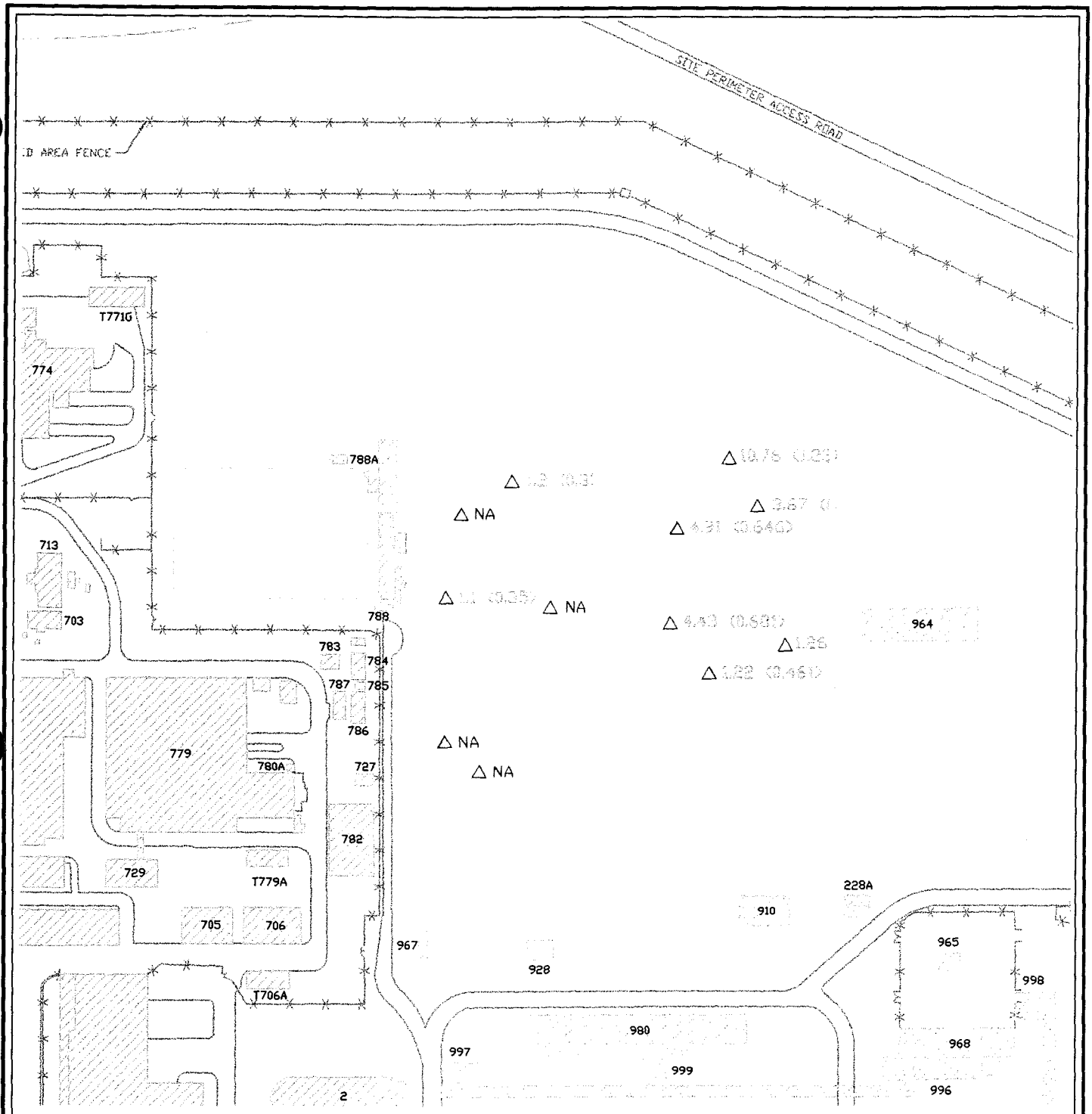
Figure II.3.1-55

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Plutonium 239/240



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 1.22 Result in pCi/g
- (0.461) Counting Error
- NA Not Analyzed

Note: Results in Red Exceed Background Level of 0.65 pCi/g

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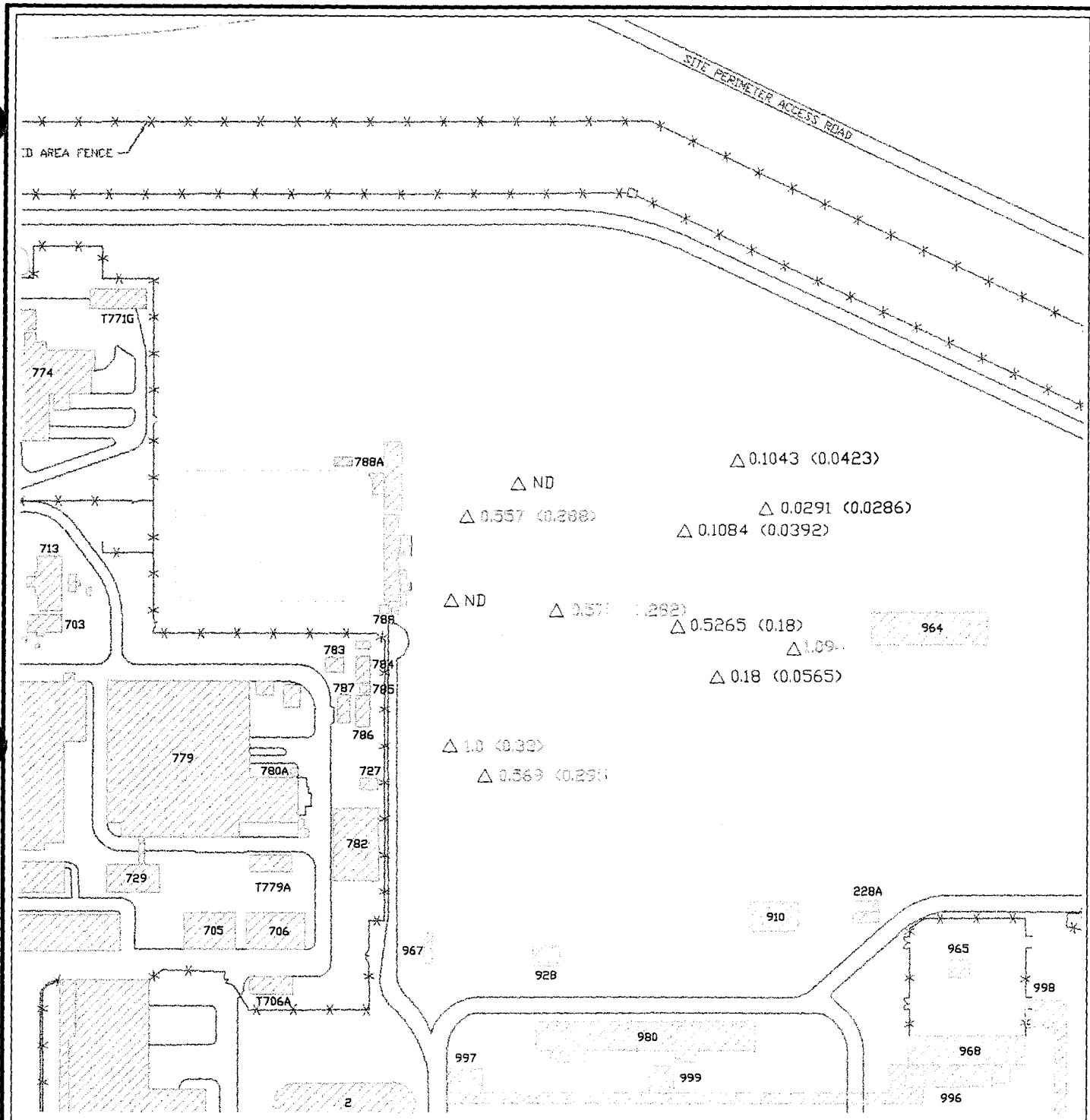
Figure II.3.1-56

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Radium 226



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 1.0 Result in pCi/g
- (0.33) Counting Error
- ND Not Detected

Note: Results in Red Exceed Background Level of 0.54 pCi/g

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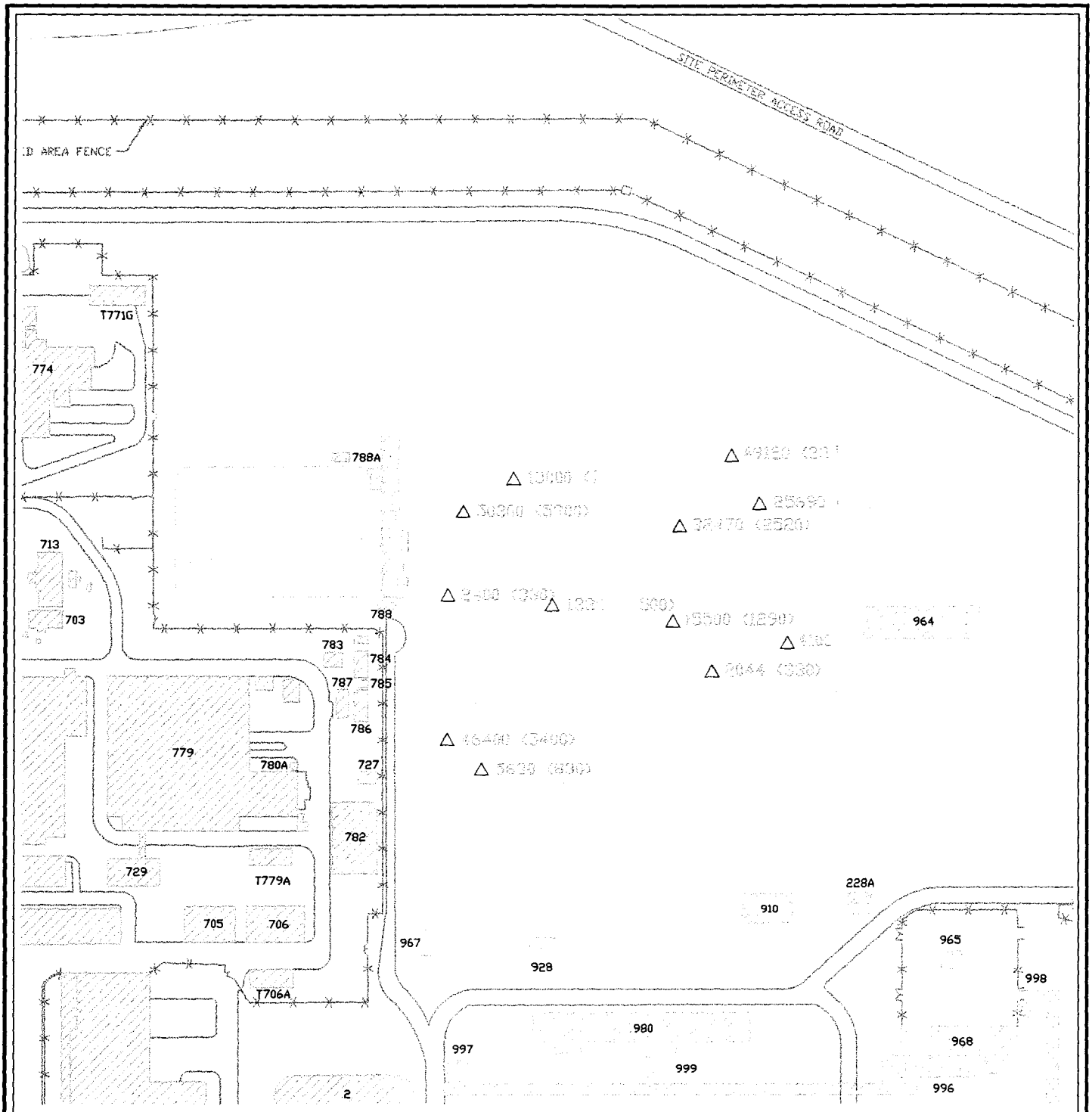
Figure II.3.1-57

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Strontium 89/90



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 2044 Result in pCi/l
- (330) Counting Error

Note: Results in Red Exceed Background Level of 212.2 pCi/l

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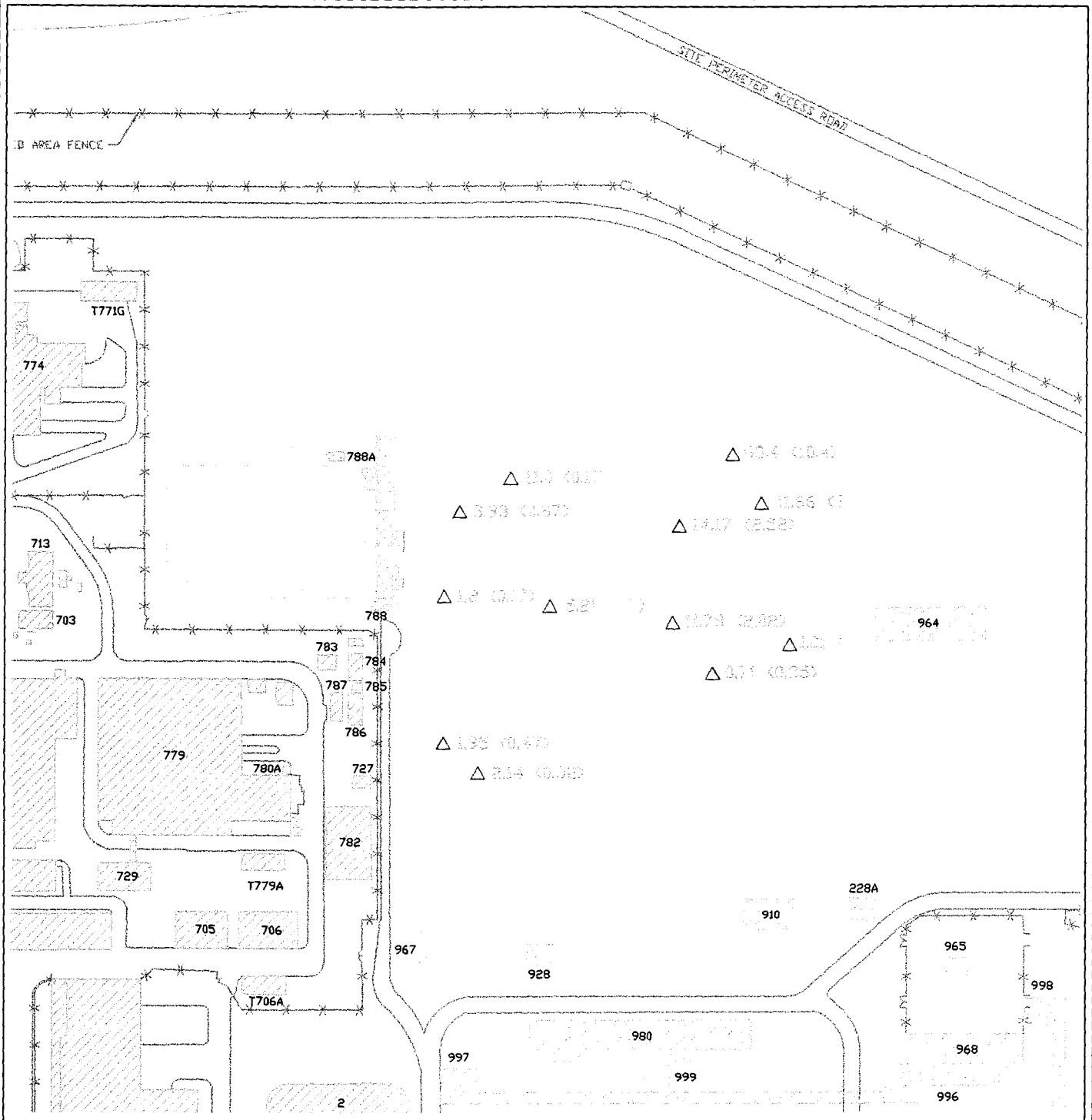
Figure II.3.1-58

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Tritium



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 5.21 Result in pCi/g
- (1.2) Counting Error

100 0 100 200 300 FEET

Note: Results in Red Exceed Background Level of 0.53 pCi/g

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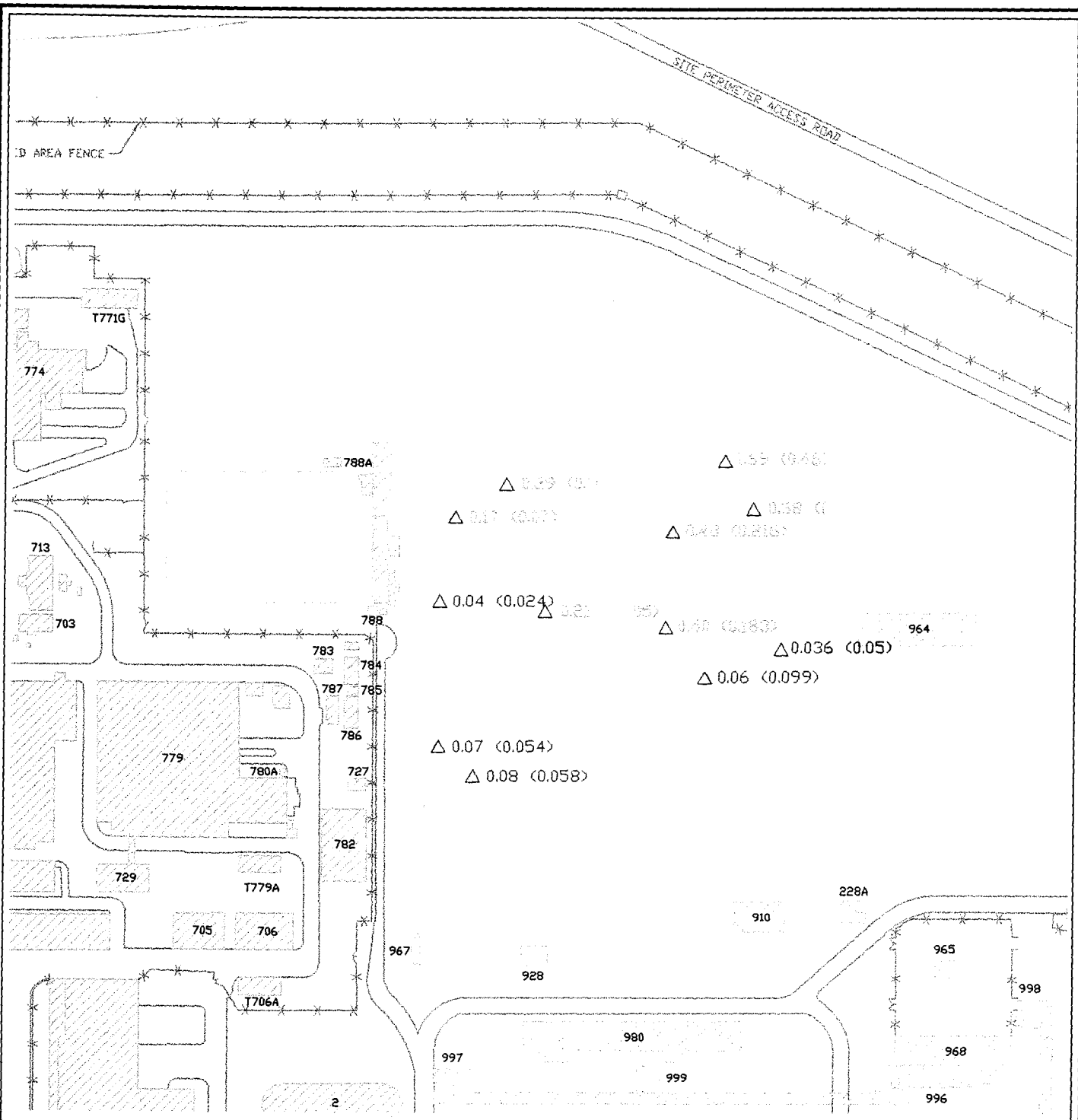
Figure II.3.1-59

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Uranium 233/234



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 0.48 Result in pCi/g
- (0.215) Counting Error

100 0 100 200 300 FEET

Note: Results in Red Exceed Background Level of 0.1 pCi/g

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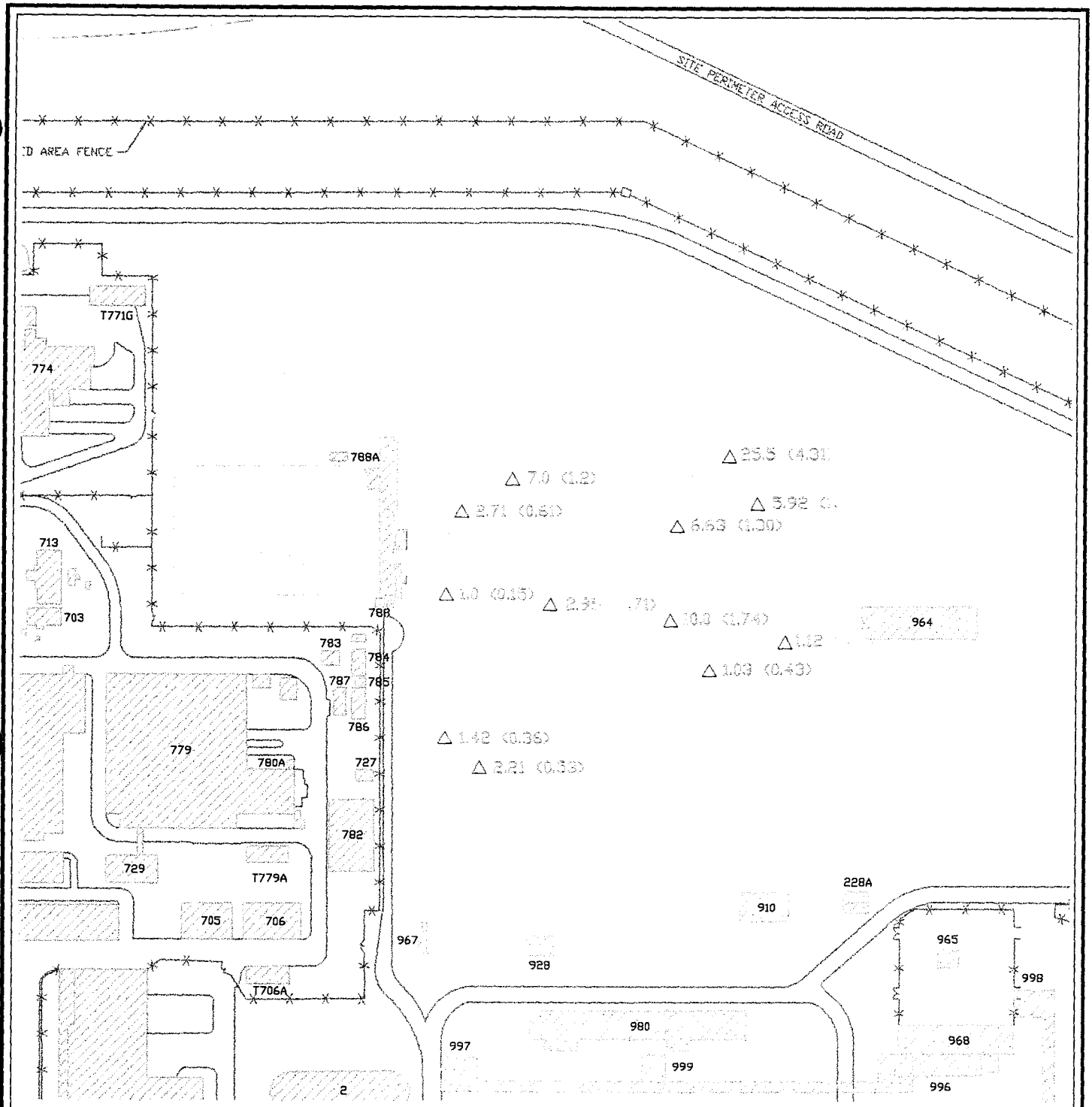
Figure II.3.1-60

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Uranium 235



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Sampling Location
- 6.63 Result in pCi/g
- (1.30) Counting Error

Note: Results in Red Exceed Background Level of 0.63 pCi/g

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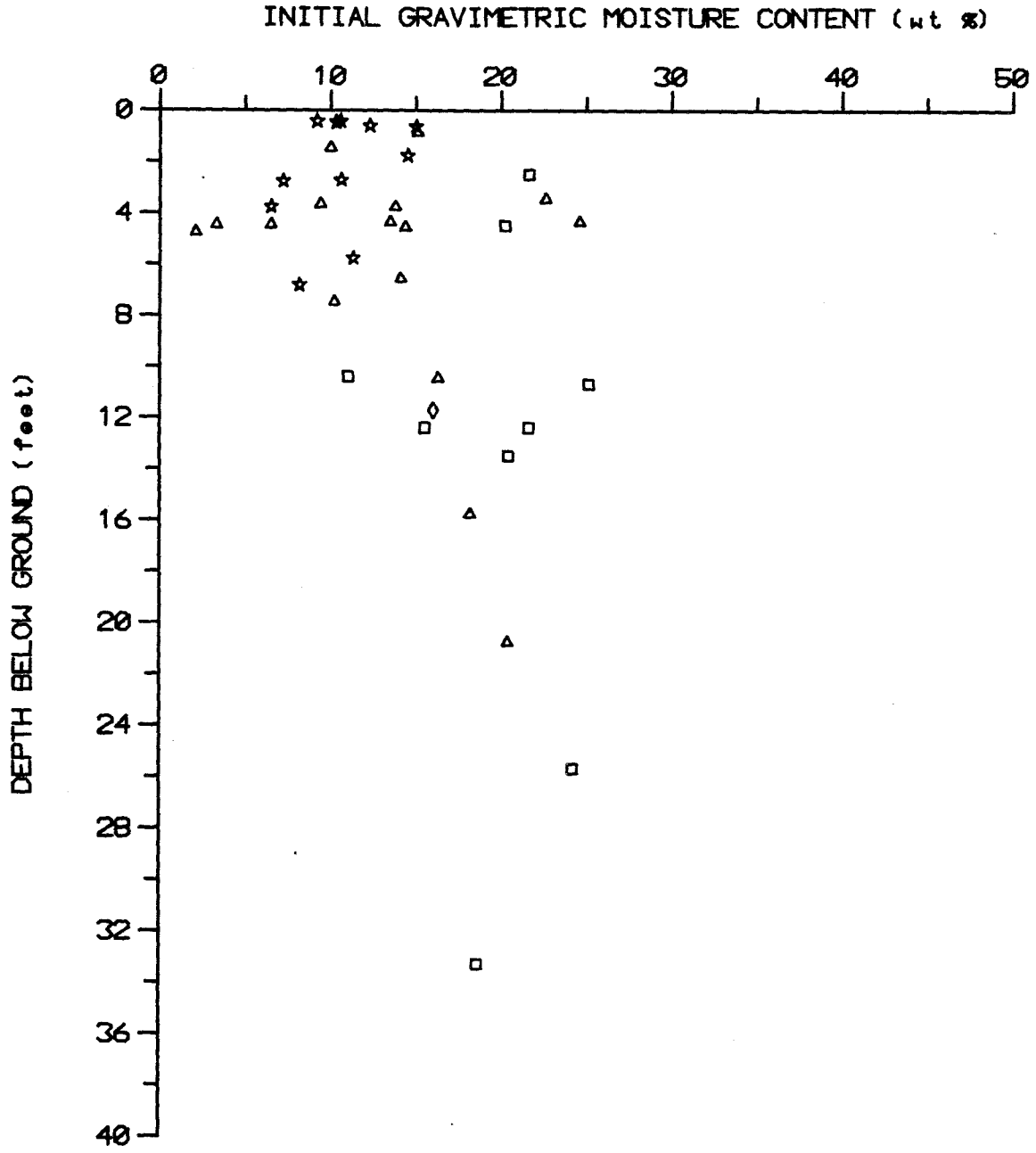
Figure II.3.1-61

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Existing Ponds Subgrade Sampling Results
Uranium 238



□ BEDROCK (SPRING '93)

△ ALLUVIUM (SPRING '93)

☆ ALLUVIUM (FALL '93)

◊ BEDROCK (FALL '93)

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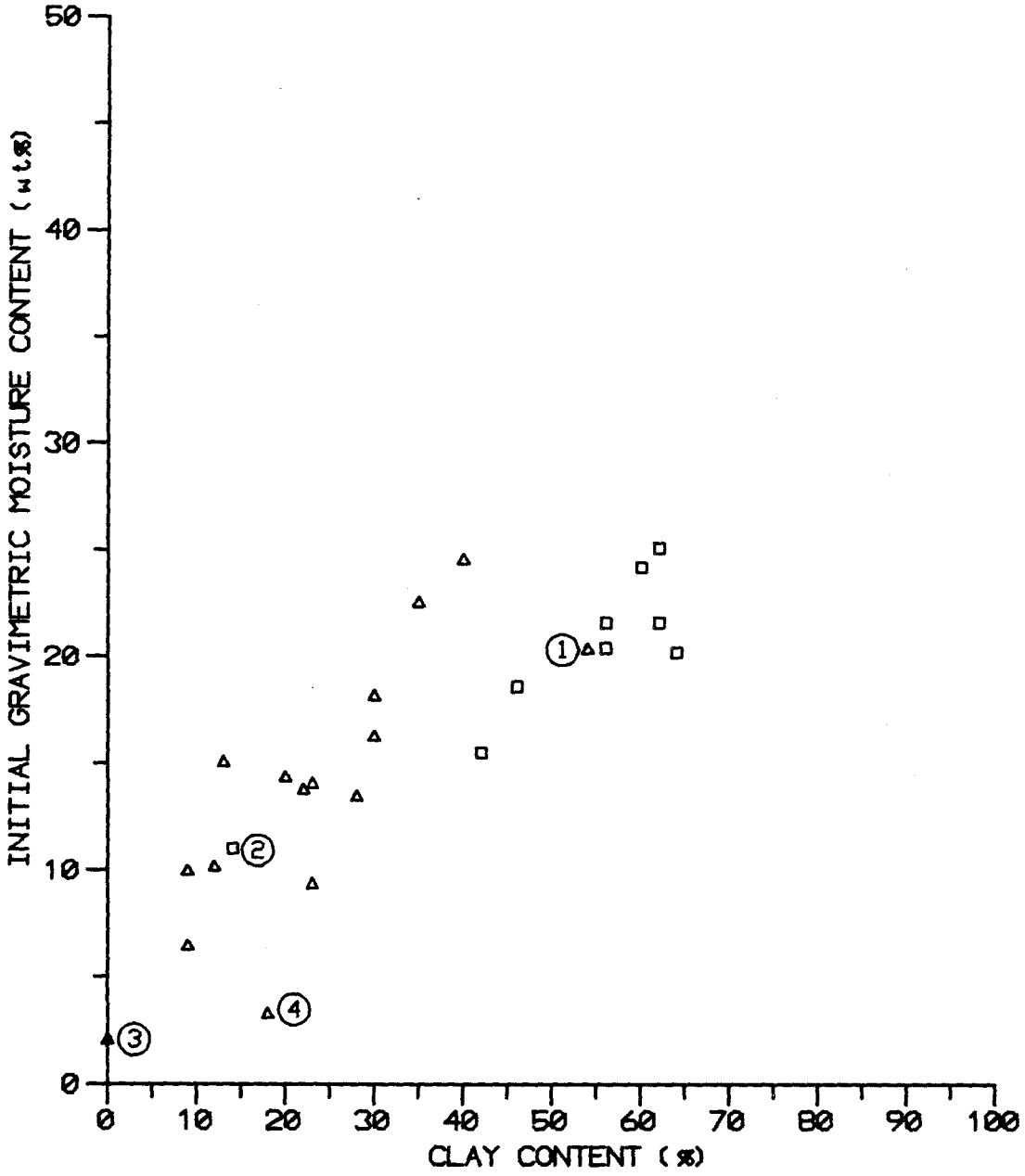
Figure II.3.3-2

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Initial Gravimetric Moisture Content versus Depth



□ BEDROCK
△ ALLUVIUM

	SAMPLE	BOREHOLE	USGS/WENTWORTH
1	BH40401AE	40593	CH
2	BH40609AE	40993	SANDSTONE
3	BH40405AE	44393	SW
4	BH40600AE	43193	GM

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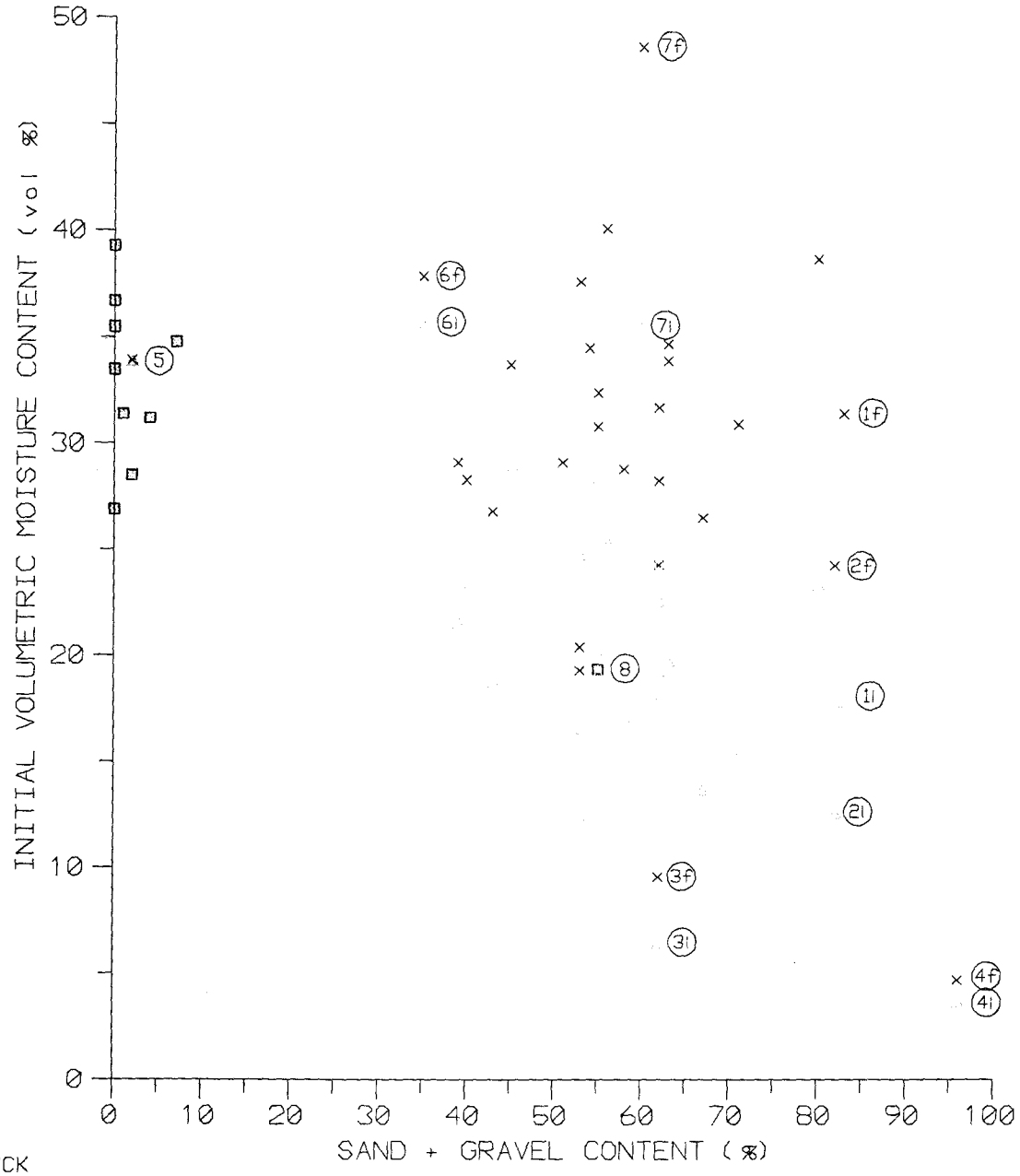
Figure II.3.3-3

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Initial Gravimetric Moisture Content versus Clay Content



□ BEDROCK
△ ALLUVIUM
· BEDROCK ADJUSTED MOISTURE CONTENT
× ALLUVIUM ADJUSTED MOISTURE CONTENT
i LABORATORY VOLUMETRIC MOISTURE CONTENT
f ADJUSTED VOLUMETRIC MOISTURE CONTENT

	SAMPLE	BOREHOLE	USGS/BEDROCK
(1)	BH40612AE	43693	GC
(2)	BH40608AE	40993	GM
(3)	BH40600AE	43193	GM
(4)	BH40405AE	44393	SW
(5)	BH40401AE	40593	CH
(6)	BH40407AE	44093	CH
(7)	BH40611AE	42893	GC
(8)	BH40609AE	40993	SANDSTONE

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Figure II.3.3-4

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Volumetric Moisture Content versus Coarse Fraction

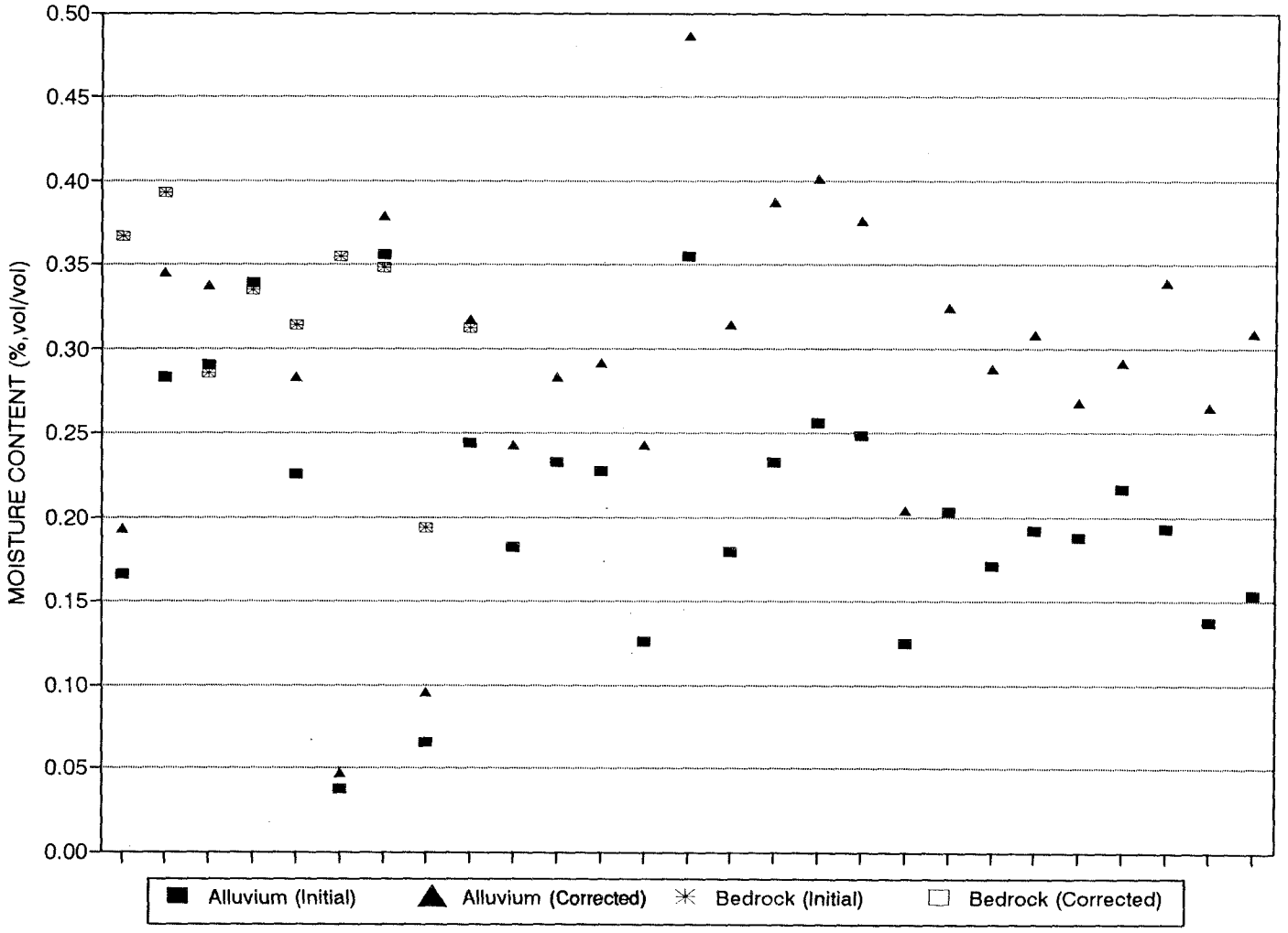

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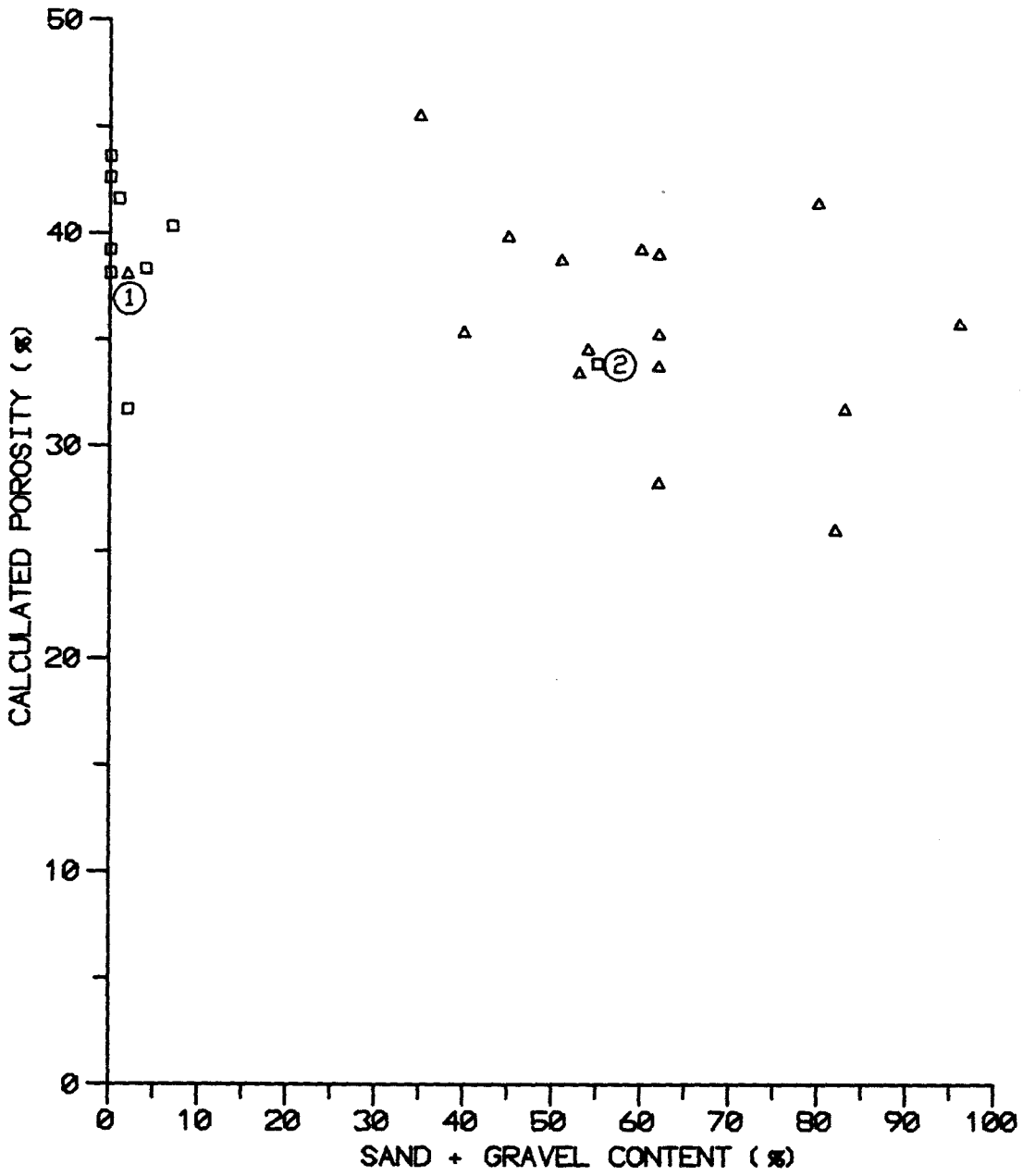
Figure II.3.3-5

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Correlation Between Initial and Corrected Moisture Contents

rf85x11h



	SAMPLE	BOREHOLE	USGS/WENTWORTH
□ BEDROCK	① BH40401AE	40593	CH
△ ALLUVIUM	② BH40609AE	40993	SANDSTONE

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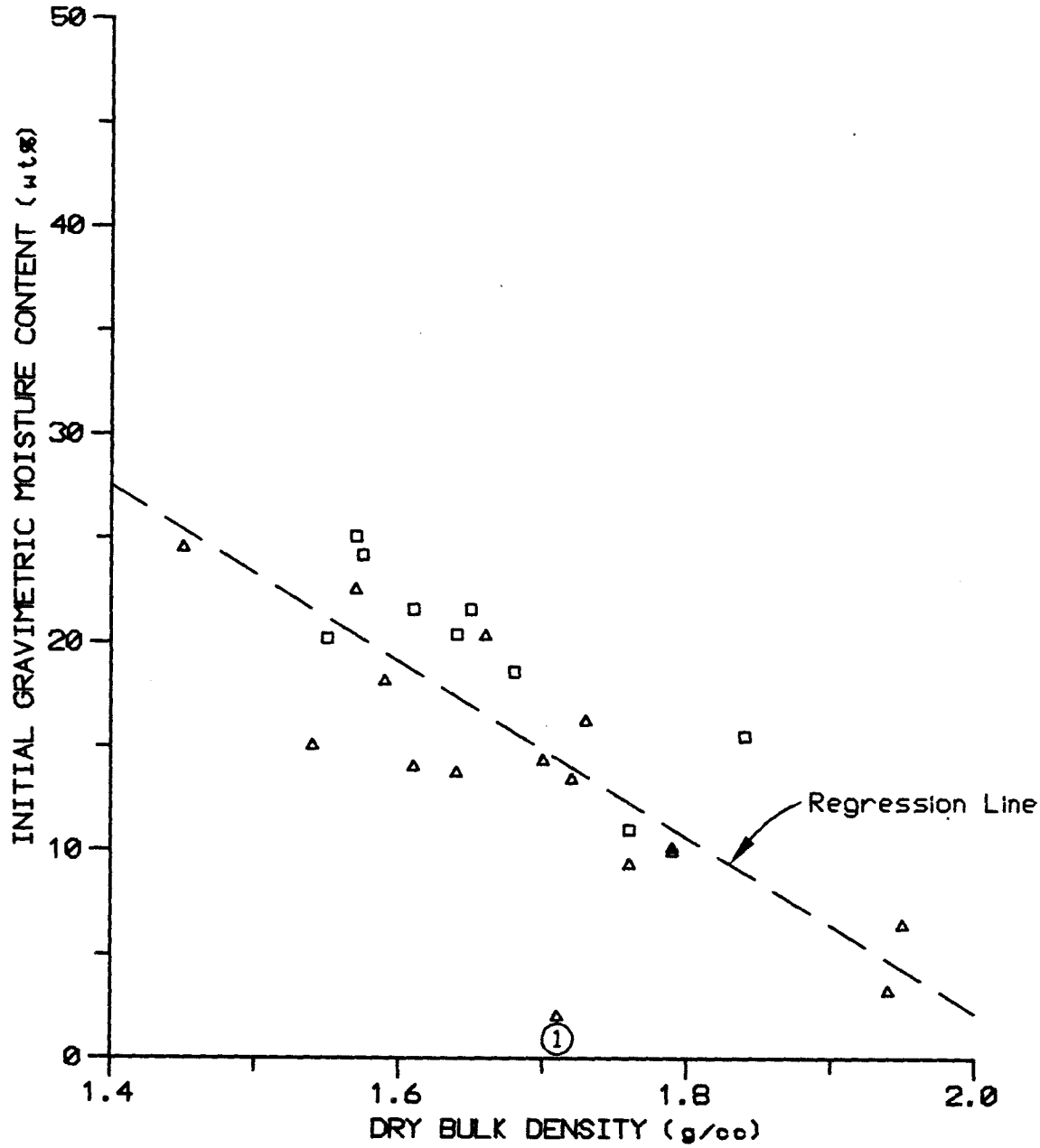
Figure II.3.3-6

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Calculated Porosity
versus Coarse Soil Particle Fraction



	SAMPLE	BOREHOLE	USGS
□ BEDROCK	① BH40404AE	44393	SW
△ ALLUVIUM			

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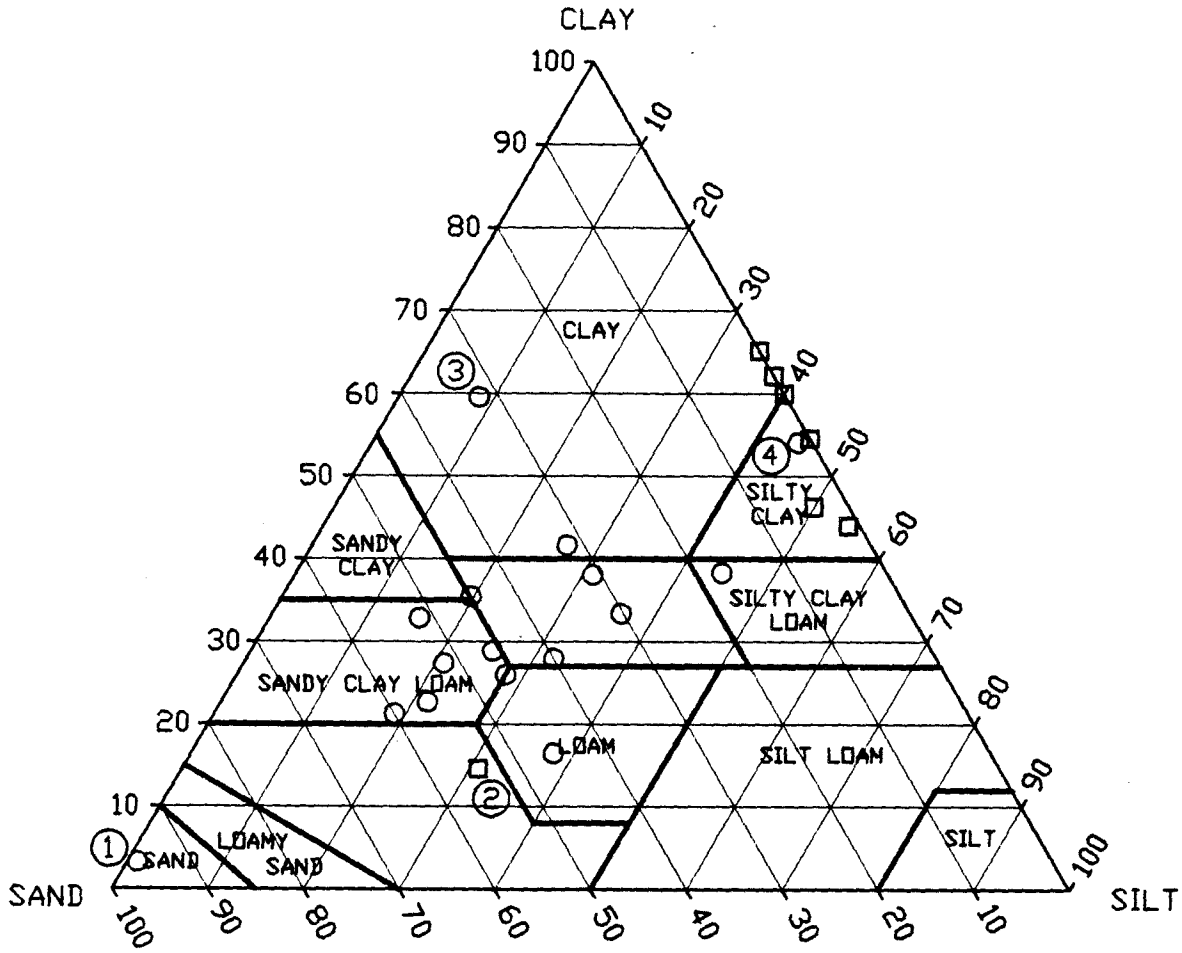
Figure II.3.3-7

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Initial Moisture Content versus Dry Bulk Density



□ BEDROCK SAMPLES
○ RFA SOILS SAMPLES

	SAMPLE	BOREHOLE	USGS/Wentworth
(1)	BH40405AE	44393	SW
(2)	BH40609AE	40993	Sandstone
(3)	BH40611AE	42893	GC
(4)	BH40401AE	40593	CH

Sand, Silt, and Clay in percent by weight (adjusted to 100% without gravel fraction)

Percentages reflect clay (below 0.002 mm), silt (0.002-0.05 mm), and sand (0.05-2.0 mm) in the basic soil textural classes

Source: Hillel (1982)

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Figure II.3.3-8

OU4 Phase I RFI/RI
Sand-Silt-Clay Textural Triangle (USDA Classification)

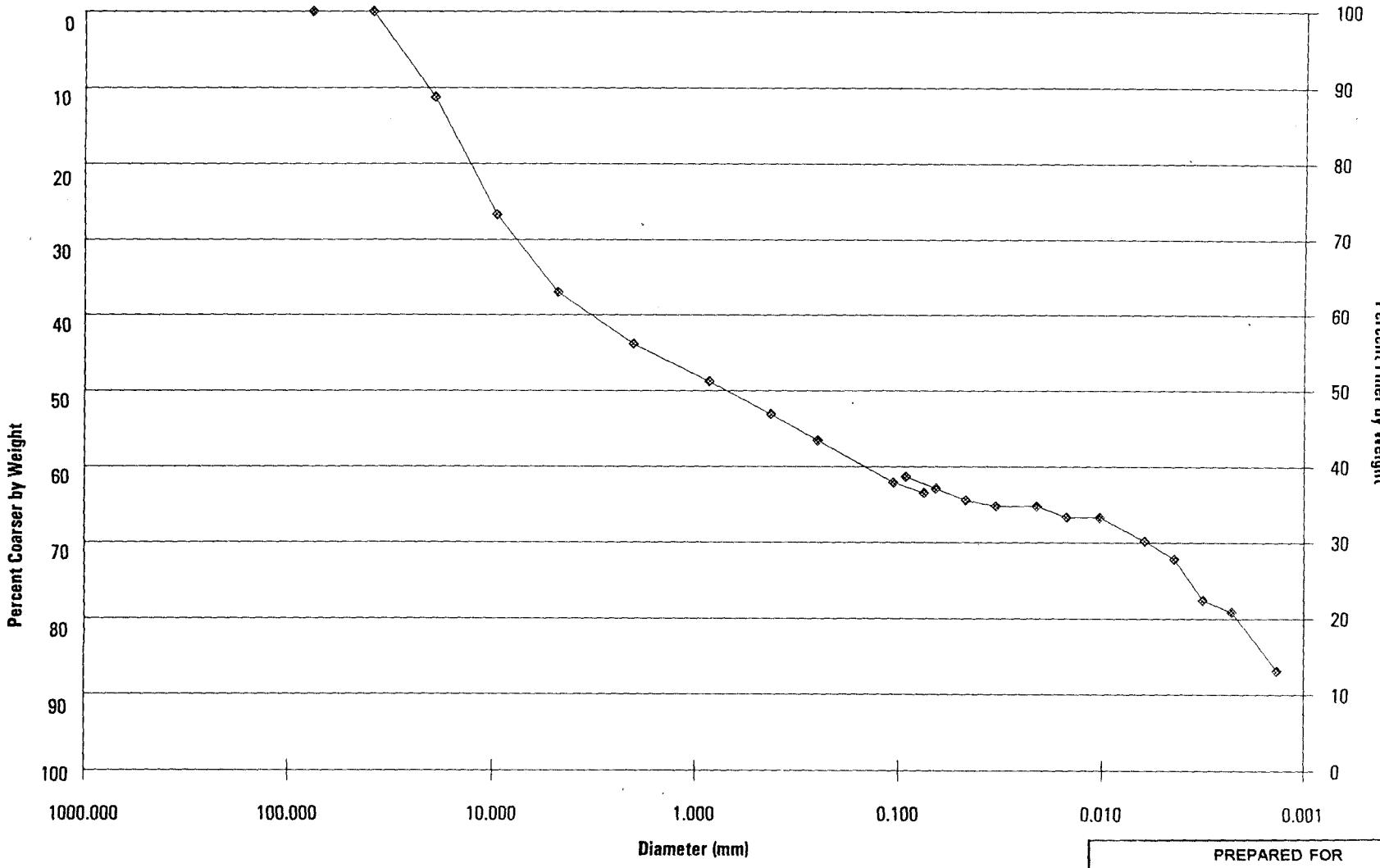

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Figure II.3.3-9

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Particle-Size Distribution,
Sample BH40600AE, Borehole 43193

rf85x11h

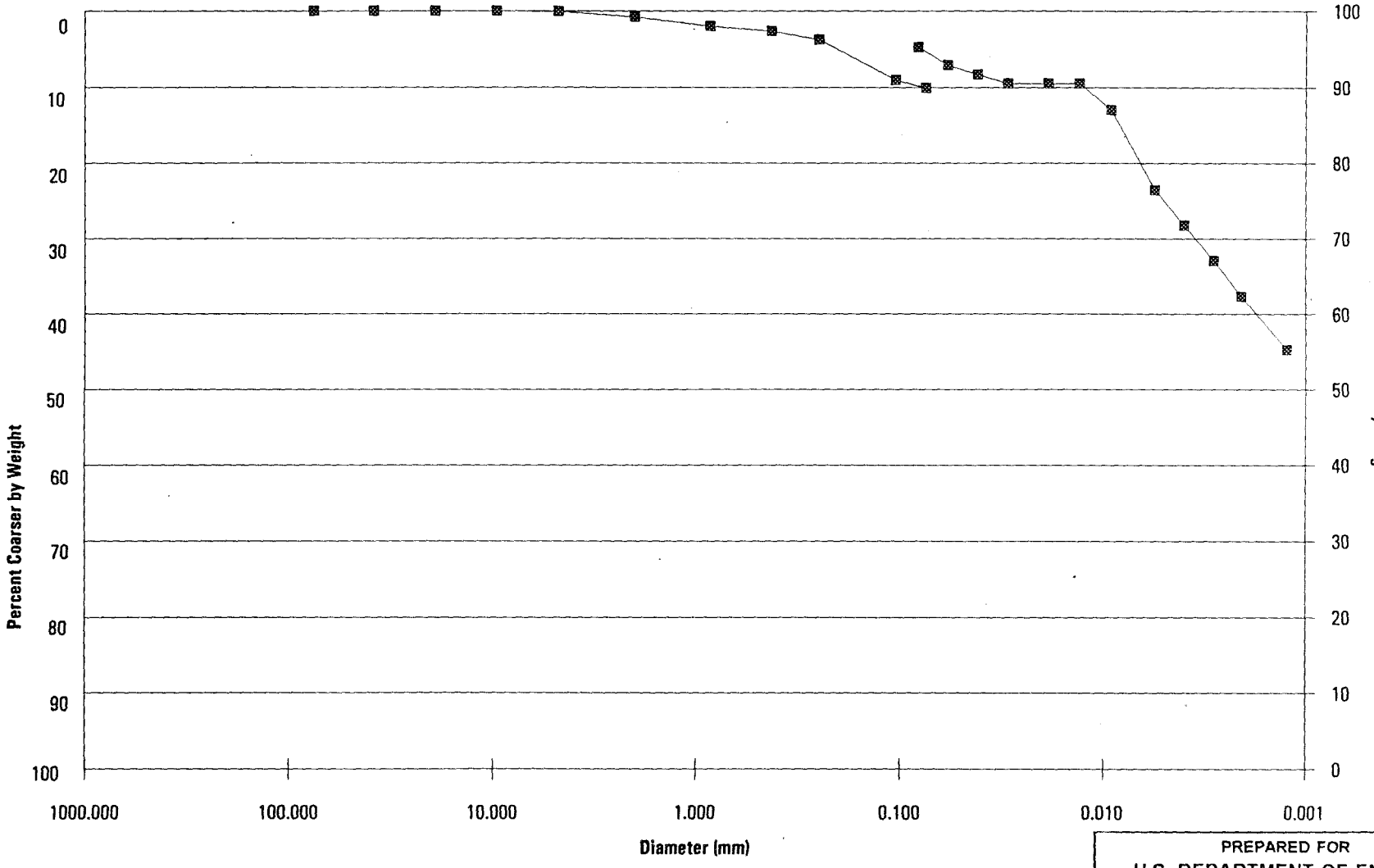

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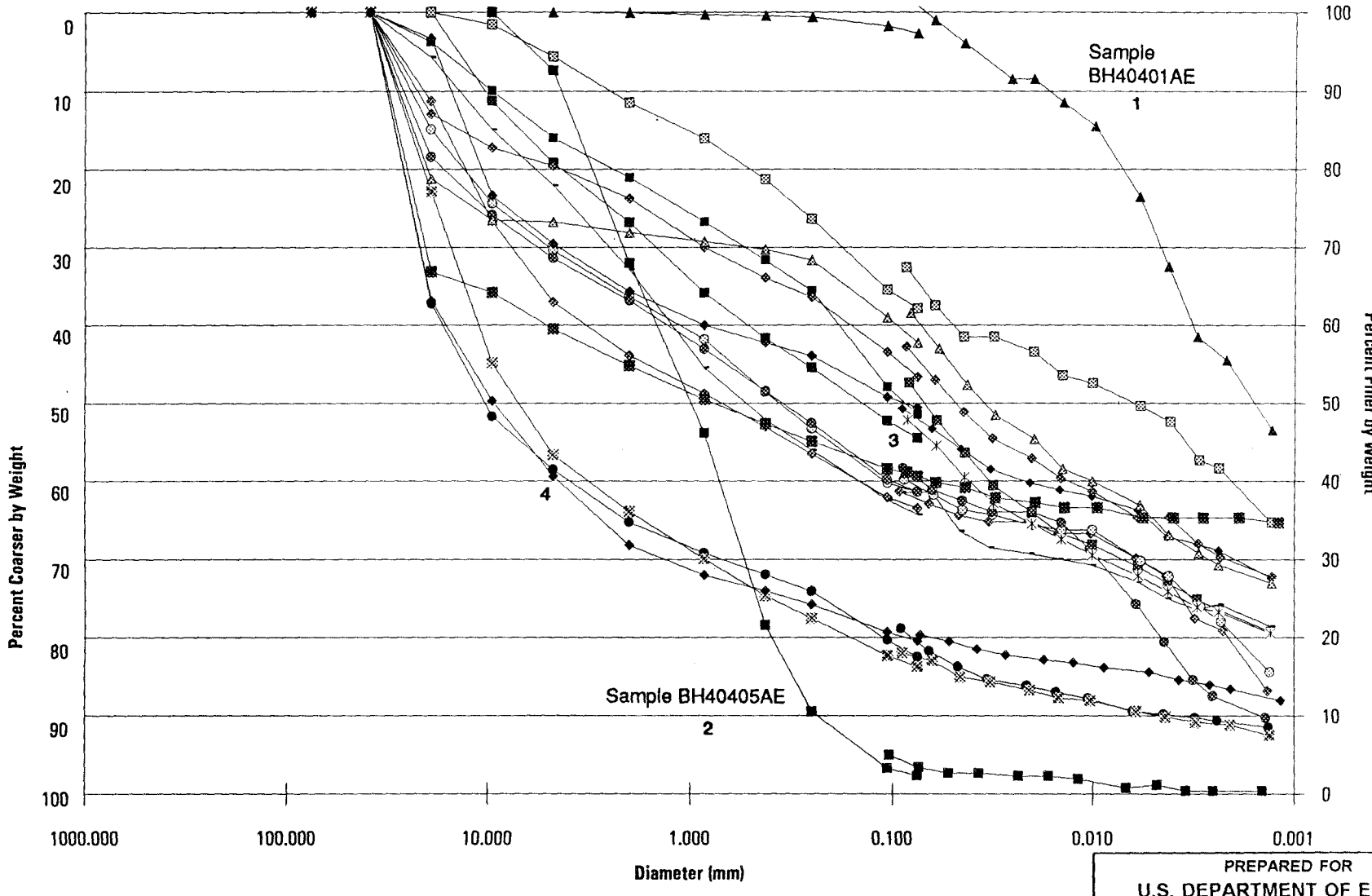
Figure II.3.3-10

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Particle-Size Distribution,
sample BH40405AE, Borehole 44393

rf85x11h



SAMPLE	BOREHOLE	USCS
BH40401AE	40593	CH
BH40405AE	44393	SW

GROUPS

1.Finer Grained RFA Soils

2.Coarser Grained RFA Soils

3. Majority of RFA Soils

4. Coarse Grain RFA Soils

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Figure II.3.3-11

OU4 Phase 1 RFI/RI
Composite Particle-Size Distribution Curves
Subsurface Soils

rf85x11h

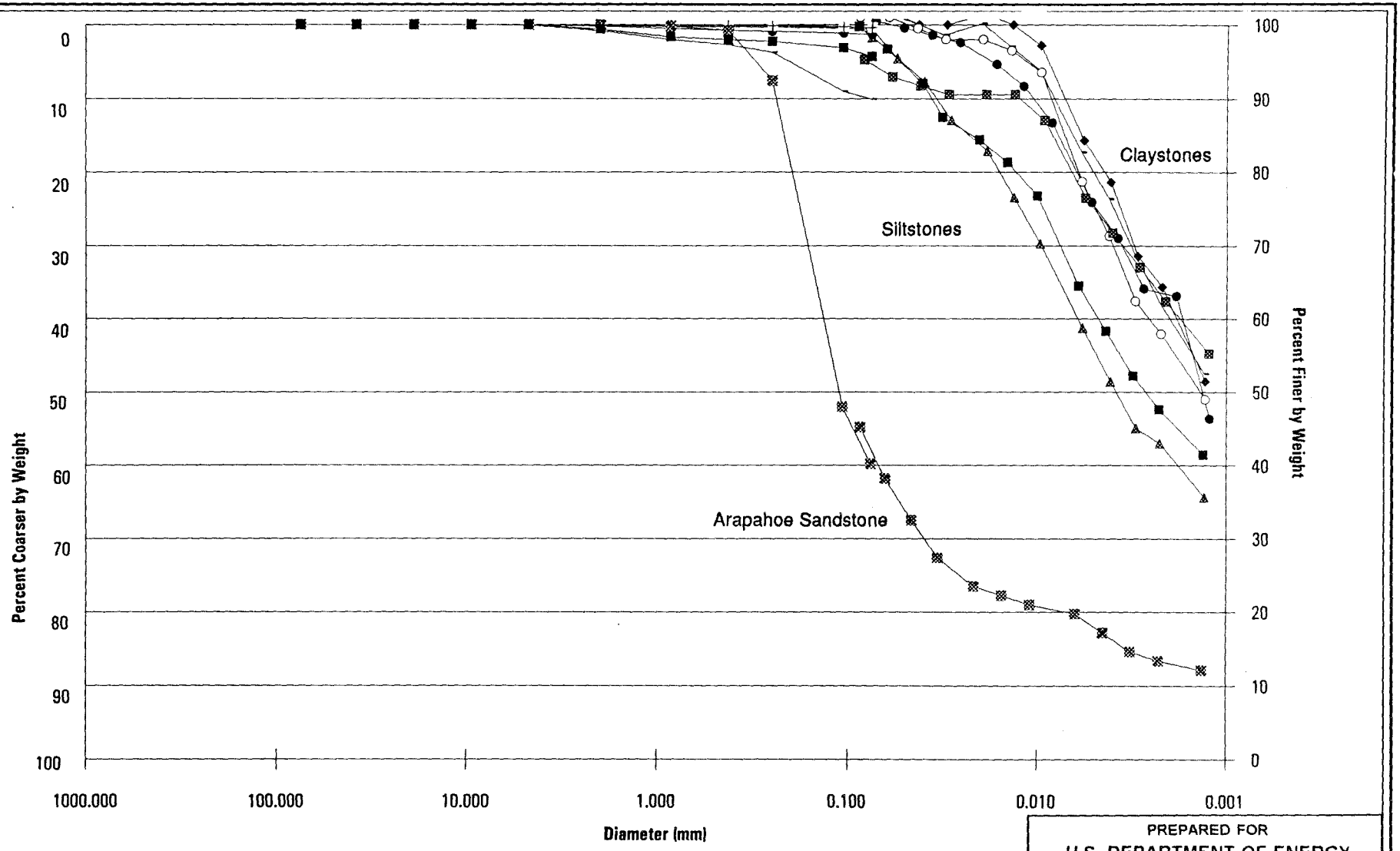

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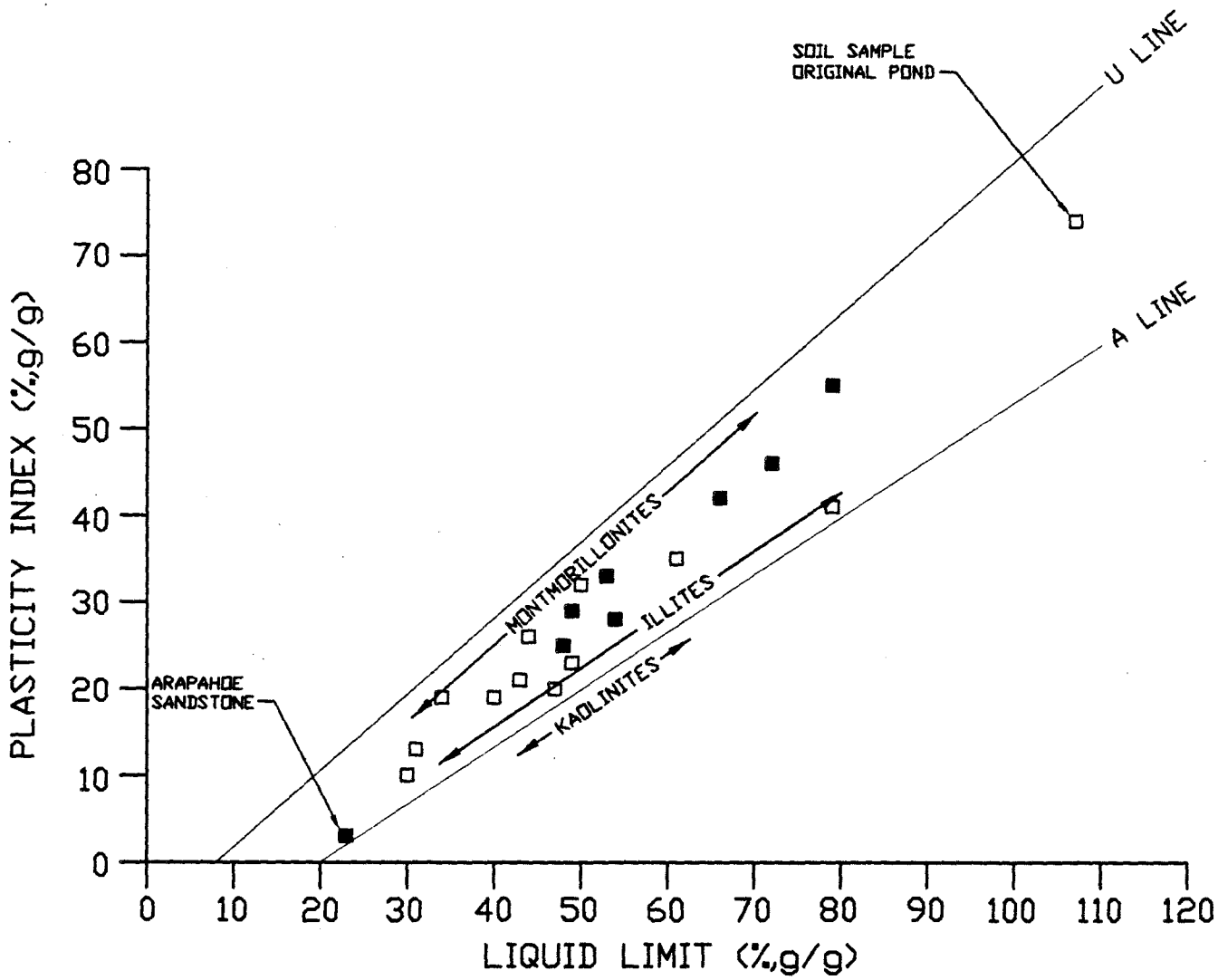
Figure II.3.3-12

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Composite Particle-Size Distribution Curves
Bedrock Lithologies

rf85x11h



LEGEND

- □ RFA SOILS
- ■ BEDROCK
- A LINE - SEPARATION BETWEEN CLAY AND SILTS
- U LINE - UPPER LIMIT LINE OF SOILS

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Figure II.3.3-13

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Soil and Bedrock Plasticity Classification

SOURCE: Holtz and Kovacs (1981)

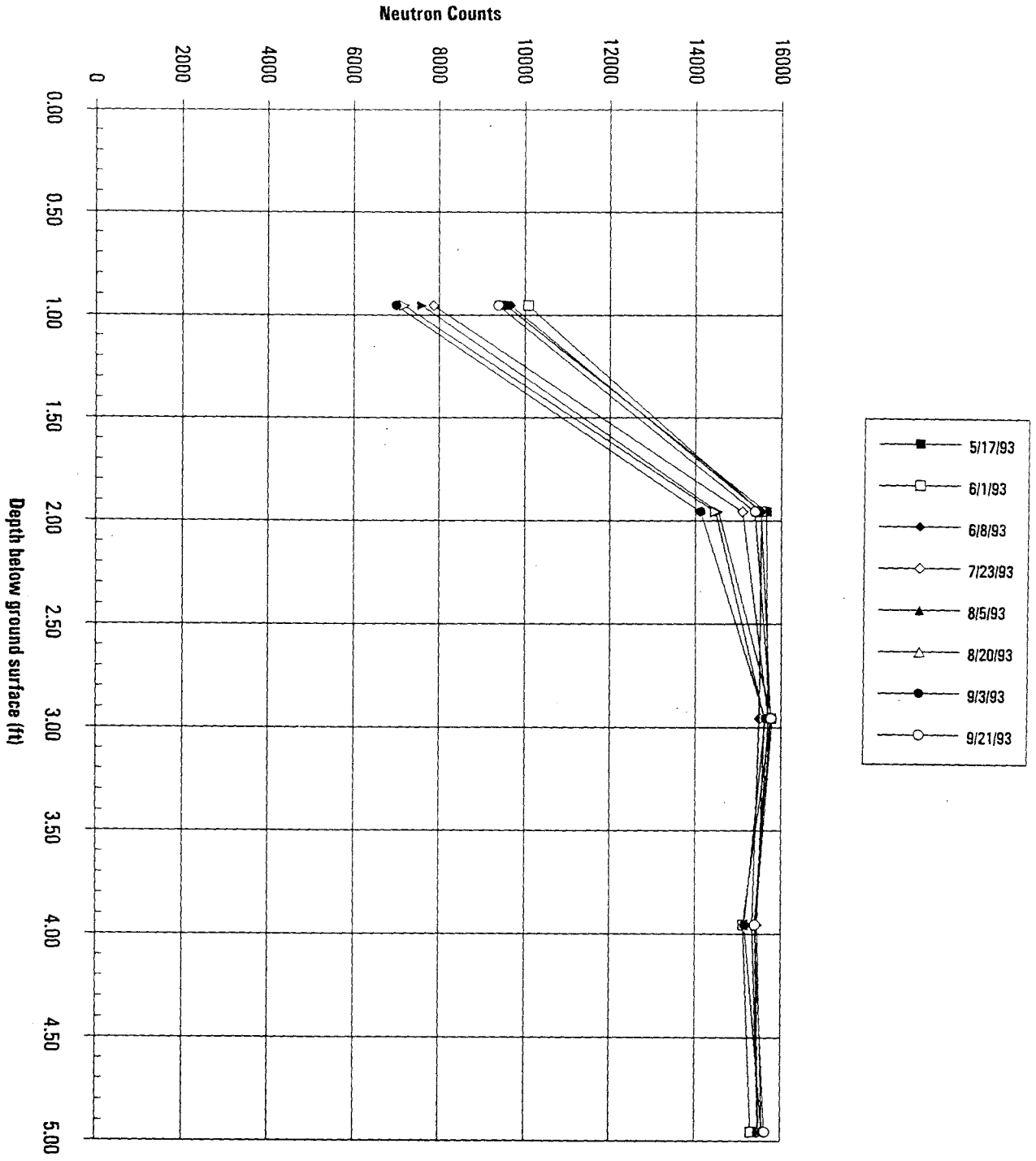

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Figure II.3.3-17

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 40293

rl85x11

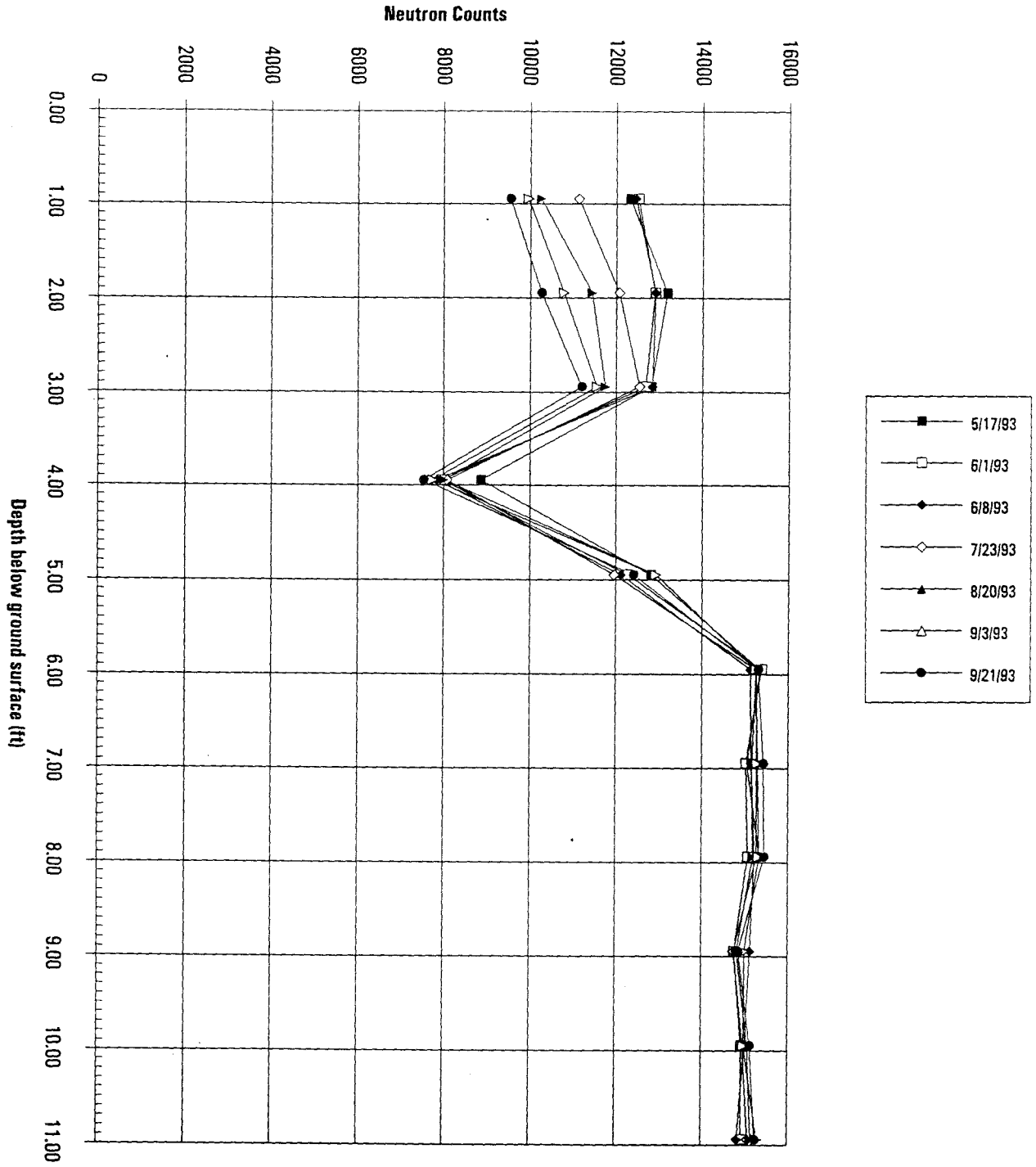

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Figure II.3.3-18

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 40393

rf85x11

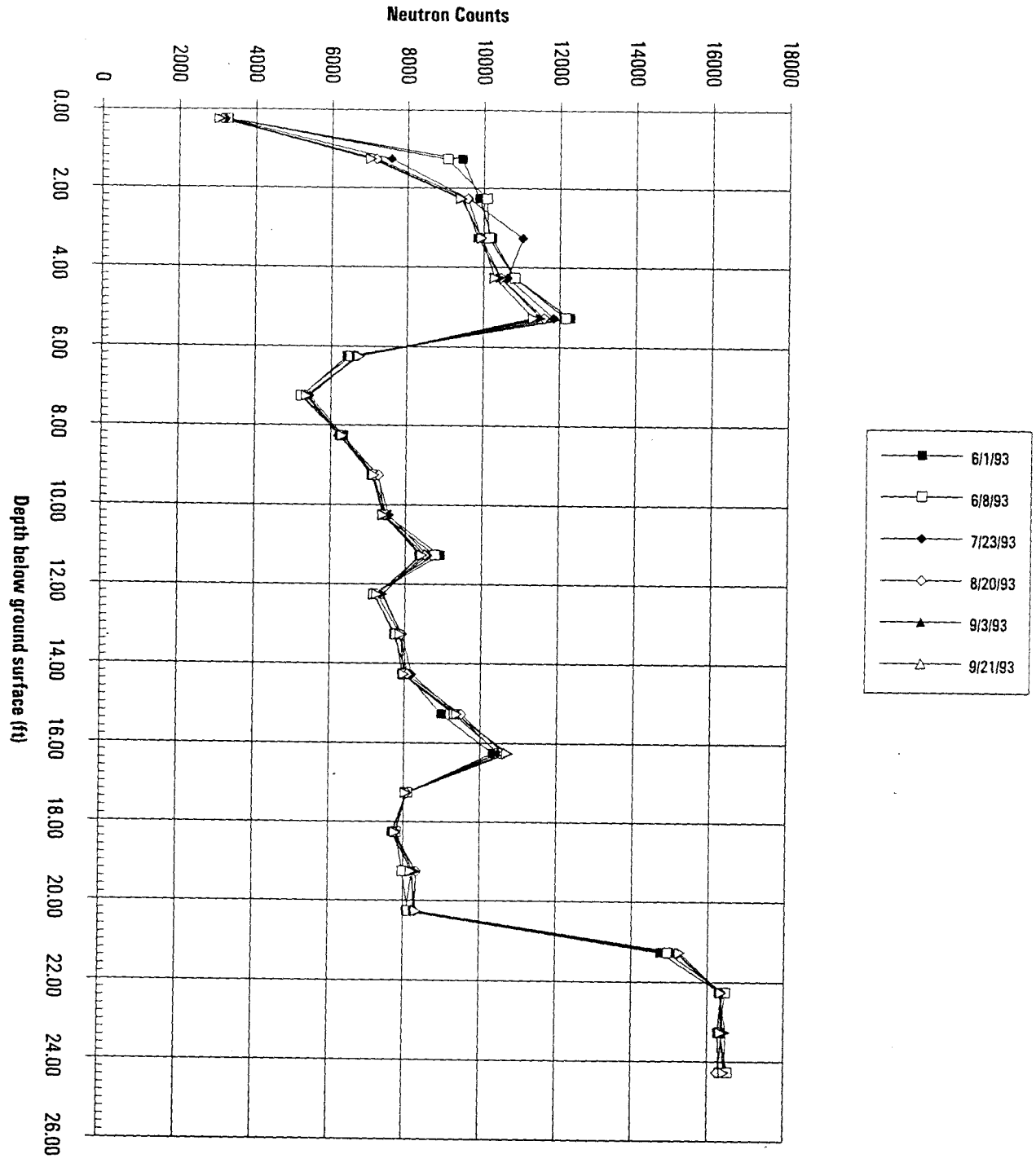

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Figure II.3.3-19

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 40593

rf85x11

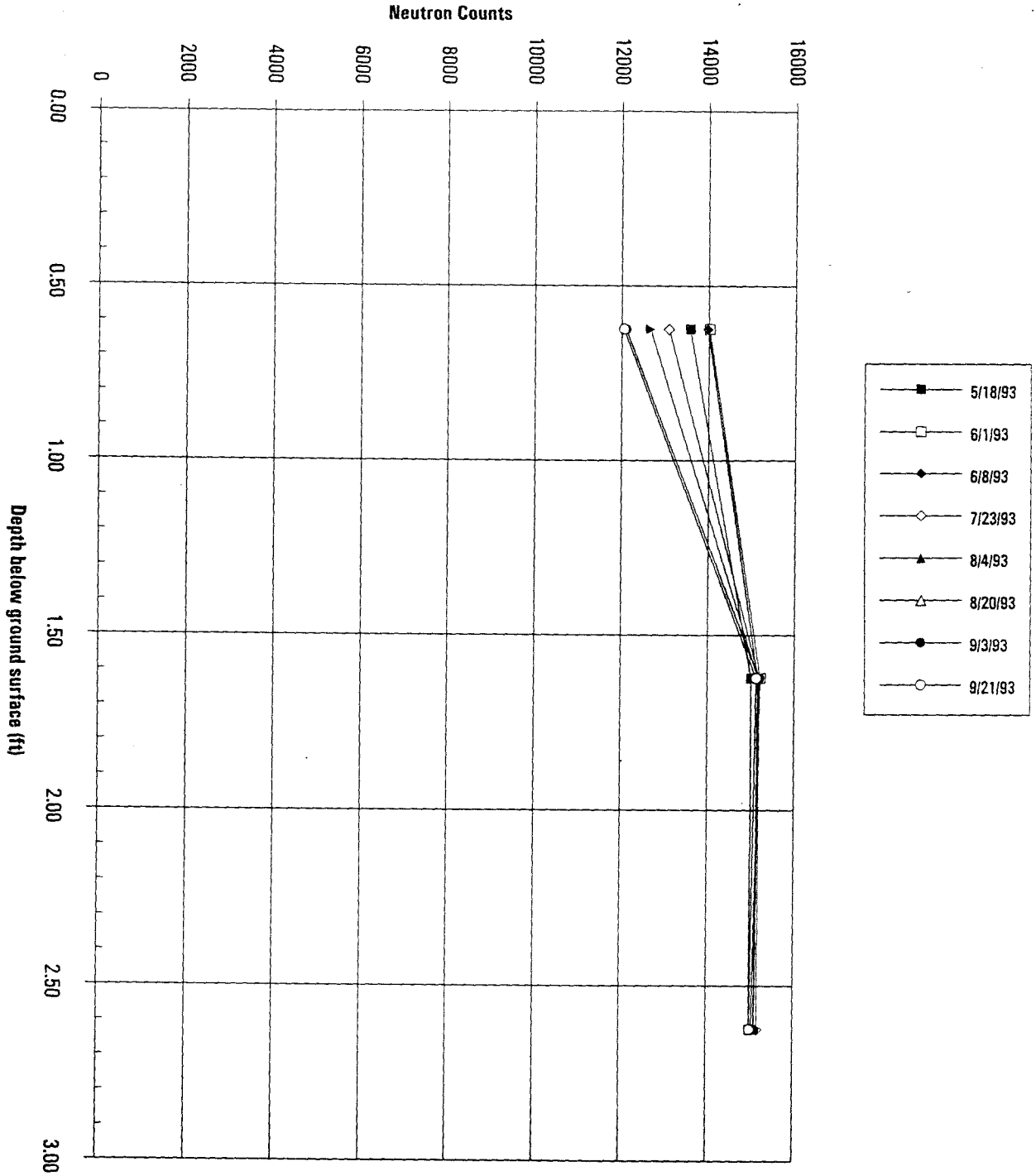

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Figure II.3.3-20

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 40693

rf85x11

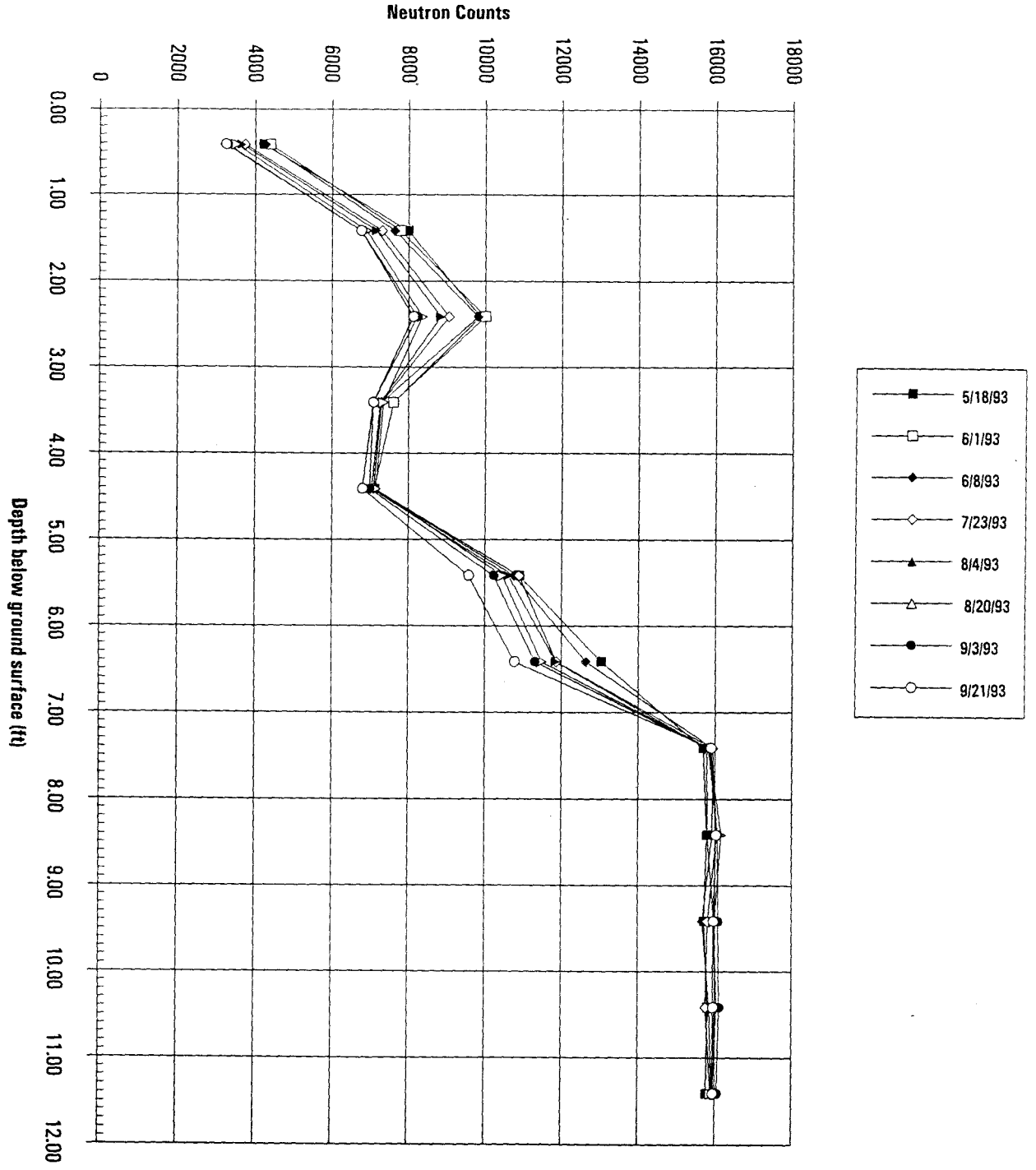

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Figure II.3.3-21

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 40793

rf85x11

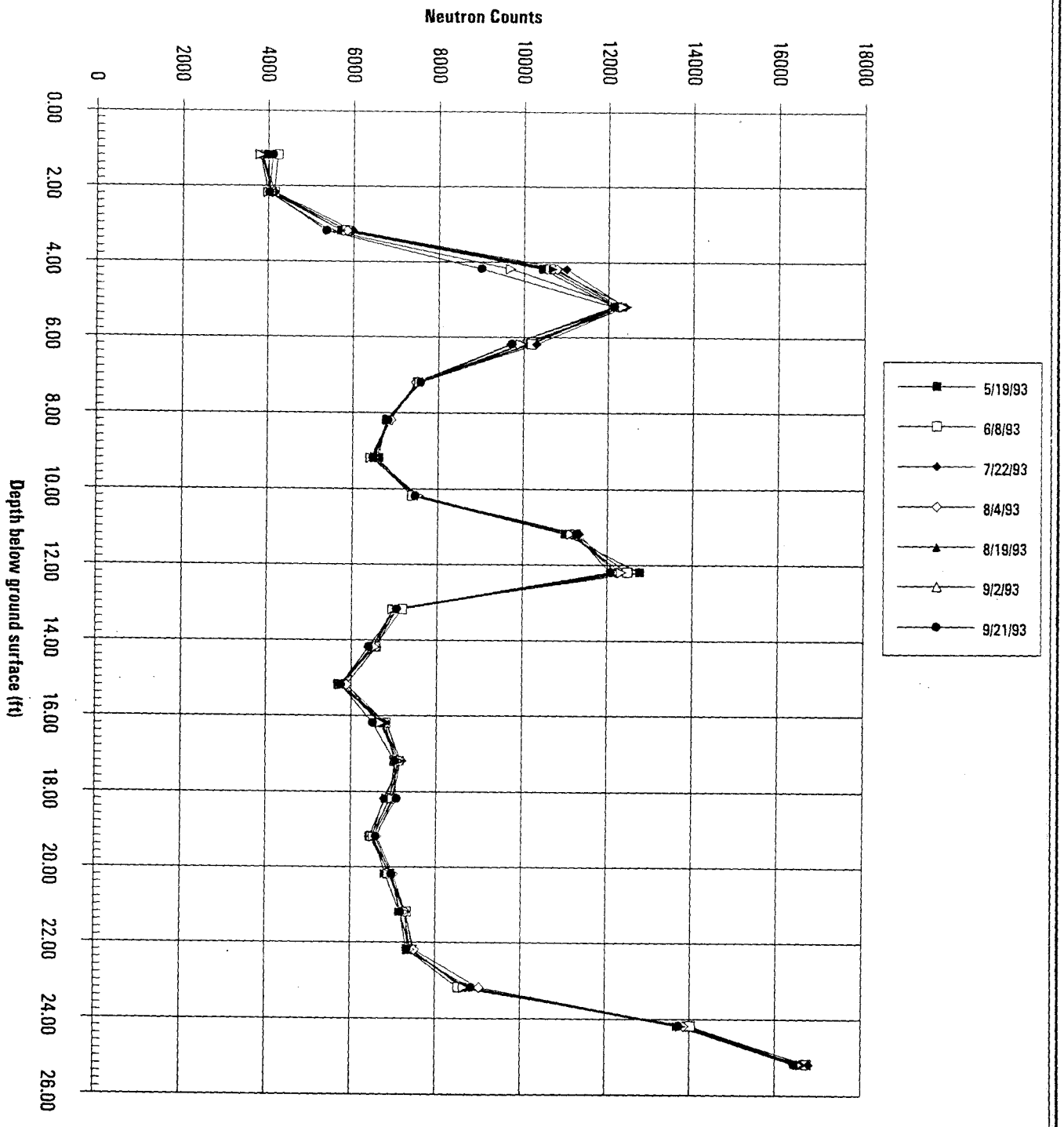

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Figure II.3.3-22

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 40993

rf85x11

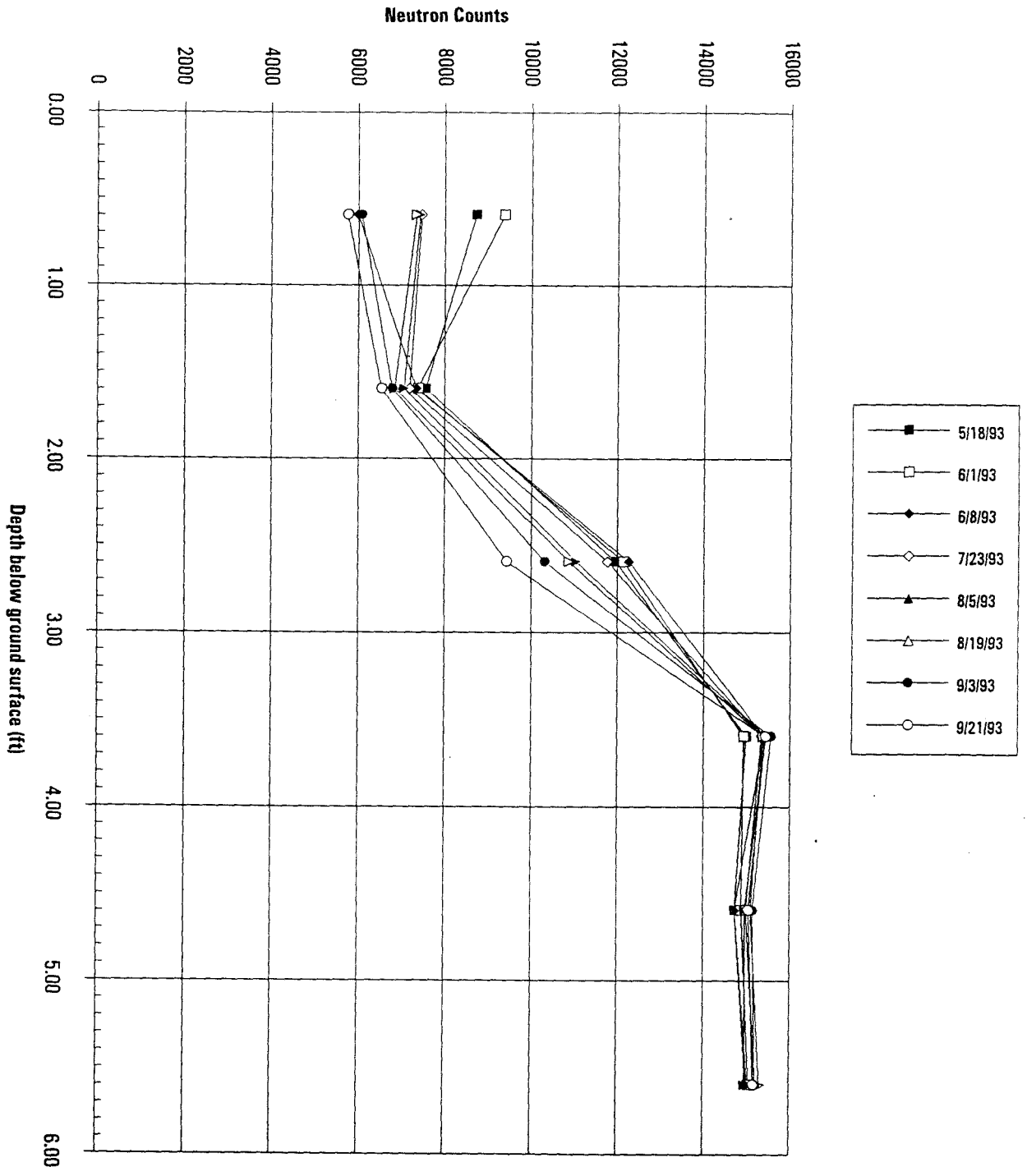

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Figure II.3.3-23

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 41293

rf85x11

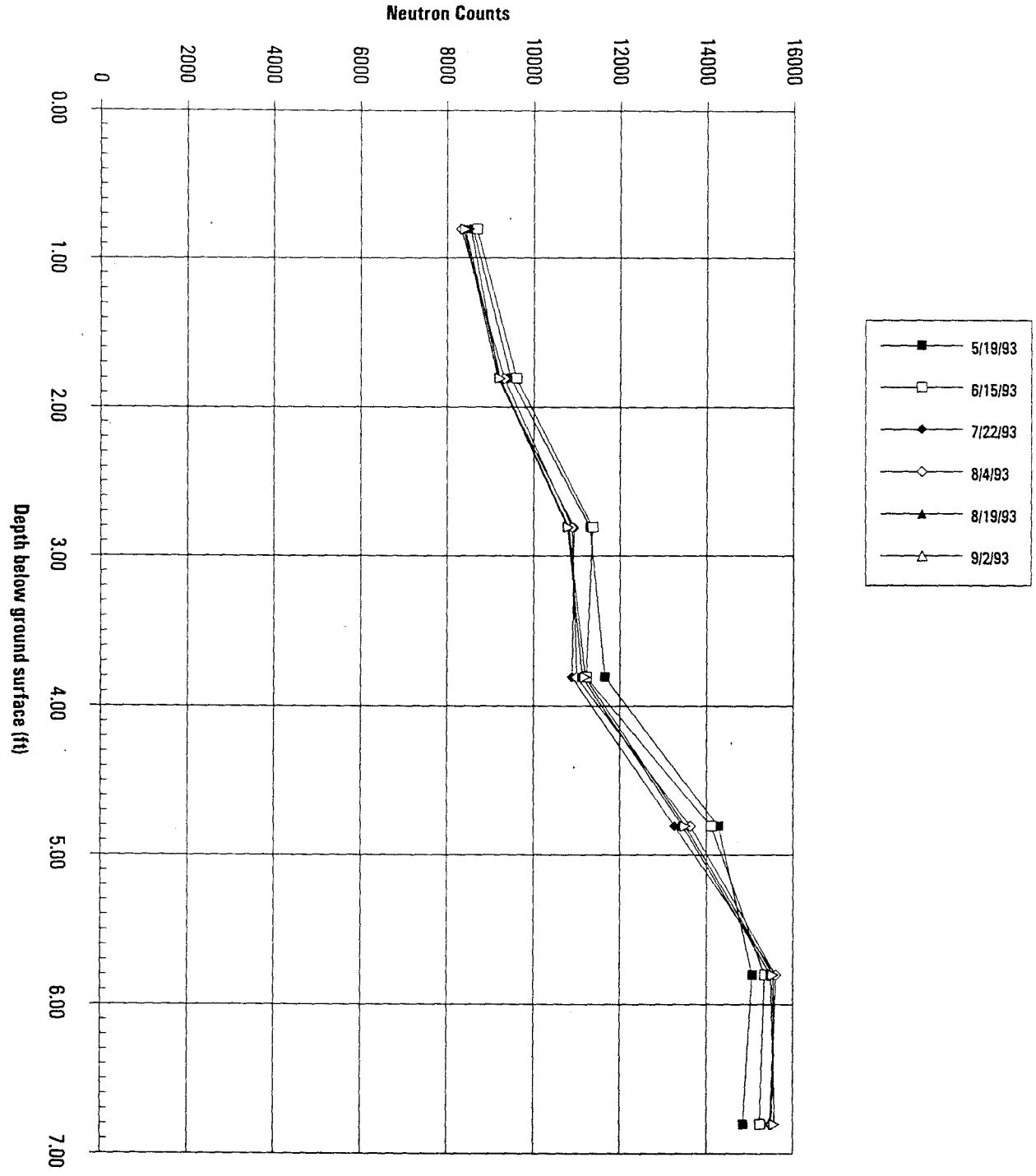

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Figure II.3.3-24

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 41593

rf85x11

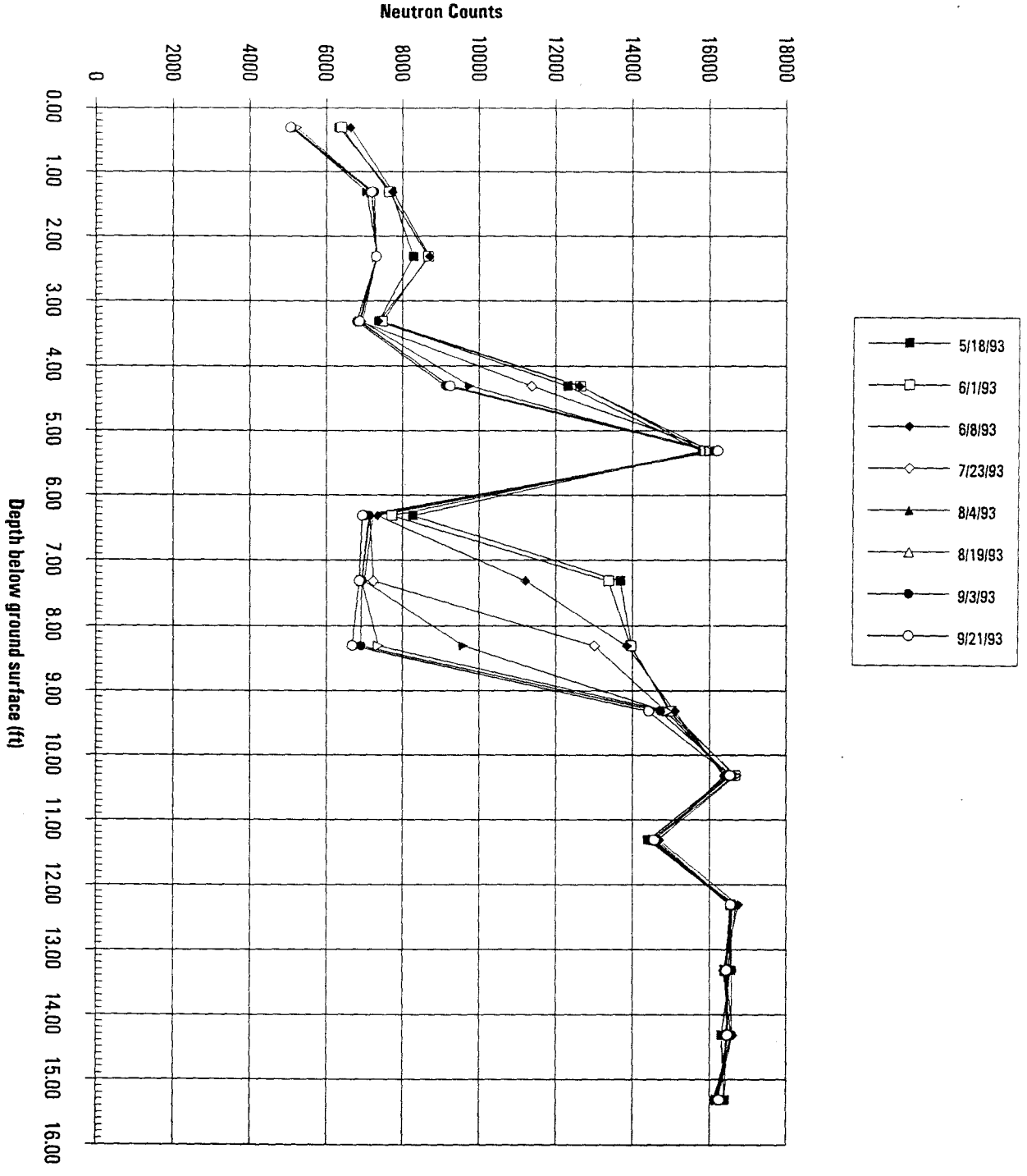

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Figure II.3.3-25

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 41793

rf85x11

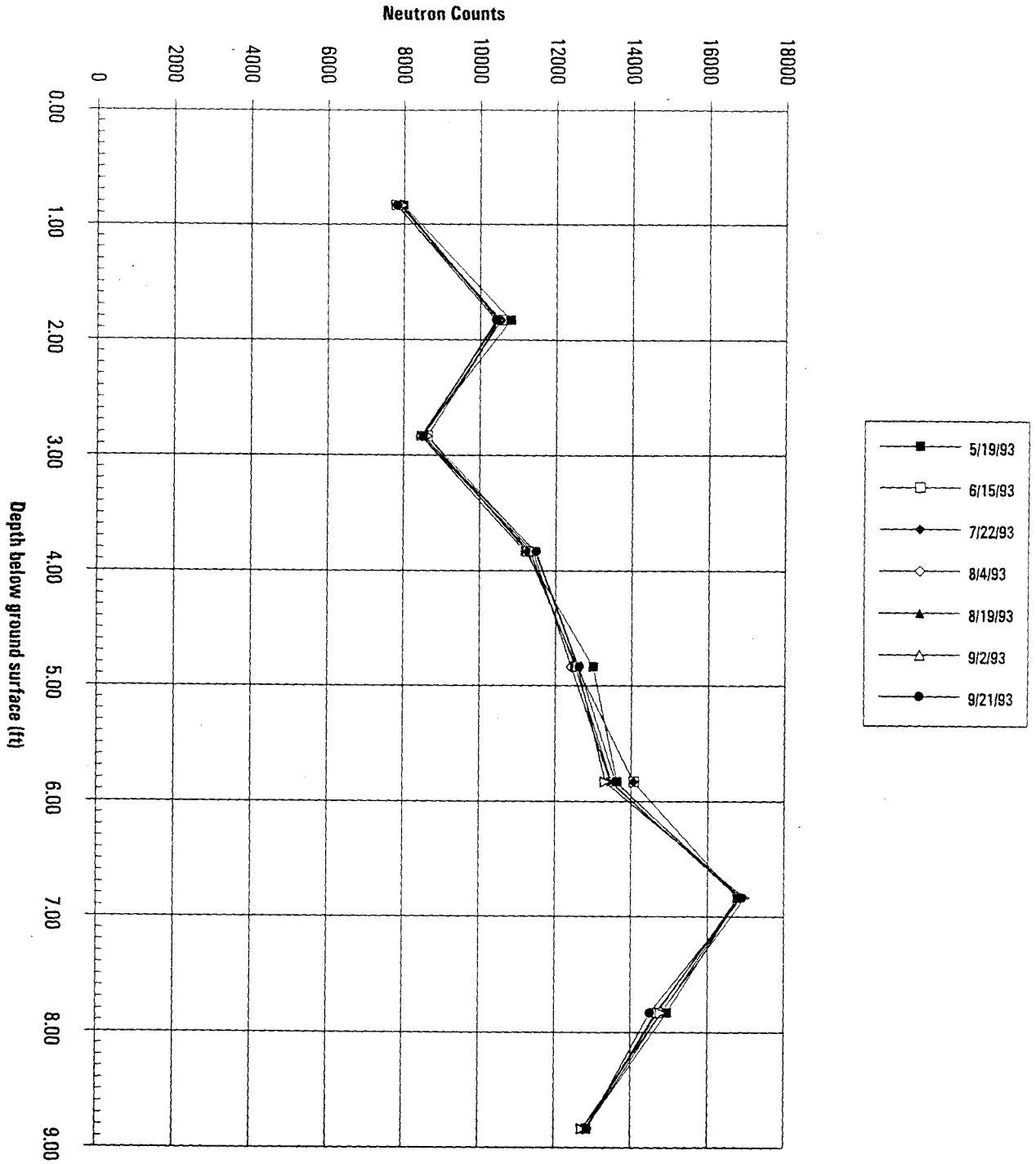

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Figure II.3.3-26

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 42493

rf85x11

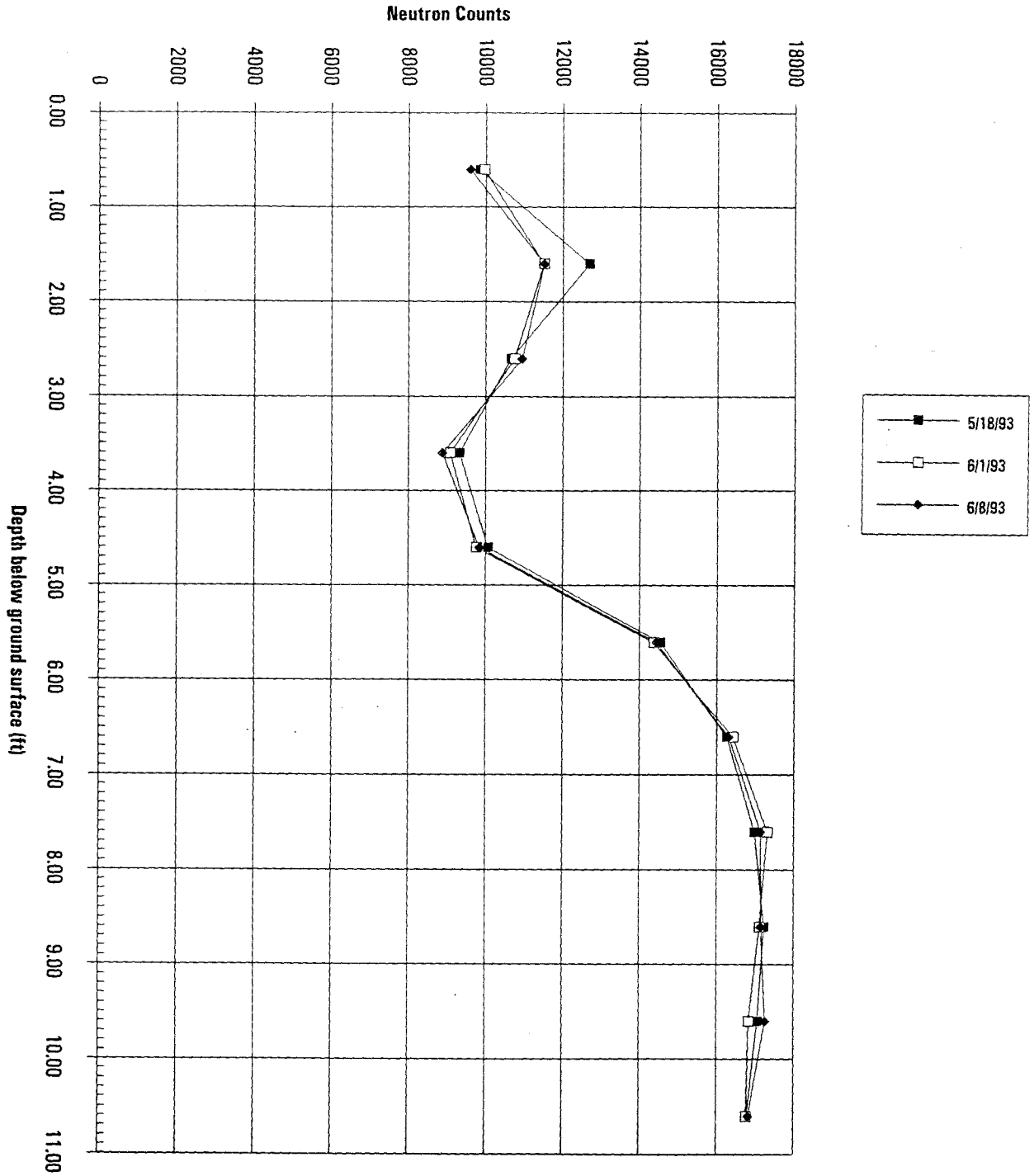

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Figure II.3.3-27

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 42893

rf85x11

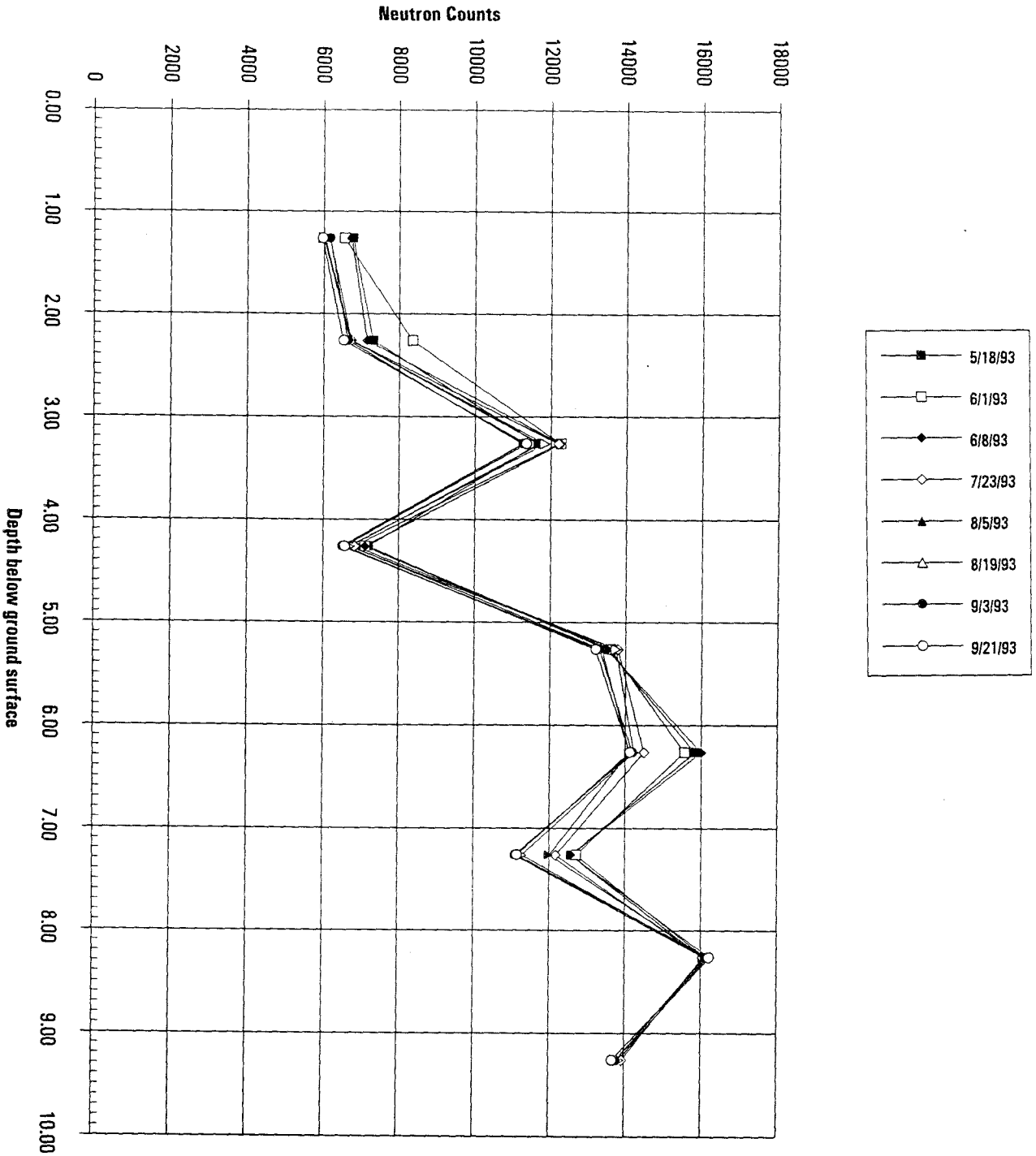

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Figure II.3.3-28

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 43193

rf85x11

126

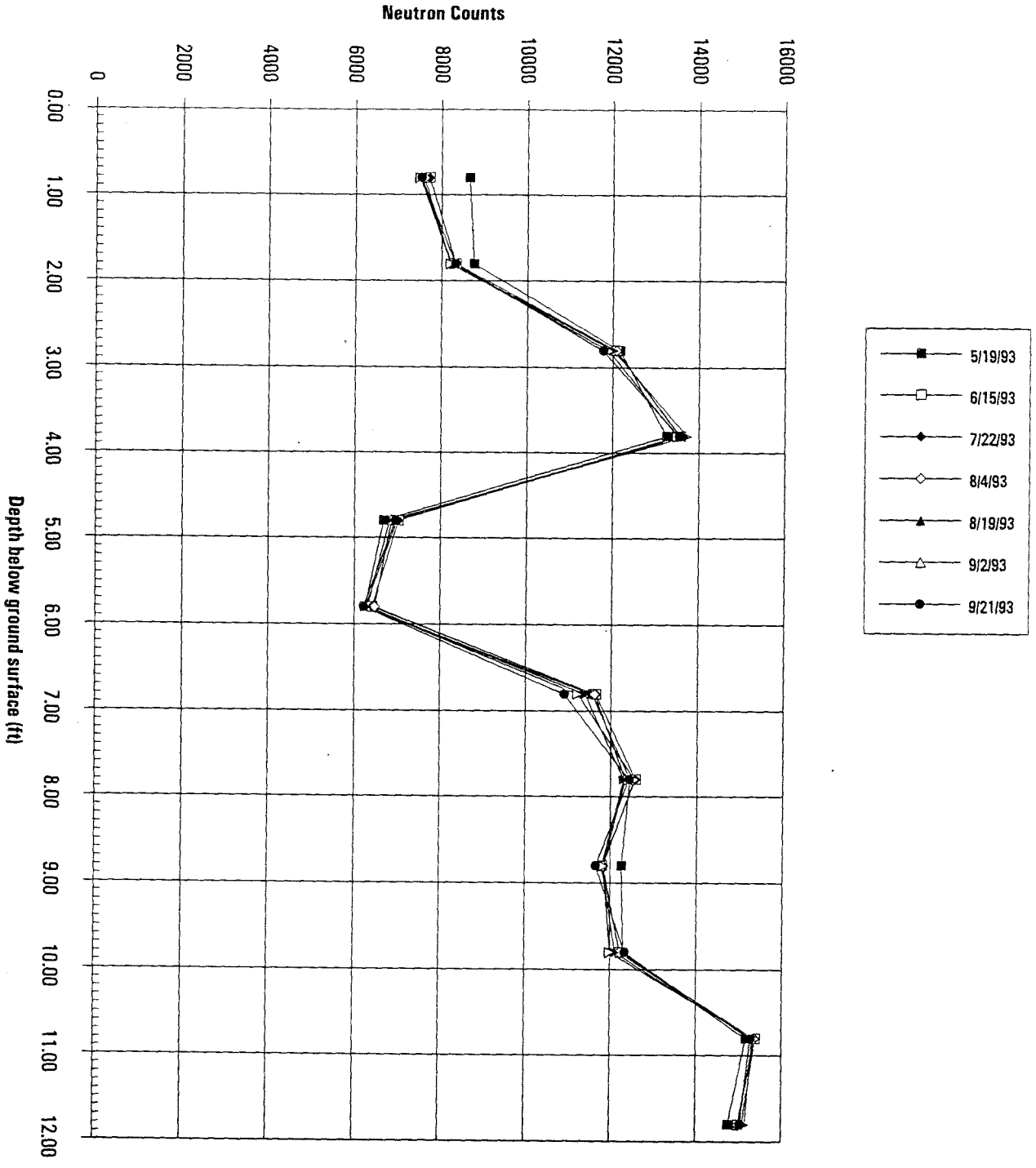

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Figure II.3.3-29

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 43693

rf85x11

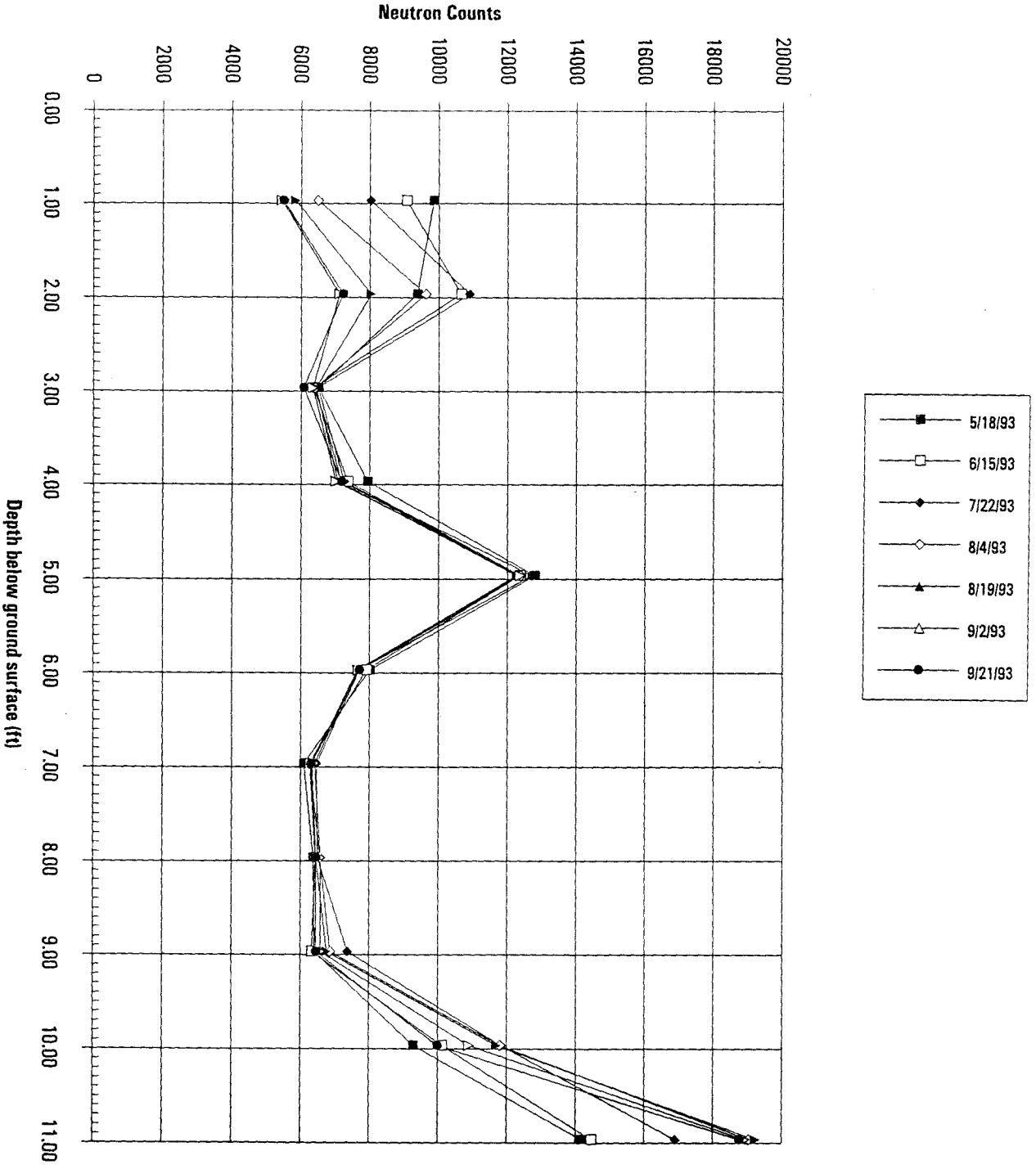

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Figure II.3.3-30

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 43793

rf85x11

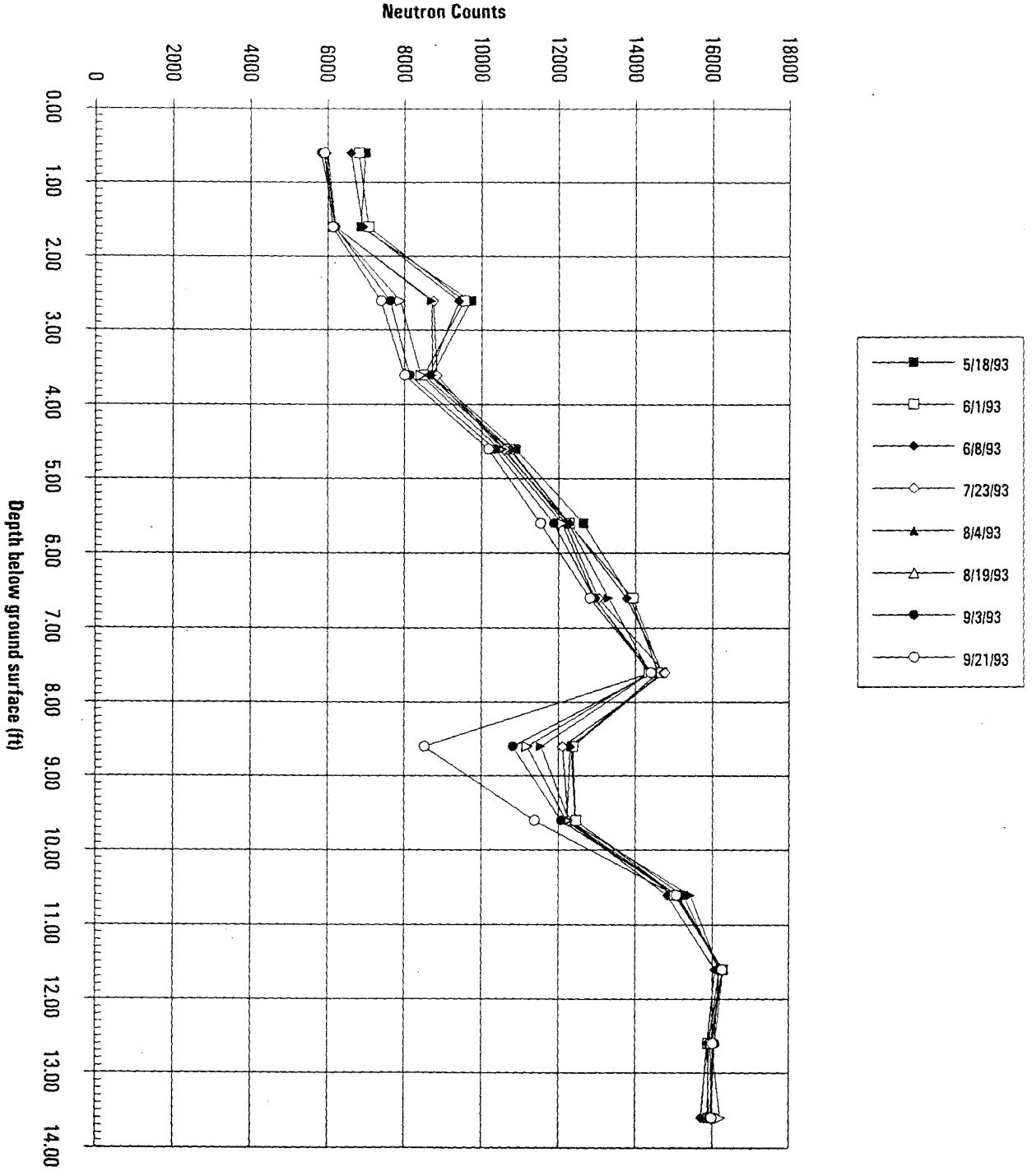

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Figure II.3.3-31

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 44093

rf85x11

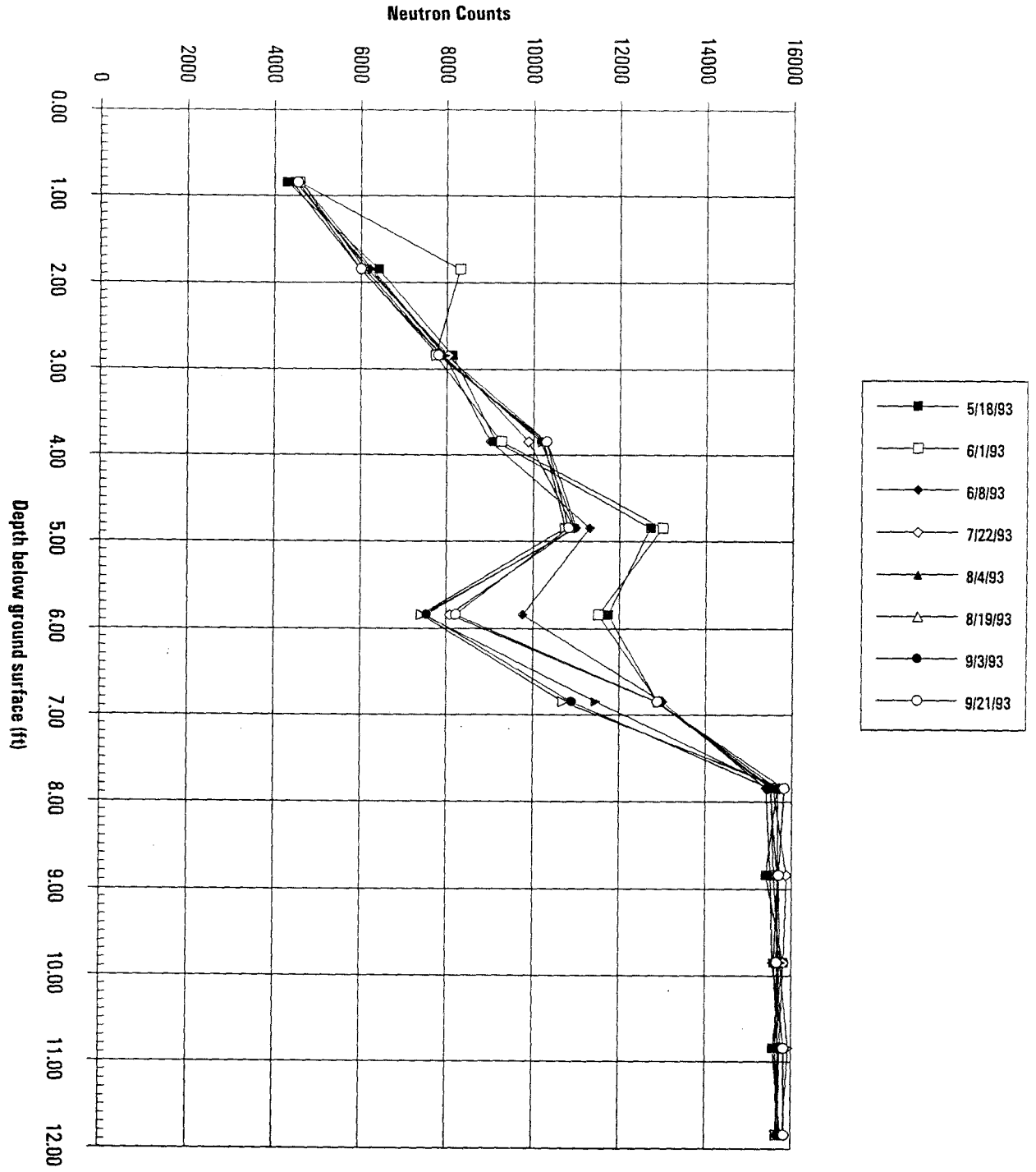

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Figure II.3.3-32

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Neutron Probe Measurements - Borehole 44393

rf85x11

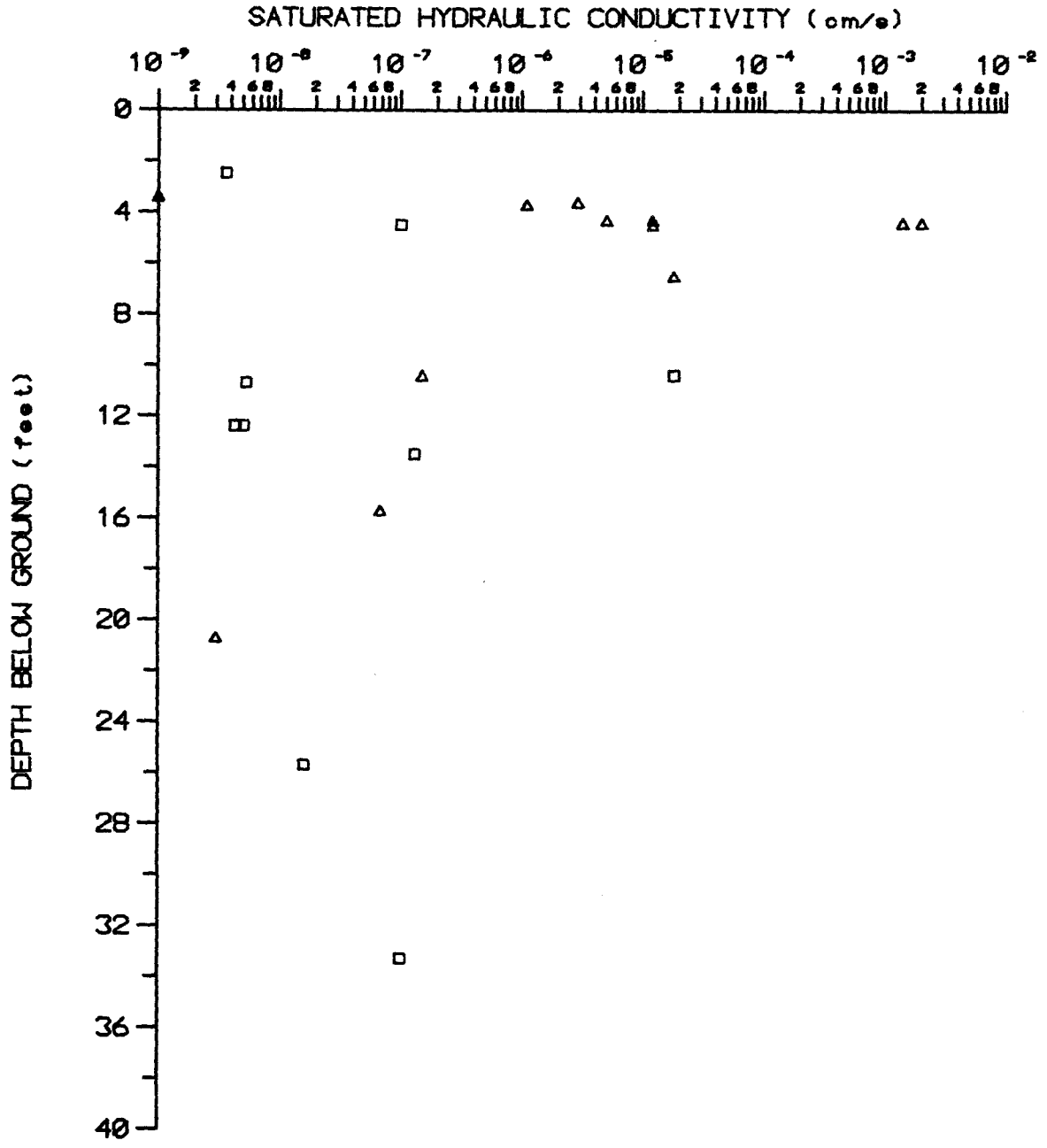

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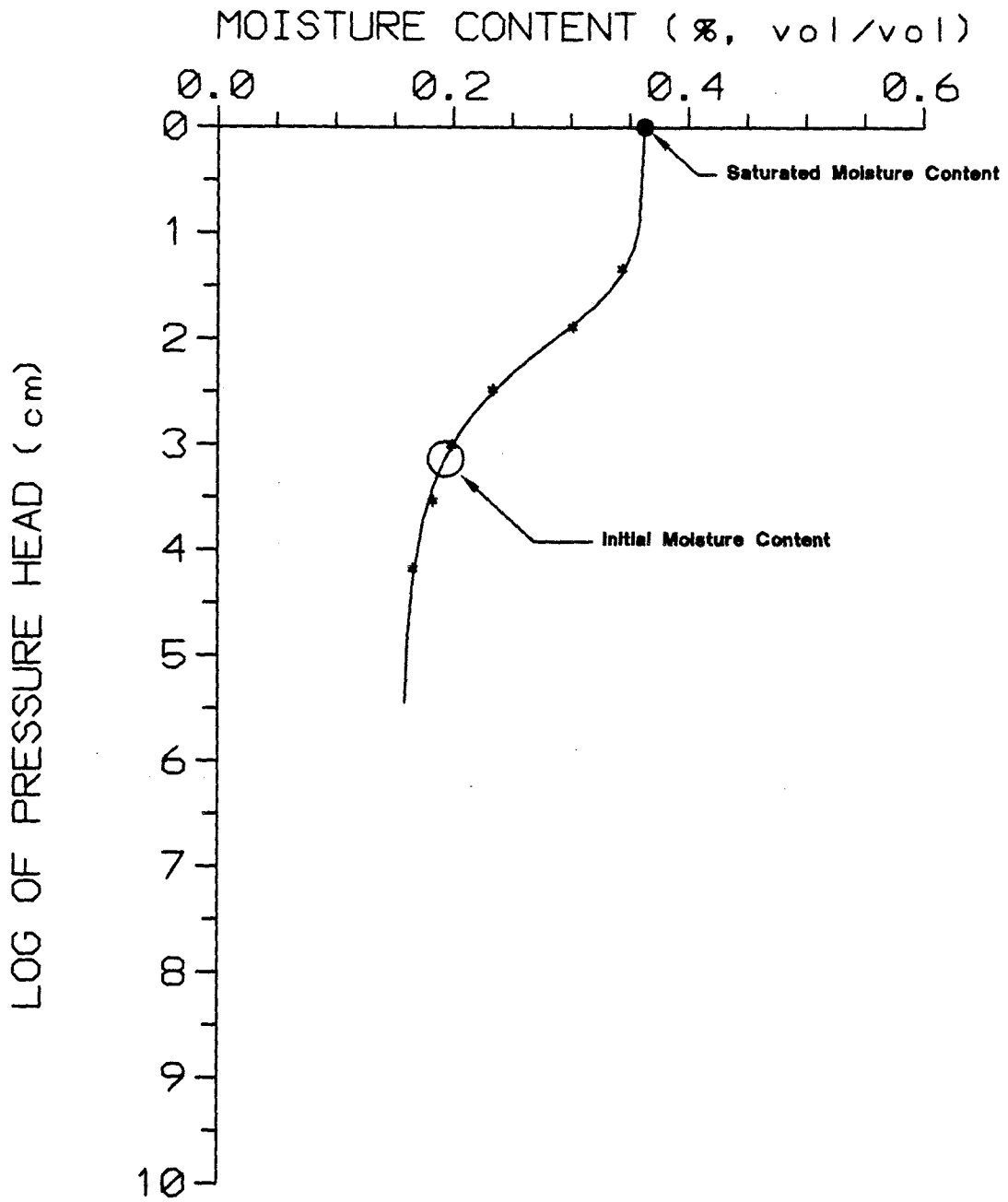
Figure II.3.3-33

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Saturated Hydraulic Conductivity versus Depth



***** Observed Data

——— Calculated

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Figure II.3.3-34

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Example of Pressure Head-Moisture Content Relationship

132

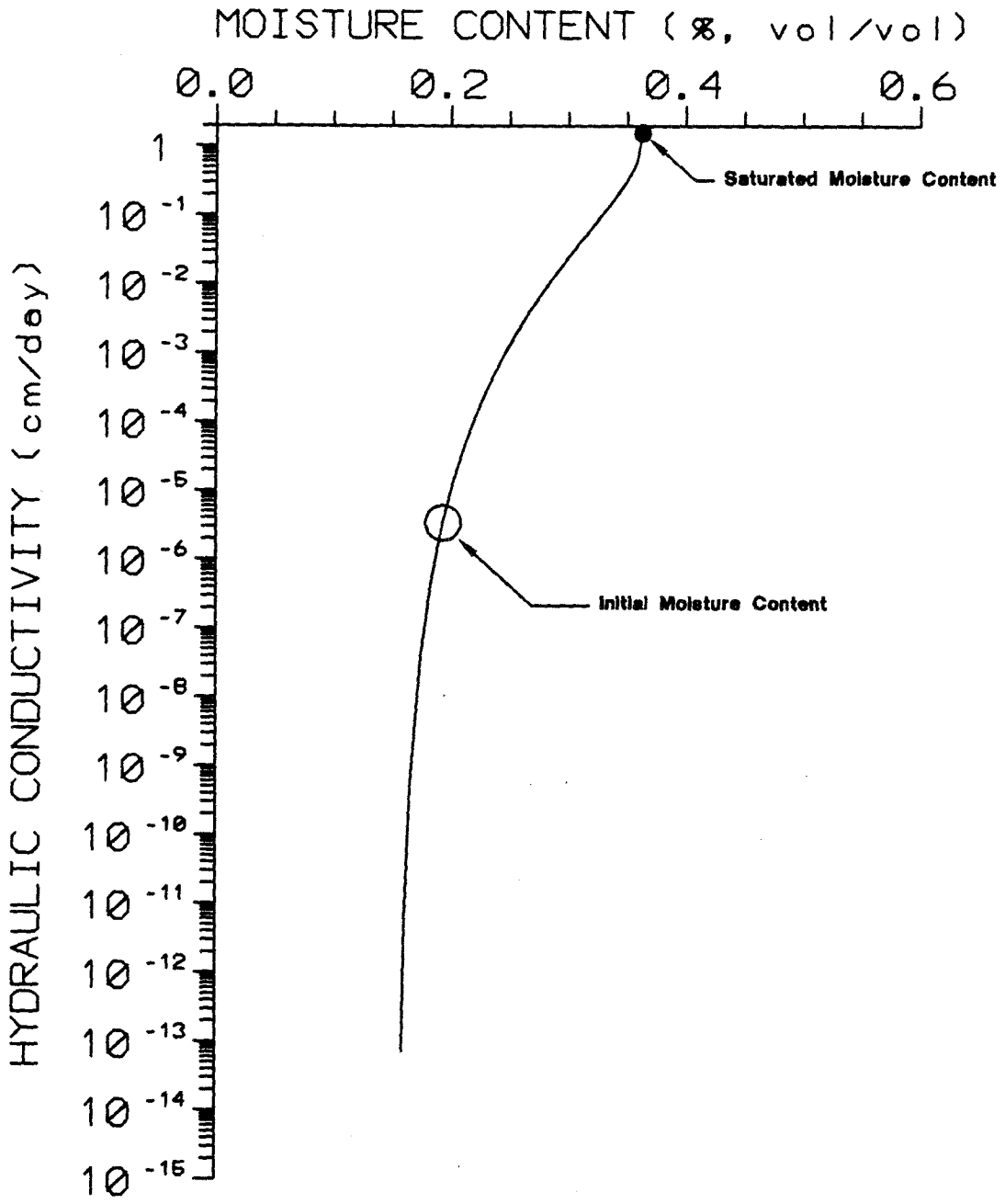

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Figure II.3.3-35

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Example of Unsaturated Hydraulic Conductivity-Moisture Content Relationship

133

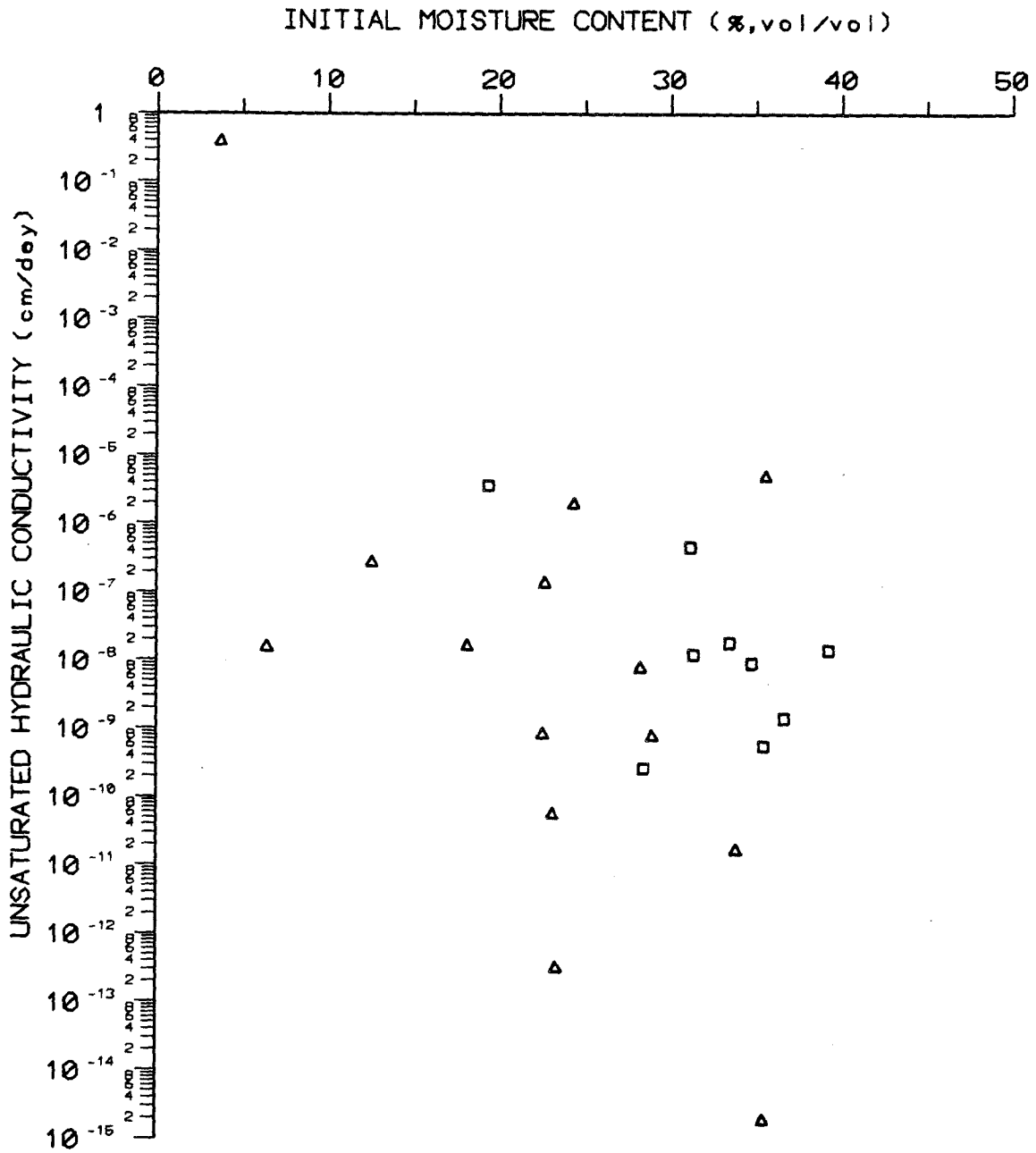

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Figure II.3.3-36

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Unsaturated Hydraulic Conductivity versus Moisture Content

134

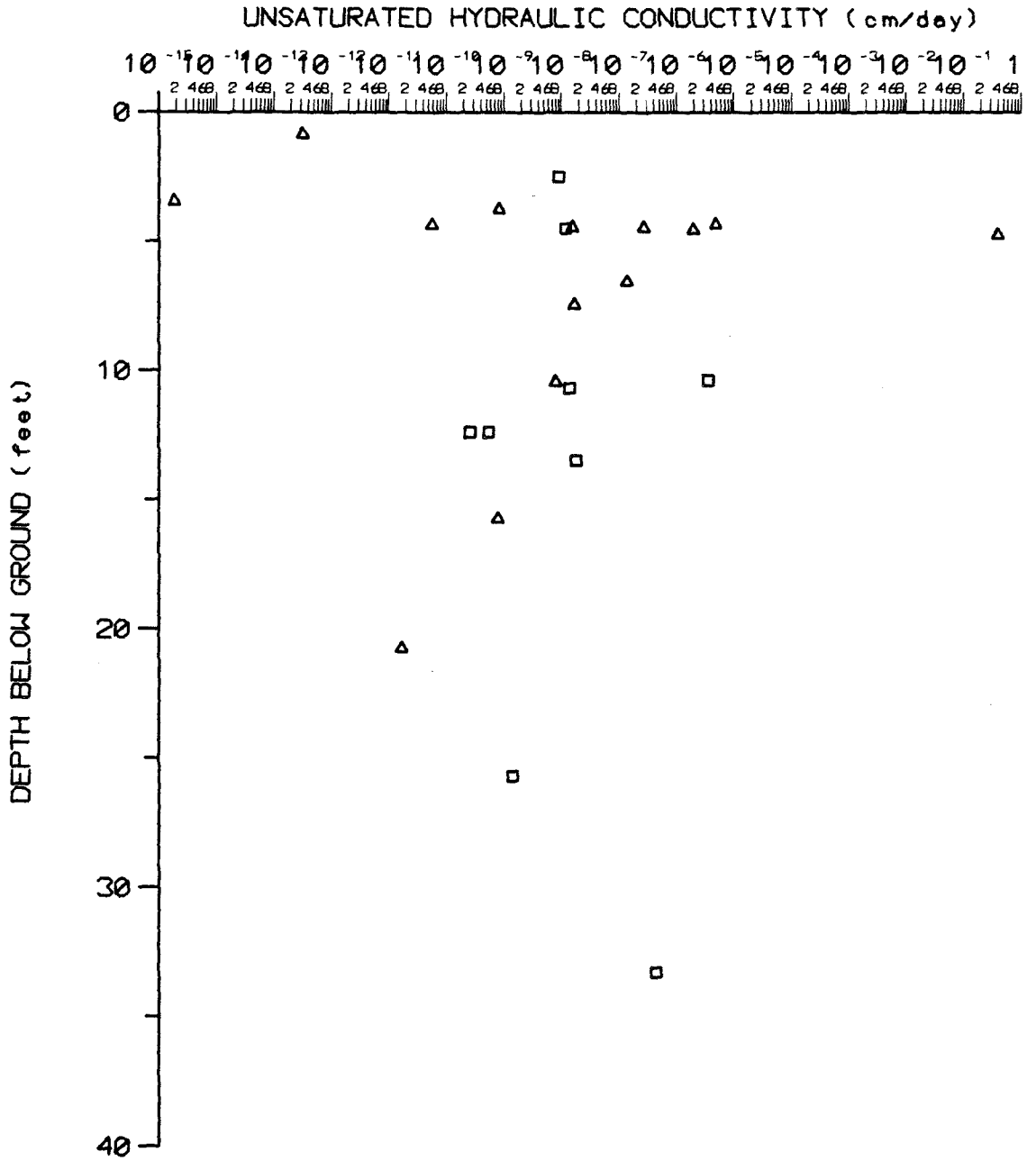

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Figure II.3.-37

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Unsaturated Hydraulic Conductivity versus Depth

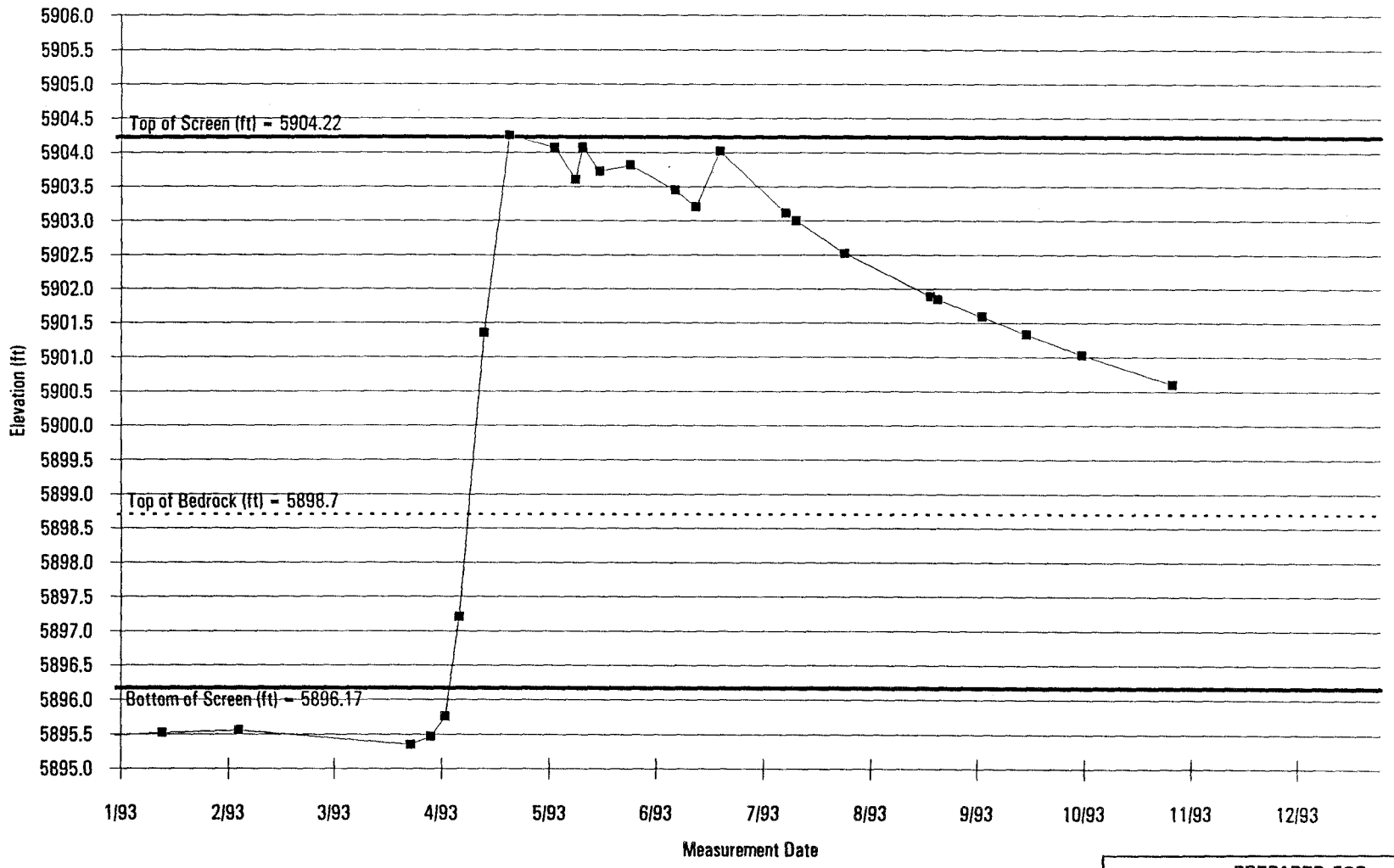

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Figure II.3.3-38

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
B208789 Hydrograph

rf85x11h

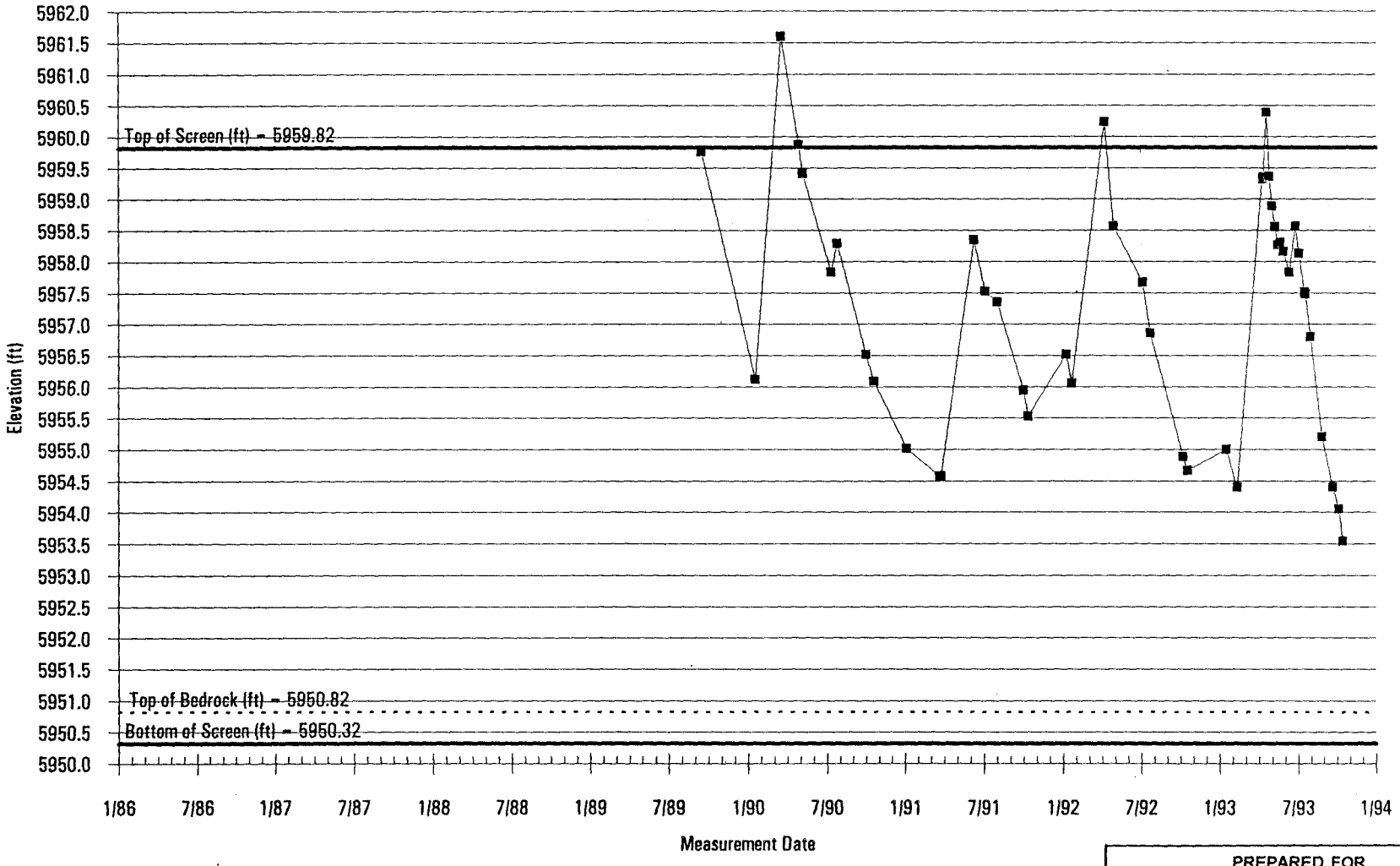

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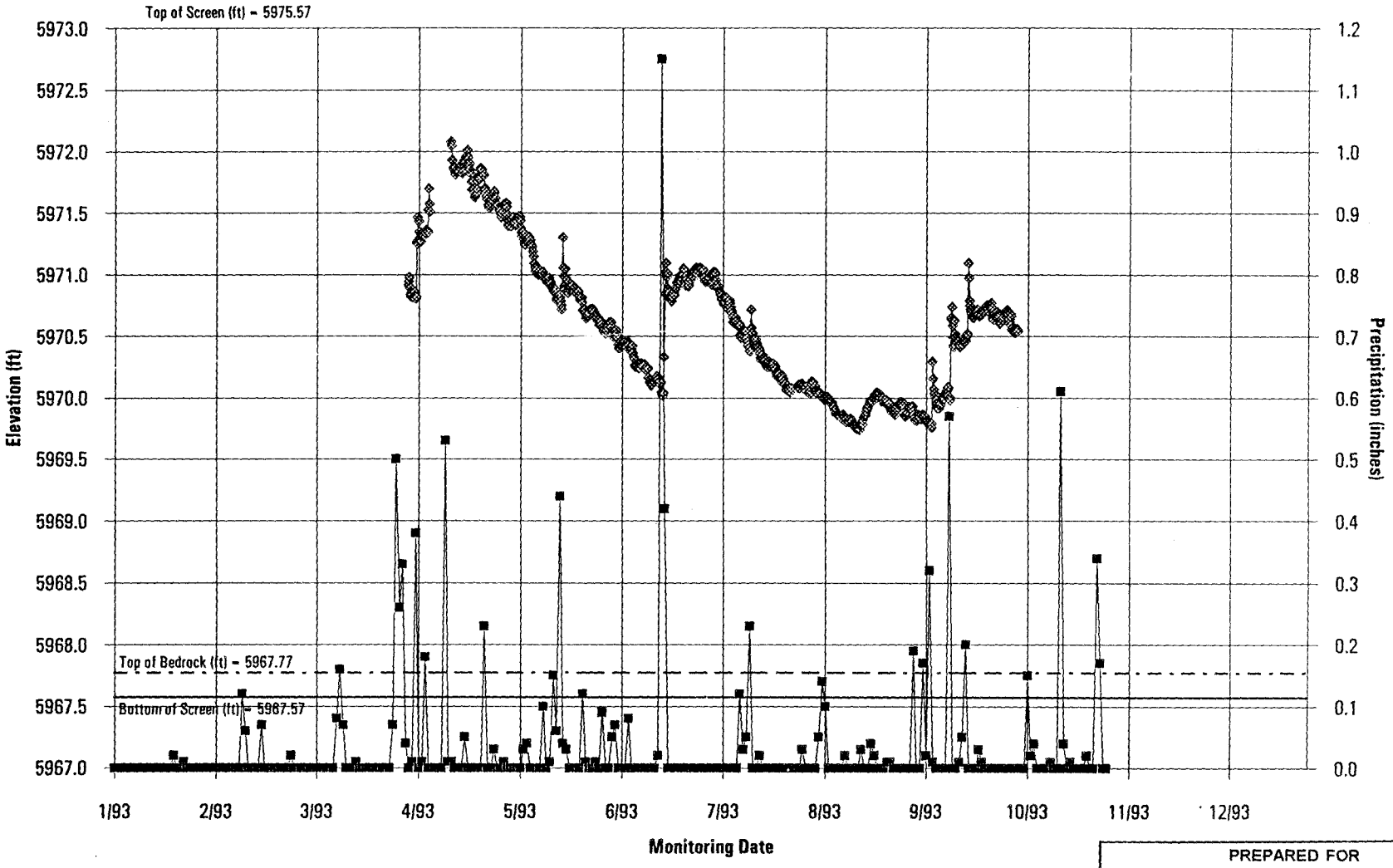
Figure II.3.3-39

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
P209789 Hydrograph

rf85x11h



LEGEND

- PRECIPITATION (inches)
- GROUNDWATER ELEVATION (FEET)

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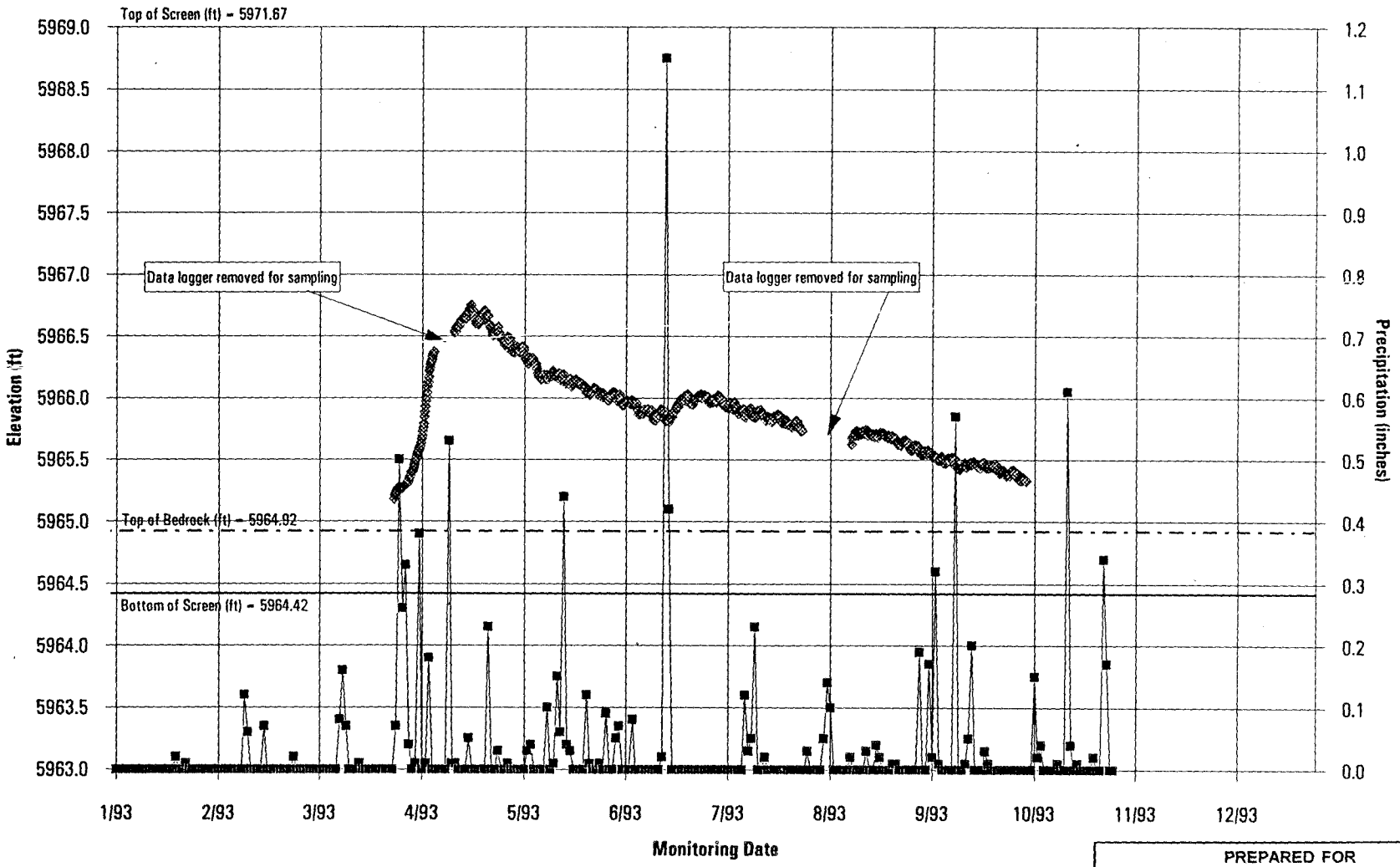
Figure II.3.3-41

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
2286 Hydrograph with Precipitation Data

rf85x11h



LEGEND

- PRECIPITATION (inches)
- GROUNDWATER ELEVATION (FEET)

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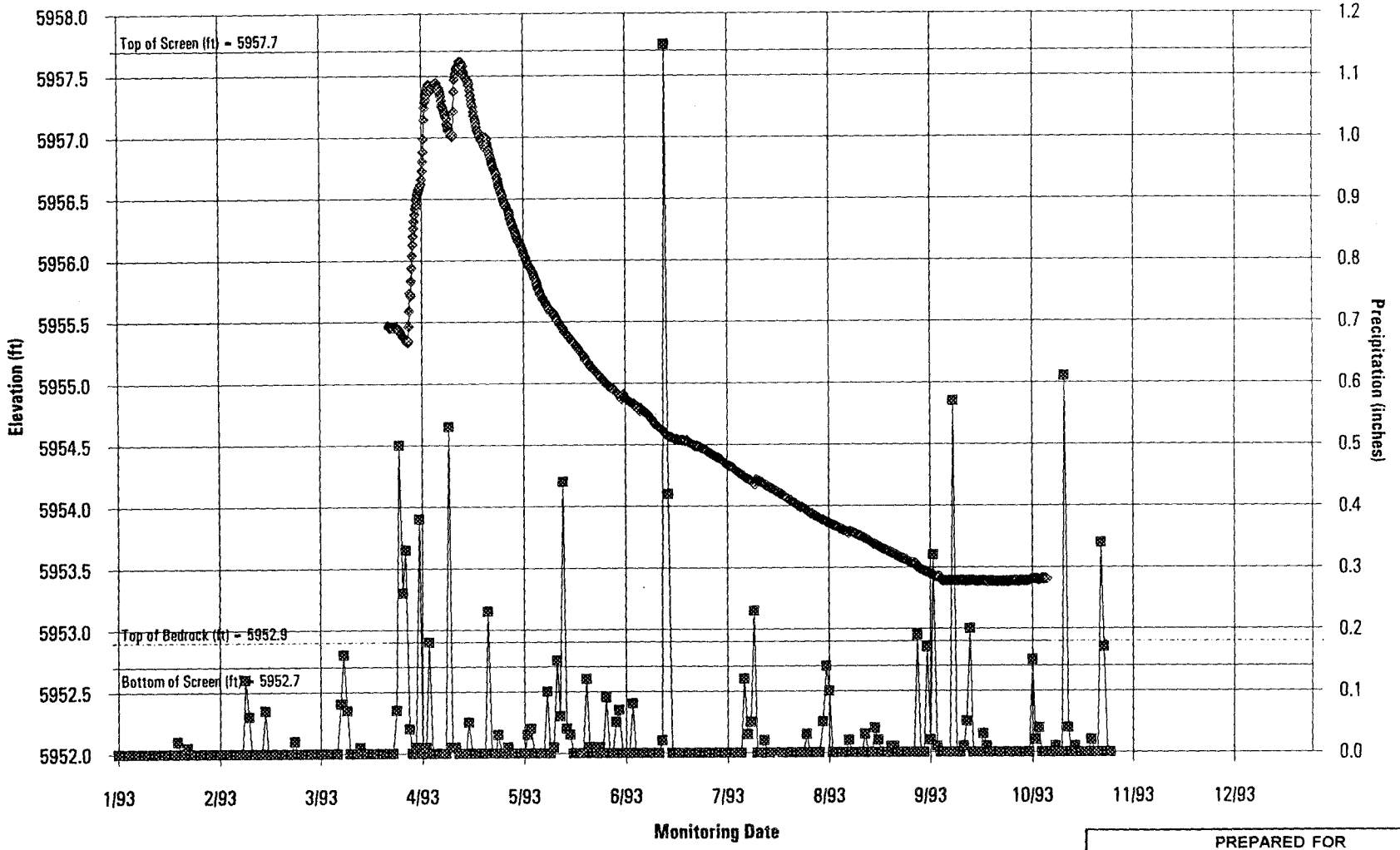
Figure II.3.3-42

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
2686 Hydrograph with Precipitation Data

rl85x11h



LEGEND

- PRECIPITATION (inches)
- GROUNDWATER ELEVATION (FEET)

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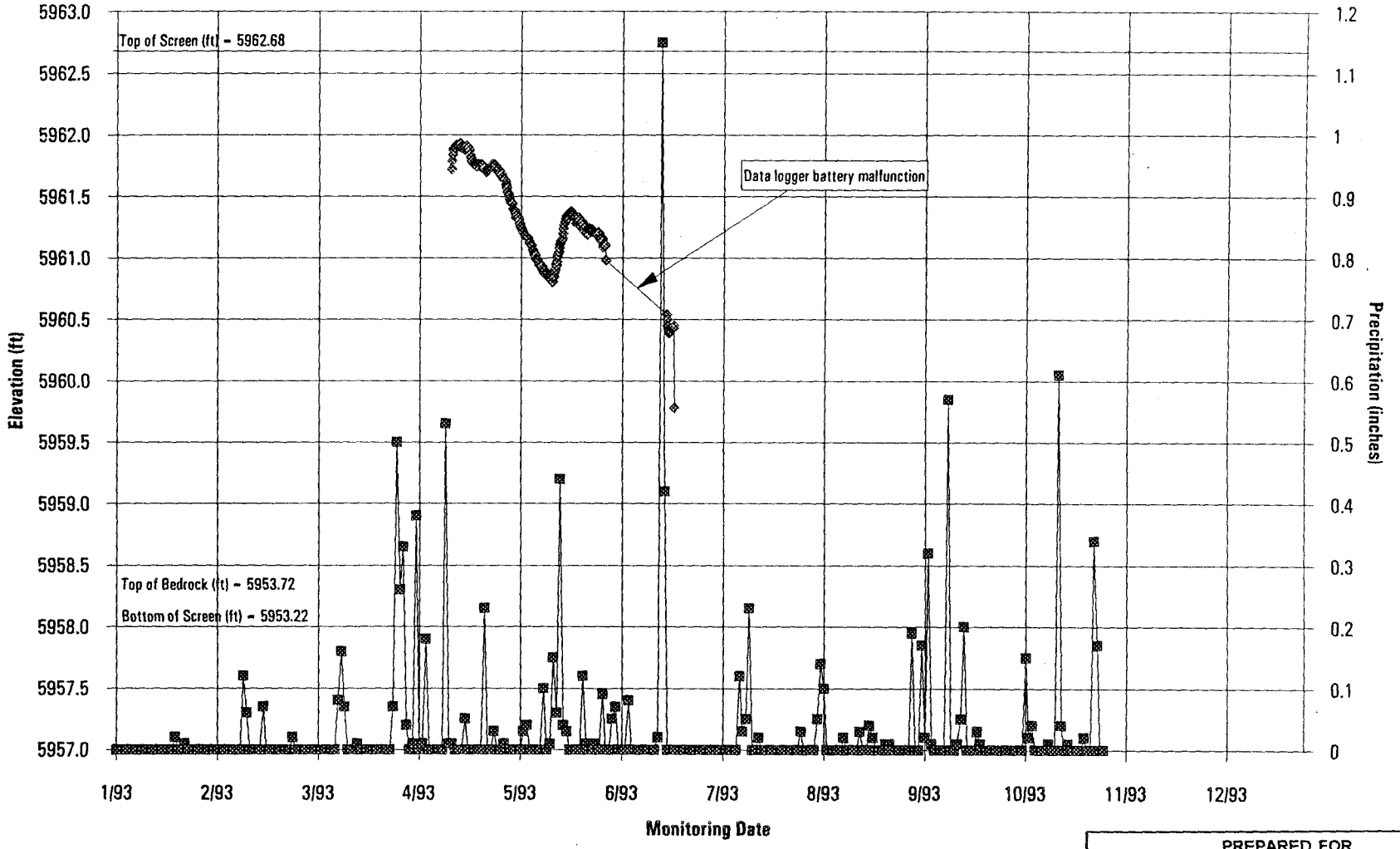
Figure II.3.3-43

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
41193 Hydrograph with Precipitation Data



LEGEND

- PRECIPITATION (inches)
- GROUNDWATER ELEVATION (FEET)

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Figure II.3.3-44

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
P207689 Hydrograph with Precipitation Data

(4/)

rf85x11h

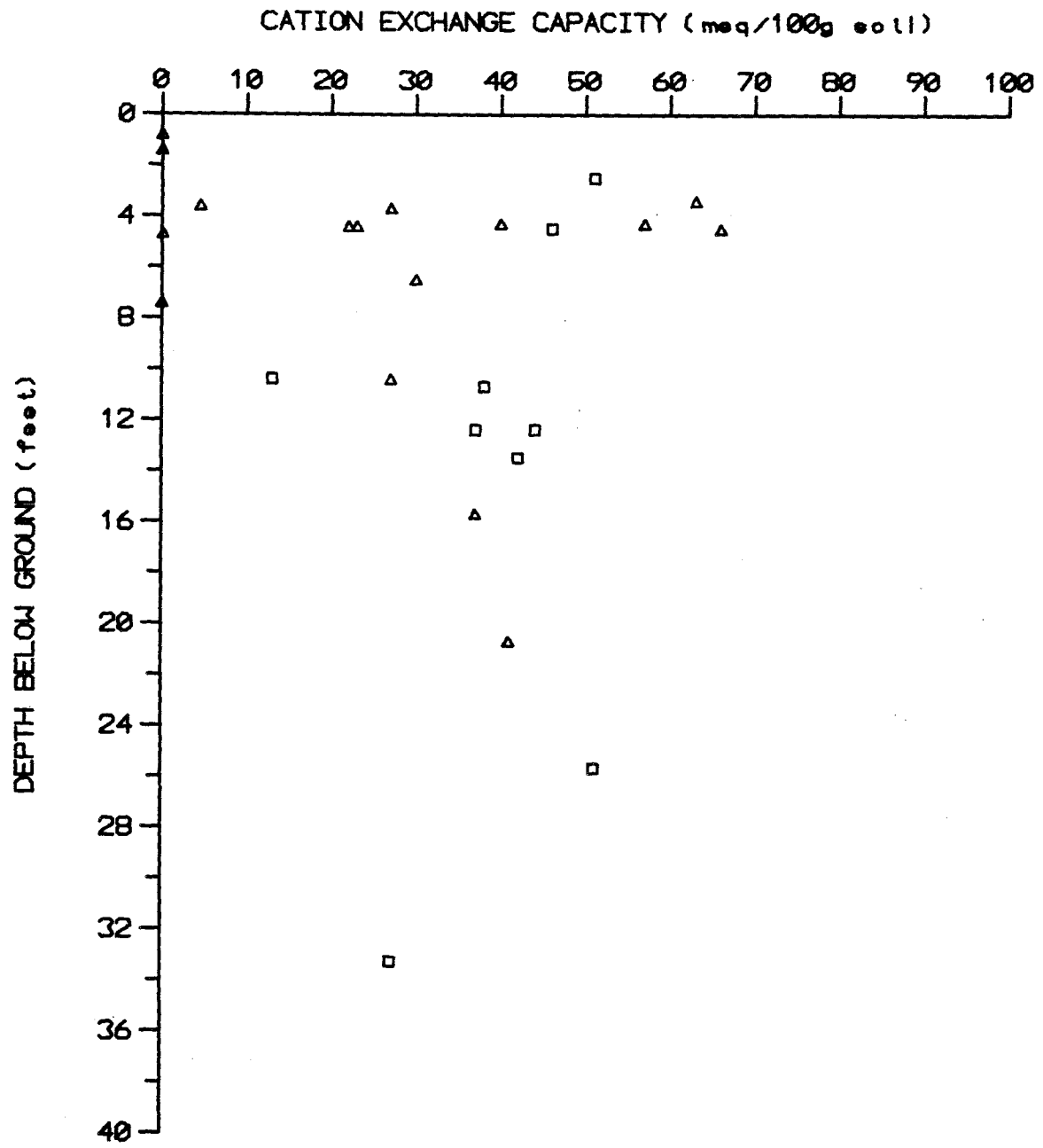

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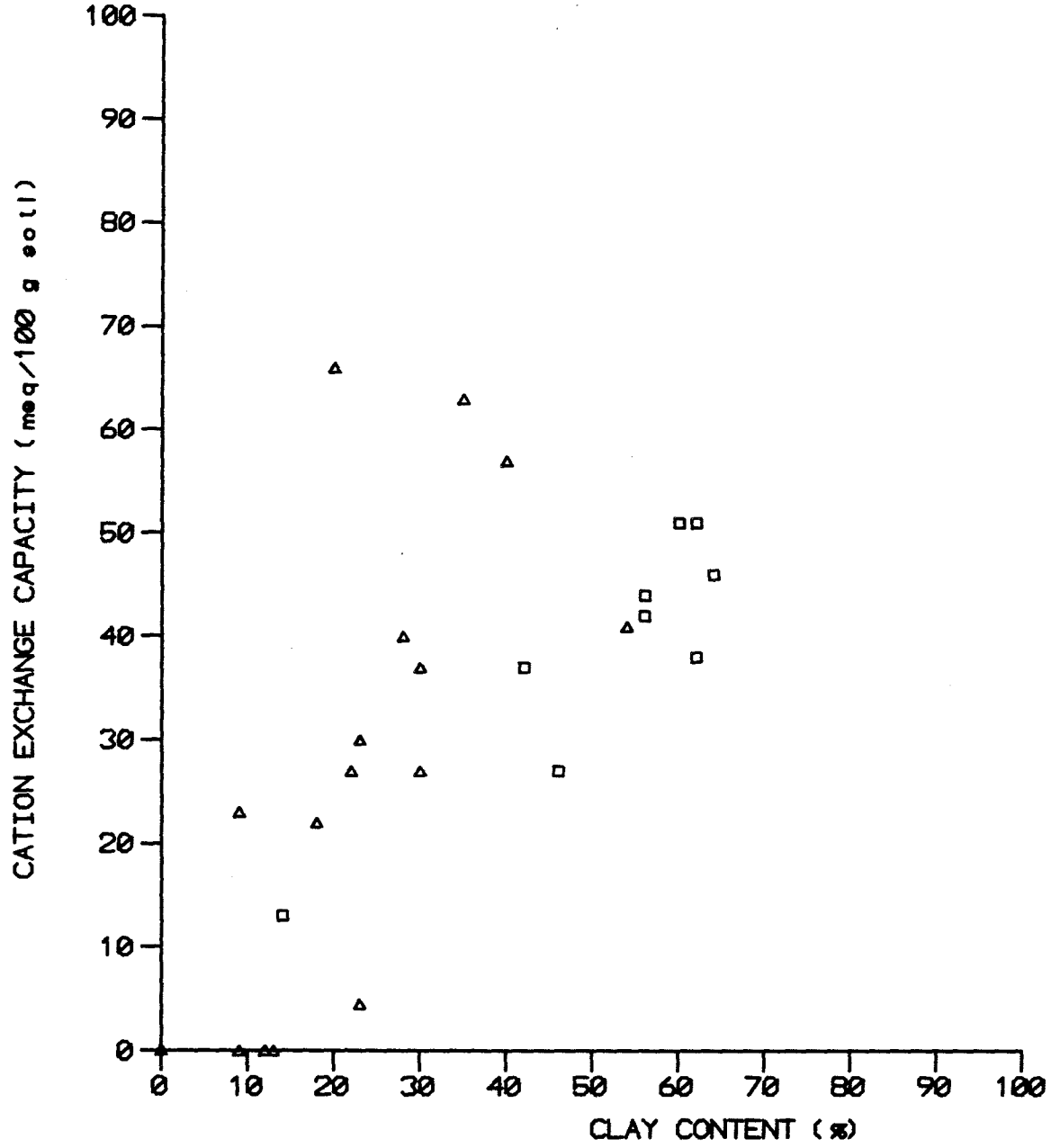
Figure II.3.3-53

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
CEC versus Depth



□ BEDROCK

△ ALLUVIUM

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Figure II.3.3-54

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
CEC versus Clay Content

152

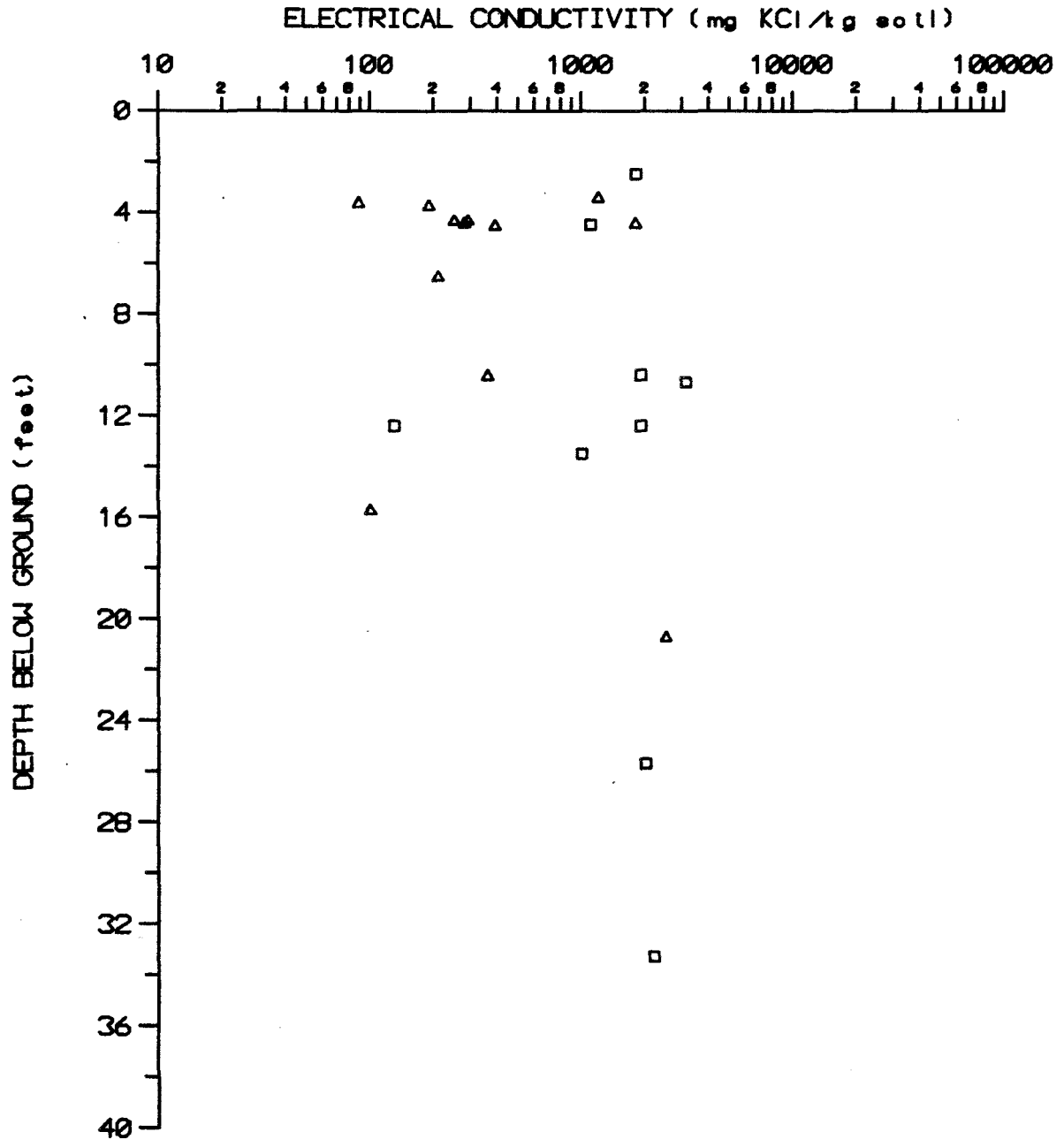

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Figure II.3.3-55

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Electrical Conductivity versus Depth

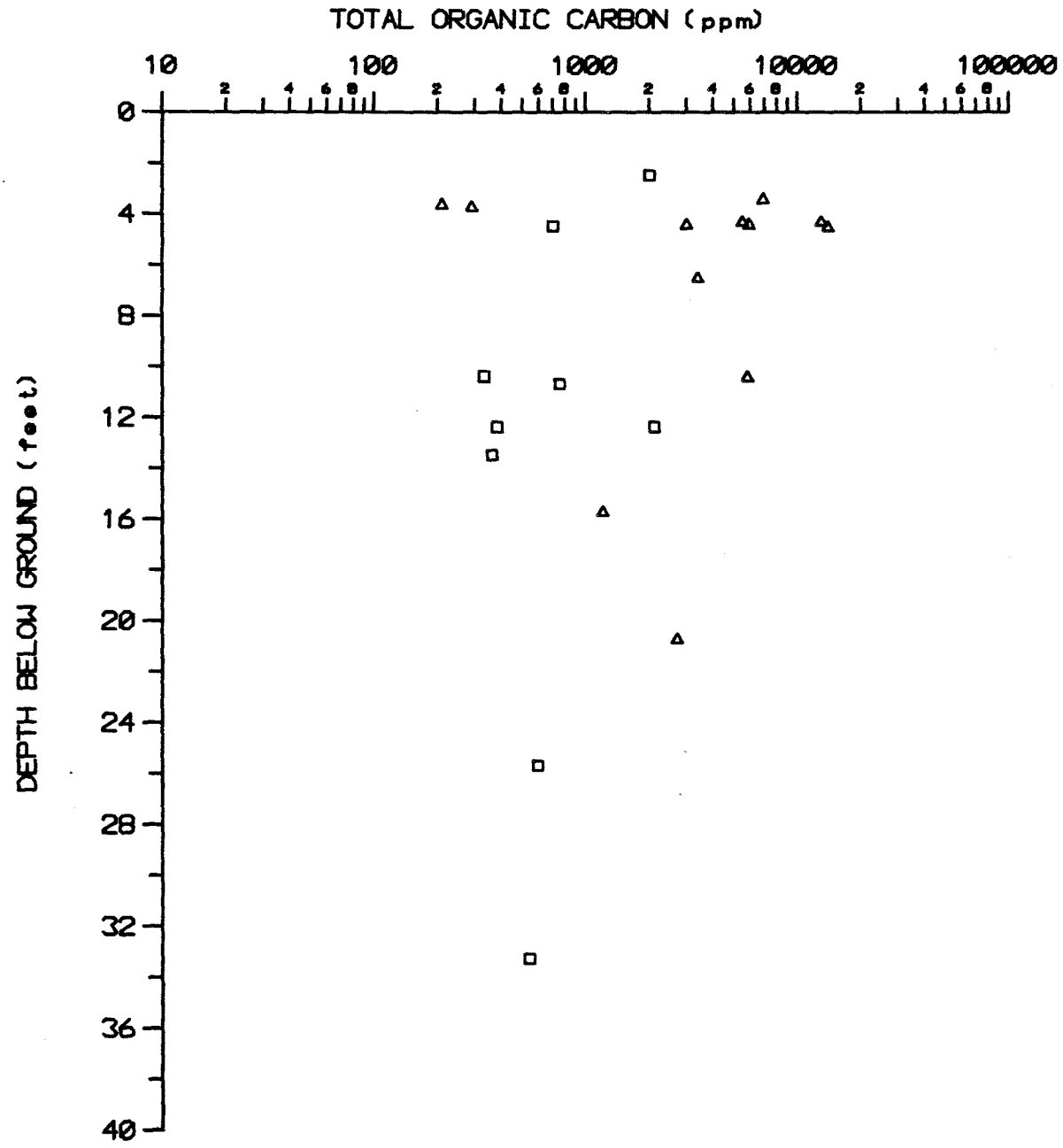

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Figure II.3.3-56

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
TOC versus Depth

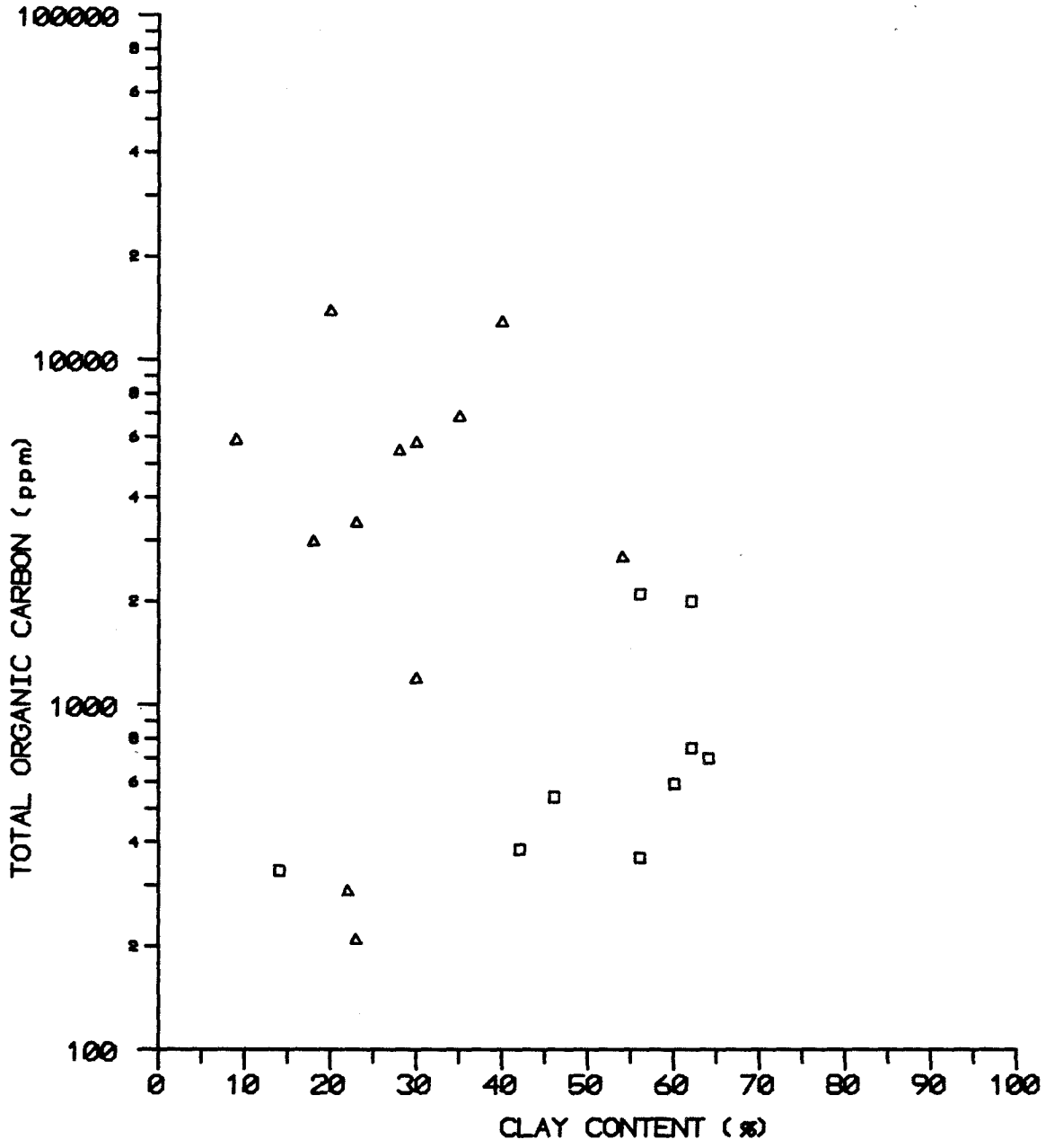

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Figure II.3.3-57

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
TOC versus Clay Content

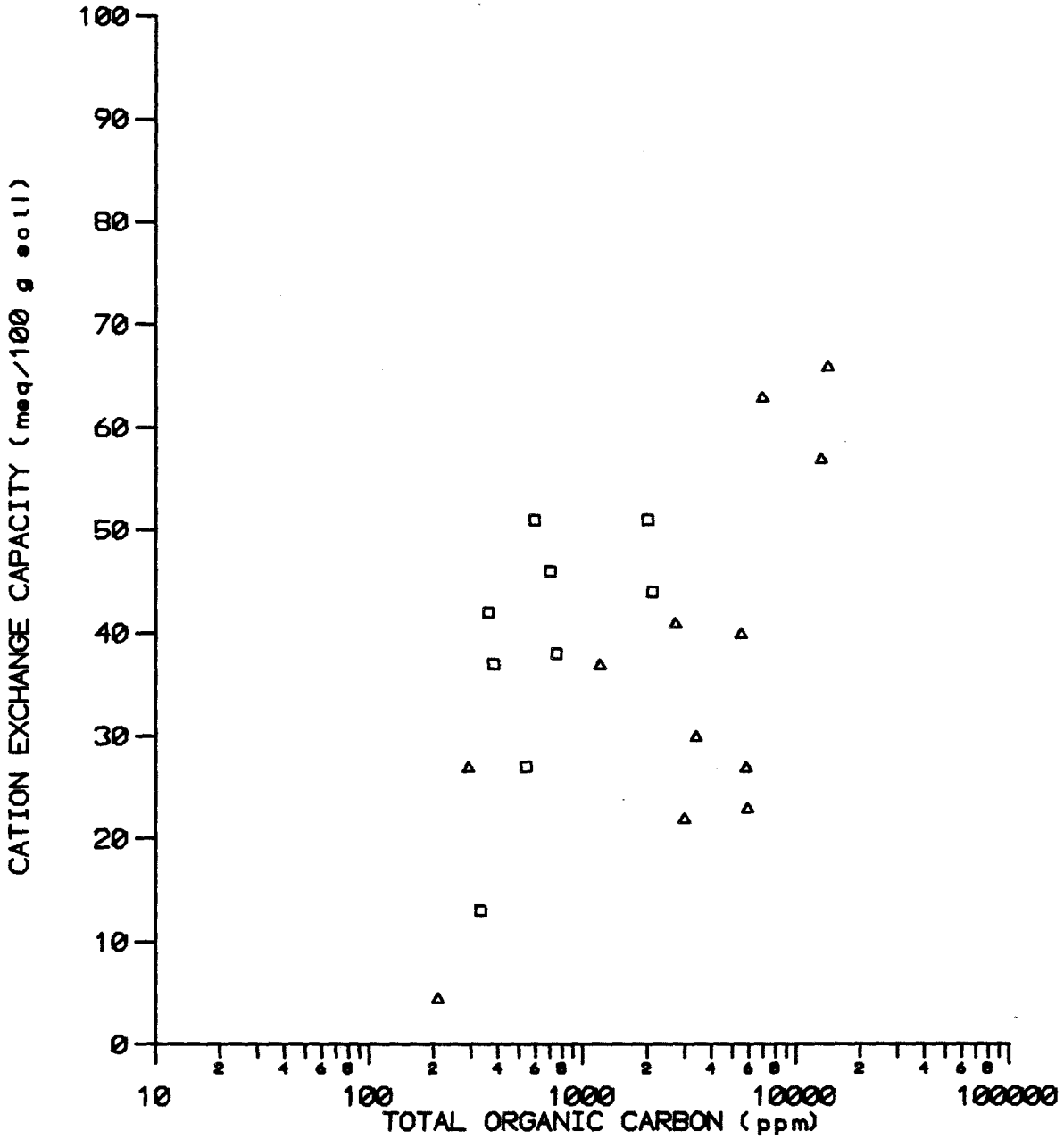

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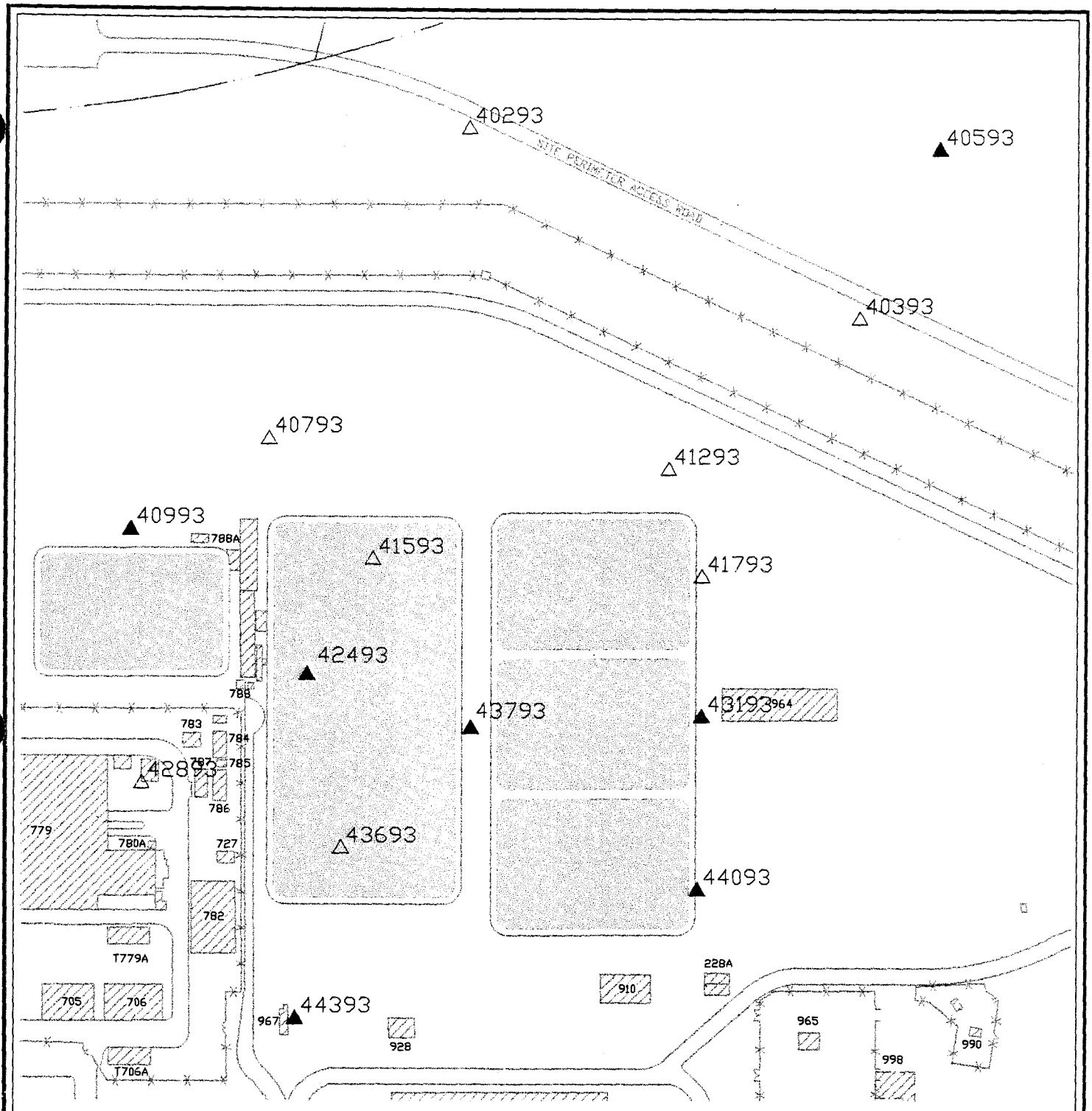
Figure II.3.3-58

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
TOC versus CEC



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- △ Single Lysimeter Location
- ▲ Dual Lysimeter Location

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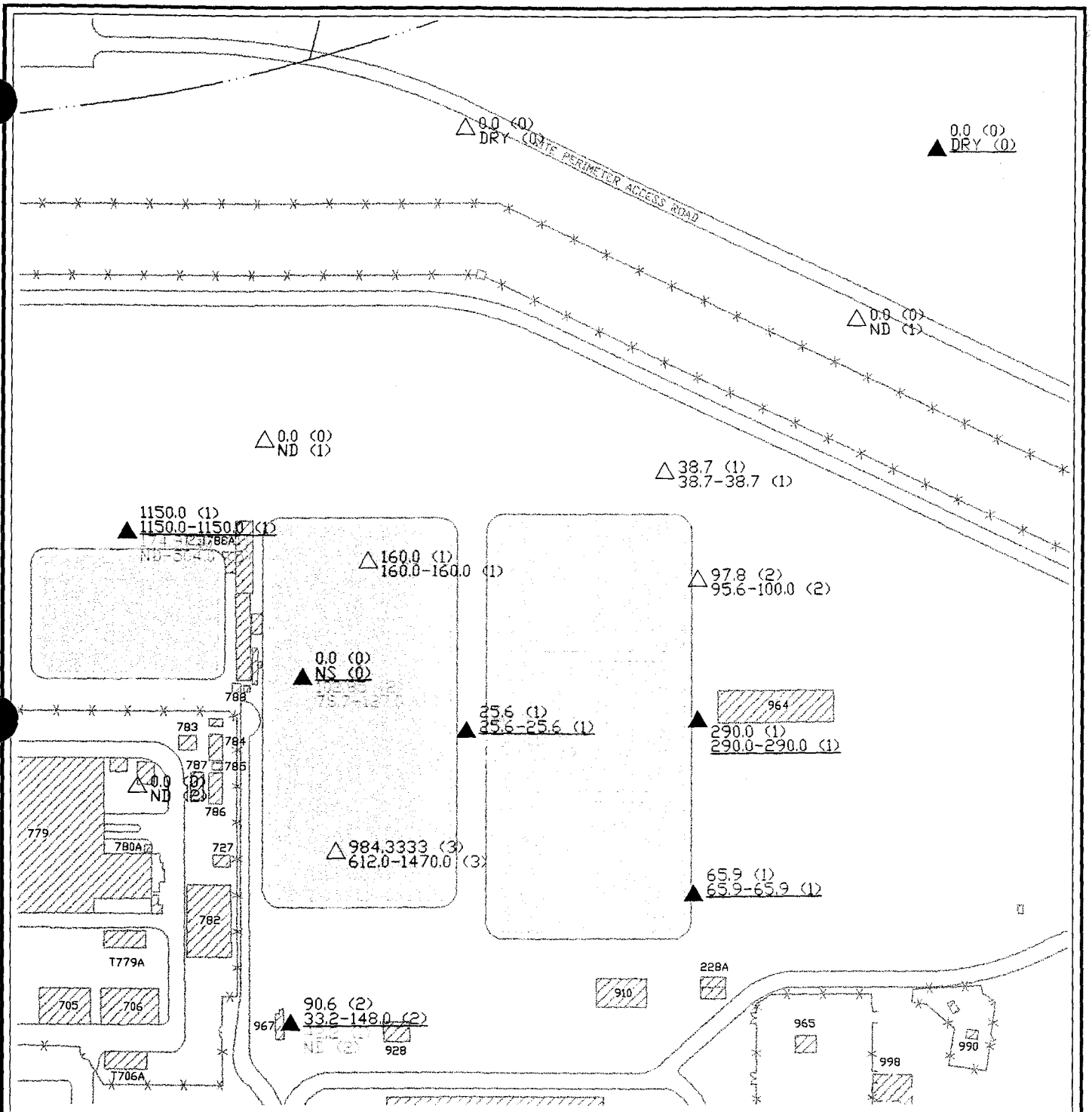
Figure II.3.3-60

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Lysimeter Location Map



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- NS Not Sampled
- ND Not Detected

SINGLE LYSIMETER

△40793 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples)

DUAL LYSIMETER

▲43193 Concentration Mean (Number of Samples) — Upper
Range of Concentration (Number of Samples)

Concentration Mean (Number of Samples) — Lower
Range of Concentration (Number of Samples)

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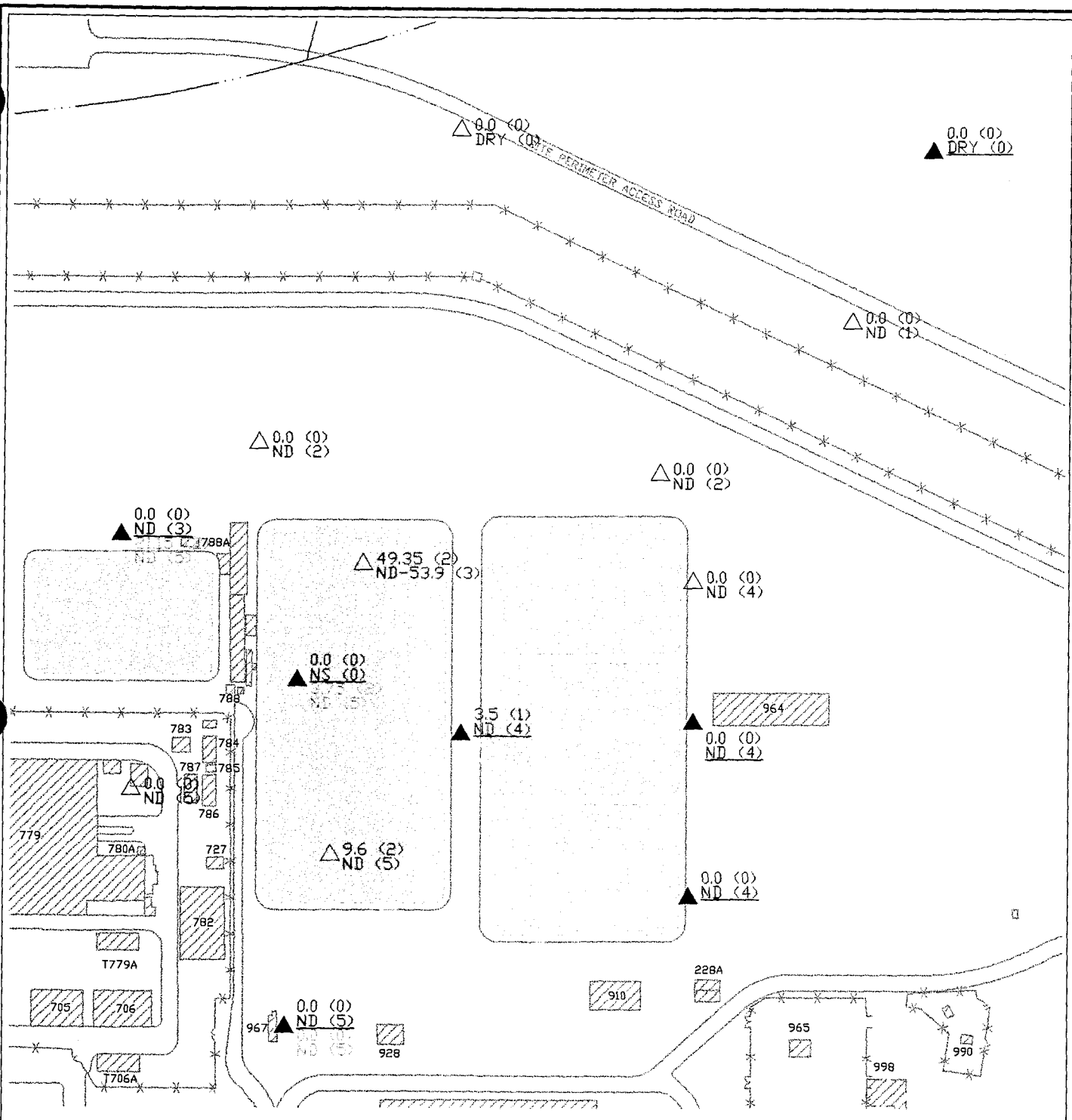
Figure II.3.3-61

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pore Water Results
Barium (μg/l)



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- NS Not Sampled
- ND Not Detected

SINGLE LYSIMETER

△40793 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples)

DUAL LYSIMETER

▲43193 Concentration Mean (Number of Samples) Range of Concentration (Number of Samples) — Upper

Concentration Mean (Number of Samples) Range of Concentration (Number of Samples) — Lower

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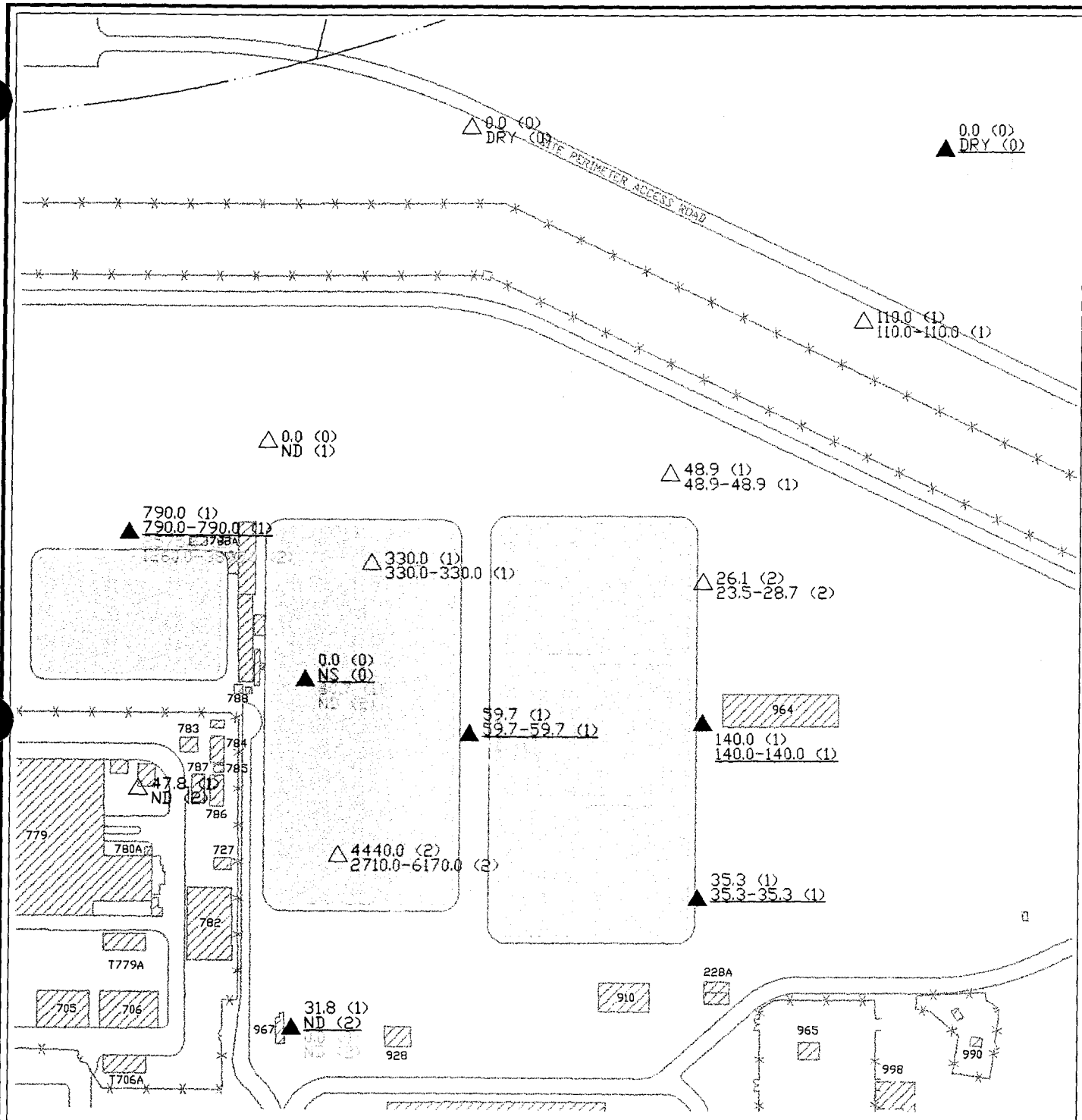
Figure II.3.3-62

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pore Water Results
Cadmium (μg/l)



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- NS Not Sampled
- ND Not Detected

SINGLE LYSIMETER

△40793 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples)

DUAL LYSIMETER

▲43193 Concentration Mean (Number of Samples) — Upper
Range of Concentration (Number of Samples)

Concentration Mean (Number of S...
Range of Concentration (Numb... — Lower

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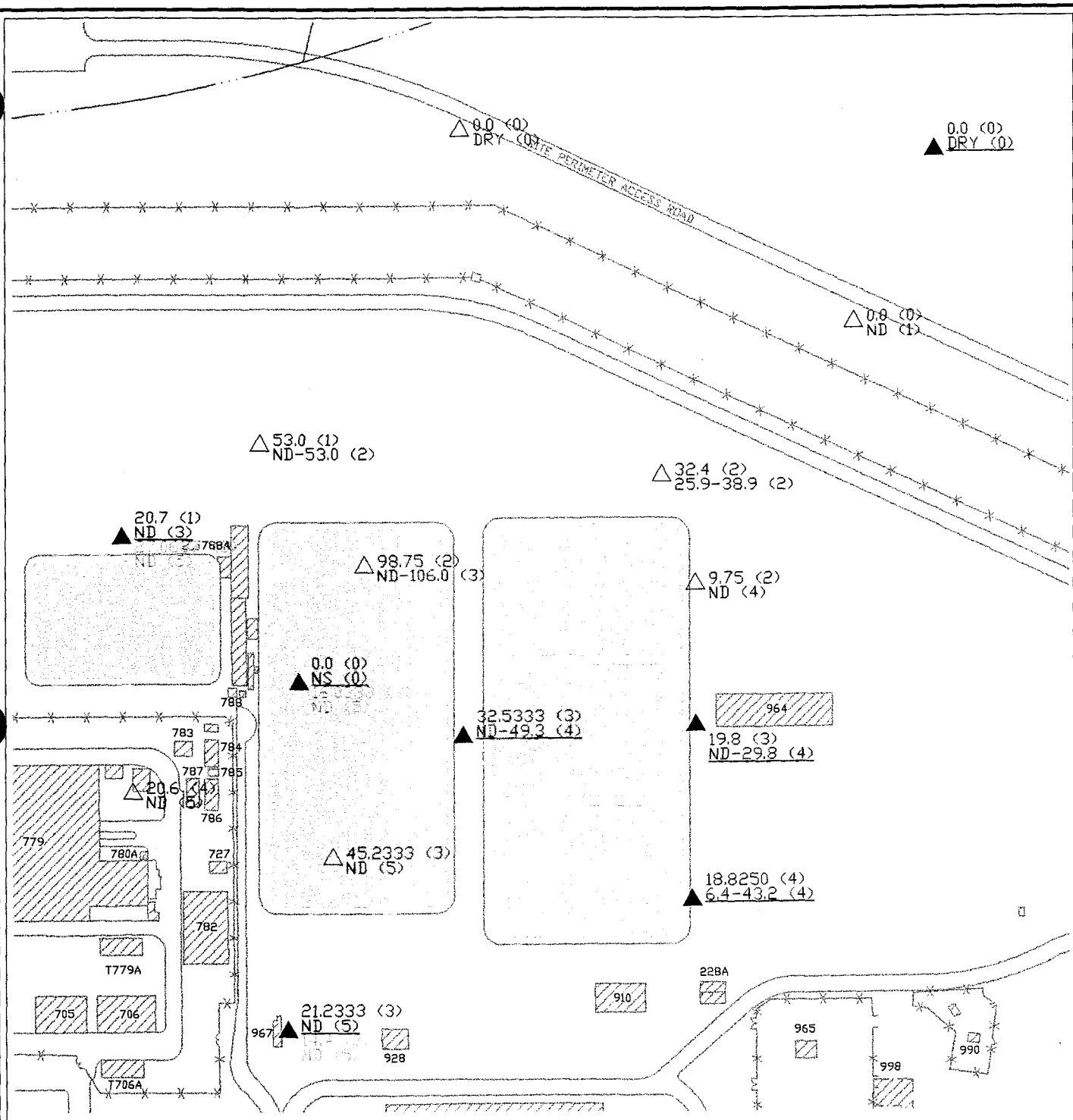
Figure II.3.3-63

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pore Water Results
Lithium (μg/l)



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- NS Not Sampled
- ND Not Detected

SINGLE LYSIMETER

△40793 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples)

DUAL LYSIMETER

▲43193 Concentration Mean (Number of Samples) — Upper
Range of Concentration (Number of Samples)

Concentration Mean (Number of ... — Lower
Range of Concentration (Number ...

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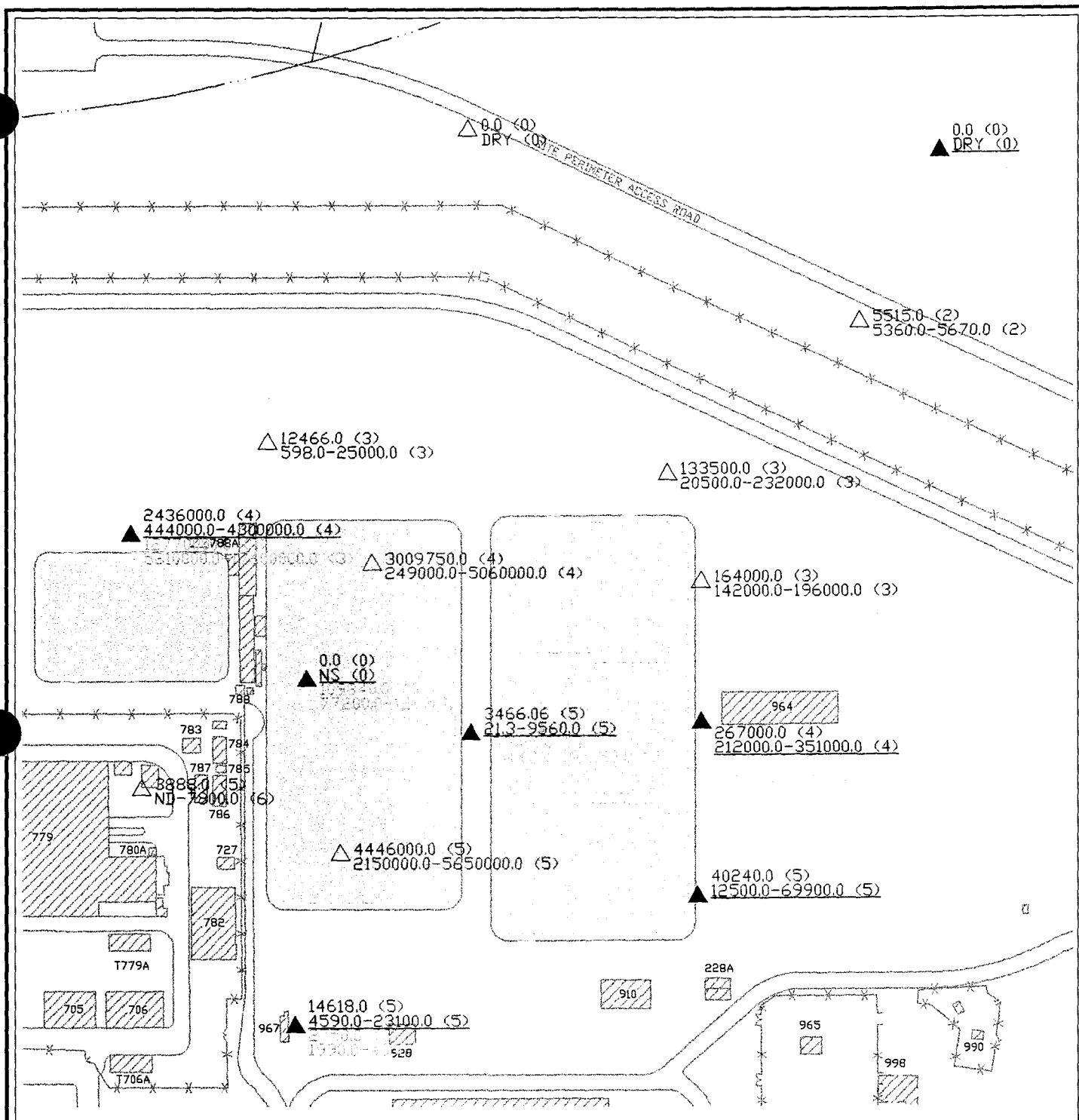
Figure II.3.3-64

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pore Water Results
Zinc (μg/l)



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- NS Not Sampled
- ND Not Detected

SINGLE LYSIMETER

△40793 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples)

DUAL LYSIMETER

▲43193 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples) — Upper

Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples) — Lower

N

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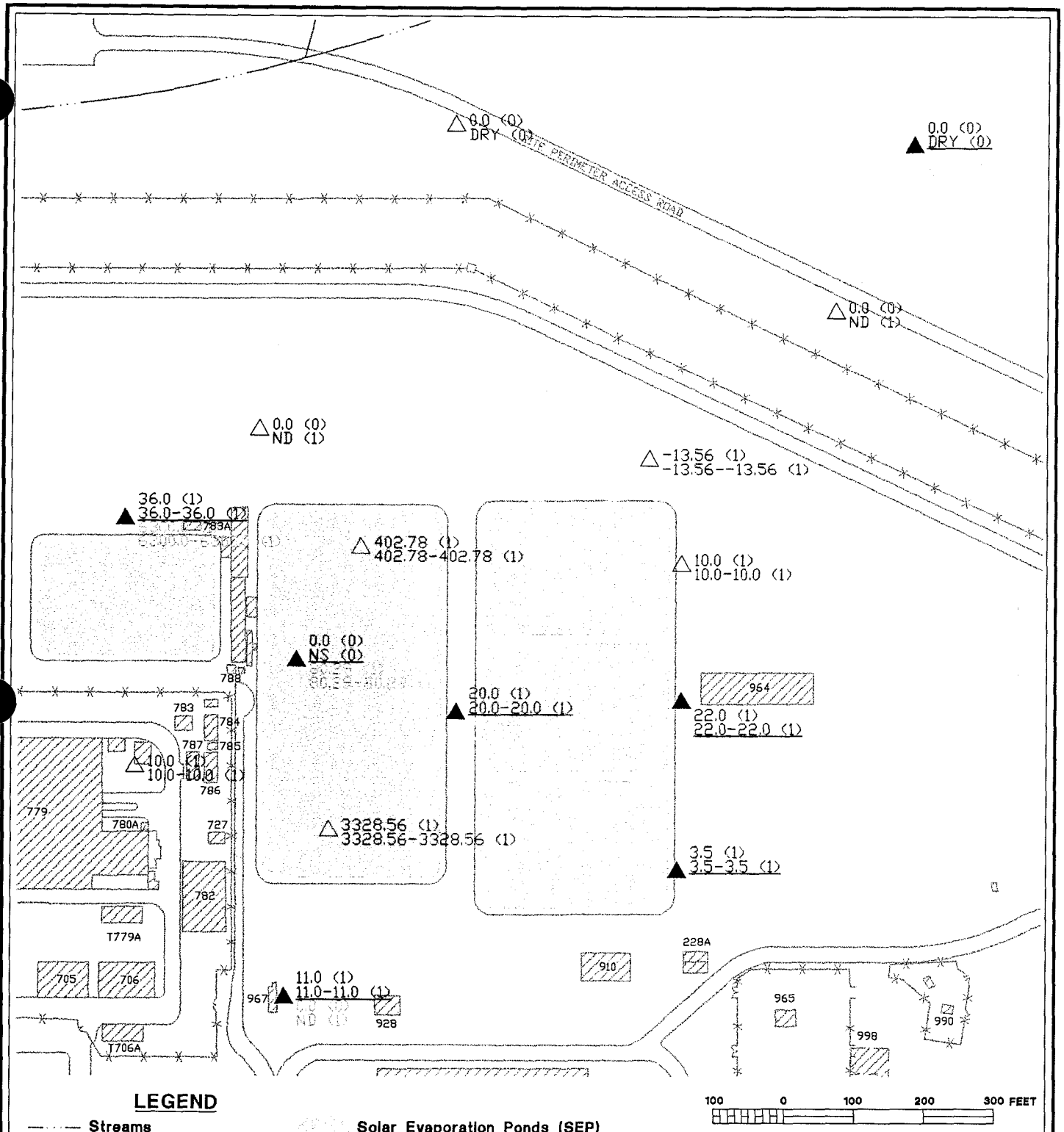
Figure II.3.3-65

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pore Water Results
Nitrate/Nitrite (μg/l)

1163



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- NS Not Sampled
- ND Not Detected

SINGLE LYSIMETER

△40793 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples)

DUAL LYSIMETER

▲43193 Concentration Mean (Number of Samples) — Upper
Range of Concentration (Number of Samples)

Concentration Mean (Number of Samples) — Lower
Range of Concentration (Number of Samples)

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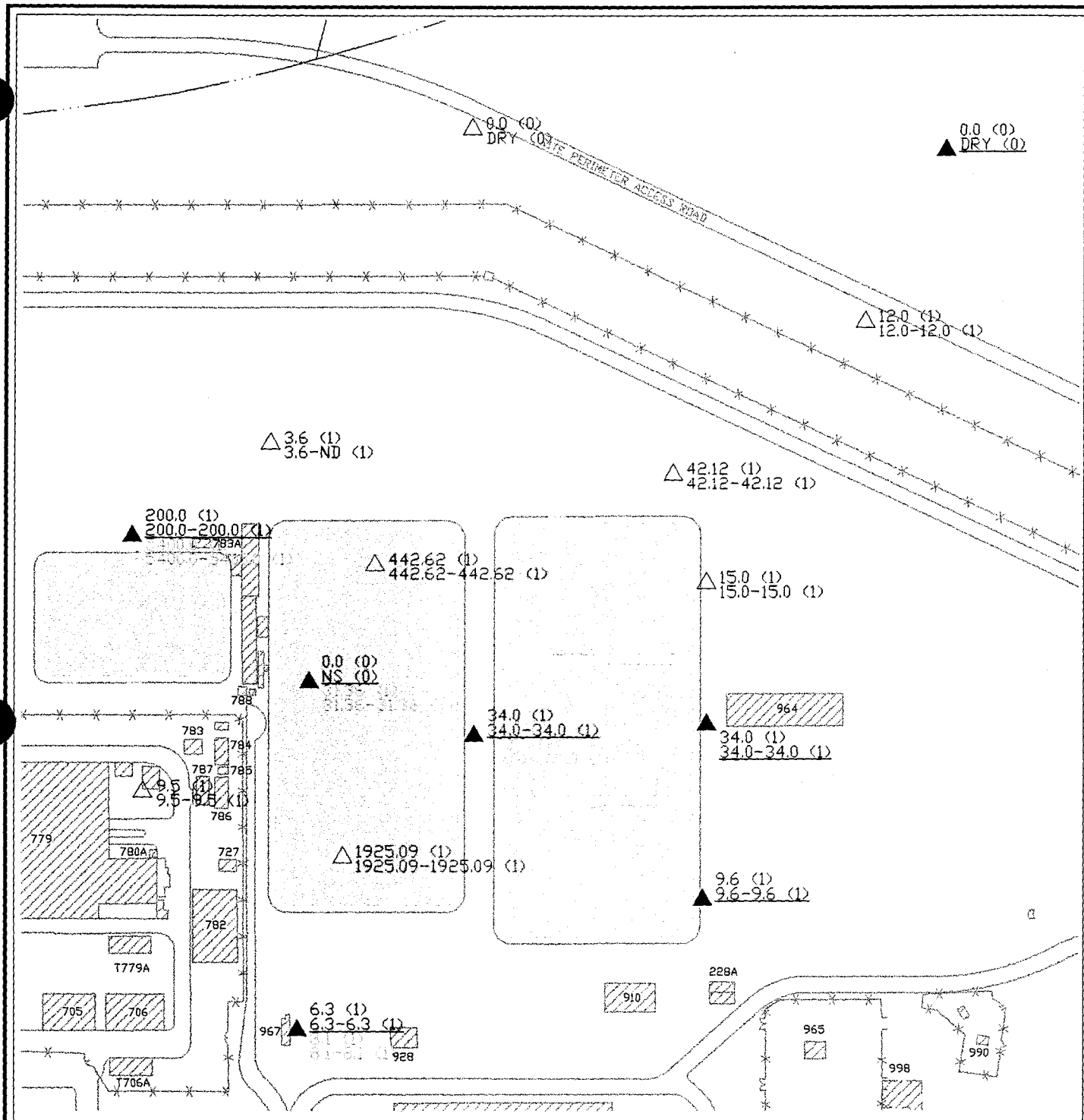
Figure II.3.3-66

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pore Water Results
Gross Alpha (pCi/l)



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- NS Not Sampled
- ND Not Detected

SINGLE LYSIMETER

△40793 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples)

DUAL LYSIMETER

▲43193 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples) — Upper

Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples) — Lower

N

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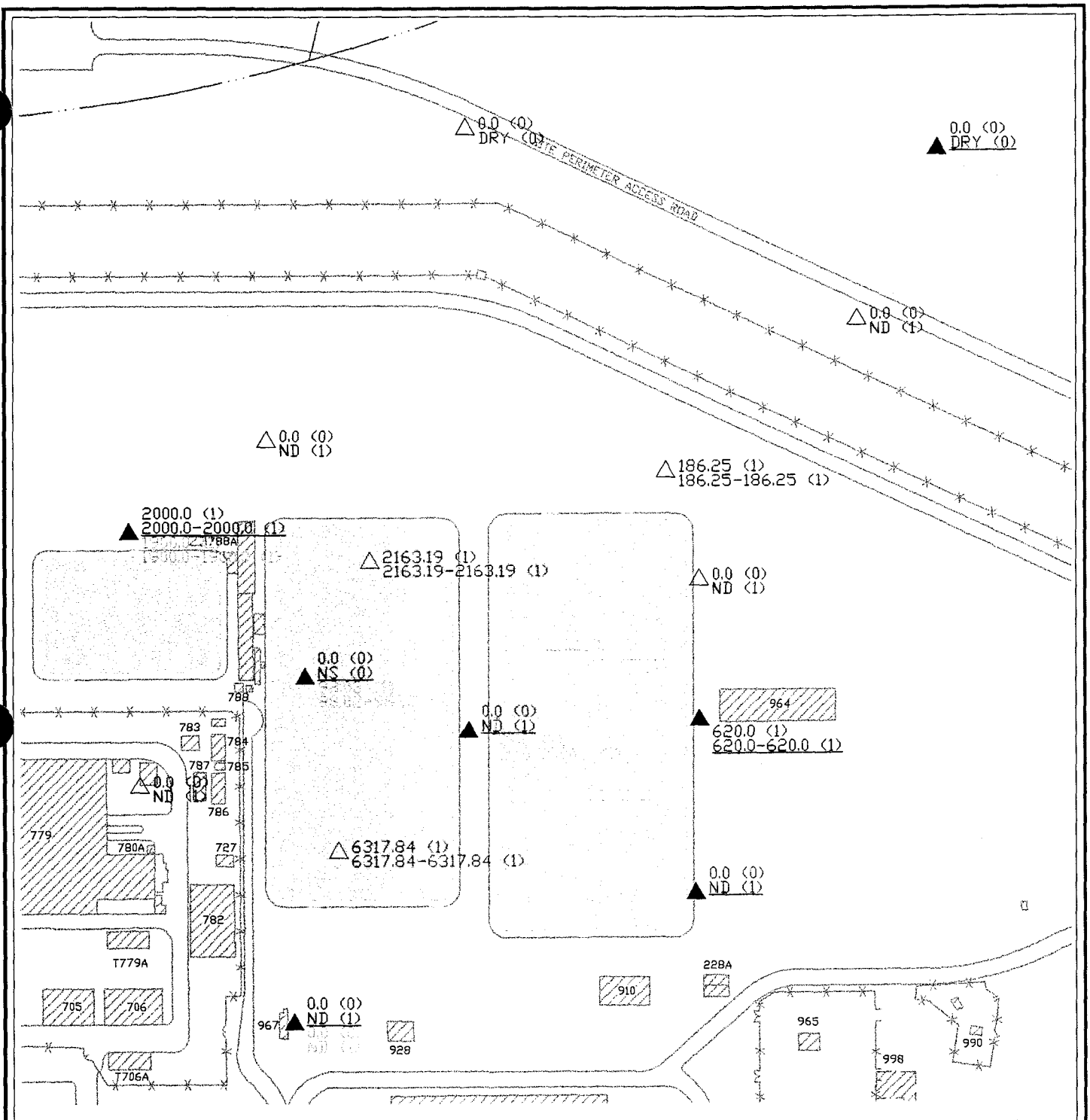
Figure II.3.3-67

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pore Water Results
Gross Beta (pCi/l)



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- NS Not Sampled
- ND Not Detected

SINGLE LYSIMETER

△40793 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples)

DUAL LYSIMETER

▲43193 Concentration Mean (Number of Samples) — Upper
Range of Concentration (Number of Samples)

Concentration Mean (Number of Samples) — Lower
Range of Concentration (Number of Samples)

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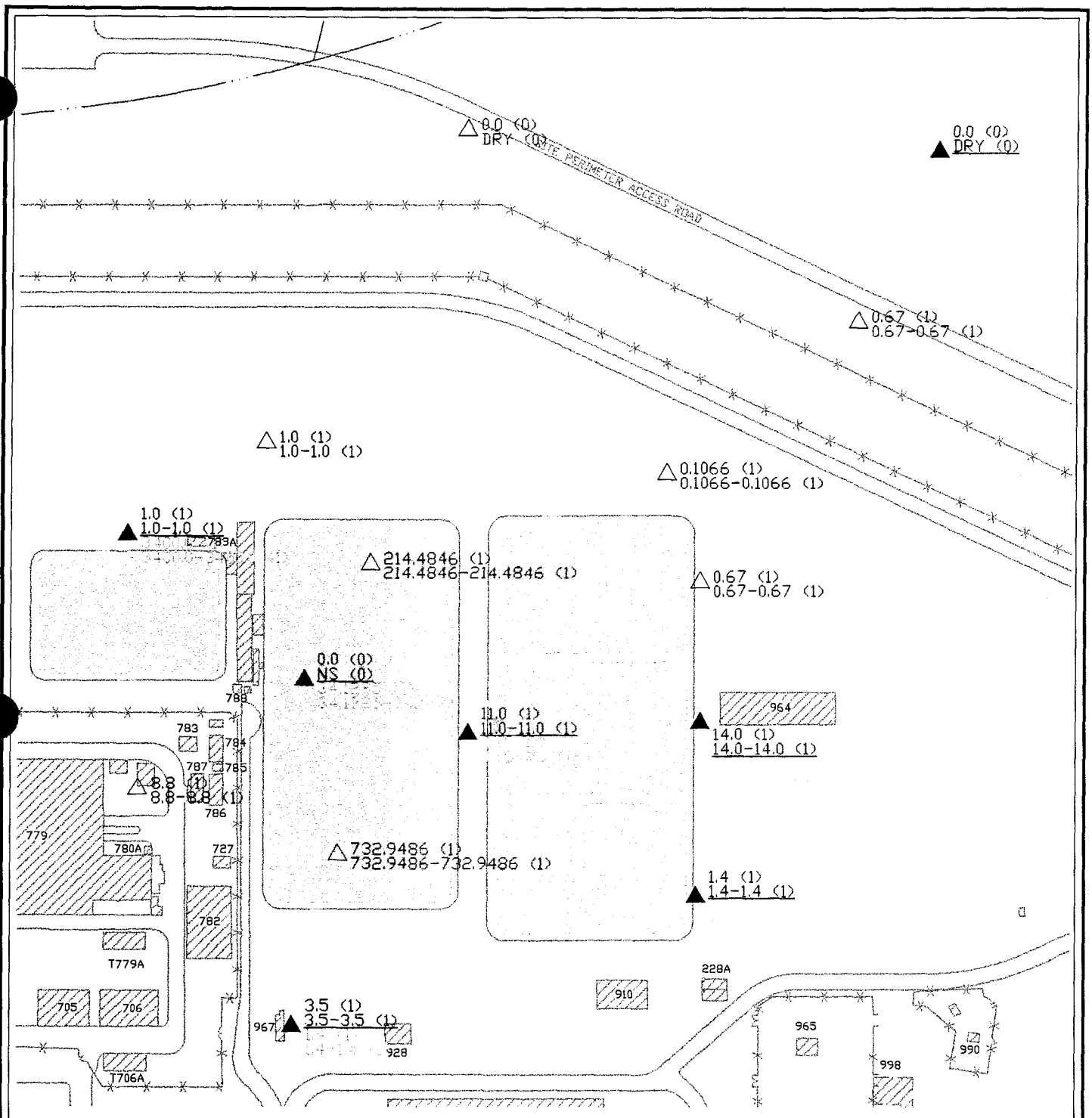
Figure II.3.3-68

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pore Water Results
Tritium (pCi/l)



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- NS Not Sampled
- ND Not Detected

SINGLE LYSIMETER

△40793 **Concentration Mean (Number of Samples)**
Range of Concentration (Number of Samples)

DUAL LYSIMETER

▲43193 **Concentration Mean (Number of Samples)** ┐ Upper
Range of Concentration (Number of Samples) ┘

Concentration Mean (Number of S... ┐ Lower
Range of Concentration (Number ... ┘

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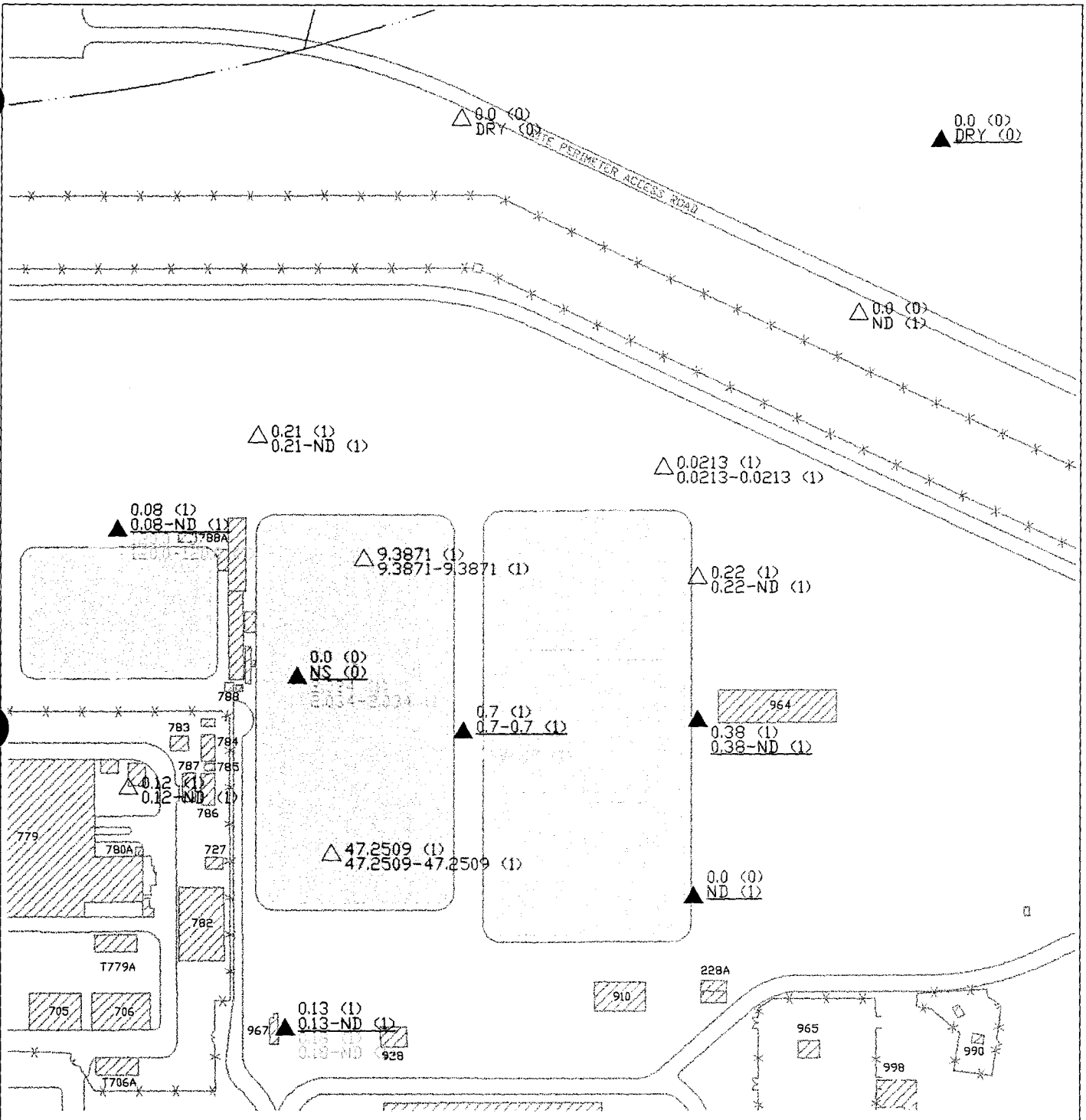
Figure II.3.3-69

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pore Water Results
Uranium 235 (pCi/l)

167



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- NS Not Sampled
- ND Not Detected

SINGLE LYSIMETER

△40793 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples)

DUAL LYSIMETER

▲43193 Concentration Mean (Number of Samples) — Upper
Range of Concentration (Number of Samples)

Concentration Mean (Number of Samples) — Lower
Range of Concentration (Number of Samples)

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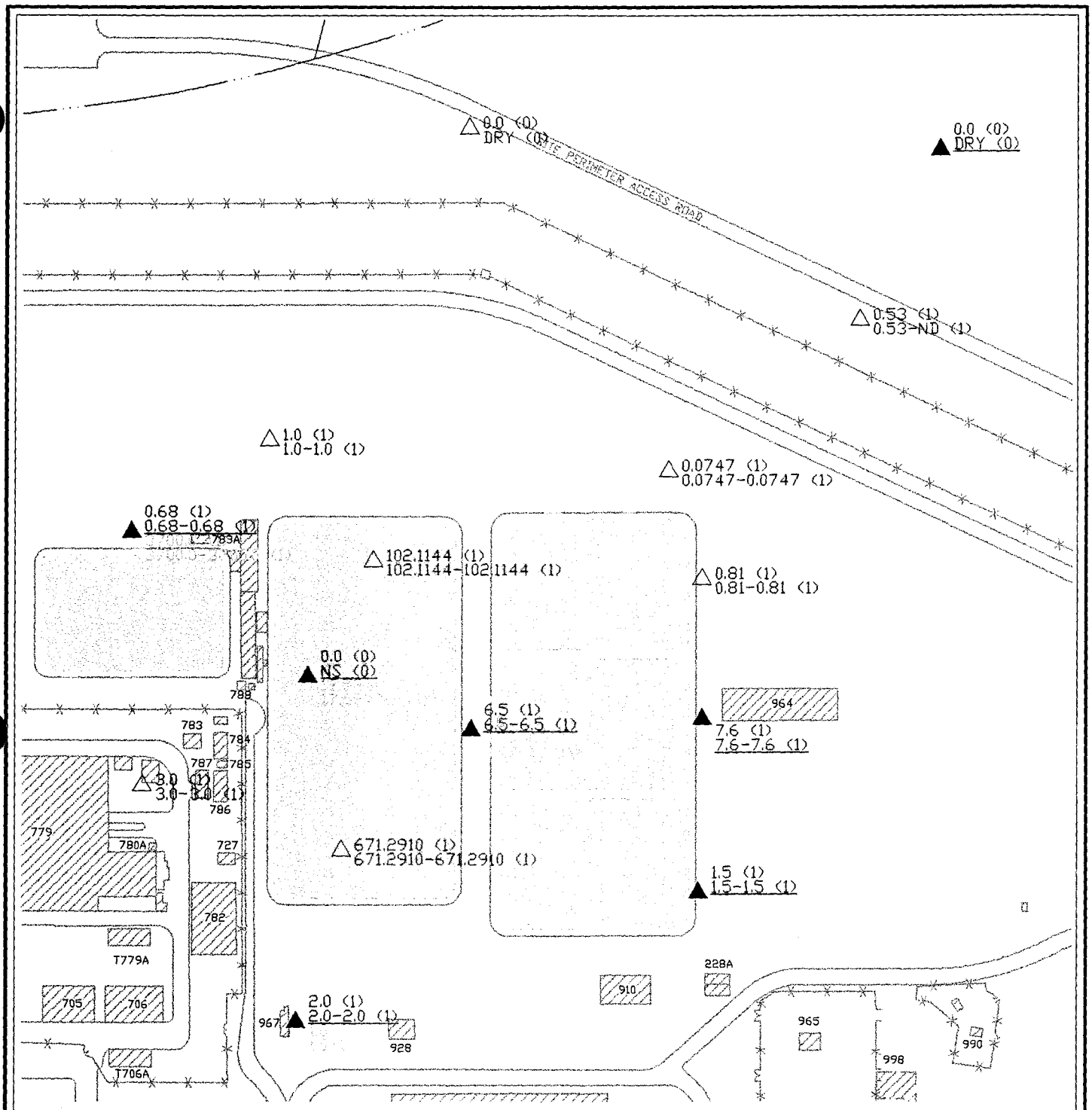
Figure II.3.3-70

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pore Water Results
Uranium 233/234 (pCi/l)



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- NS Not Sampled
- ND Not Detected

SINGLE LYSIMETER

△40793 Concentration Mean (Number of Samples)
Range of Concentration (Number of Samples)

DUAL LYSIMETER

▲43193 Concentration Mean (Number of Samples) — Upper
Range of Concentration (Number of Samples)

Concentration Mean (Number of Samples) — Lower
Range of Concentration (Number of Samples)

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Figure II.3.3-71

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pore Water Results
Uranium 238 (pCi/l)

169

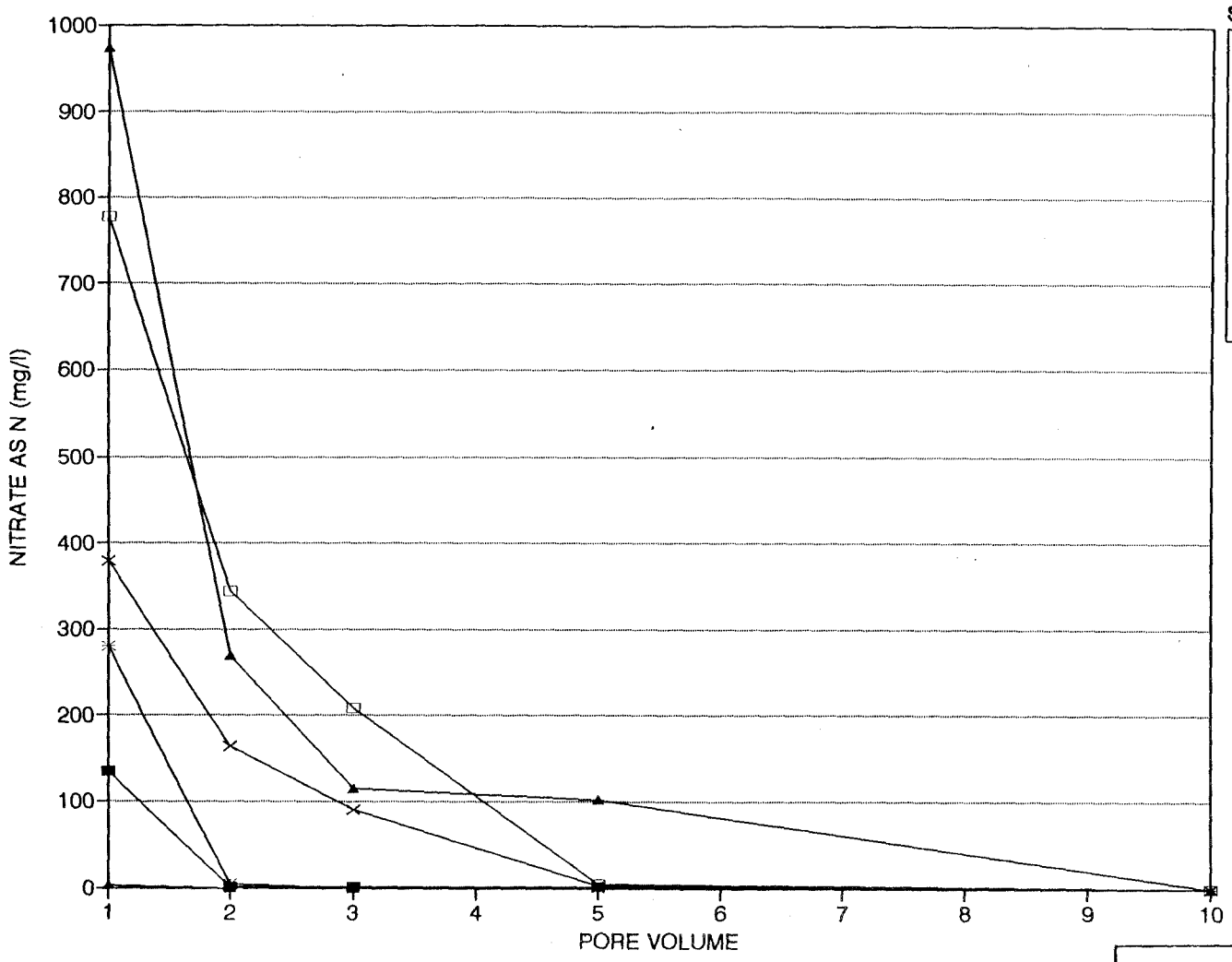

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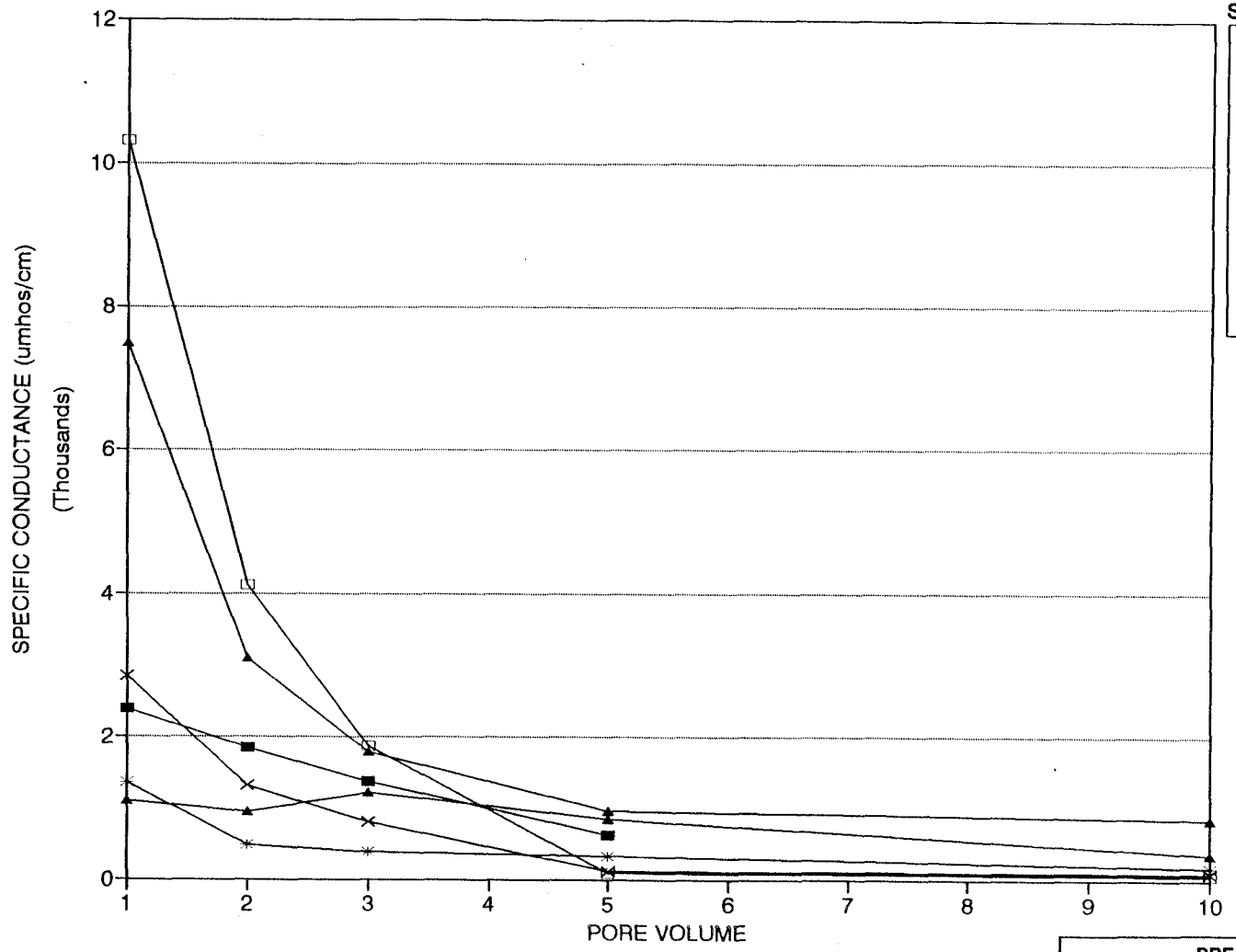
Figure II.3.3-72

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Nitrate in Leachate

rl85x11h



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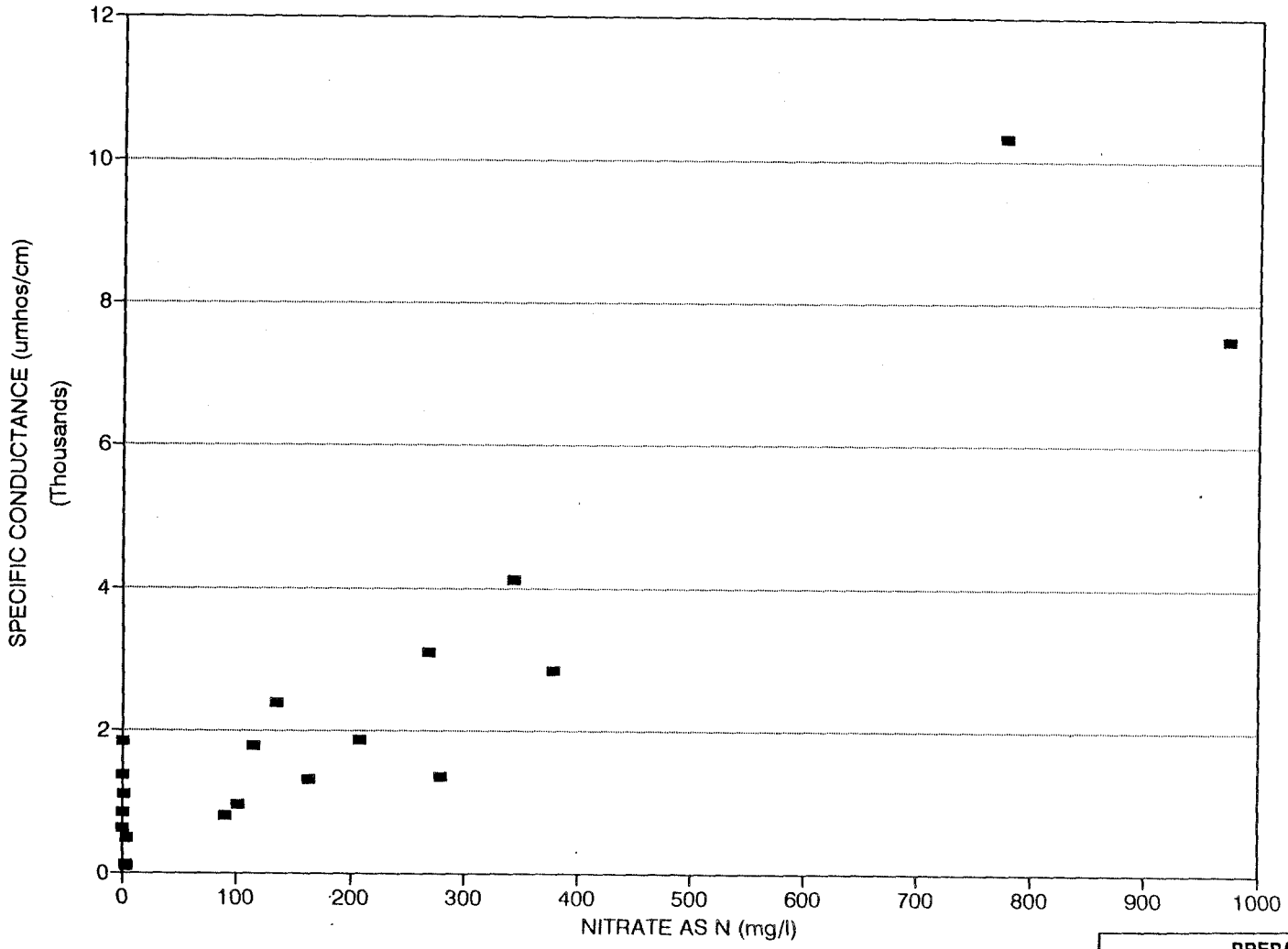
GOLDEN, COLORADO

Figure II.3.3-73

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Specific Conductance in Leachate

rl85x11h



LEGEND

■ SOIL SAMPLE VALVE RELATIVE TO PORE VOLUME EXCHANGES

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Figure II.3.3-74

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Nitrate-Specific Conductance in Leachate

rl85x11h

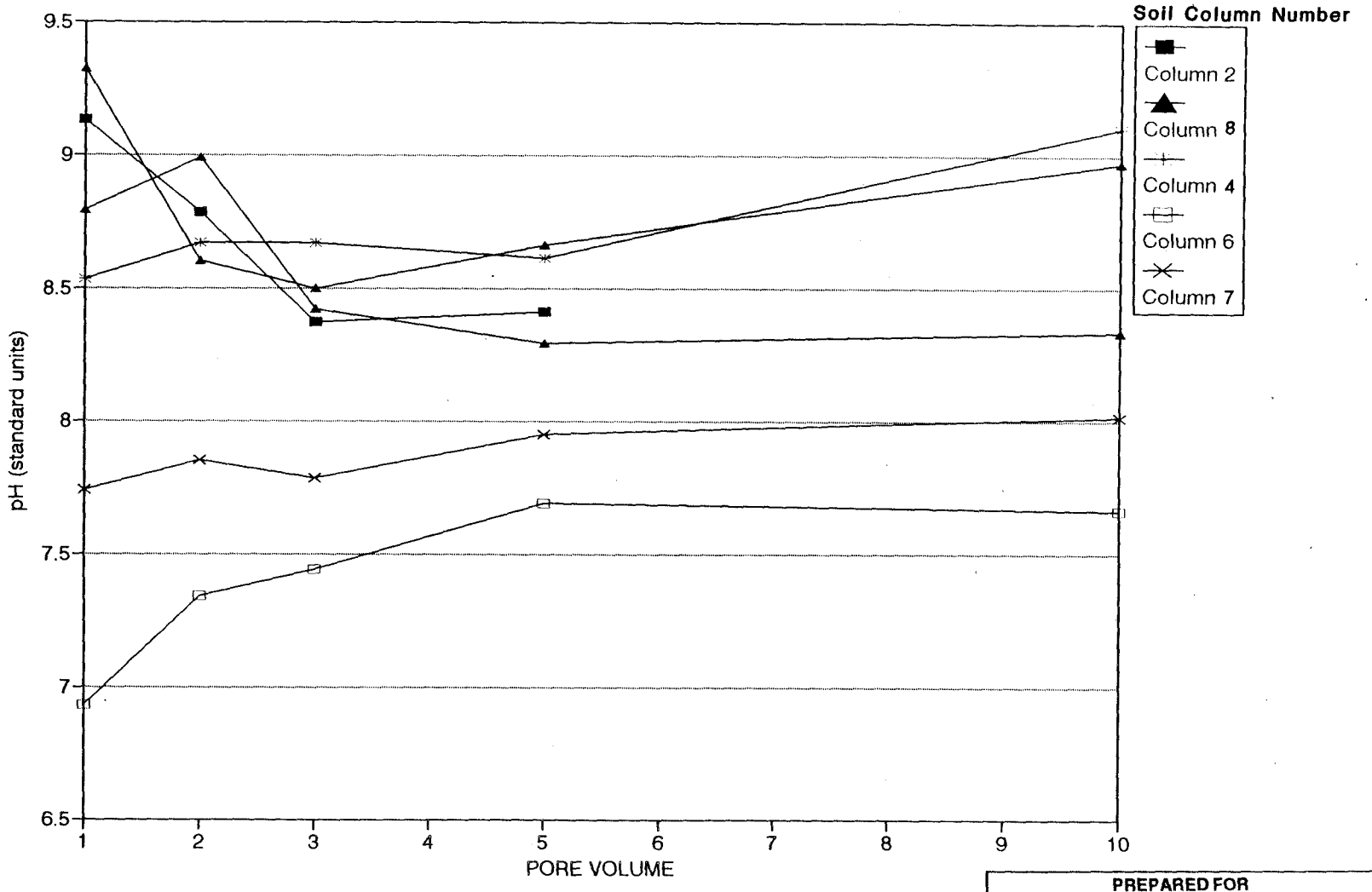

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Figure II.3.3-75

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
pH in Leachate.

rf85x11h

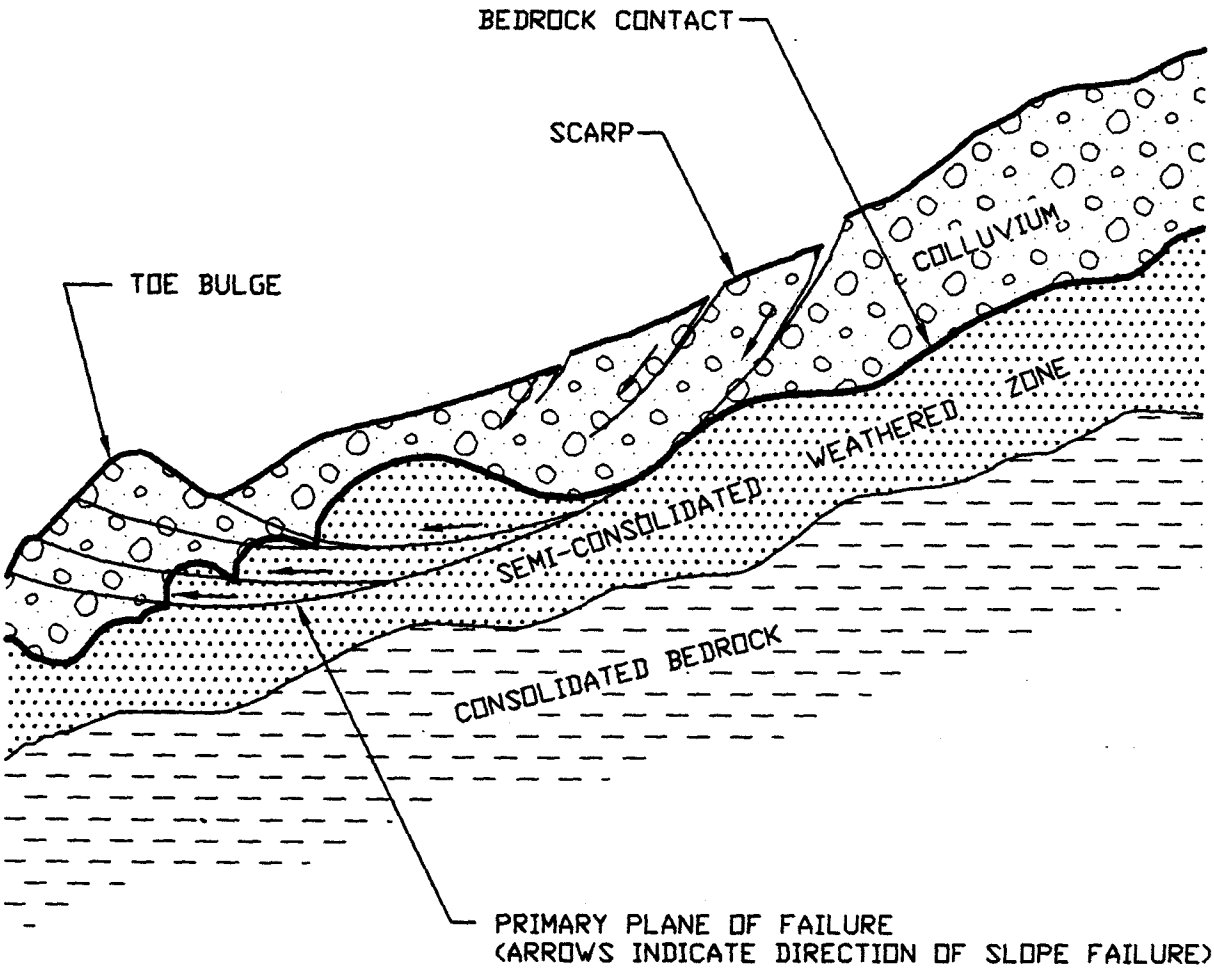

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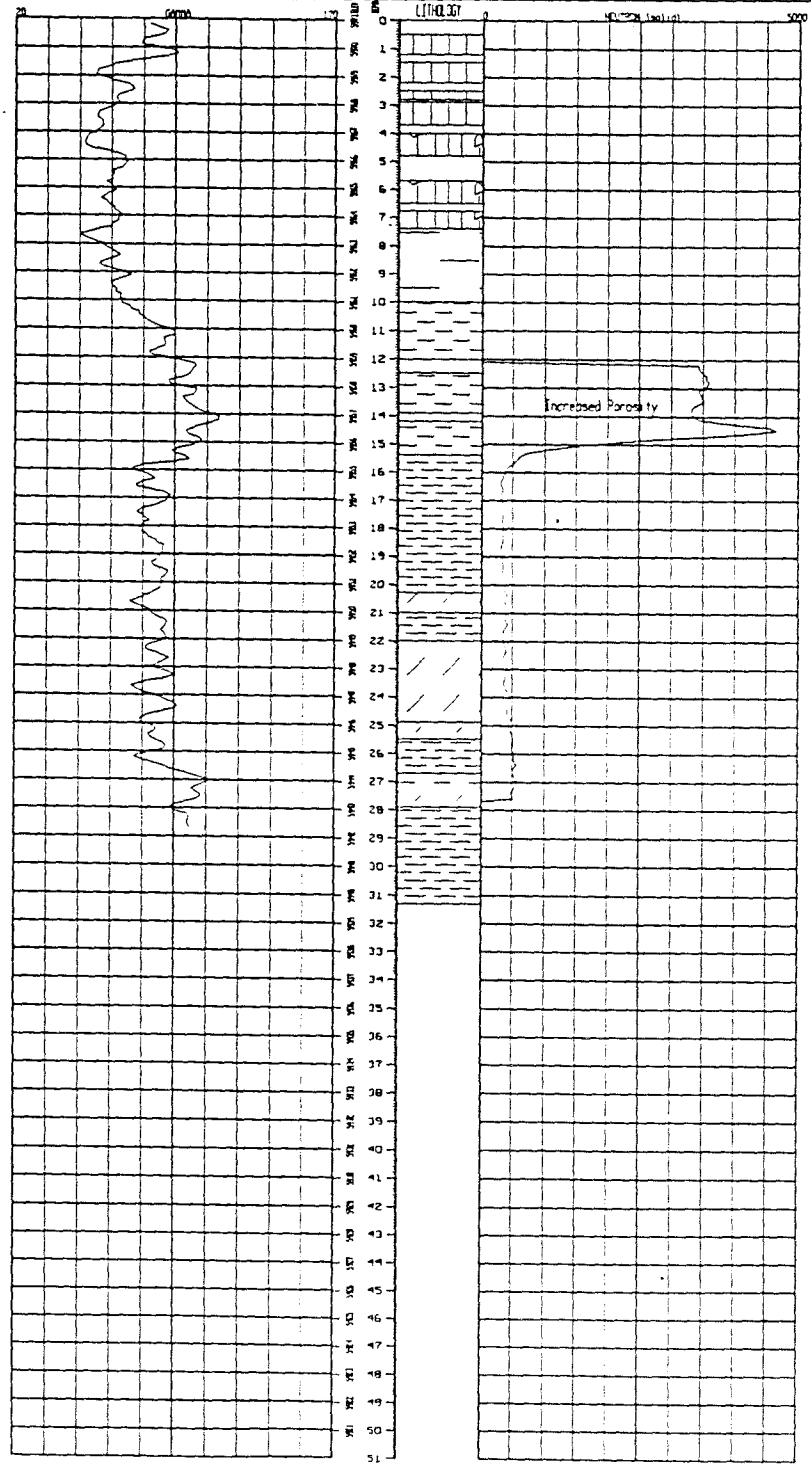
Figure II.3.5-15

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Idealized Slump-Block Profile

Source: P.H. Rahn, 1986

STATE PLANE COORDINATE	TOTAL DEPTH (FT) 31 30	GROUND ELEVATION (FT) 5971 03	PROJECT NUMBER 0U4-RFI/RI	LOG OF BORING NUMBER
NORTH 750876	AREA Pond 207A	CASING DIAMETER (IN)	GEOLOGIST K R MIYOSHI	
EAST 2084701	LOCATOR NUMBER L10	BOREHOLE DIAMETER (IN) 8 00	DATE DRILLED 03/31/93	42193

REMARKS HOLLOW STEM AUGER AND CONVENTIONAL CORING BOREHOLE PLUGGED AND ABANDONED RIG GEOLOGY BY K R MIYOSHI (TE) CORE LOGGING BY J C EVANS AND C D MURRAY (AE)



Asphalt/surface) or no recovery

GW

GM

GC

ML

Clayey Sandstone

Siltstone

Clayey Siltstone

Sandy Claystone

Claystone

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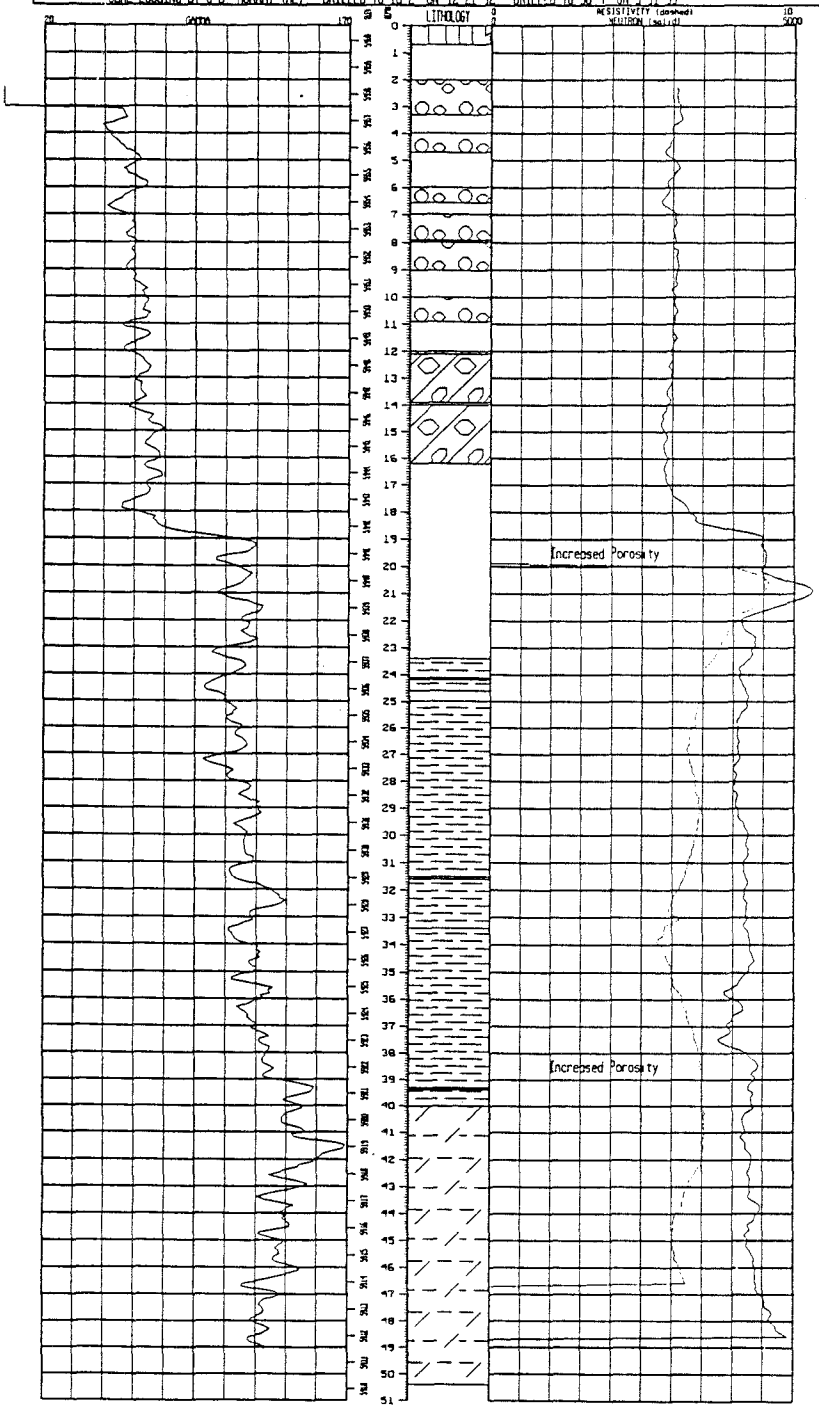
GOLDEN, COLORADO

Figure II.3.5-17

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Borehole 42193 Geophysical Log

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 50 40	GROUND ELEVATION (FT) 5960 55	PROJECT NUMBER	0U4-RFI/RI	LOG OF BORING NUMBER	
NORTH	750435	AREA E OF 2078 S	CASING DIAMETER (IN)	GEOLOGIST	JCE/KWP		
EAST	2085601	LOCATOR NUMBER M10	BOREHOLE DIAMETER (IN) 8 00	DATE DRILLED	03/30/93	44193	

REMARKS HOLLOW STEM AUGER AND CONVENTIONAL CORING BOREHOLE PLUGGED AND ABANDONED RIG GEOLOGY BY J C EVANS (AE) AND K W PACHECO (TE), CORE LOGGING BY C D MURRAY (AE) DRILLED TO 16 2' ON 12-21-92 DRILLED TO 50 4' ON 3-31-93



Asphalt(surface) or no recovery

GW

GM

GC

ML

Clayey Sandstone

Siltstone

Clayey Siltstone

Sandy Claystone

Claystone

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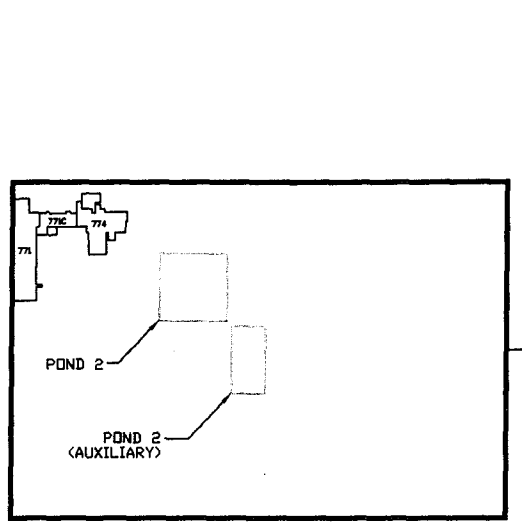
Figure II.3.5-18

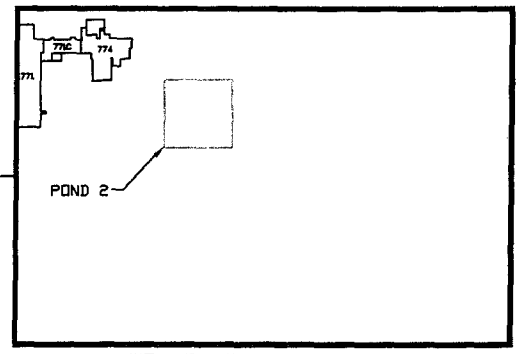
Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Borehole 44193 Geophysical Log

251



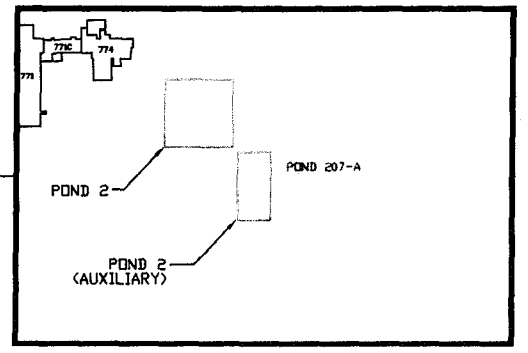
SEPTEMBER 1955

POND 2-AUXILIARY CONSTRUCTED



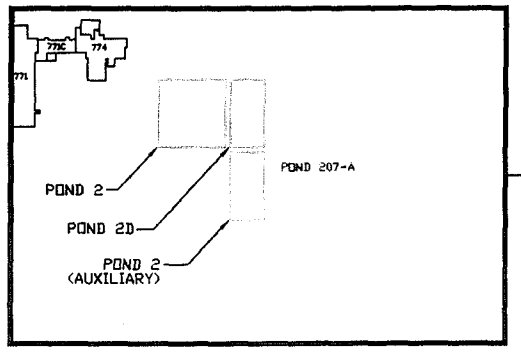
OCTOBER 1953

POND 2 CONSTRUCTION COMPLETED



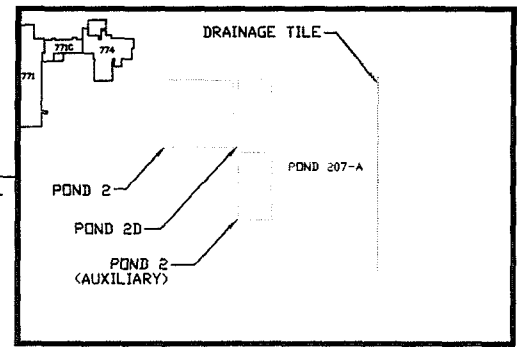
AUGUST 1956

POND 207-A ENTERED SERVICE



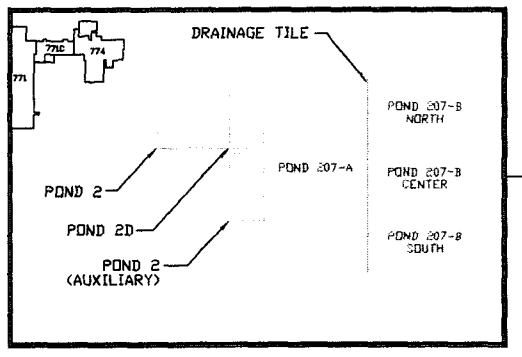
APRIL 1959

POND 2D CONSTRUCTED



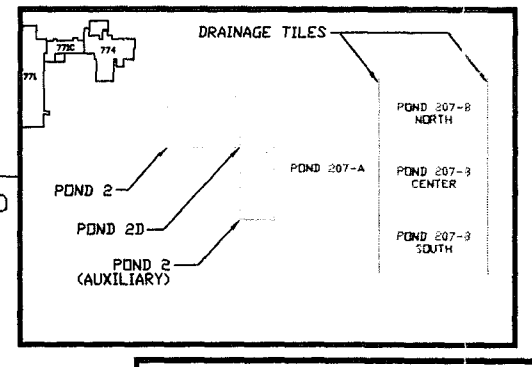
DECEMBER 1959

DRAINAGE TILE INSTALLED EAST OF POND 207-A



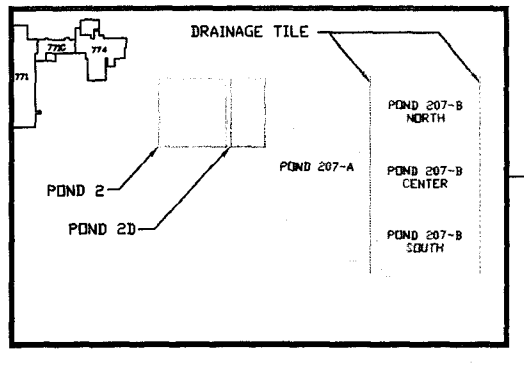
JUNE 1960

207-B PONDS COMPLETED. LEAKS DISCOVERED. POND 207-B SOUTH RELINED IN NOVEMBER 1960



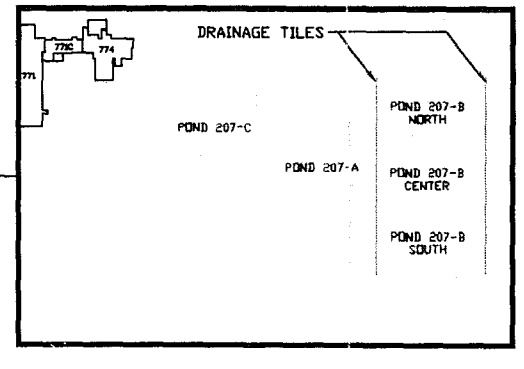
APRIL 1961

DRAINAGE TILE CONSTRUCTED EAST OF 207-B PONDS. PONDS 207-B CENTER AND NORTH RELINED IN JULY 1961



OCTOBER 1962

POND 2-AUXILIARY REMOVED



NOVEMBER 1963

POND 207-A RELINED WITH TWO 1-1/2' LAYERS ASPHALTIC CONCRETE

DECEMBER 1970

PONDS 2 AND 2D REMOVED, POND 207-C PLACED IN SERVICE

1986

PROCESS WASTE PLACEMENT DISCONTINUED

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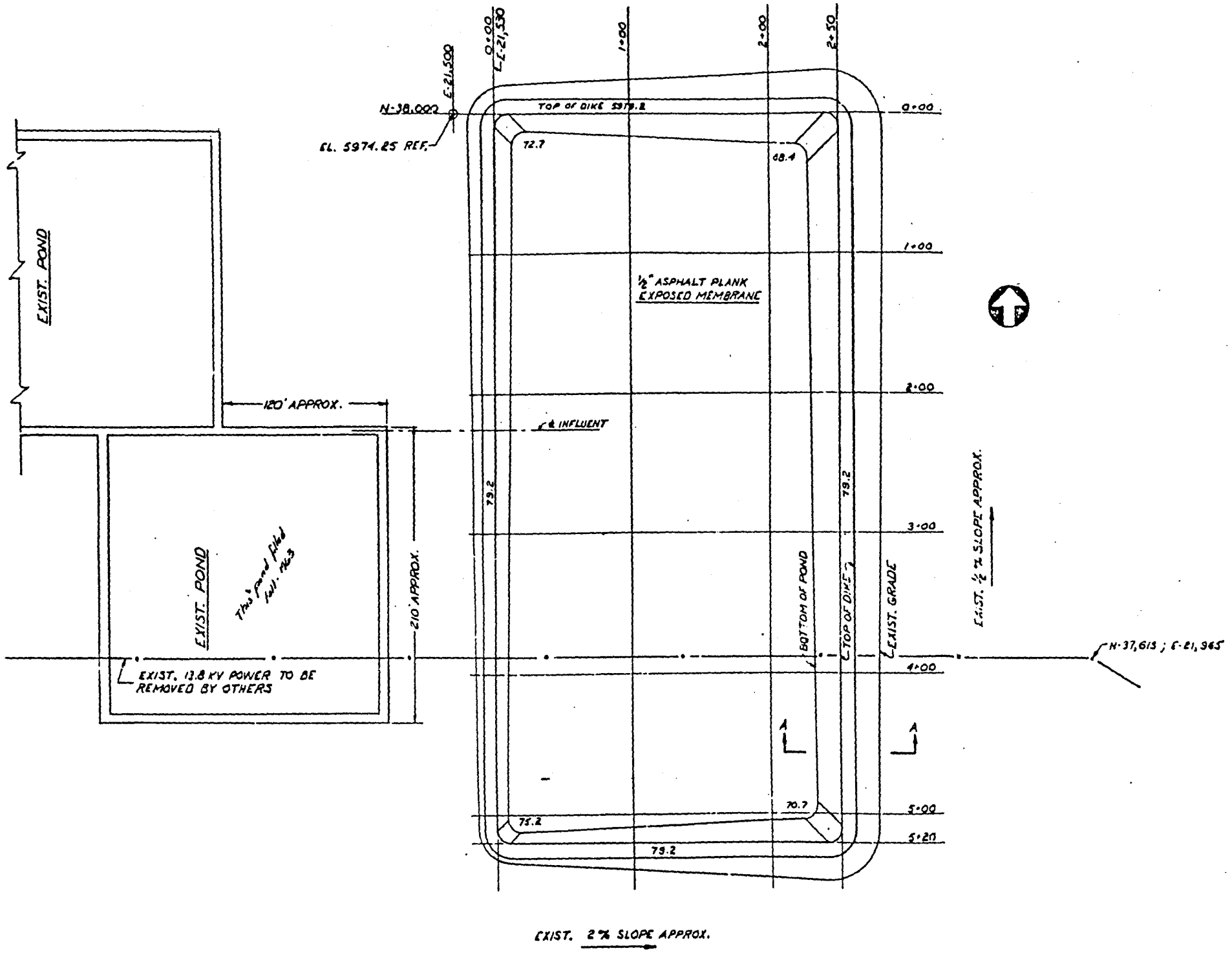
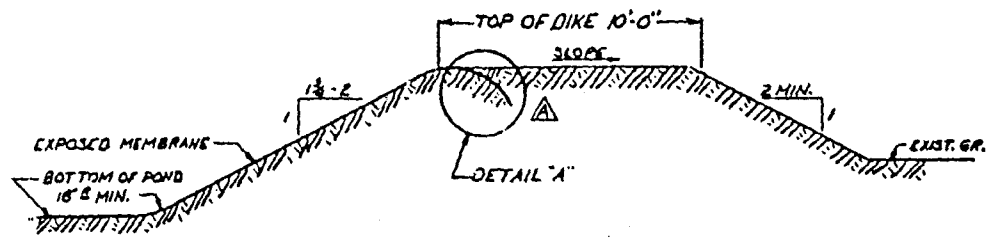
GOLDEN, COLORADO

Figure II.3.1-1

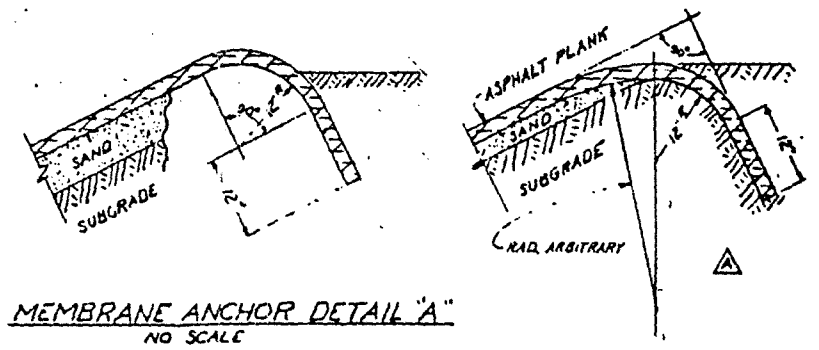
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Timeline Of Solar Pond Construction



PLAN
SCALE: 1"=40'



SECTION A-A (TYP.)
NO SCALE



MEMBRANE ANCHOR DETAIL "A"
NO SCALE

NOMINAL AREA - 3 ACRES
NOMINAL CAP. - 17 ACRE-FEET

NOTES:

1. MAT'LS & CONSTR. TO CONFORM WITH PROVISIONS OF THE SPECS.
2. INSIDE CORNERS OF POND, TOP & BOTTOM OF DIKE, TO BE 10' RAD.
3. A DOUBLE THICKNESS OF ASPHALT PLANK SHALL BE USED AT THE LOCATION OF THE INFLUENT. THE ADDITIONAL LAYER SHALL BE A MIN. OF 3' WIDE & SHALL EXTEND FROM THE TOP OF THE DIKE TO THE BOTTOM OF THE POND & A DISTANCE OF AT LEAST 10' ALONG THE BOTTOM
4. POND INFLUENT LINE FROM 200,000 GAL. STORAGE TANK BY OTHERS.

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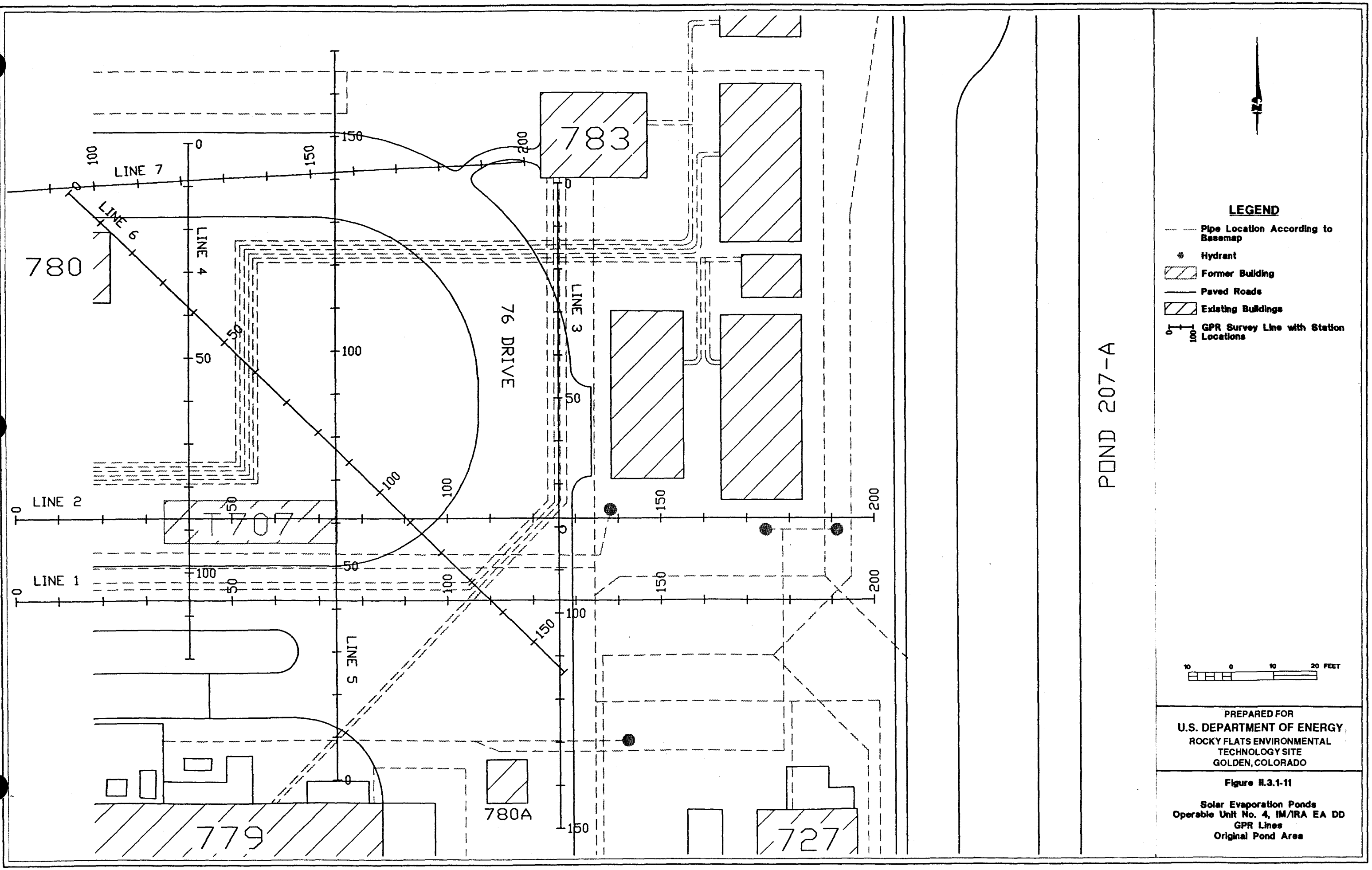
Figure II.3.1-10

Solar Evaporation Ponds
Operable Unit No. 4, IM/RA EA DD
Engineering Drawing Showing Location of Pond 2 and 2-Auxiliary Relative to SEP 207-A

Source: Closure Plans for the Solar Evaporation Ponds, 1988



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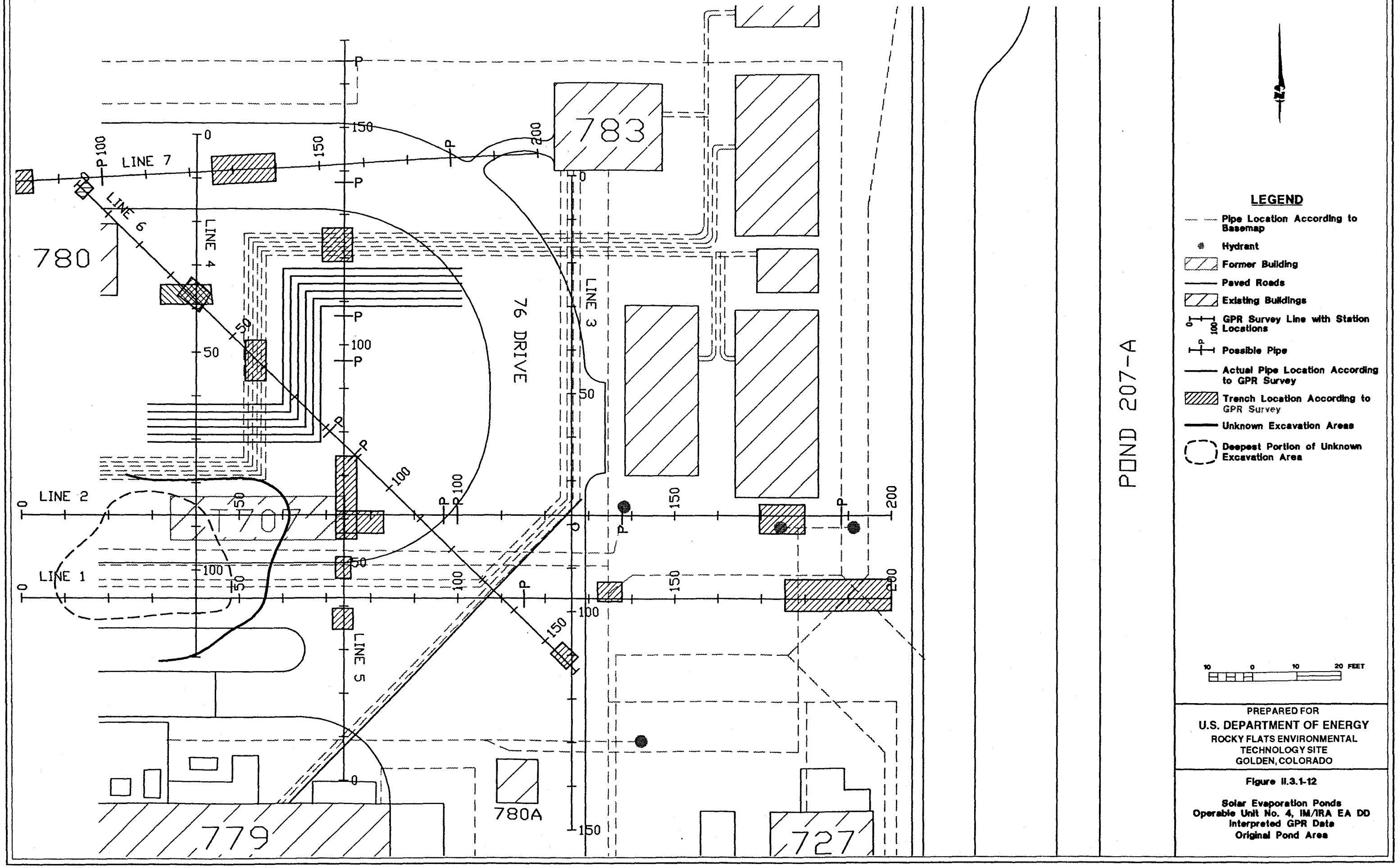
GOLDEN, COLORADO

Figure II.3.1-11

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
GPR Lines
Original Pond Area


LINE 7
LINE 6
LINE 4
LINE 3
LINE 2
LINE 1
LINE 5
780
783
770
779
780A
727
76 DRIVE
POND 207-A
LEGEND
Pipe Location According to Basemap
Hydrant
Former Building
Paved Roads
Existing Buildings
GPR Survey Line with Station Locations
Possible Pipe
Actual Pipe Location According to GPR Survey
Trench Location According to GPR Survey
Unknown Excavation Areas
Deepest Portion of Unknown Excavation Area
10 0 10 20 FEET
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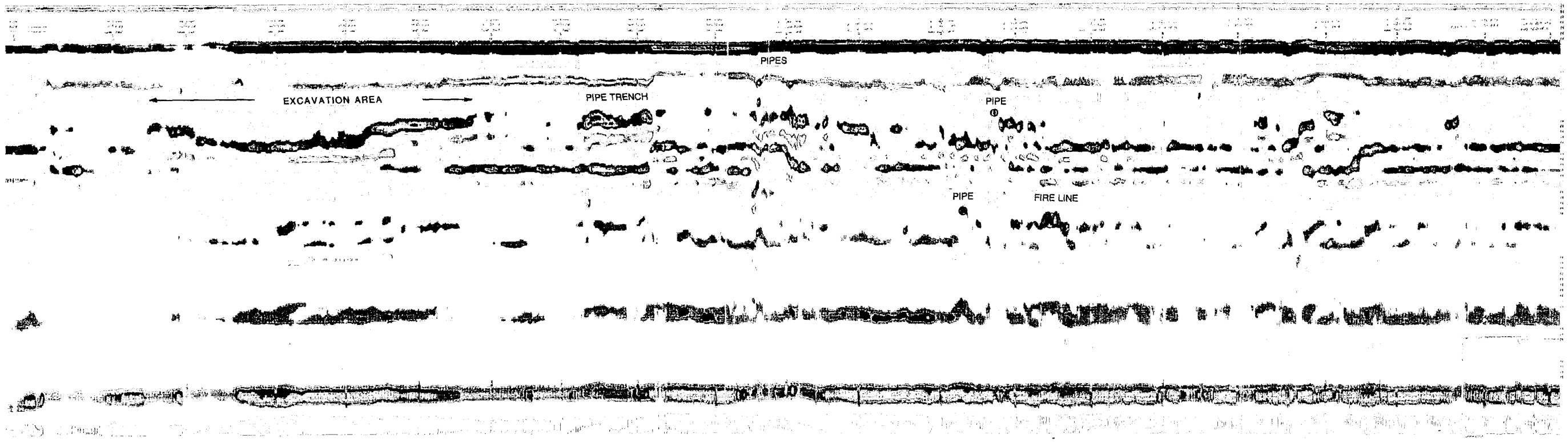
GOLDEN, COLORADO
Figure II.3.1-12
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Interpreted GPR Data
Original Pond Area



NOTES:
1. Horizontal distance scale in feet
2. Vertical time scale
   = 35 nanoseconds
3. Approximate depth = 3 – 8 feet
4. Vertical boxcar filter
   low pass n = 15
   high pass n = 60

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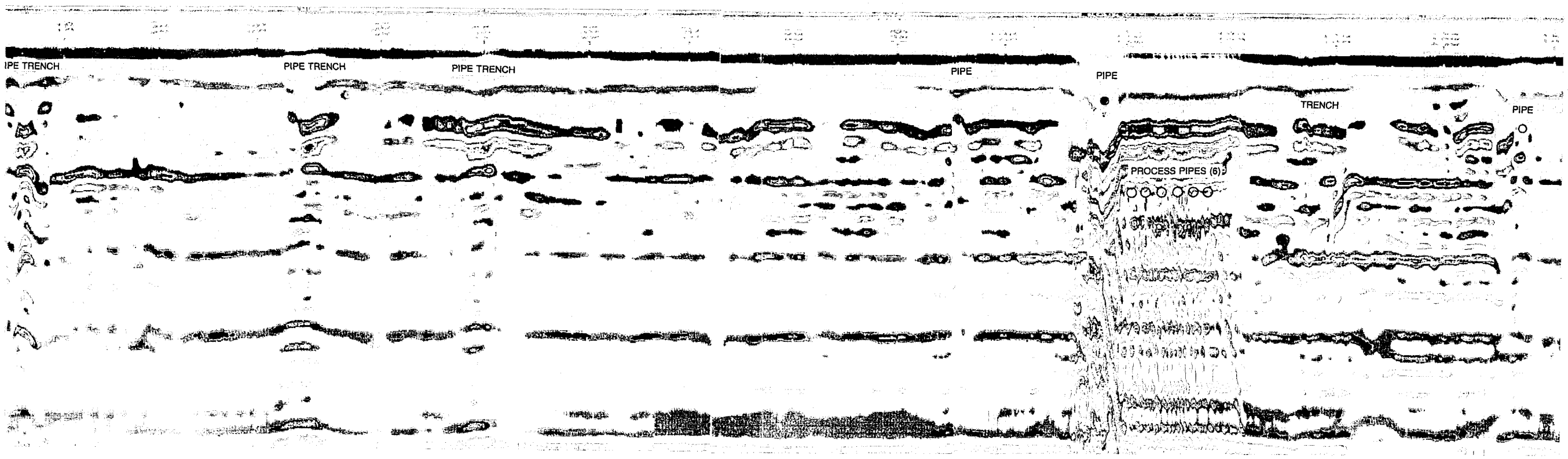
TECHNOLOGY SITE
GOLDEN, COLORADO

Figure II.3.1-13

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
GPR Profile
Line 1

23



NOTES:
1. Horizontal distance scale in feet
2. Vertical time scale
   = 35 nanoseconds
3. Approximate depth = 3 – 8 feet
4. Vertical boxcar filter
   low pass n = 15
   high pass n = 60

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Figure II.3.1-14

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
GPR Profile
Line 5

24

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
11	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	300 *	250 *	<250 *	<250 *	300 *	250 *	<250 *	<250 *
10	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	300 *	300 *	<250 *	<250 *	<250 *	<250 *	<250 *
9	<250 *	<250 *	<250 *	<250 *	250 *	<250 *	<250 *	500 *	<250 *	400 *	<250 *	800 *	<250 *	<250 *	<250 *
8	<250 *	300 *	<250 *	<250 *	<250 *	250 *	500 *	300 *	<250 *	300 *	500 *	<250 *	800 *	600 *	<250 *
7	<250 *	<250 *	<250 *	<250 *	<250 *	250 *	<250 *	<250 *	300 *	250 *	250 *	<250 *	<250 *	500 *	<250 *
6	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	750 *	750 *	<250 *	<250 *	<250 *	500 *	250 *	<250 *
5	<250 *	<250 *	<250 *	<250 *	300 *	<250 *	<250 *	<250 *	250 *	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *
4	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	250 *	250 *	<250 *	<250 *	300 *	<250 *	250 *	<250 *	<250 *
3	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	250 *	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *
2	<250 *	<250 *	<250 *	<250 *	250 *	<250 *	250 *	<250 *	250 *	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *
1	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	250 *	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	<250 *	300 *

Pond 207-B Center

N

LEGEND

500 * Survey Location and Result In Counts per Minute (cpm)

Approximate Scale: 1 inch = 8 Meters

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Figure II.3.1-22

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-B Center
Direct Alpha Radiation
Survey Results

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
11	6 *	3 *	0 *	3 *	0 *	18 *	12 *	0 *	6 *	0 *	0 *	12 *	9 *	6 *	3 *
10	6 *	3 *	0 *	0 *	9 *	3 *	9 *	3 *	0 *	6 *	0 *	0 *	3 *	0 *	0 *
9	6 *	6 *	0 *	12 *	0 *	9 *	6 *	9 *	3 *	15 *	0 *	0 *	0 *	15 *	0 *
8	12 *	3 *	3 *	0 *	3 *	18 *	3 *	3 *	3 *	0 *	3 *	0 *	0 *	3 *	0 *
7	3 *	3 *	3 *	3 *	0 *	6 *	3 *	9 *	6 *	3 *	12 *	0 *	0 *	15 *	3 *
6	12 *	6 *	0 *	0 *	0 *	12 *	24 *	3 *	0 *	0 *	3 *	6 *	0 *	3 *	3 *
5	9 *	9 *	0 *	3 *	0 *	3 *	18 *	0 *	0 *	3 *	6 *	0 *	0 *	0 *	0 *
4	6 *	3 *	0 *	0 *	3 *	3 *	21 *	3 *	3 *	0 *	0 *	3 *	3 *	0 *	0 *
3	12 *	15 *	3 *	3 *	3 *	3 *	3 *	0 *	6 *	3 *	3 *	0 *	0 *	0 *	3 *
2	3 *	3 *	0 *	6 *	0 *	12 *	12 *	0 *	3 *	0 *	3 *	3 *	6 *	3 *	6 *
1	9 *	3 *	3 *	0 *	3 *	9 *	6 *	6 *	0 *	3 *	9 *	15 *	6 *	0 *	6 *

SEP 207-B Center

LEGEND

6 * Survey Location and Result in Disintegrations per Minute per 100 cm^2 ($dpm/100cm^2$)

Approximate Scale: 1 inch = 8 Meters

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Figure II.3.1-23

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-B Center
Removable (Smear) Alpha Radiation Survey Results

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
11	350 *	150 *	180 *	200 *	450 *	150 *	<BG *	<BG *	100 *	150 *	300 *	<BG *	<BG *	<BG *	400 *
10	250 *	200 *	250 *	100 *	300 *	100 *	<BG *	200 *	<BG *	<BG *	400 *	<BG *	<BG *	150 *	<BG *
9	100 *	160 *	150 *	150 *	200 *	100 *	150 *	200 *	<BG *	<BG *	<BG *	<BG *	<BG *	200 *	<BG *
8	150 *	180 *	350 *	200 *	250 *	250 *	<BG *	150 *	<BG *	100 *	<BG *	150 *	200 *	<BG *	<BG *
7	150 *	150 *	220 *	300 *	200 *	<BG *	<BG *	250 *	<BG *	<BG *	100 *	<BG *	<BG *	<BG *	<BG *
6	150 *	200 *	200 *	350 *	250 *	150 *	150 *	<BG *	<BG *	250 *	150 *	200 *	200 *	<BG *	<BG *
5	120 *	160 *	200 *	250 *	250 *	<BG *	<BG *	150 *	<BG *	100 *	150 *	200 *	<BG *	150 *	<BG *
4	140 *	180 *	180 *	150 *	250 *	<BG *	<BG *	300 *	<BG *	<BG *	<BG *	<BG *	100 *	<BG *	<BG *
3	150 *	150 *	200 *	200 *	200 *	100 *	150 *	350 *	<BG *	<BG *	300 *	500 *	350 *	<BG *	150 *
2	150 *	100 *	200 *	250 *	300 *	<BG *	250 *	150 *	100 *	200 *	400 *	150 *	<BG *	250 *	<BG *
1	6000 *	100 *	180 *	200 *	150 *	<BG *	<BG *	<BG *	<BG *	100 *	<BG *	300 *	200 *	150 *	<BG *

SEP 207-B Center

LEGEND

150 * Survey Location and Result in counts per minute (cpm)

<BG Less than Background

NOTE

1. Background measurement was not reported in field records Measurements reported in gross counts (without subtracting background counts).
2. Survey performed by E.G.&G.

Approximate Scale: 1 Inch = 8 Meters

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Figure II.3.1-24

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-B Center
Direct Beta Radiation
Survey Results

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
11	45 *	48 *	60 *	69 *	6 *	6 *	18 *	3 *	18 *	21 *	0 *	0 *	0 *	3 *	0 *
10	43 *	28 *	26 *	38 *	15 *	48 *	30 *	15 *	0 *	0 *	0 *	15 *	15 *	0 *	0 *
9	40 *	42 *	36 *	36 *	90 *	0 *	81 *	9 *	0 *	15 *	18 *	6 *	0 *	0 *	0 *
8	100 *	40 *	80 *	44 *	15 *	75 *	15 *	21 *	12 *	0 *	0 *	12 *	0 *	21 *	9 *
7	60 *	34 *	47 *	50 *	27 *	18 *	12 *	30 *	0 *	0 *	0 *	0 *	39 *	0 *	6 *
6	54 *	44 *	36 *	36 *	33 *	36 *	39 *	27 *	0 *	0 *	15 *	0 *	0 *	0 *	0 *
5	50 *	69 *	37 *	70 *	21 *	45 *	0 *	0 *	0 *	0 *	0 *	0 *	0 *	9 *	0 *
4	70 *	46 *	51 *	48 *	60 *	0 *	0 *	30 *	0 *	0 *	36 *	12 *	0 *	0 *	3 *
3	61 *	43 *	38 *	72 *	24 *	24 *	60 *	12 *	15 *	0 *	21 *	24 *	0 *	6 *	0 *
2	46 *	66 *	50 *	64 *	48 *	21 *	90 *	15 *	18 *	9 *	6 *	18 *	0 *	30 *	6 *
1	48 *	111 *	64 *	55 *	50 *	39 *	18 *	54 *	3 *	0 *	12 *	0 *	0 *	6 *	12 *

SEP 207-B Center

N

LEGEND

6 * Survey Location and Result in Disintegrations per Minute per 100 cm^2 ($dpm/100cm^2$)

Approximate Scale: 1 inch = 8 Meters

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Figure II.3.1-25

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-B Center
Removable Beta (Smear) Radiation Survey Results

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
11	1227 *	621 *	1117 *	1064 *	1165 *	1301 *	952 *	655 *	548 *	449 *	716 *	466 *	588 *	550 *	537 *
10	911 *	785 *	487 *	584 *	798 *	654 *	514 *	244 *	340 *	389 *	817 *	1066 *	650 *	1158 *	377 *
9	869 *	953 *	883 *	617 *	1233 *	989 *	839 *	1201 *	773 *	535 *	827 *	522 *	1267 *	611 *	815 *
8	846 *	726 *	742 *	1100 *	604 *	1133 *	2135 *	697 *	495 *	515 *	622 *	758 *	856 *	670 *	1146 *
7	506 *	465 *	705 *	697 *	683 *	685 *	1857 *	592 *	483 *	803 *	316 *	722 *	918 *	320 *	516 *
6	768 *	995 *	600 *	400 *	373 *	225 *	595 *	1110 *	622 *	476 *	696 *	716 *	802 *	1056 *	650 *
5	1013 *	1351 *	922 *	963 *	600 *	339 *	752 *	459 *	612 *	649 *	1081 *	917 *	662 *	1200 *	633 *
4	629 *	824 *	671 *	464 *	752 *	320 *	792 *	831 *	1049 *	1275 *	752 *	808 *	547 *	876 *	546 *
3	913 *	1153 *	637 *	749 *	335 *	423 *	1272 *	2551 *	2352 *	1965 *	825 *	665 *	1274 *	1317 *	1516 *
2	872 *	427 *	646 *	709 *	588 *	208 *	468 *	1842 *	1183 *	1441 *	757 *	748 *	1294 *	1166 *	1060 *
1	2980 *	695 *	710 *	557 *	564 *	243 *	730 *	561 *	898 *	721 *	953 *	894 *	756 *	496 *	527 *

SEP 207-B Center

N

LEGEND

516 * Survey Location and Result In Counts per Minute (cpm)

Approximate Scale: 1 Inch = 8 Meters

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Figure II.3.1-26

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-B Center
Gamma (FIDLER) Radiation Survey Results

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
11	<250	250	300	300	<250	<250	250	<250	<250	<250	<250	<250	250	<250	<250
10	<250	<250	<250	250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	250
9	<250	250	<250	250	300	<250	<250	<250	<250	<250	<250	<250	<250	250	<250
8	<250	300	<250	<250	300	<250	<250	<250	<250	<250	<250	<250	<250	250	<250
7	<250	<250	<250	300	250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250
6	<250	250	<250	250	<250	<250	<250	<250	<250	250	250	250	<250	300	<250
5	<250	300	<250	<250	<250	<250	<250	250	<250	<250	<250	300	<250	<250	<250
4	<250	<250	<250	<250	<250	<250	300	250	<250	<250	250	<250	250	<250	<250
3	<250	<250	<250	<250	<250	<250	250	<250	250	<250	<250	250	<250	<250	<250
2	<250	<250	<250	<250	250	250	<250	300	<250	<250	<250	<250	<250	<250	<250
1	<250	<250	<250	250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	155

SEP 207-B North

LEGEND

250 Survey Location and Result in Counts per Minute (cpm)

Approximate Scale: 1 inch = 8 Meters

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Figure II.3.1-27

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-B North
Direct Alpha Radiation
Survey Results

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
11	0	0	0	0	0	0	6	0	3	3	3	0	3	0	6
10	0	0	0	0	0	6	0	3	0	0	3	0	6	0	0
9	9	0	3	0	0	0	0	0	6	3	3	0	0	6	0
8	0	6	3	3	3	6	3	6	0	0	0	0	3	0	3
7	0	0	3	3	3	0	0	0	0	0	0	3	3	0	3
6	0	3	0	3	3	6	0	0	0	3	3	0	0	0	9
5	3	12	0	0	6	0	0	3	3	0	3	0	0	3	0
4	3	12	0	0	0	6	0	0	0	6	0	0	6	3	0
3	0	6	3	0	6	0	0	0	0	0	0	0	3	3	0
2	0	3	6	9	6	0	3	3	0	0	0	3	3	0	0
1	0	3	3	0	3	3	0	0	0	0	6	0	9	3	3

SEP 207-B North

LEGEND

3 Survey Location and Result in Disintegrations per Minute per 100 cm^2 (dpm/100cm^2)

Approximate Scale: 1 Inch = 8 Meters

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Figure II.3.1-28

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-B North
Removable (Smear) Alpha Radiation Survey Results

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
11	<100	<100	500	<100	400	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
10	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
9	<100	<100	<100	<100	500	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
8	<100	<100	<100	<100	<100	<100	<100	<100	<100	500	<100	<100	<100	<100	<100
7	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	500	<100	<100
6	<100	<100	600	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
5	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
4	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
3	<100	<100	<100	<100	<100	<100	<100	700	<100	<100	<100	<100	<100	<100	<100
2	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
1	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100

SEP 207-B North

LEGEND

500 Survey Location and Result in Counts per Minute (cpm)

Approximate Scale: 1 inch = 8 Meters

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Figure II.3.1-29

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Pond 207-B North
Direct Beta Radiation Survey Results

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
11	12	6	30	12	0	0	24	9	15	9	9	0	12	18	0
10	0	0	0	0	21	3	12	57	6	12	33	21	30	18	15
9	0	15	18	45	0	6	9	0	0	36	60	24	15	15	24
8	39	0	0	9	30	30	0	12	0	0	0	18	36	0	3
7	33	15	24	3	48	15	0	33	21	15	6	30	0	48	9
6	12	0	15	0	36	12	12	9	30	0	21	12	3	18	12
5	15	36	30	21	6	0	54	3	33	3	12	9	12	30	0
4	15	18	30	0	3	0	18	0	9	6	39	0	18	9	30
3	0	33	12	12	33	24	6	3	12	27	0	27	0	0	12
2	12	0	54	54	0	30	30	15	18	0	0	12	0	15	18
1	0	3	0	9	24	12	33	48	0	24	54	21	15	27	21

SEP 207-B North

N

LEGEND

12 **Survey Location and Result in Disintegrations per Minute per 100 cm² (dpm/100cm²)**

Approximate Scale: 1 inch = 8 Meters

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Figure II.3.1-30

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-B North
Removable Beta (Smear) Radiation Survey Results

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
11	394 *	676 *	851 *	771 *	852 *	618 *	947 *	753 *	416 *	547 *	806 *	551 *	416 *	554 *	554 *
10	697 *	796 *	1199 *	918 *	879 *	3890 *	431 *	814 *	782 *	631 *	299 *	719 *	273 *	661 *	540 *
9	753 *	882 *	762 *	977 *	980 *	957 *	784 *	797 *	867 *	172 *	69 *	307 *	319 *	457 *	874 *
8	788 *	638 *	32 *	1017 *	1162 *	525 *	755 *	438 *	248 *	206 *	109 *	517 *	412 *	747 *	783 *
7	735 *	1094 *	-8 *	591 *	742 *	469 *	633 *	812 *	793 *	322 *	91 *	727 *	912 *	806 *	954 *
6	715 *	1042 *	1138 *	507 *	982 *	688 *	536 *	647 *	144 *	238 *	314 *	602 *	631 *	202 *	981 *
5	576 *	924 *	454 *	576 *	1103 *	697 *	752 *	754 *	622 *	881 *	765 *	164 *	759 *	143 *	104 *
4	557 *	1007 *	707 *	923 *	779 *	747 *	1061 *	451 *	633 *	643 *	238 *	413 *	559 *	1 *	105 *
3	589 *	658 *	881 *	779 *	910 *	566 *	697 *	415 *	127 *	851 *	525 *	265 *	640 *	1004 *	912 *
2	650 *	1031 *	1071 *	990 *	672 *	453 *	635 *	956 *	751 *	292 *	661 *	752 *	1020 *	1056 *	746 *
1	636 *	1207 *	567 *	723 *	600 *	641 *	667 *	658 *	703 *	794 *	655 *	747 *	884 *	1263 *	607 *

SEP 207-B North

N

LEGEND

783 * Survey Location and Result in Counts per Minute (cpm)

Approximate Scale: 1 inch = 8 Meters

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Figure II.3.1-31

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
SEP 207-B North
Gamma (FIDLER) Radiation Survey Results

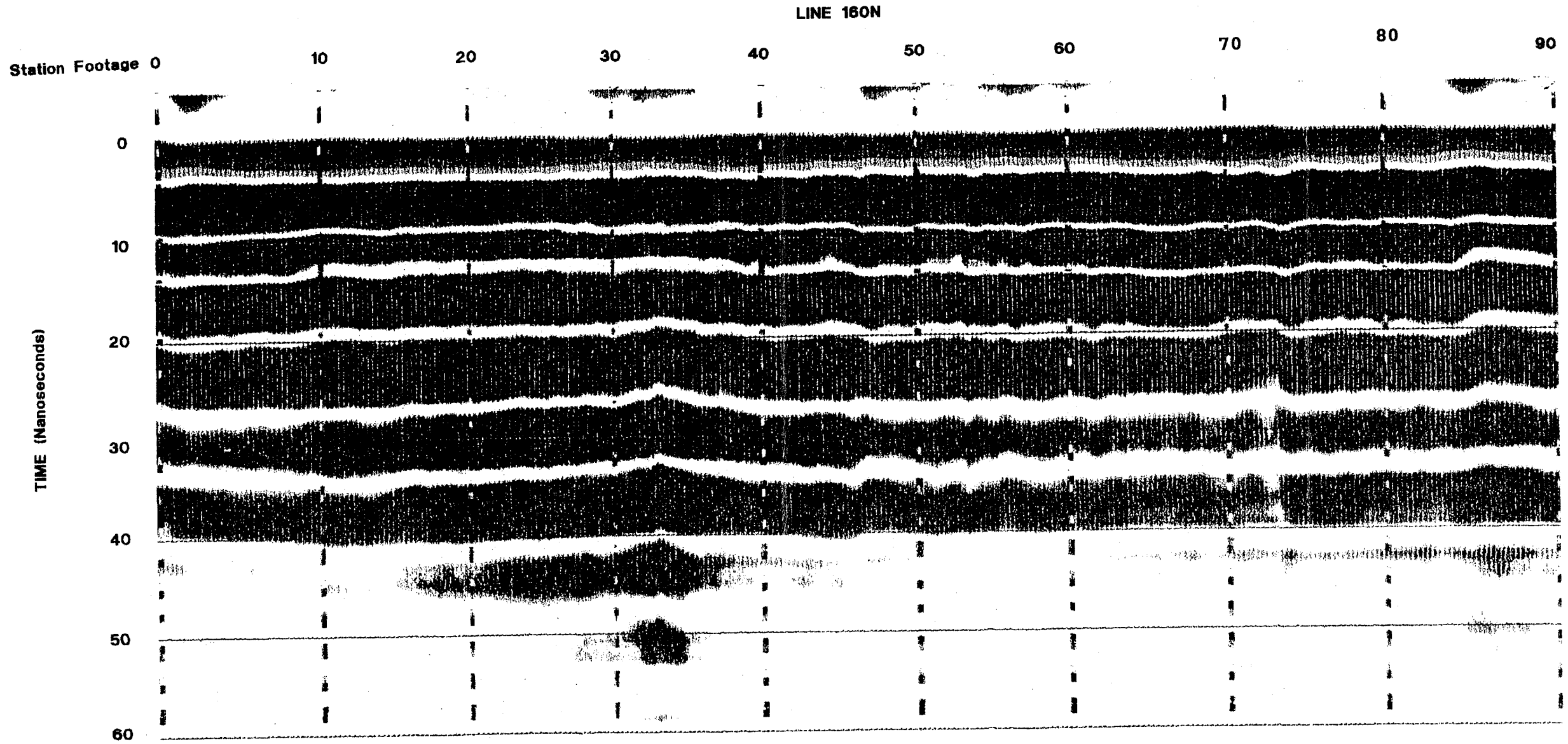

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Figure II.3.1-33

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Typical GPR Record
SEP 207-A - 300 MHz Antenna

LINE 180N

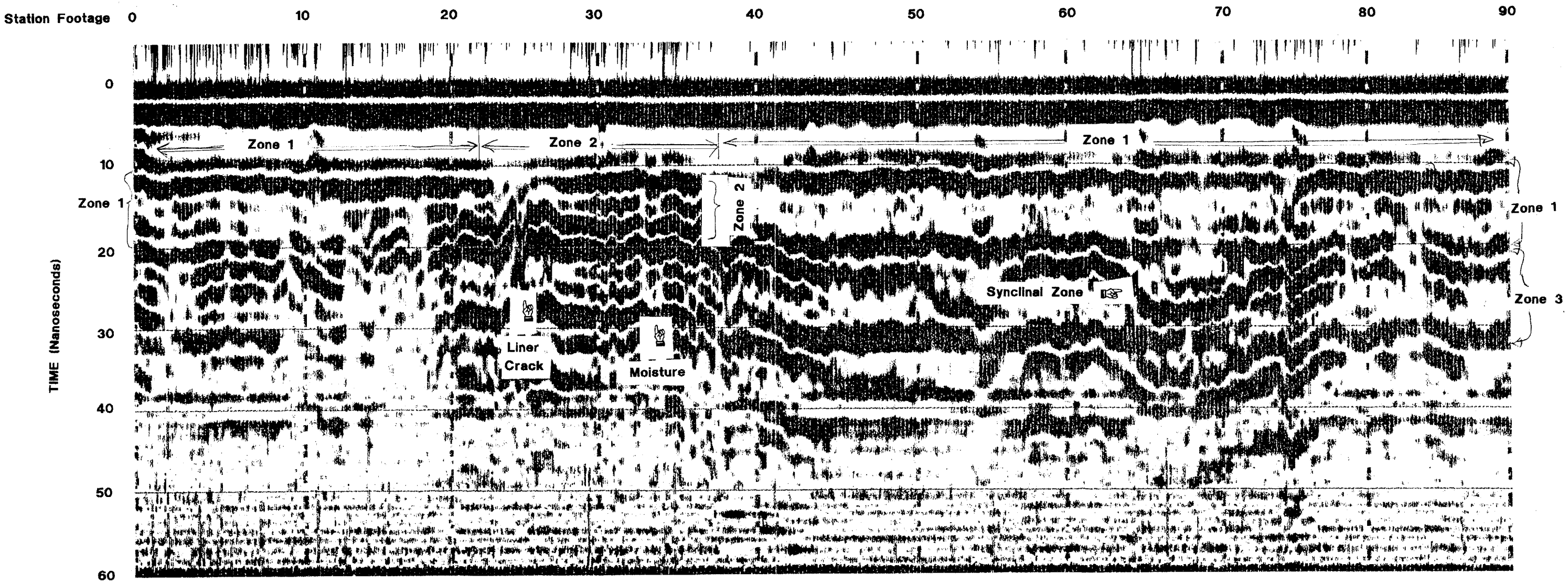

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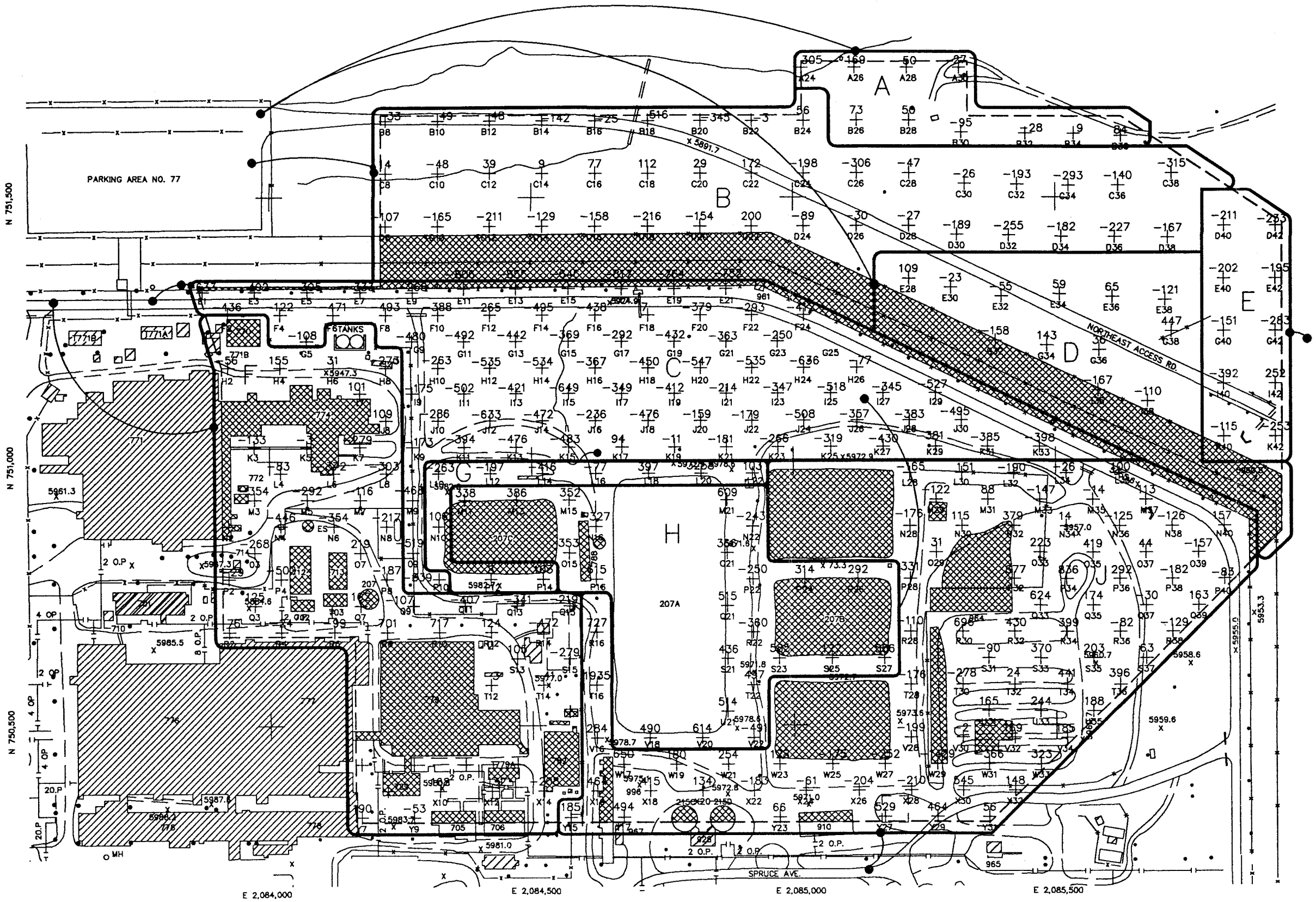
Figure II.3.1-34

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Typical GPR Record
SEP 207-A - 900 MHz Antenna



LEGEND

- Roads
- Drainage/Stream
- −531 Radiological Instrument Reading (cpm)
- + D38 Grid Location of Radiological Reading
- Areas Inaccessible for Radiological Survey
- Surficial Soil Sample Boundary
- FIDLER Checkpoint Reading Location
- Radiological Survey Boundary

BOUNDED REGION	BACKGROUND READING (cpm)
A	1947
B	2311
C	1929
D	1947
E	1954
F	1855
G	1547
H	1834
J	1429

100 0 100 200 Feet

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GOLDEN, COLORADO

Figure II.3.2-1

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD OU4-Wide Gamma (FIDLER) Survey Results

* SEPs 207–A, 207–B Center, and 207–B North radiological surveys were completed by EG&G.
Negative values indicate instrument reading at survey location was less than associated checkpoint.

752100

2083850

752100

2086300

A-1

N. WALNUT CREEK

PROTECTED AREA FENCE

SITE PERIMETER ACCESS ROAD

40093 40193 40293 40593 44893 40393 44793 45693 40693 46193 45793 42693 40793 40893 41193 41293 40993 42093 41993 42393 41693 42293 41793 41893 43293 42993 43793 SS400593 43193 43593 43493 43893 43993 44093 44193 44393 44593

T771A 770 771B T771C T771G 771C 774 771 772 772A 715 716 714 712 713 701 730 702 703 788A 788 783 784 787 785 786 779 780A 727 776 777 782 729 T779A 778 705 706 T706A T707B 964 910 228A 967 928 965 998 990 995 988

2083850

750200

2086300

750200

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- OU4 Boundary
- 44793 Borehole Surficial Soil Sampling Location
- Random Surficial Soil Sampling Location
- Discrete Surficial Soil Sampling Location

100 0 100 200 300 FEET

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GOLDEN, COLORADO

Figure II.3.2-2

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Locations of Surficial Soil Samples

752100
2083850
752100
2086300
N
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
ND
T771A
770
771B
T771C
T771G
771C
774
771
772
772A
715
716
714
712
713
703
702
701
730
788A
788
783
787
785
786
779
780A
727
776
777
782
729
T779A
778
705
706
T706A
T707B
967
928
964
910
228A
965
998
990
995
988
750200
2083850
2086300

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- Results in mg/kg
- ND Not Detected

NOTES

1. Results in red exceed the background level of 0.92 mg/kg

100 0 100 200 300 FEET

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Figure II.3.2-3

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Beryllium

752100
2083850
752100
2086300
N
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
ND
356
T771A
771B
770
T771C
T771G
771C
774
771
772
772A
788A
712
713
715
716
714
701
730
702
703
788
783
787
785
786
779
780A
727
776
777
782
729
T779A
705
706
778
T706A
T707B
967
928
964
910
228A
965
998
990
995
988
750200
2083850
2086300
LEGEND
Streams
Paved Roads
Buildings
Fence
OU4 Boundary
Solar Evaporation Pond (SEP)
Sample Location
Results in mg/kg
ND Not Detected
NOTES
1. Results in red exceed the background level of 0.64 mg/kg
100 0 100 200 300 FEET
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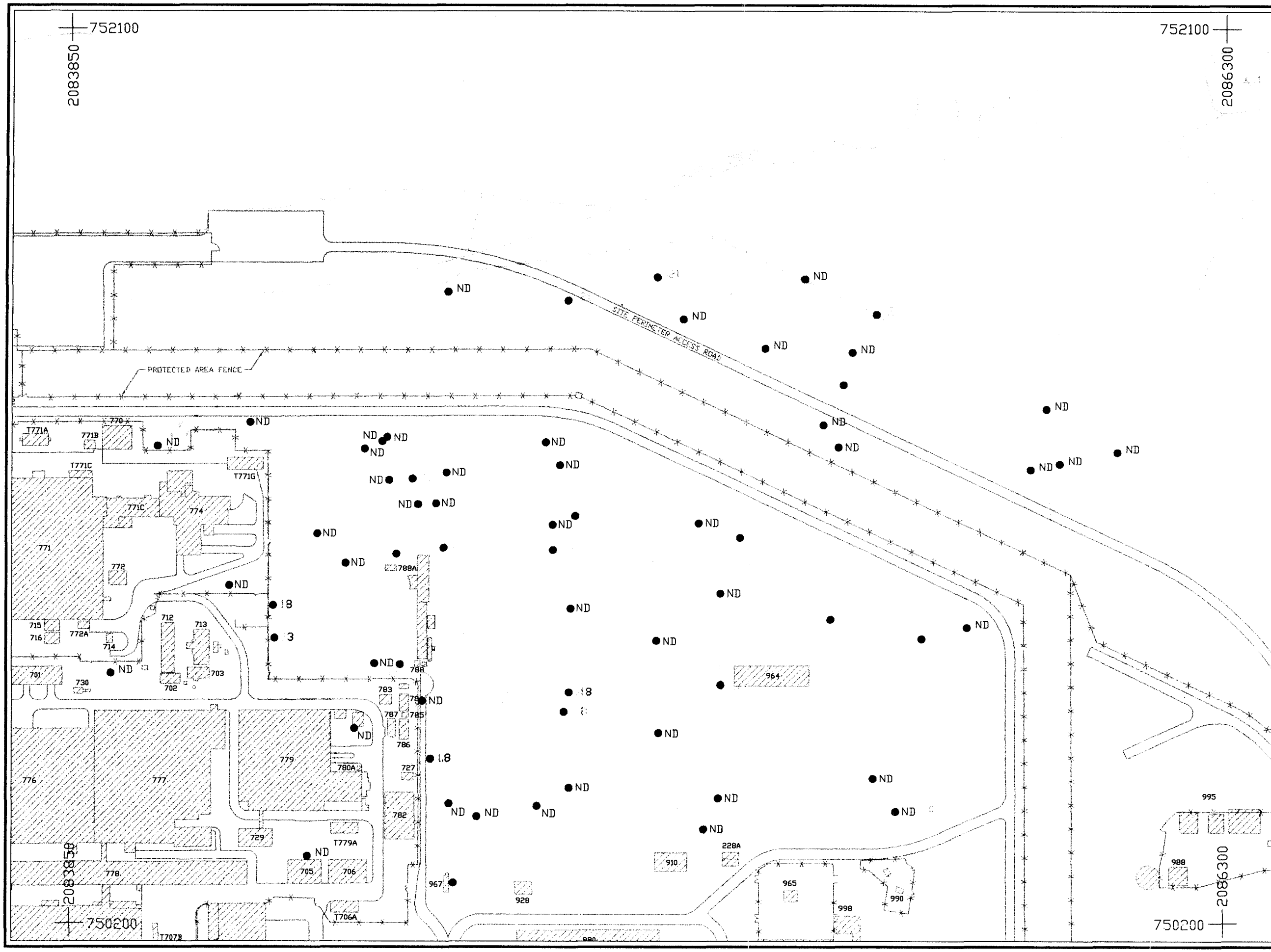
GOLDEN, COLORADO
Figure II.3.2-4
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Cadmium



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- Results in mg/kg
- ND Not Detected

NOTES

1. Results in red exceed the background level of 0.03 mg/kg

100 0 100 200 300 FEET

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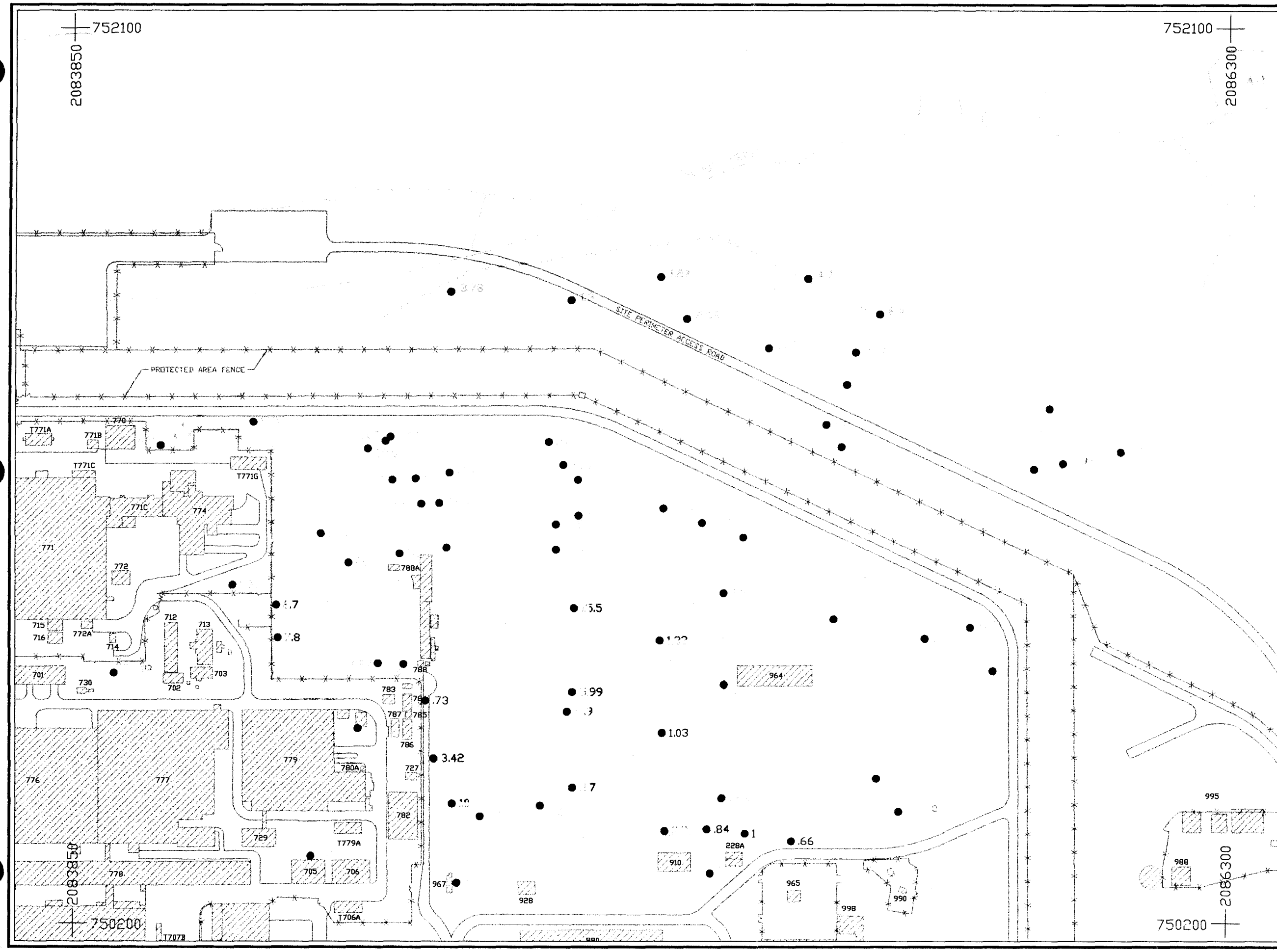
Figure II.3.2-5

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Surficial Soil Sampling Results Mercury



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- Results in mg/kg

NOTES

1. Results in red exceed the background level of 1.11 mg/kg

100 0 100 200 300 FEET

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Figure II.3.2-6

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Nitrate/Nitrite

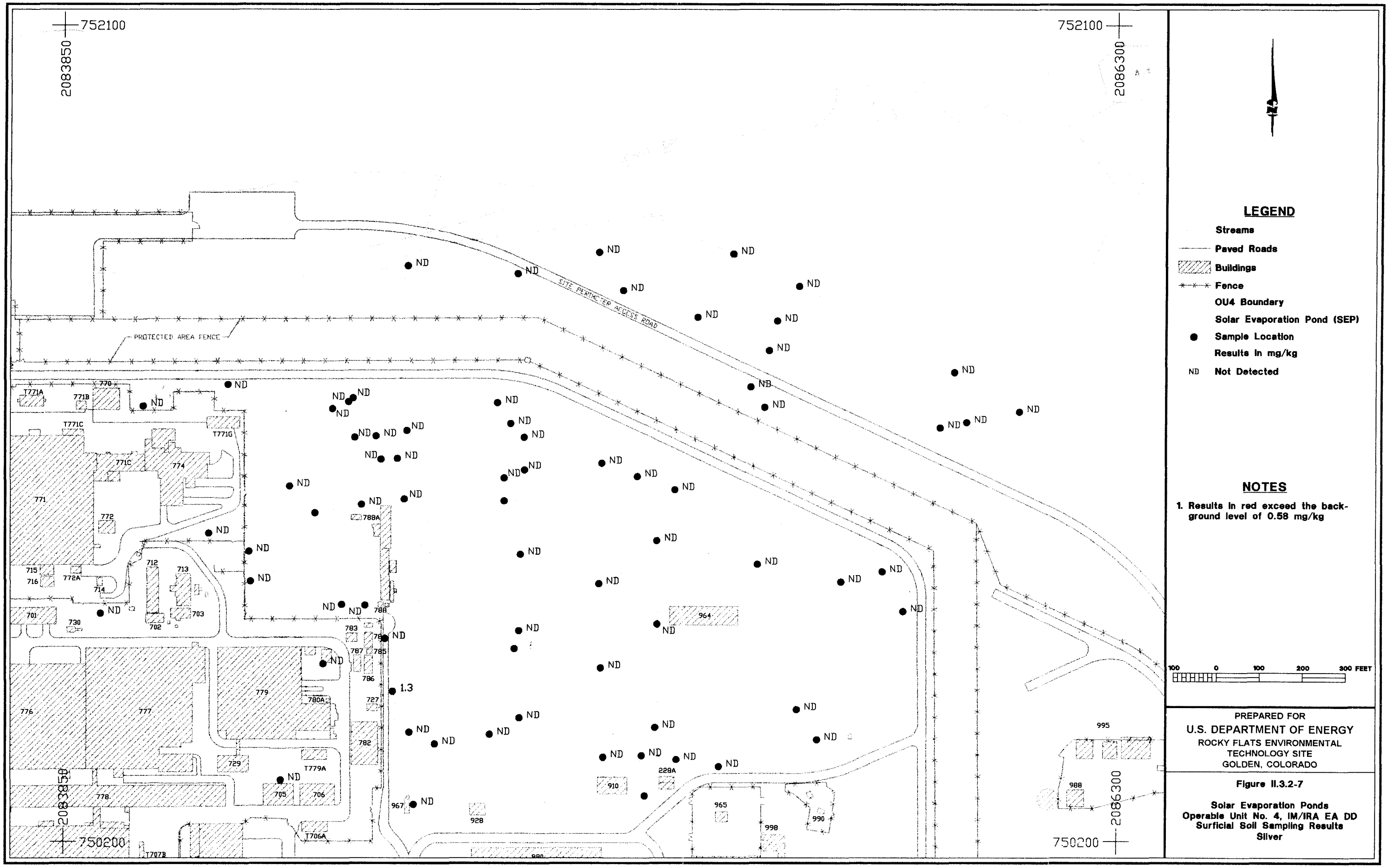
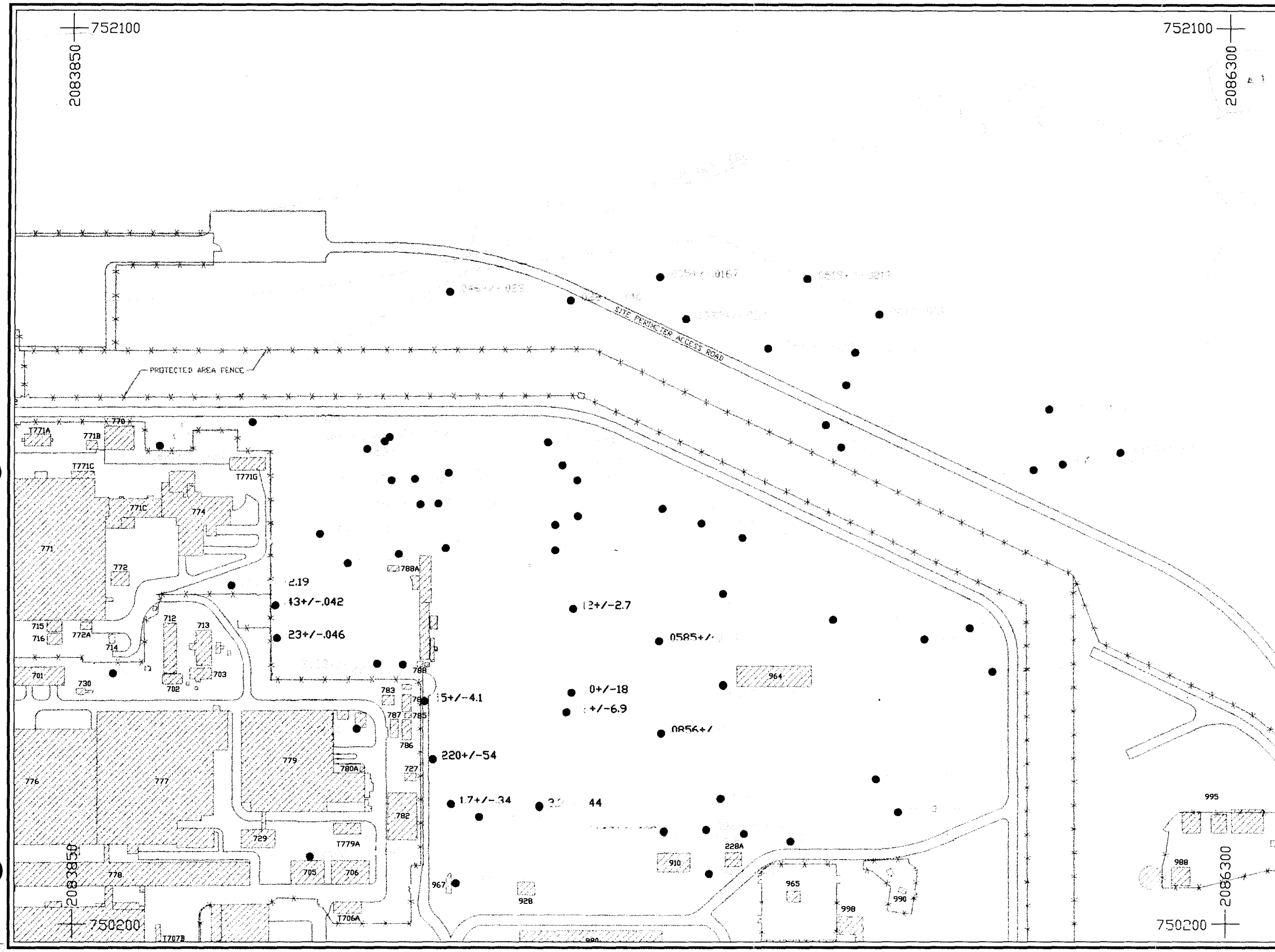


Figure II.3.2-7

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Silver



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- Results and Counting Error in pCi/g

NOTES

1. Results in red exceed the background level of 0.027 pCi/g

100 0 100 200 300 FEET

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Figure II.3.2-8

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Americium 241

752100
2083850
752100
2086300
A-1
N. WALNUT CREEK
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
T771A
771B
770
T771C
T771G
771C
774
771
772
715
716
772A
714
712
713
701
730
702
703
788A
788
783
784
787
785
786
964
779
780A
727
776
777
782
729
T779A
778
705
706
T706A
T707B
967
928
910
228A
965
998
990
995
988
750200
2086300
750200
2083850

N

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- OU4 Boundary
- Sample Location
- Results and Counting Error in pCi/g
- Not Detected
- Not Analyzed

NOTES

1. There are no background data for this constituent

100 0 100 200 300 FEET

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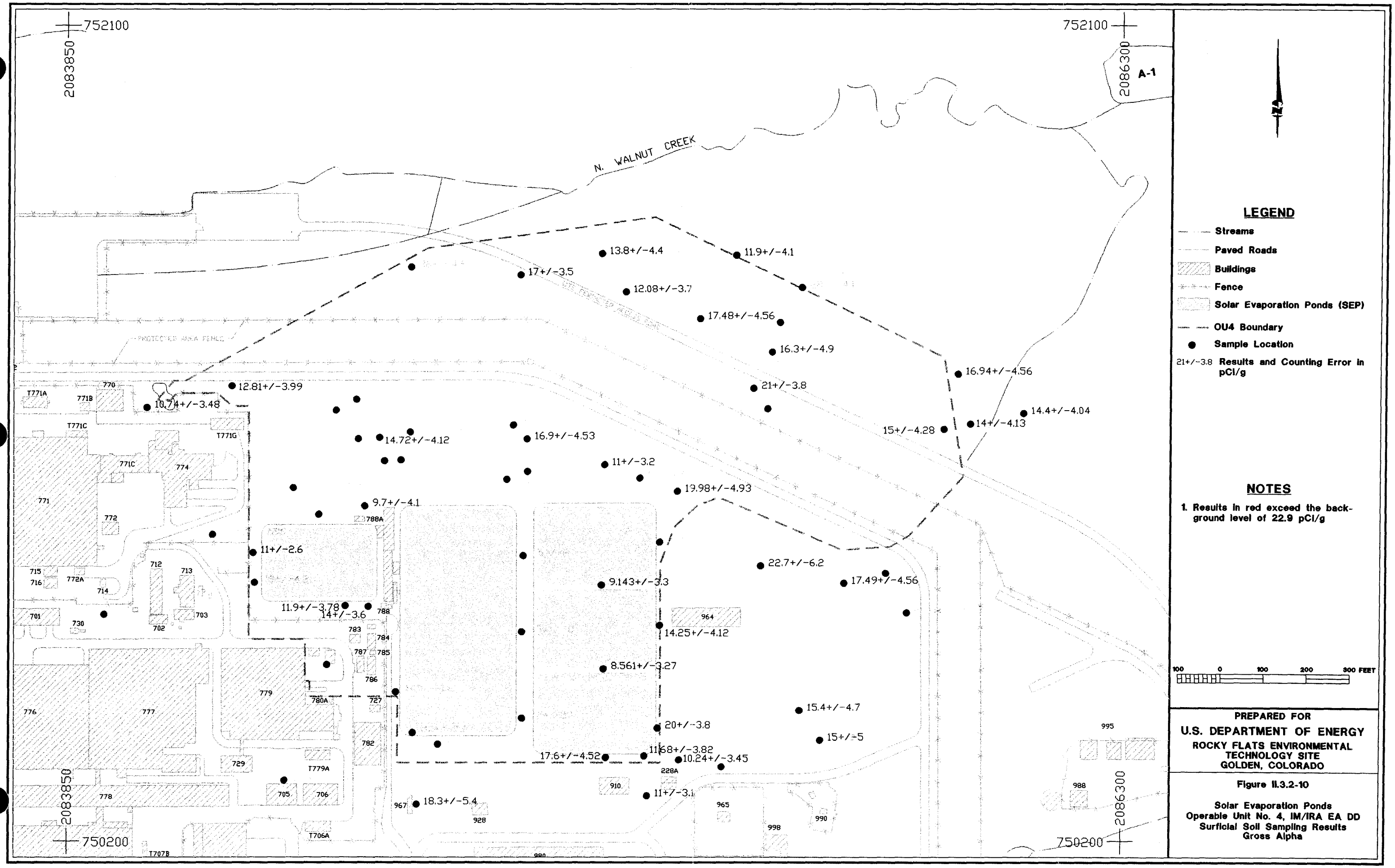
Figure II.3.2-9

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Cesium-134



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- OU4 Boundary
- Sample Location
- 21+/-3.8 Results and Counting Error in pCi/g

NOTES

1. Results in red exceed the background level of 22.9 pCi/g

100 0 100 200 300 FEET

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Figure II.3.2-10

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Gross Alpha

752100
2083850
752100
2086300
N
.0129+/-.0085
.0788+/-.0351
.039+/-.018
.0463+/-.0182
.06+/-.024
.0267+/-.0134
.0266+/-.0142
.0101+/-.0108
PROTECTED AREA FENCE
T771A
771B
770
T771C
T771G
771C
774
771
772
788A
712
713
715
716
772A
714
701
730
702
703
788
783
784
787
785
786
779
780A
727
776
777
782
729
T779A
705
706
778
967
928
T706A
T707B
964
910
228A
965
998
990
995
988
750200
2083850
750200
2086300
100 0 100 200 300 FEET

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- Results and Counting Error in pCi/g

NOTES

1. Results in red exceed the background level of 0.062 pCi/g

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Figure II.3.2-11

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Plutonium 239/240

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- Results and Counting Error in pCi/l
- ND Not Detected

NOTES

1. There are no background data for this constituent

100 0 100 200 300 FEET

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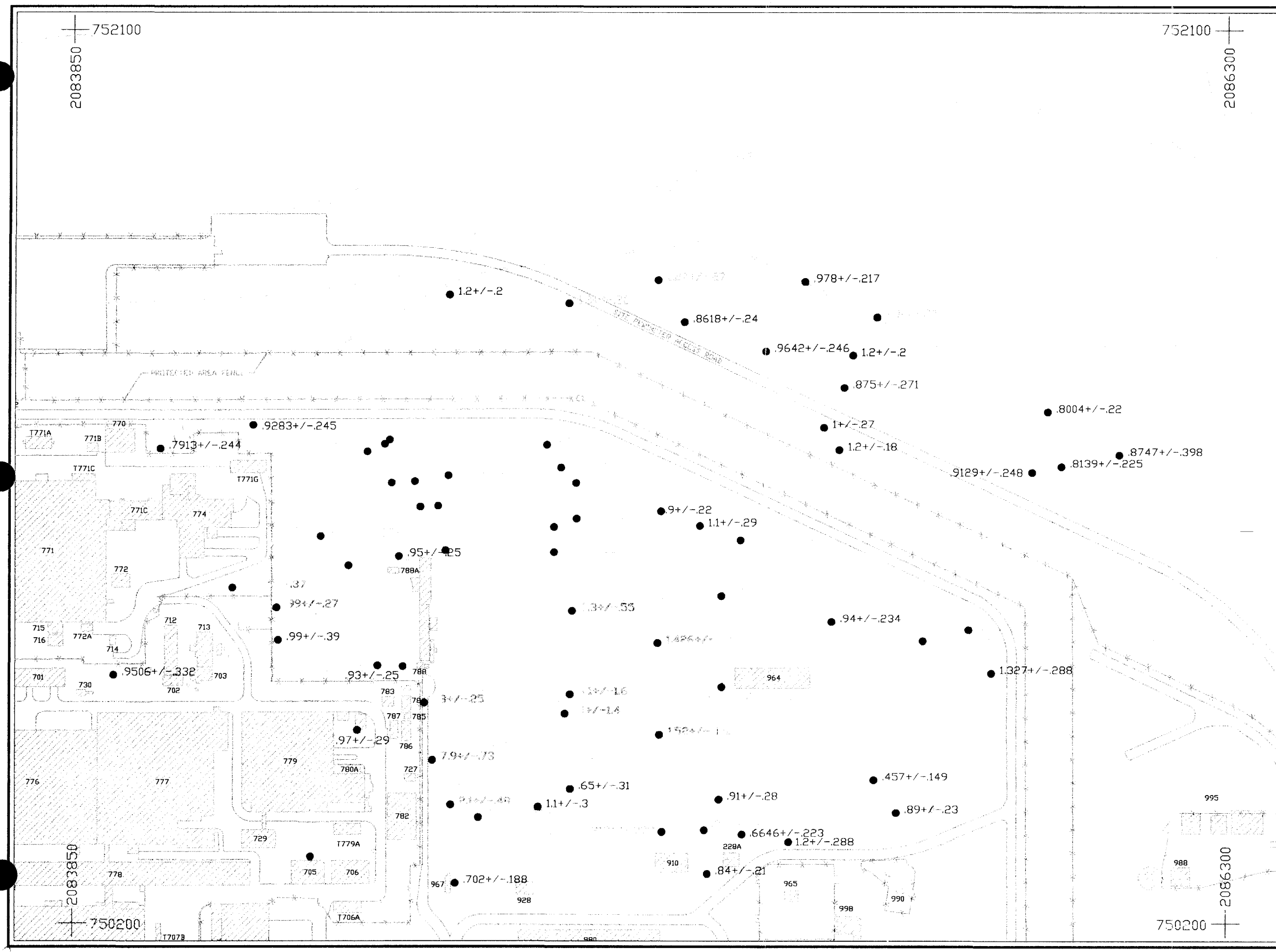
Figure II.3.2-12

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Tritium



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- 1.2+/-.18 Results and Counting Error in pCi/g

NOTES

1. Results in red exceed the background level of 1.22 pCi/g

100 0 100 200 300 FEET

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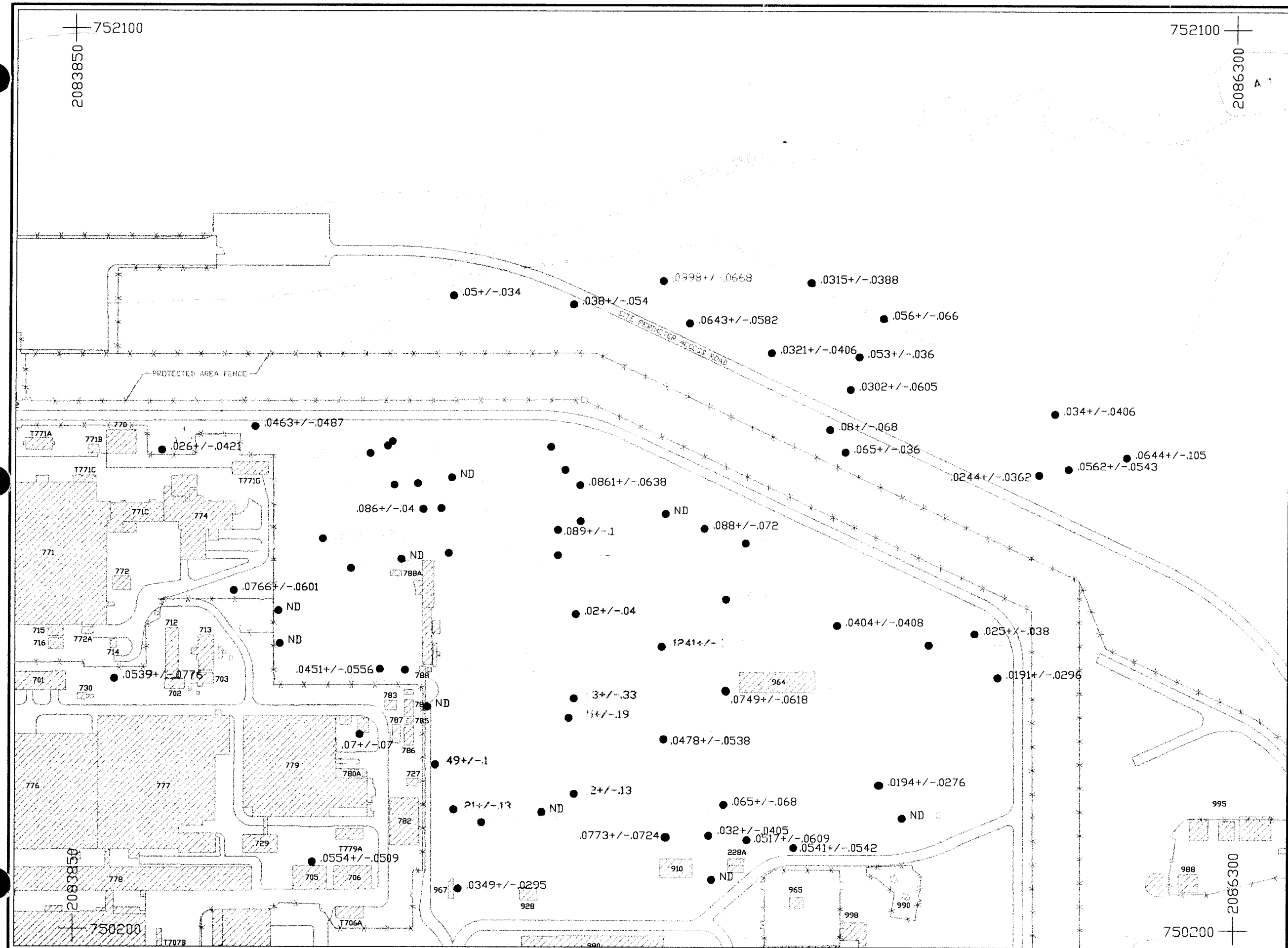
Figure II.3.2-13

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Uranium 233/234

83



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .08+/-.068 Results and Counting Error in pCi/g
- ND Not Detected

NOTES

1. Results in red exceed the background level of 0.09 pCi/g

100 0 100 200 300 FEET

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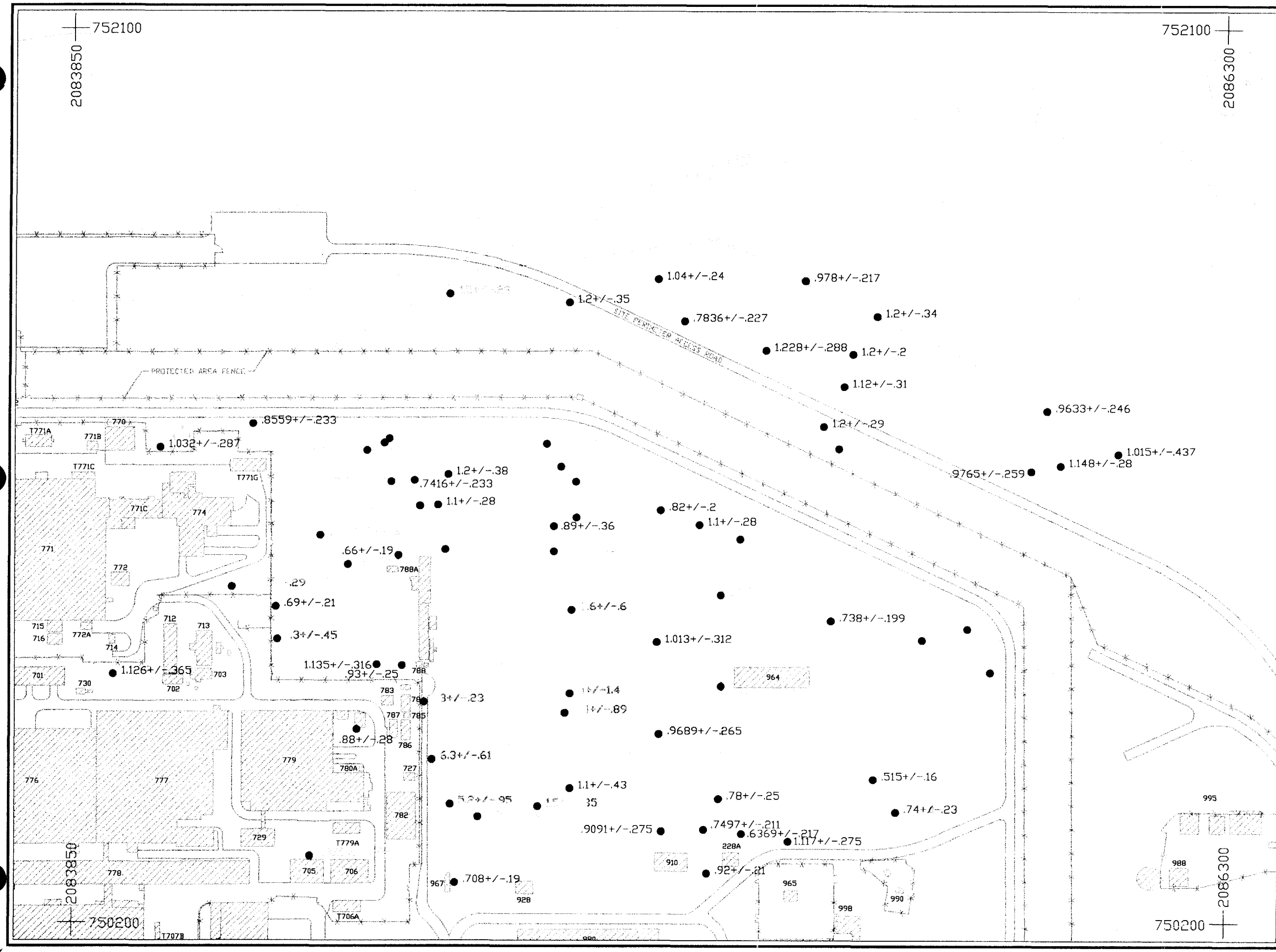
Figure II.3.2-14

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Uranium 235

84



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- .82+/-.2 Results and Counting Error in pCi/g

NOTES

1. Results in red exceed the background level of 1.27 pCi/g

100 0 100 200 300 FEET

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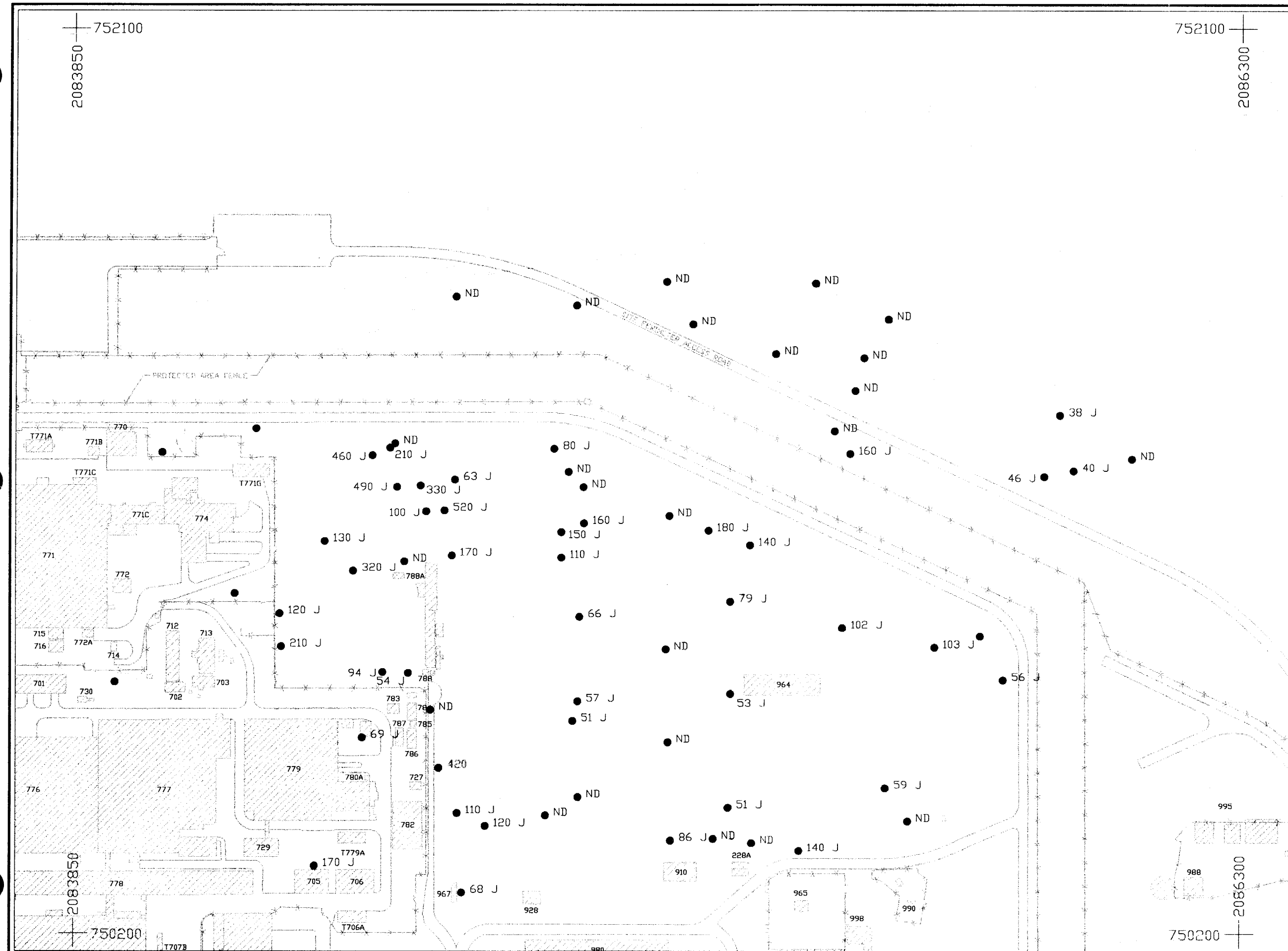
Figure II.3.2-15

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Uranium 238

86



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 38 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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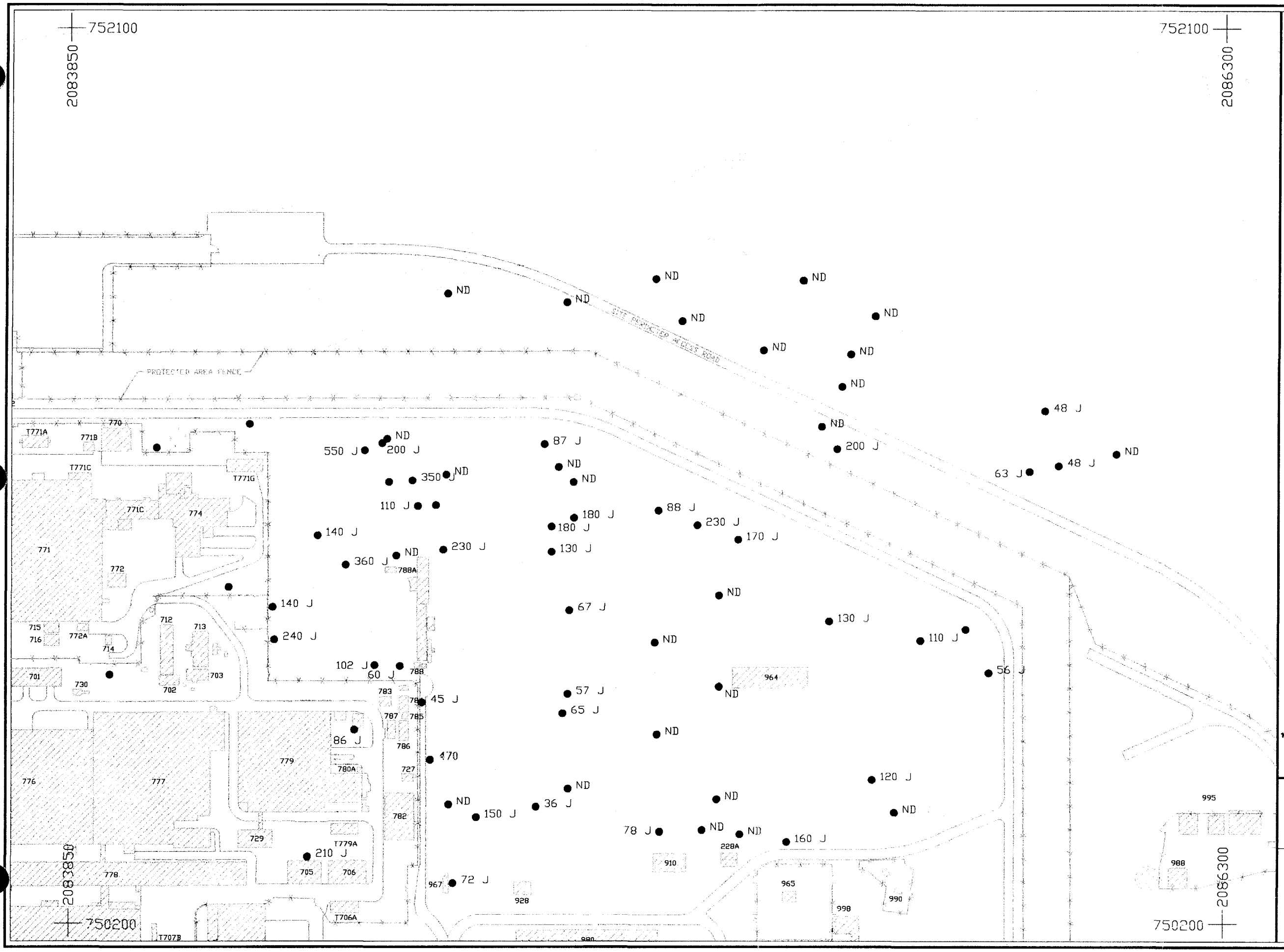
Figure II.3.2-16

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Benzo(a)anthracene



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 48 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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Figure II.3.2-17

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Surficial Soil Sampling Results Benzo(a)pyrene

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- OU4 Boundary
- Sample Location
- 43 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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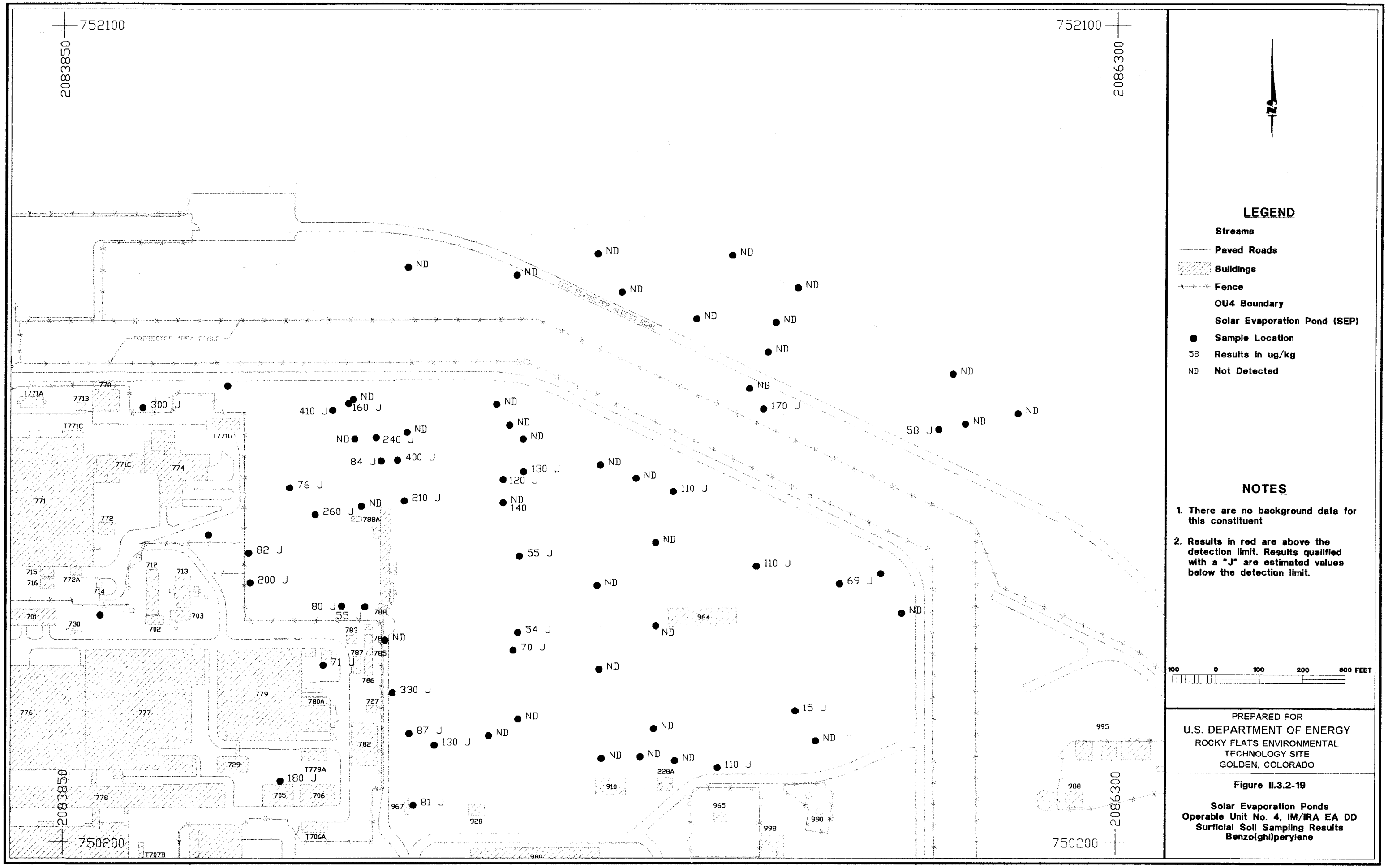
Figure II.3.2-18

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Benzo(b)fluoranthene



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 58 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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Figure II.3.2-19

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Benzo(ghi)perylene

89

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- OU4 Boundary
- Sample Location
- 50.00 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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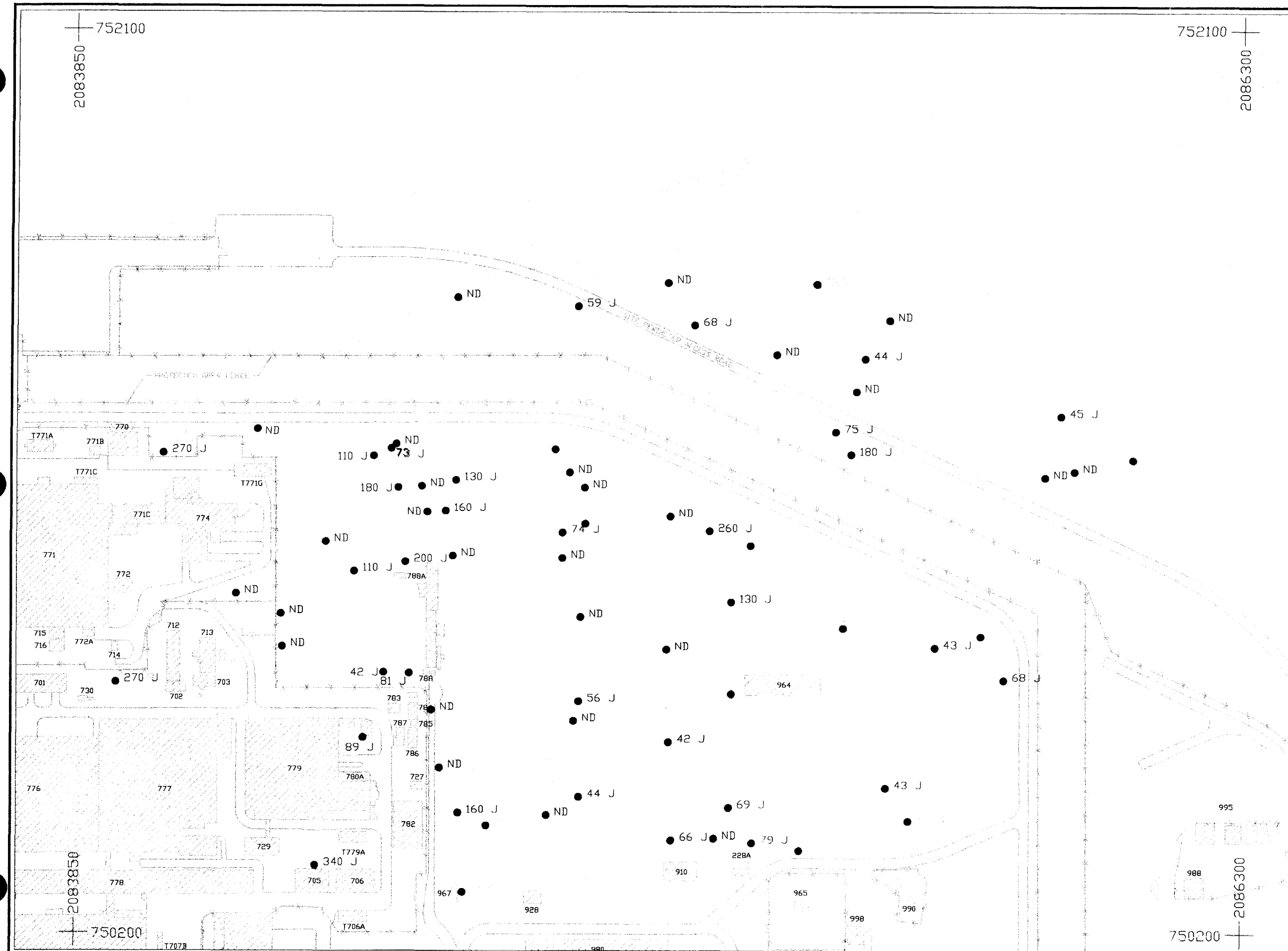
Figure II.3.2-20

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Benzo(k)fluoranthene



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 45 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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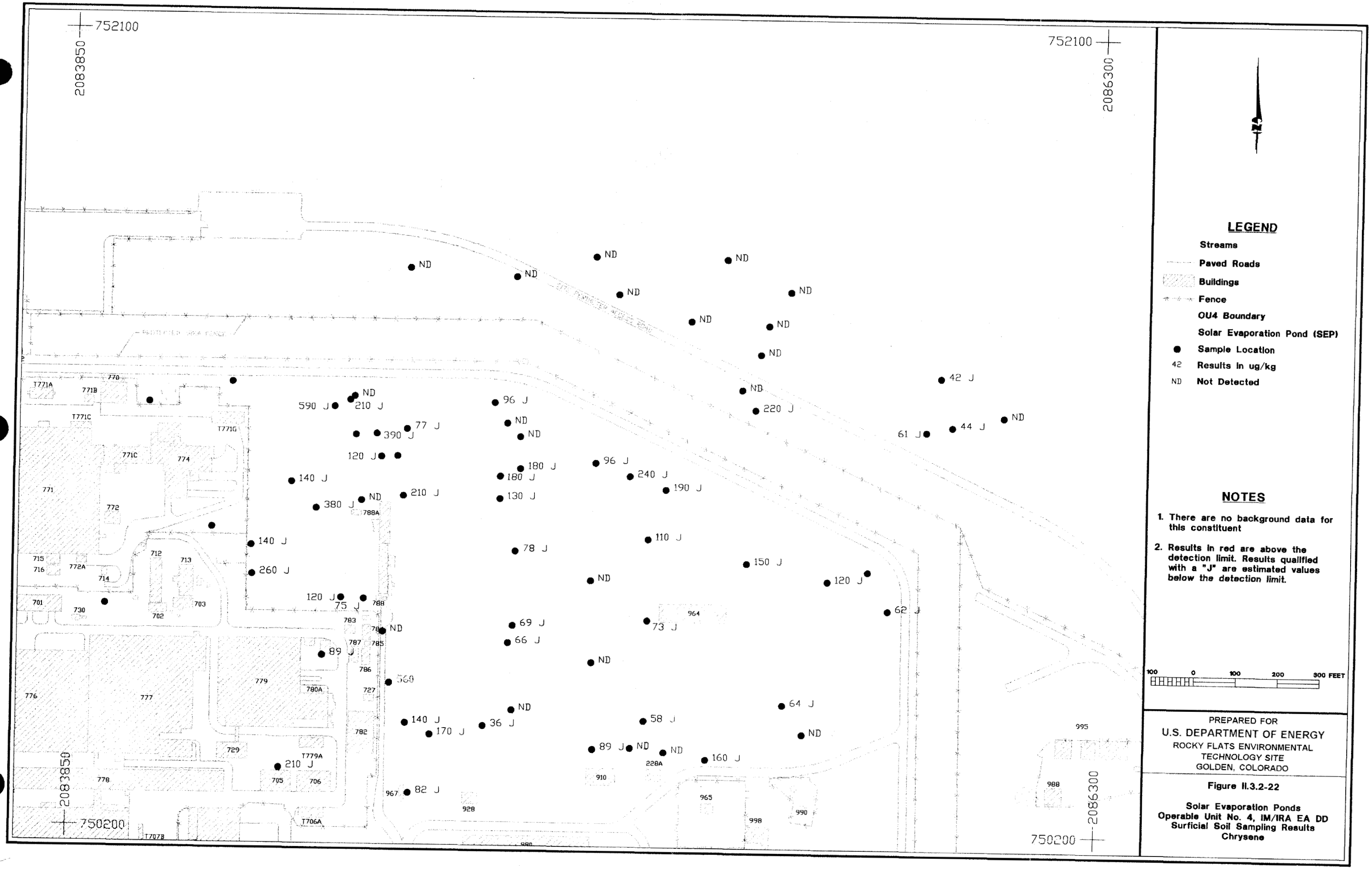
Figure II.3.2-21

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Bis(2-ethylhexyl)phthalate



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 42 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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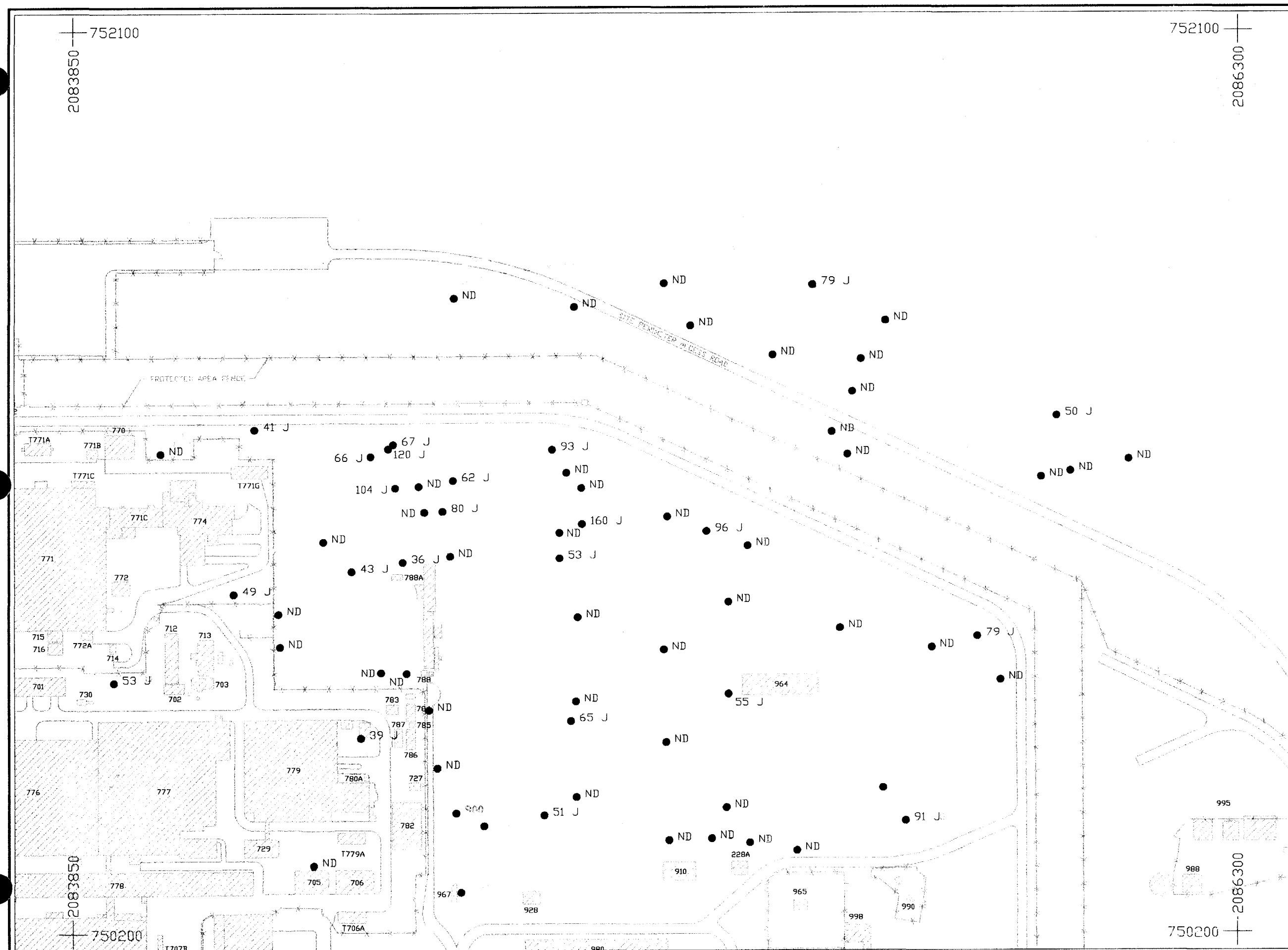
Figure II.3.2-22

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Surficial Soil Sampling Results Chrysene

92



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 160 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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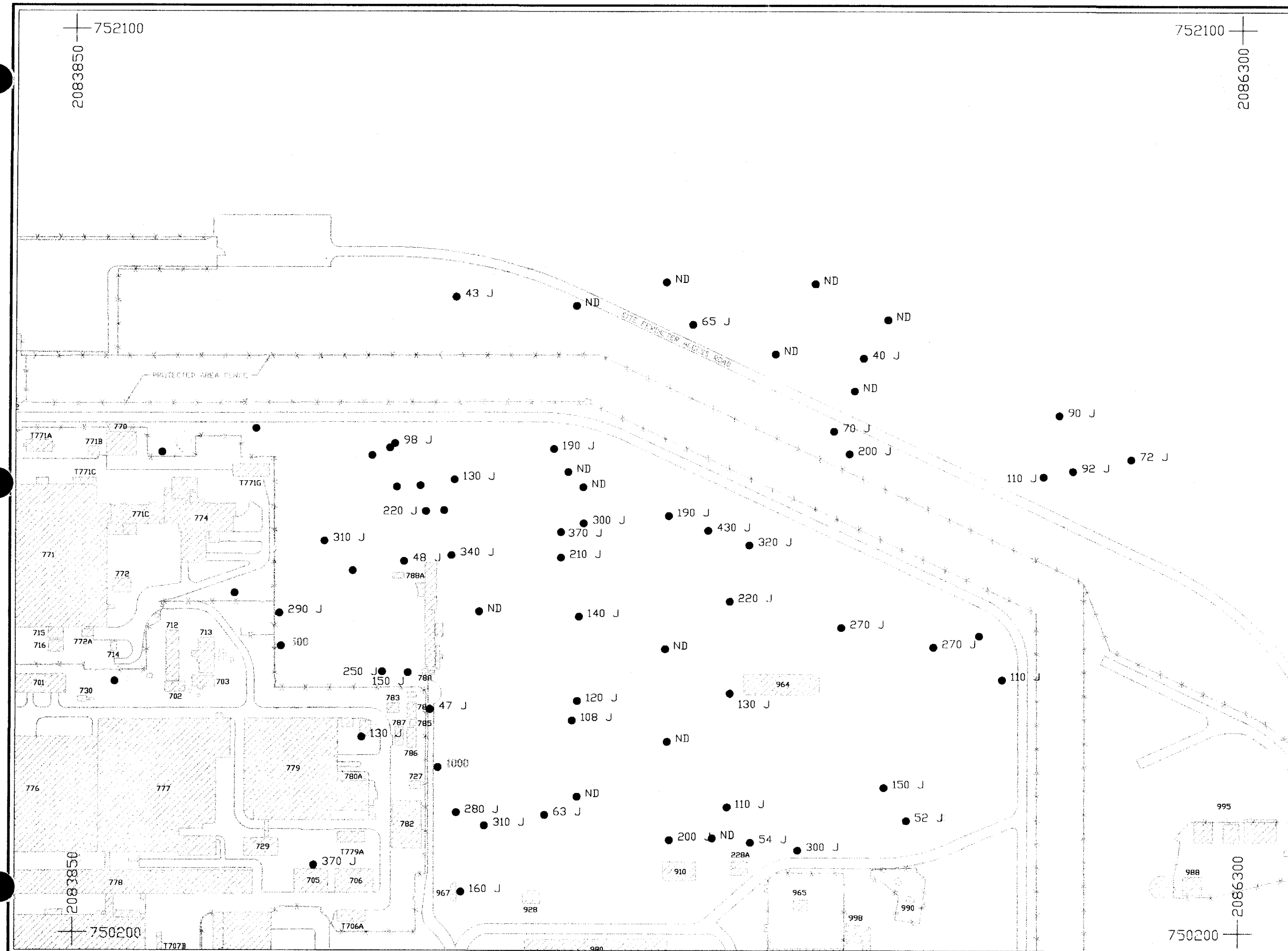
Figure II.3.2-23

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Di-n-butyl phthalate

93



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 270 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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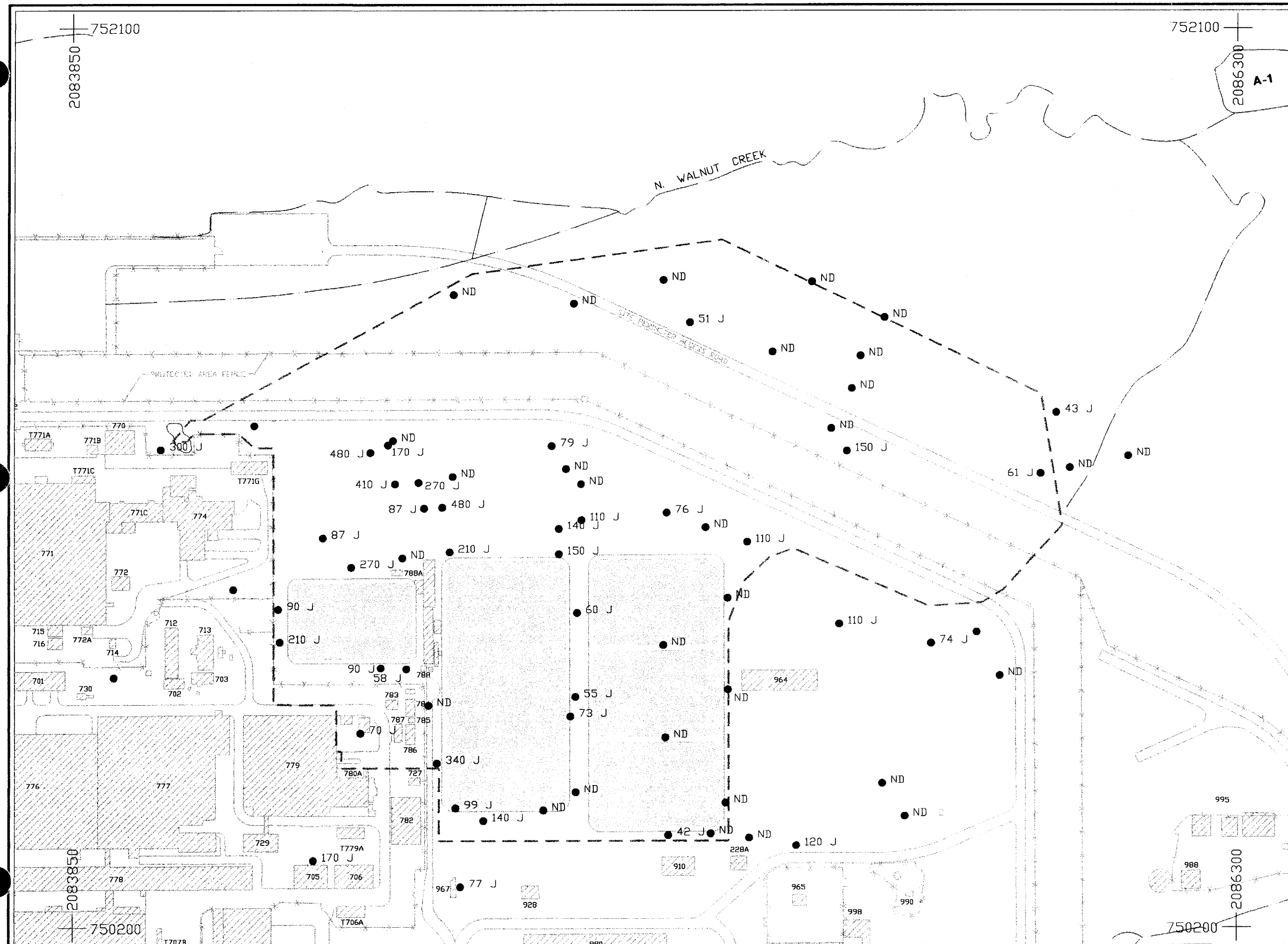
Figure II.3.2-24

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Fluoranthene



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Ponds (SEP)
- OU4 Boundary
- Sample Location
- 150 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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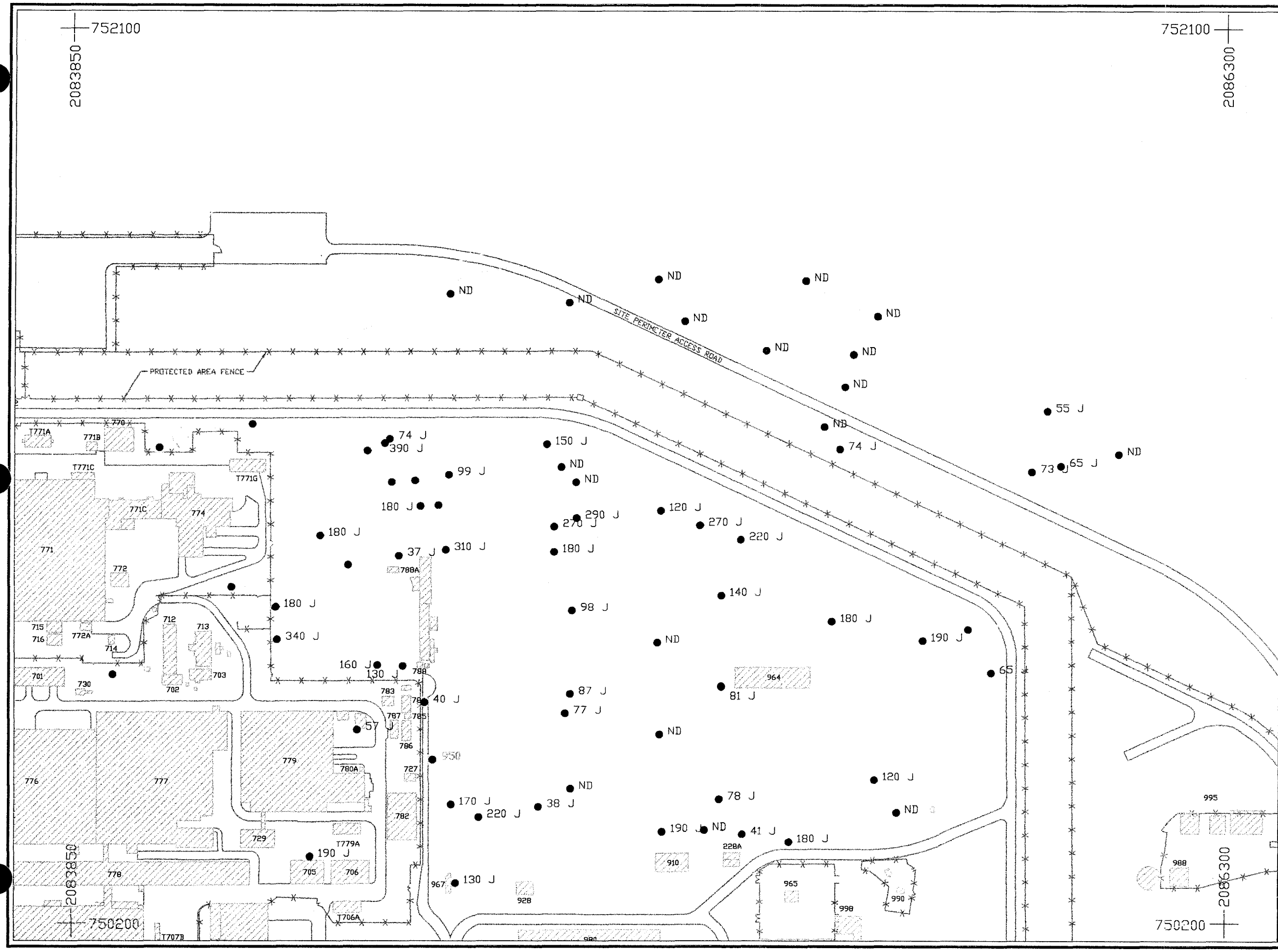
Figure II.3.2-25

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Indeno(1,2,3-cd)pyrene

95



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 120 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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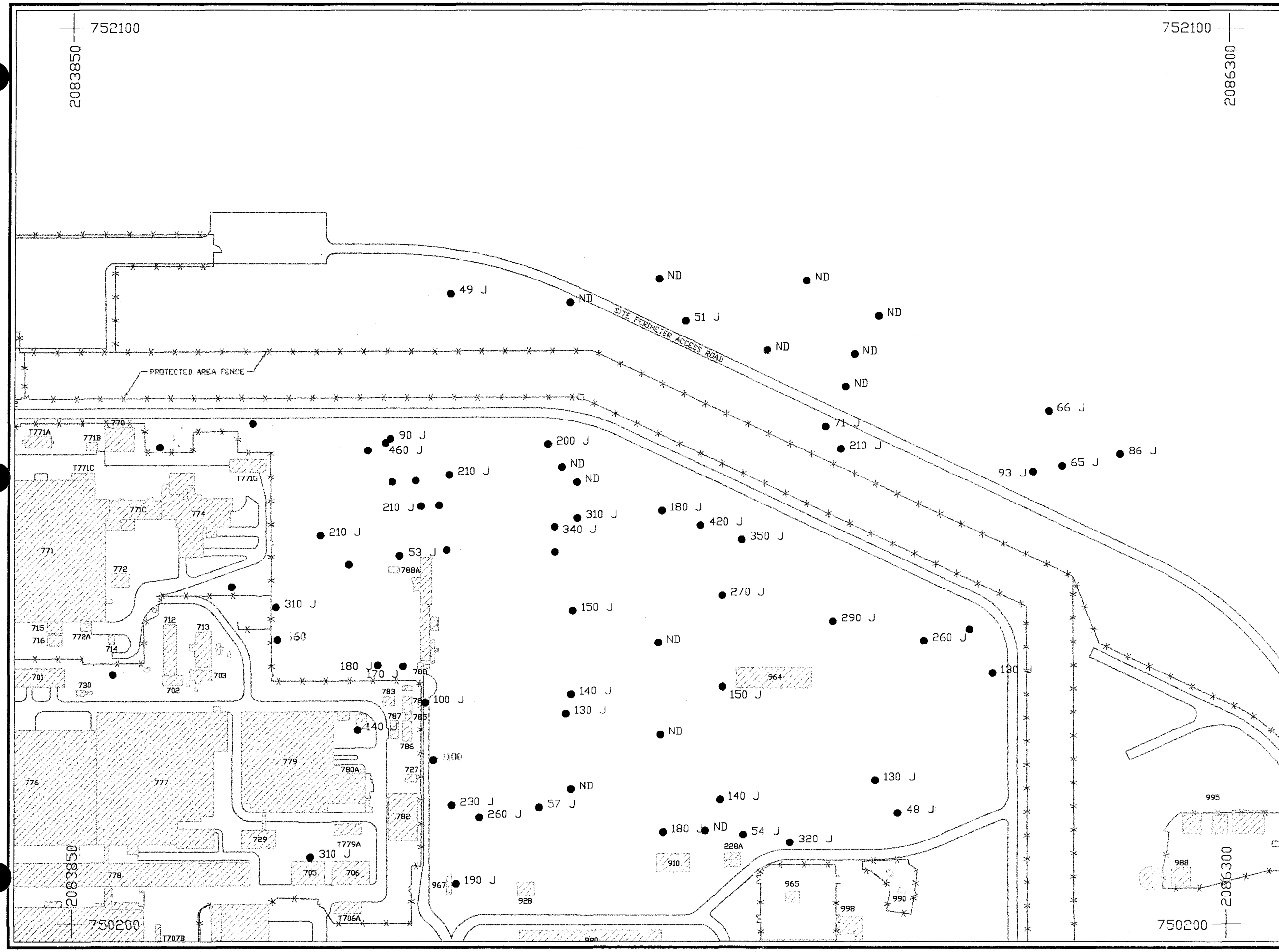
Figure II.3.2-26

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Surficial Soil Sampling Results Phenanthrene



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 420 Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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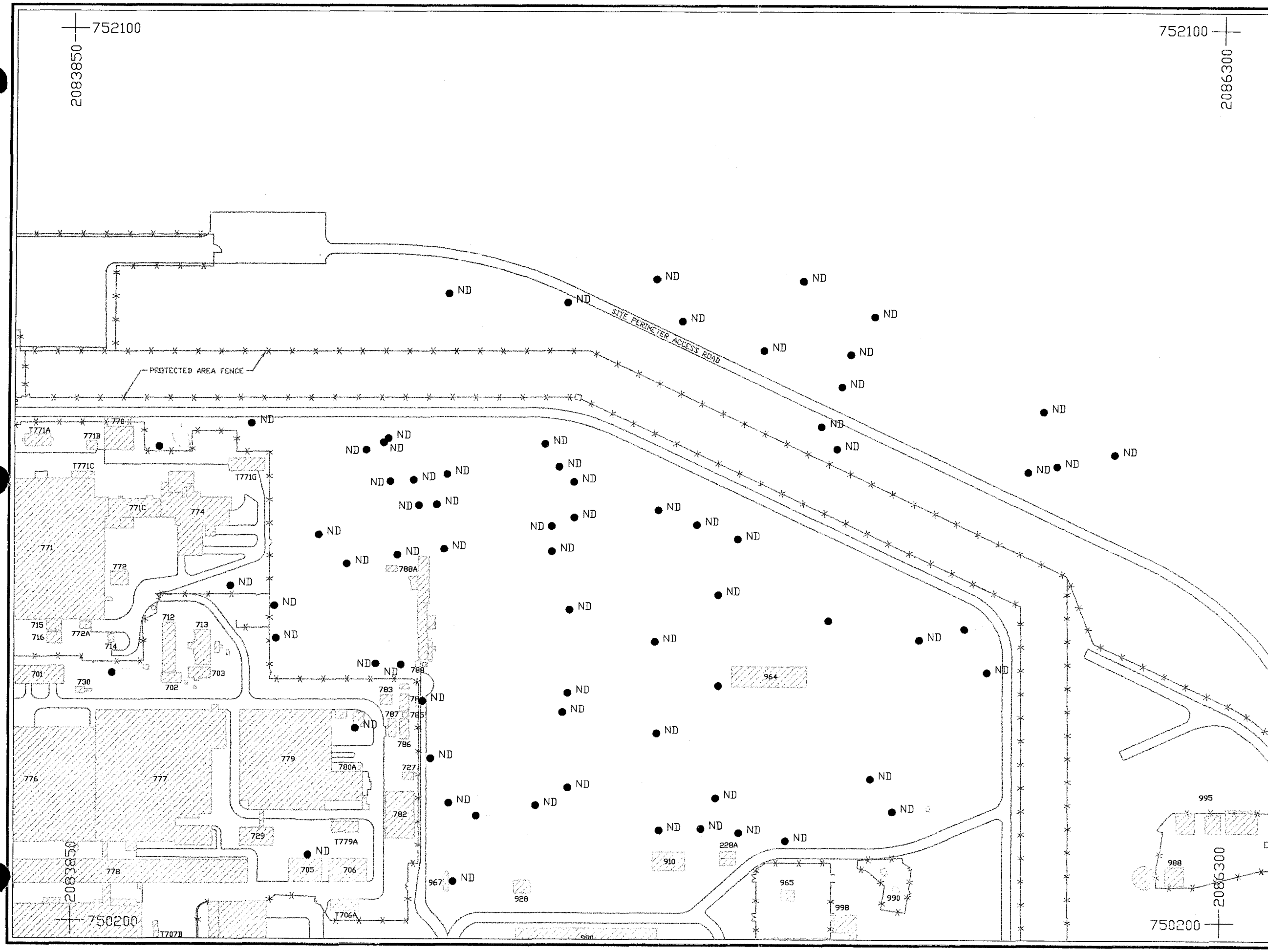
GOLDEN, COLORADO

Figure II.3.2-27

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Pyrene



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- Results in ug/kg
- ND Not Detected

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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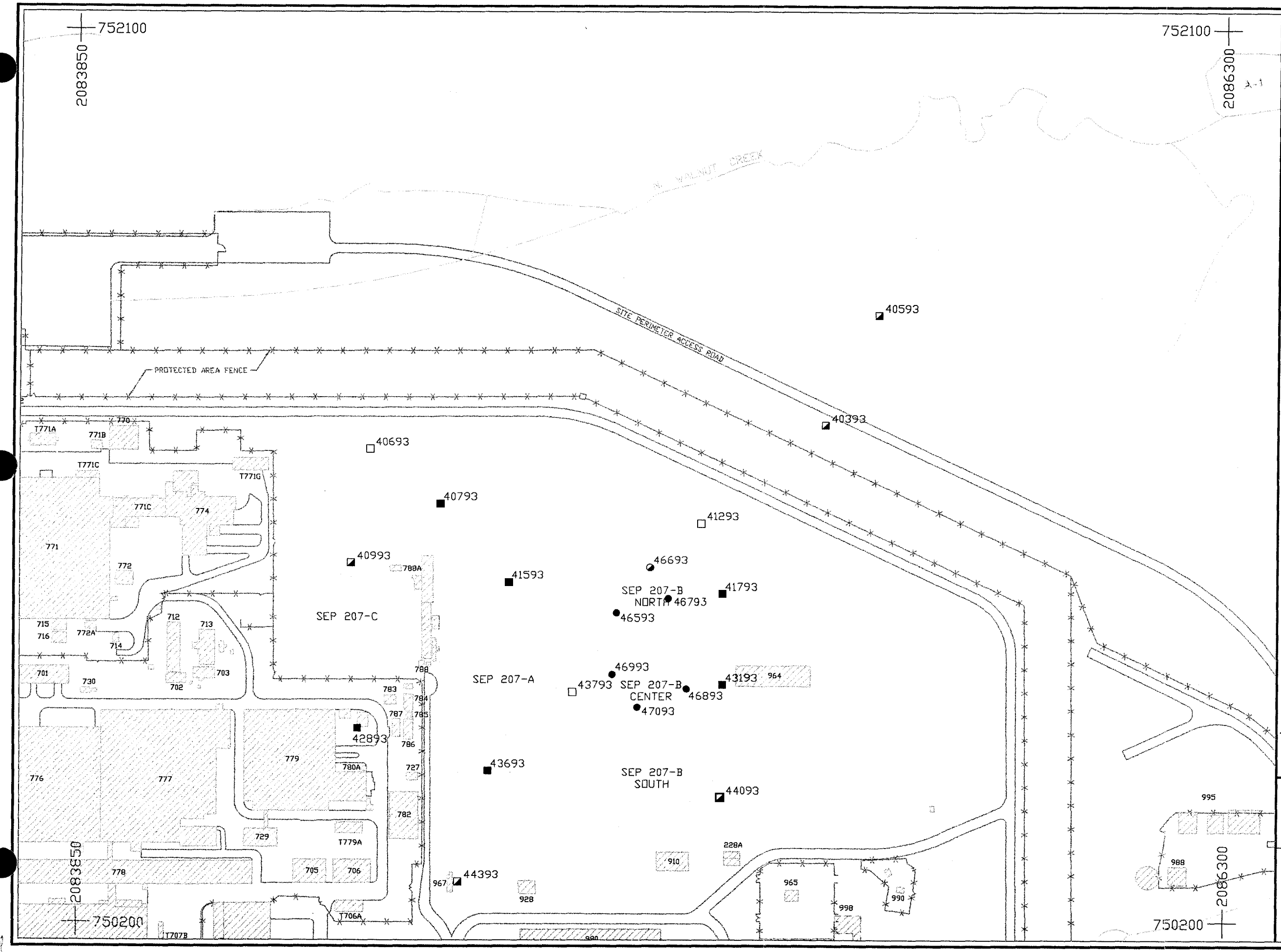
Figure II.3.2-28

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Soil Sampling Results
Aroclor-1254

98



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary

DBS - ANALYZED SAMPLES

- ■ 40793 Alluvium Sample Location And Identification
- □ 40693 Bedrock Sample Location And Identification
- ◪ 40993 Alluvium And Bedrock Sample Location And Identification

IT - ANALYZED SAMPLES

- ● 46593 Alluvium Sample Location And Identification
- ◪ 46693 Alluvium And Bedrock Sample Location And Identification

DBS - D.B. Stephens and Associates

IT - International Technology Corporation

100 0 100 200 300 FEET

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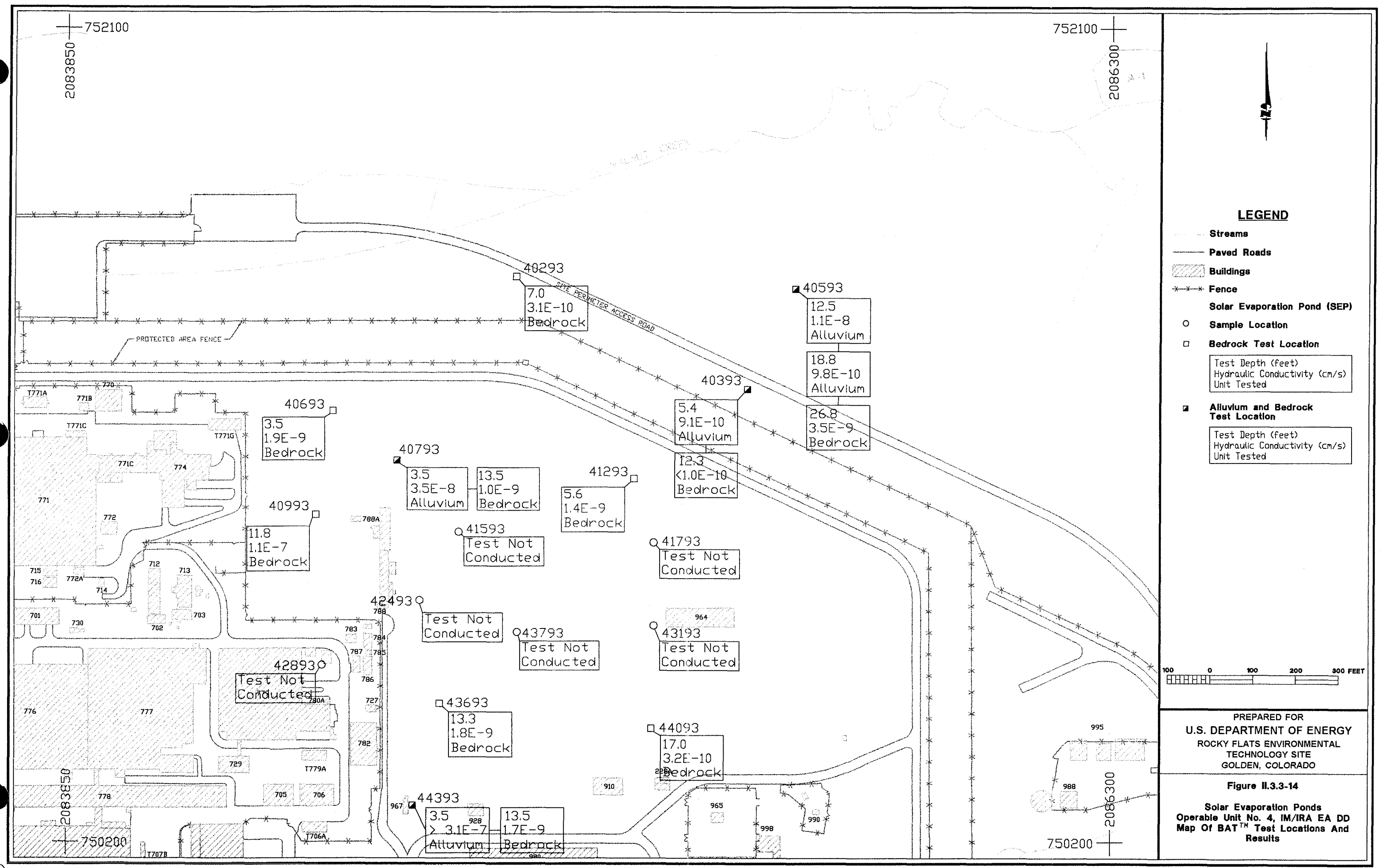
Figure II.3.3-1

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Physical Property Soil And Bedrock Sample Locations



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GOLDEN, COLORADO

Figure II.3.3-14

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Map Of BAT™ Test Locations And Results

112

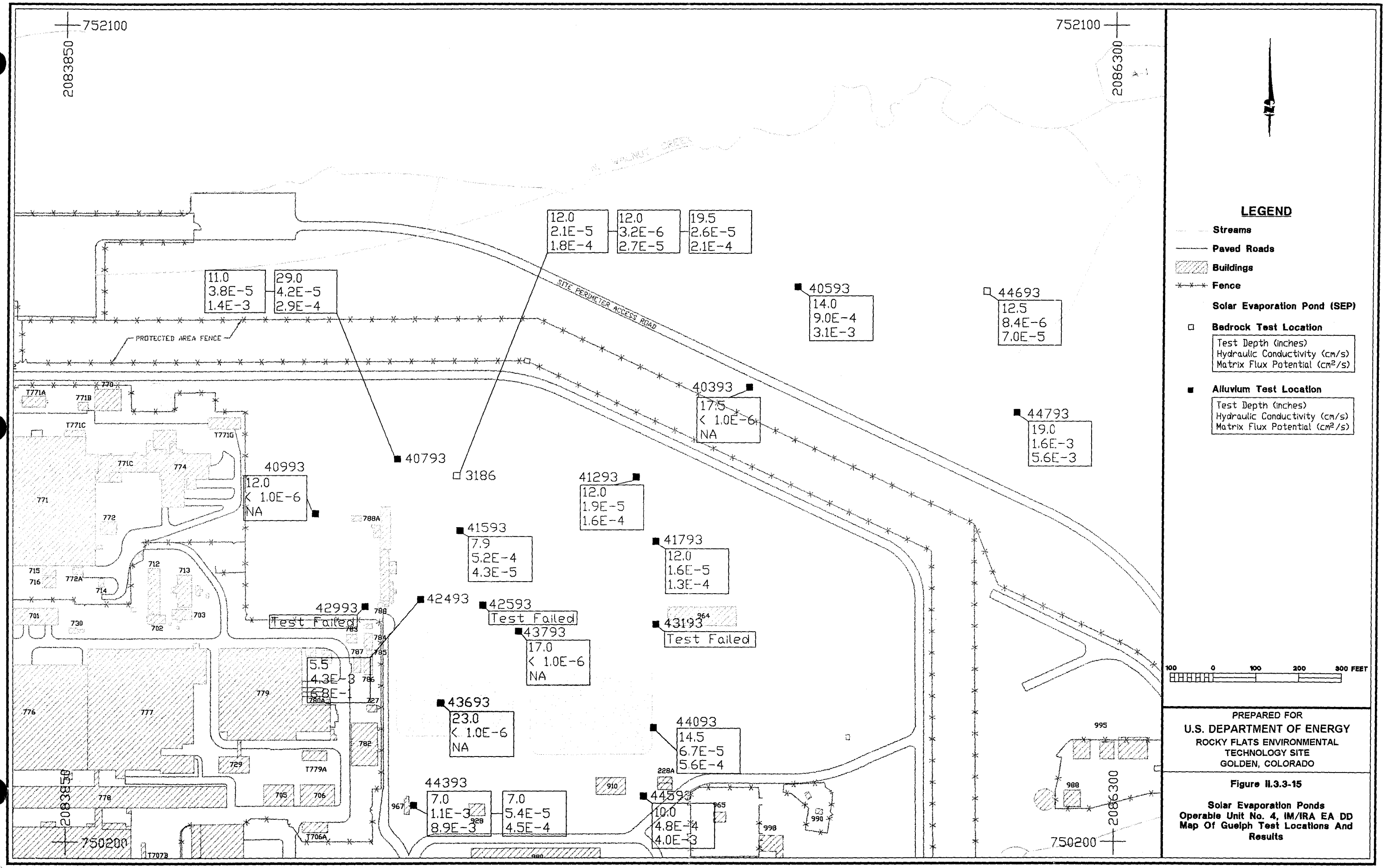

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Figure II.3.3-15

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Map Of Guelph Test Locations And Results

113

752100

2083850

752100

2086300

N

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- Solar Evaporation Pond
- 40593 Monitoring Well With Neutron Access Tube Location And Identification

100 0 100 200 300 FEET

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Figure II.3.3-16

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Map Of Neutron Probe Access Locations

752100
2083850
752100
2086300
N. WALNUT CREEK
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
T771A
771B
770
T771C
T771G
771C
774
771
772
788A
712
713
715
716
772A
714
701
730
702
703
788
964
O 2286
3/26/93 TO 10/26/93
784
787
785
786
779
780A
727
776
777
782
729
T779A
705
706
778
967
928
T706A
T707B
750200
2083850
O 41193
3/24/93 TO 10/26/93
3787
3/31/93 TO 4/13/93
O 2686
~~3/26/93 TO 10/26/93~~
P207689
P207789
4/13/93 TO 7/14/93
228A
910
965
998
990
980
995
988
750200
2086300
100 0 100 200 300 FEET

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- 1886 Alluvium Monitoring Well and Identification
- 76292 Bedrock Monitoring Well and Identification

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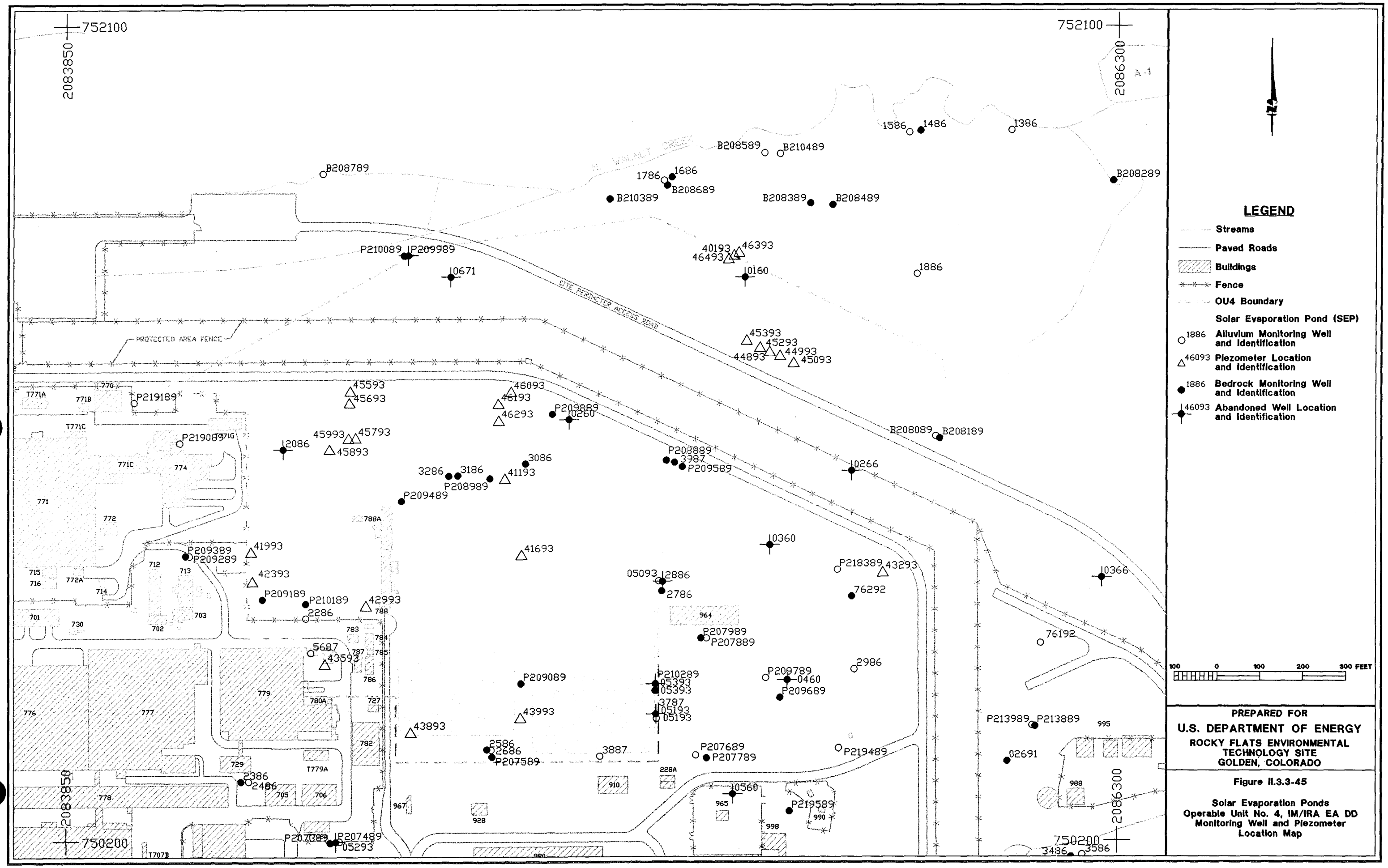
Figure II.3.3-40

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Location And Duration Of Data Loggers/Transducers



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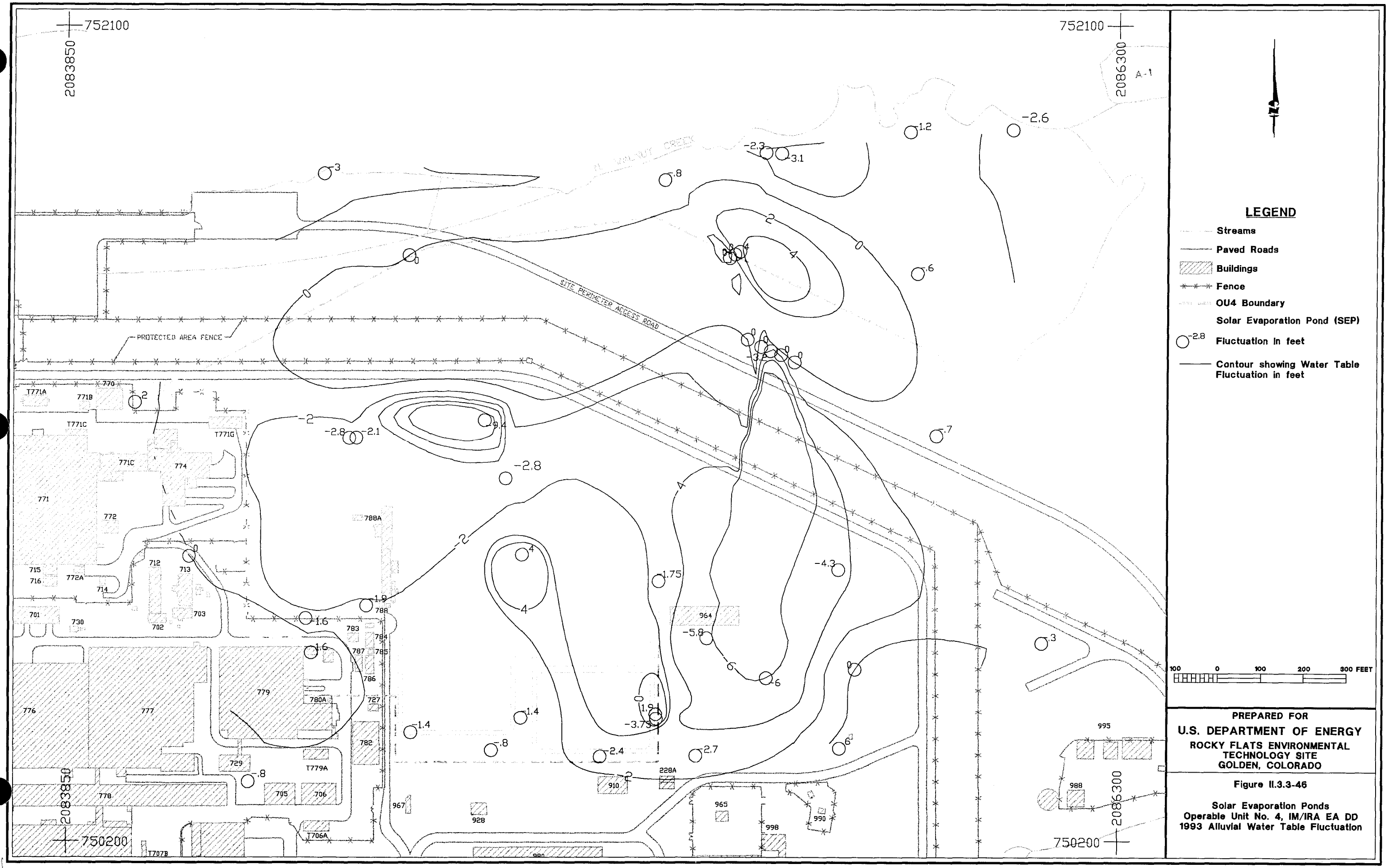
GOLDEN, COLORADO

Figure II.3.3-45

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Monitoring Well and Piezometer Location Map

143



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- -2.8 Fluctuation in feet
- Contour showing Water Table Fluctuation in feet

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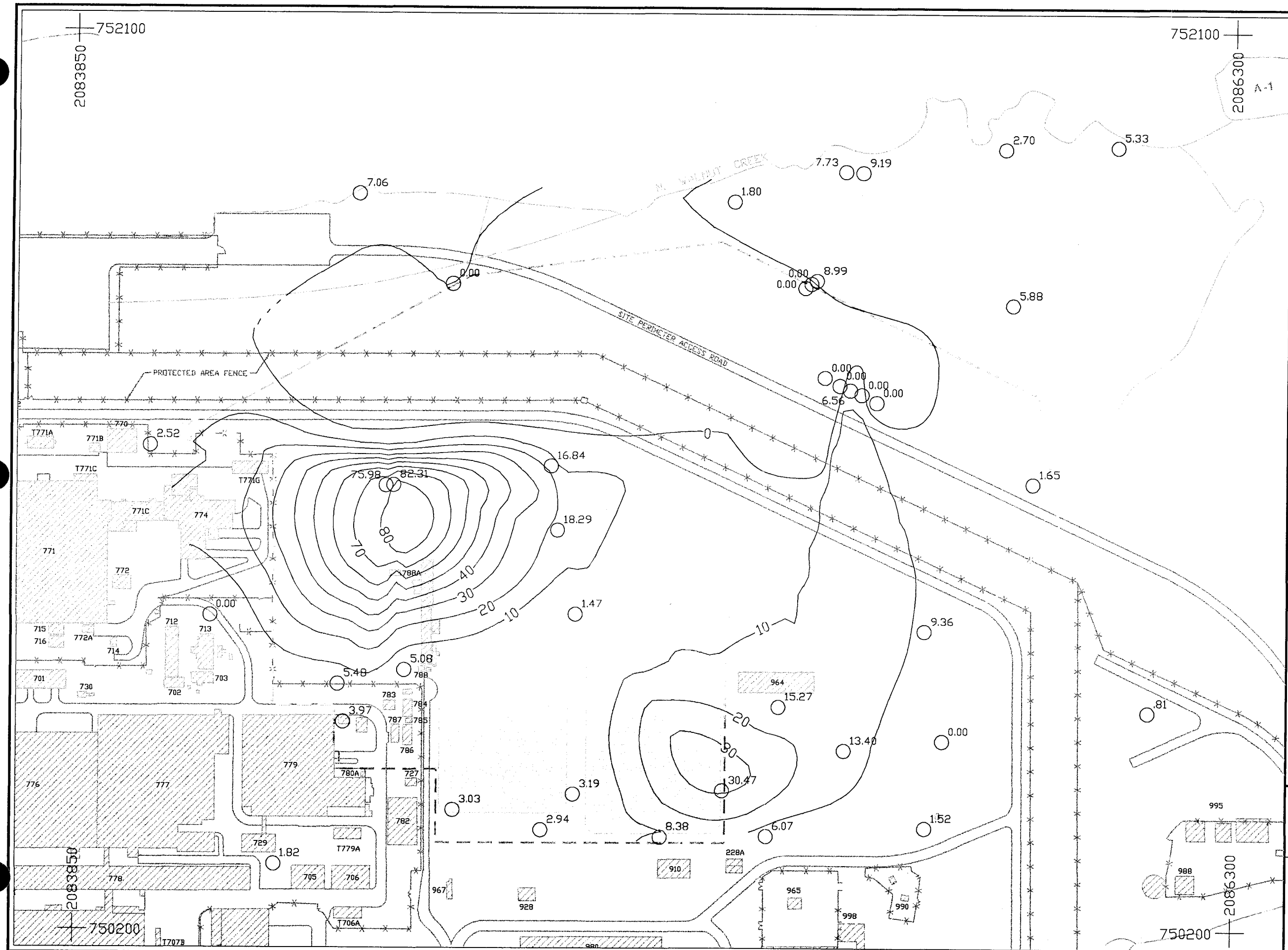
GOLDEN, COLORADO

Figure II.3.3-46

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
1993 Alluvial Water Table Fluctuation

144



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- 1.65 Relative Hydraulic Conductivity at Alluvial Monitoring Well
- Contour showing Relative Hydraulic Conductivity in cm/sec

NOTES

1. Relative hydraulic conductivity is calculated by dividing the approximate difference between the 1993 maximum and the minimum ground water levels by the length of time between them
2. Units = 10^{-6} cm/sec

100 0 100 200 300 FEET

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Figure II.3.3-47

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Alluvial Relative Hydraulic Conductivity

145

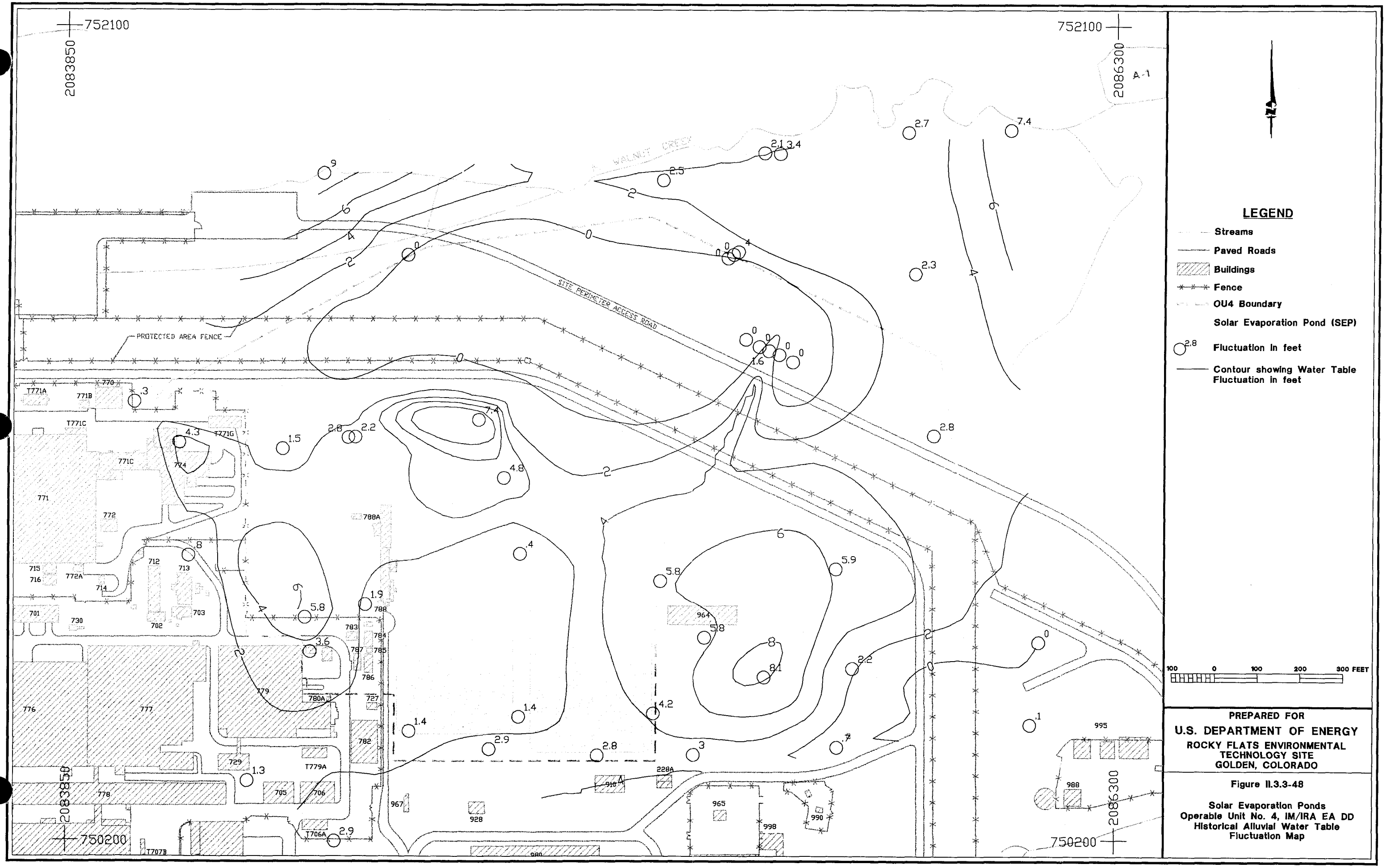

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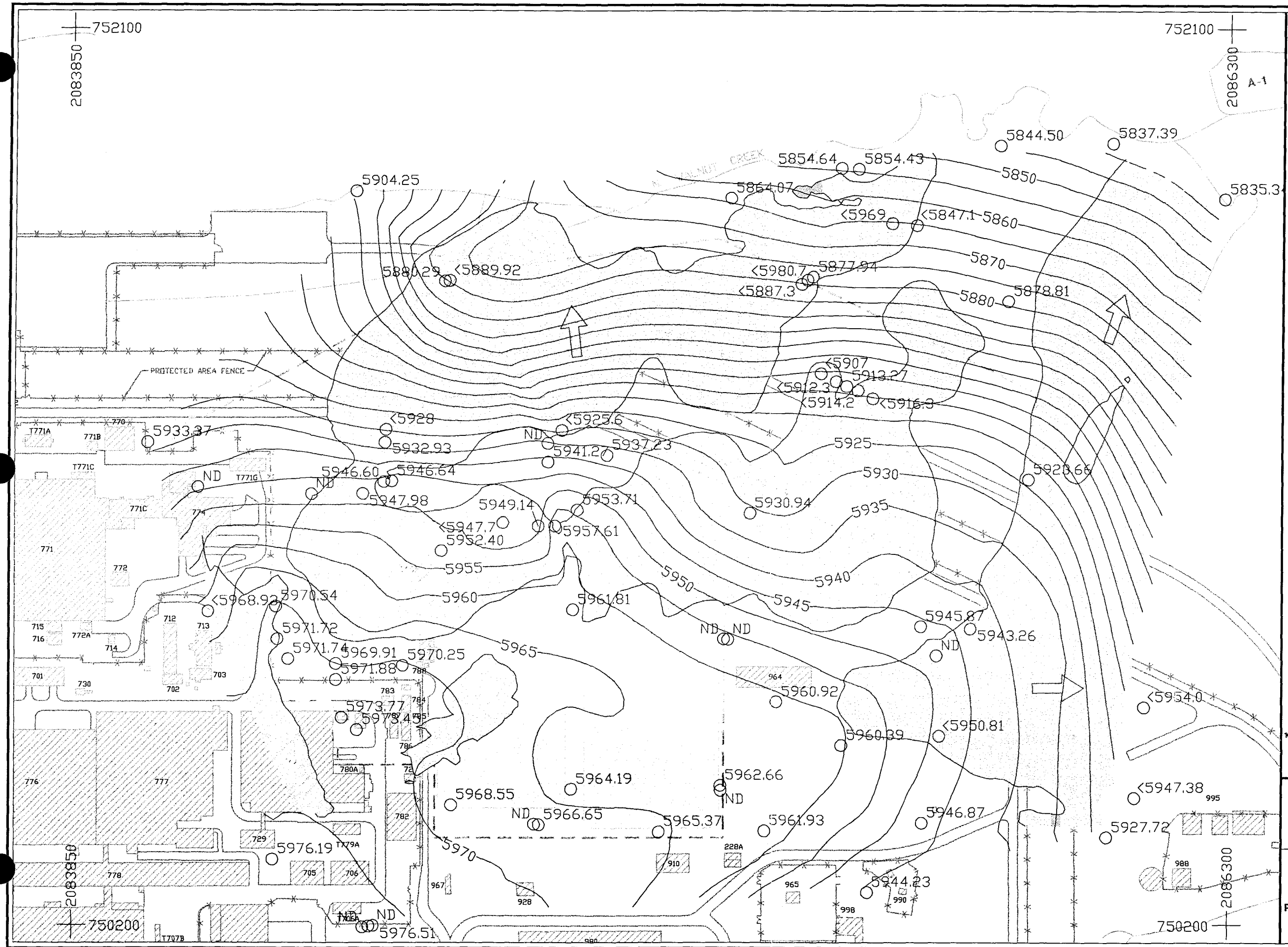
Figure II.3.3-48

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Historical Alluvial Water Table Fluctuation Map

146



N

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- 5970.54 Ground Water Elevation (in feet msl)
- Areas of Dry Alluvial
- –5900– Water Elevation Contour (in feet msl)
- Direction of Ground Water Flow

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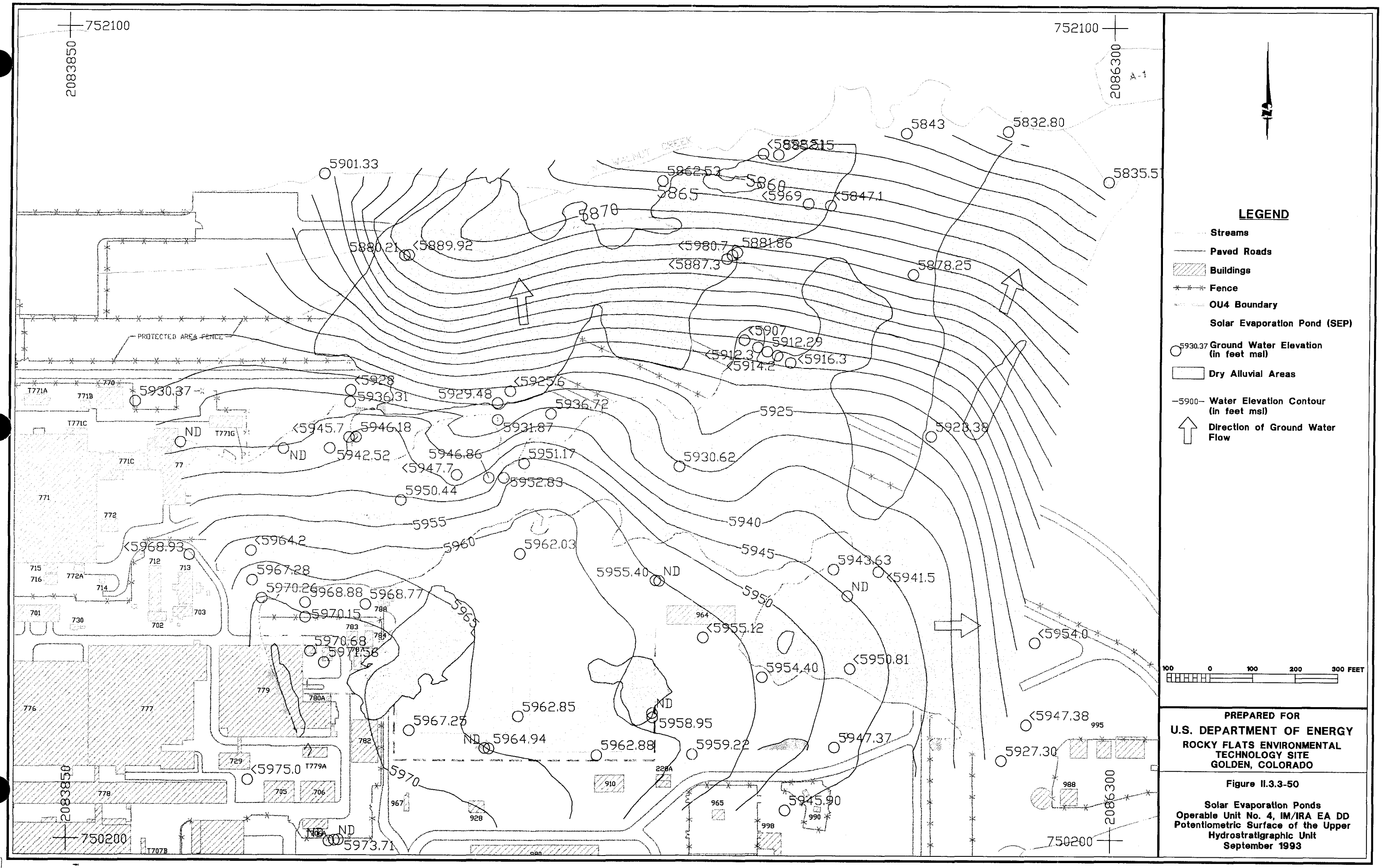
Figure II.3.3-49

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Potentiometric Surface Map of the Upper Hydrostratigraphic Unit April 1993



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- 5930.37 Ground Water Elevation (in feet msl)
- Dry Alluvial Areas
- 5900 Water Elevation Contour (in feet msl)
- Direction of Ground Water Flow

100 0 100 200 300 FEET

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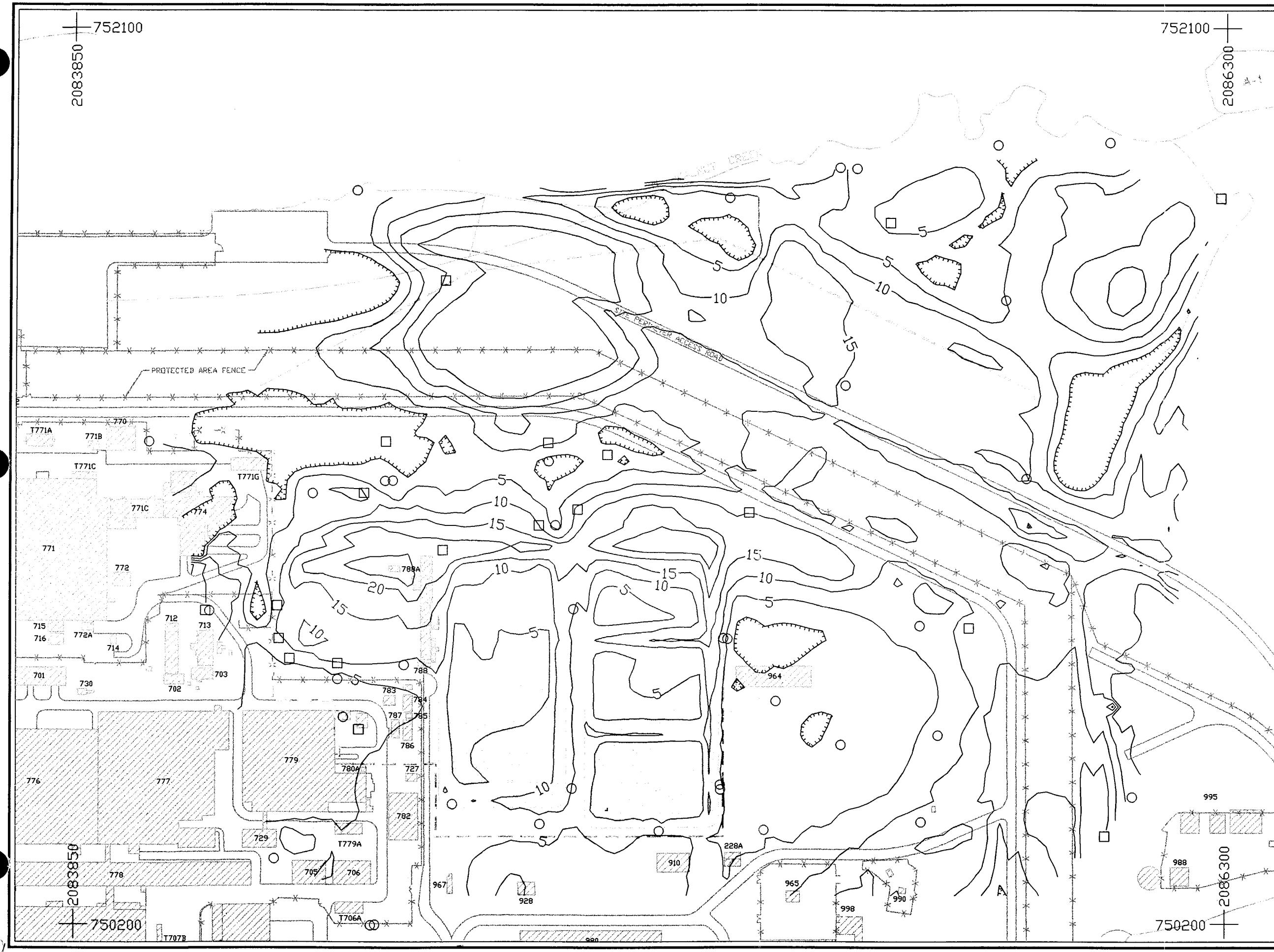
GOLDEN, COLORADO

Figure II.3.3-50

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Potentiometric Surface of the Upper Hydrostratigraphic Unit
September 1993

148



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Alluvium Monitoring Well Location
- Bedrock Monitoring Well Location
- Historical Seep

NOTES

1. Contours represent the difference between ground surface elevation and estimated maximum historical elevation of water table in feet
2. Units represent thickness in feet

100 0 100 200 300 FEET

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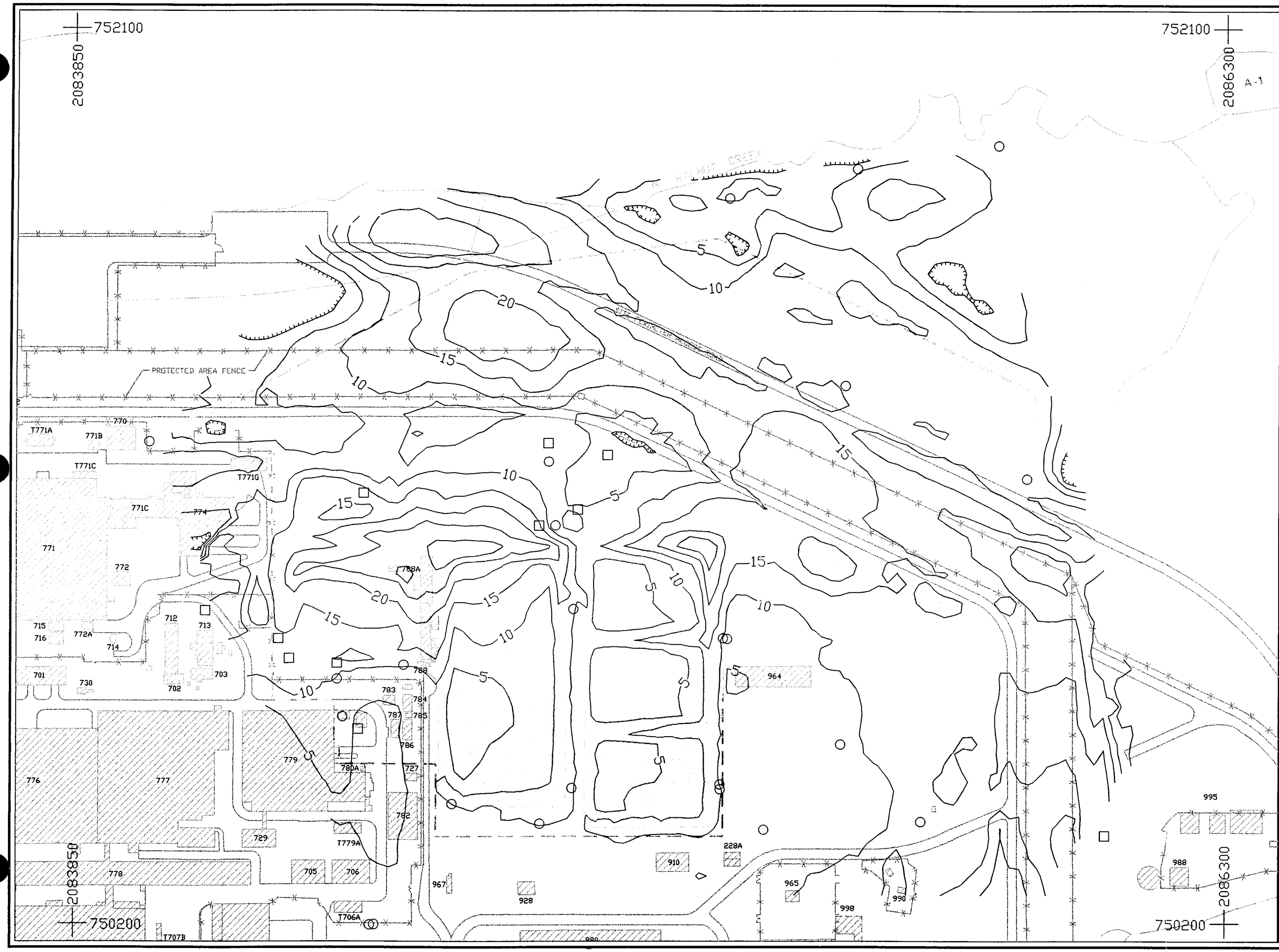
GOLDEN, COLORADO

Figure II.3.3-51

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Minimum Vadose Zone
Thickness Isopach



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Alluvium Monitoring Well Location
- Bedrock Monitoring Well Location
- Historical Seep

NOTES

1. Contours represent the difference between ground surface elevation and estimated minimum historical ground water elevation in feet
2. Units represent thickness in feet

100 0 100 200 300 FEET

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ROCKY FLATS PLANT
GOLDEN, COLORADO

Figure II.3.3-52

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Maximum Vadose Zone
Thickness Isopach

752100

2083850

752100

2086300

A-1

SITE PERIMETER ACCESS ROAD

PROTECTED AREA FENCE

SG01 SG02 SG03 SG04 SG05 SG06 SG07 SG08 SG09 SG10 SG11 SG12 SG13 SG14 SG15 SG16 SG17 SG18 SG19 SG20 SG21 SG22 SG23 SG24 SG25 SG26 SG27 SG28

770 771 771C 772 772A 774 776 777 778 779 780A 782 784 785 786 787 788 788A 701 702 703 705 706 712 713 714 715 716 727 729 730 910 928 964 965 967 988 990 995 998 228A

T771A T771B T771C T771G T779A T706A T707B

750200

2083850

750200

2086300

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- SG01 Sample Location and Identification

100 0 100 200 300 FEET

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GOLDEN, COLORADO

Figure II.3.3-59

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Soil Gas Survey Location Map

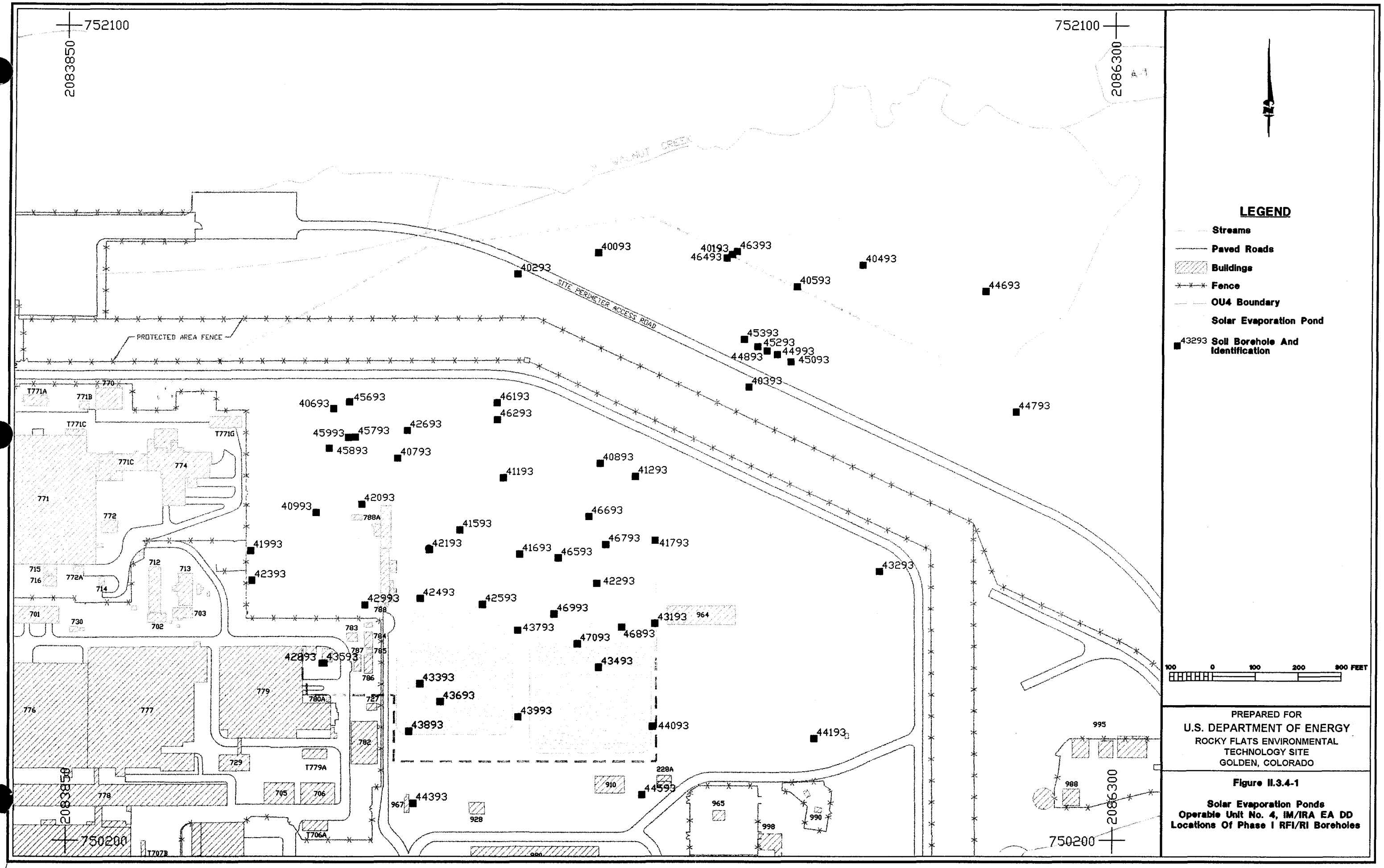

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Figure II.3.4-1

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Locations Of Phase I RFI/RI Boreholes

174

752100
2083850
752100
2086300
A-1
N. WALNUT CREEK
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
106 0-6
142 0-6
134 0-2.9
193 0-5
147 0-5
52 0-4
77.1 0-6
62 0-6
74.1 0-3.3
54.4 0-6
120 0-2
100 2-4
68.8 4-6
140 .5-2.25
41.2 2.25-4.25
37.4 4.6-6.6
75.5 0-5
68.8 0-6
63.3 0-2
65.9 2-4
44.5 4-6
92.3 0-6
80.1 .5-2.5
112
201
52.2 0-6
67.3 .75-2.75
31.9 2.75-4.75
32.4 4.75-6.75
110 .7-6.1
69.8 1-6
268 0-2
117 2-4
49.4 4-6
73.7 0-2
46.4 2-4
31 4-6
116 1.3-3.1
29.2 3.3-5
9.7 5.5-7
964
87.7 0-6
143 0-5
103 .7-2.7
76.6 2.7-4.7
41.8 4.8-6.8
120 .5-2.5
93.6 2.5-4.6
114 4.6-6.6
109
130 .5-5.3
87.4 0-2
23.9 2-4
26.3 4-5.4
144 0-2
88.6 2-4
42.7 4-6
89.3 0-6
129 0-6
226 0-6
83 0-6
995
988
228A
910
62 0-6.2
965
998
990
967
90.1 0-5
928
980
T771A
771B
770
T771C
T771G
771C
774
771
772
772A
715
716
712
713
714
701
730
702
703
783
784
787
785
788
788A
786
779
780A
727
776
777
782
729
T779A
778
705
706
T706A
T707B
750200
2083850
750200
2086300

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 74.1 Results in mg/kg
- 0-3.3 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 93.87 mg/kg

100 0 100 200 300 FEET

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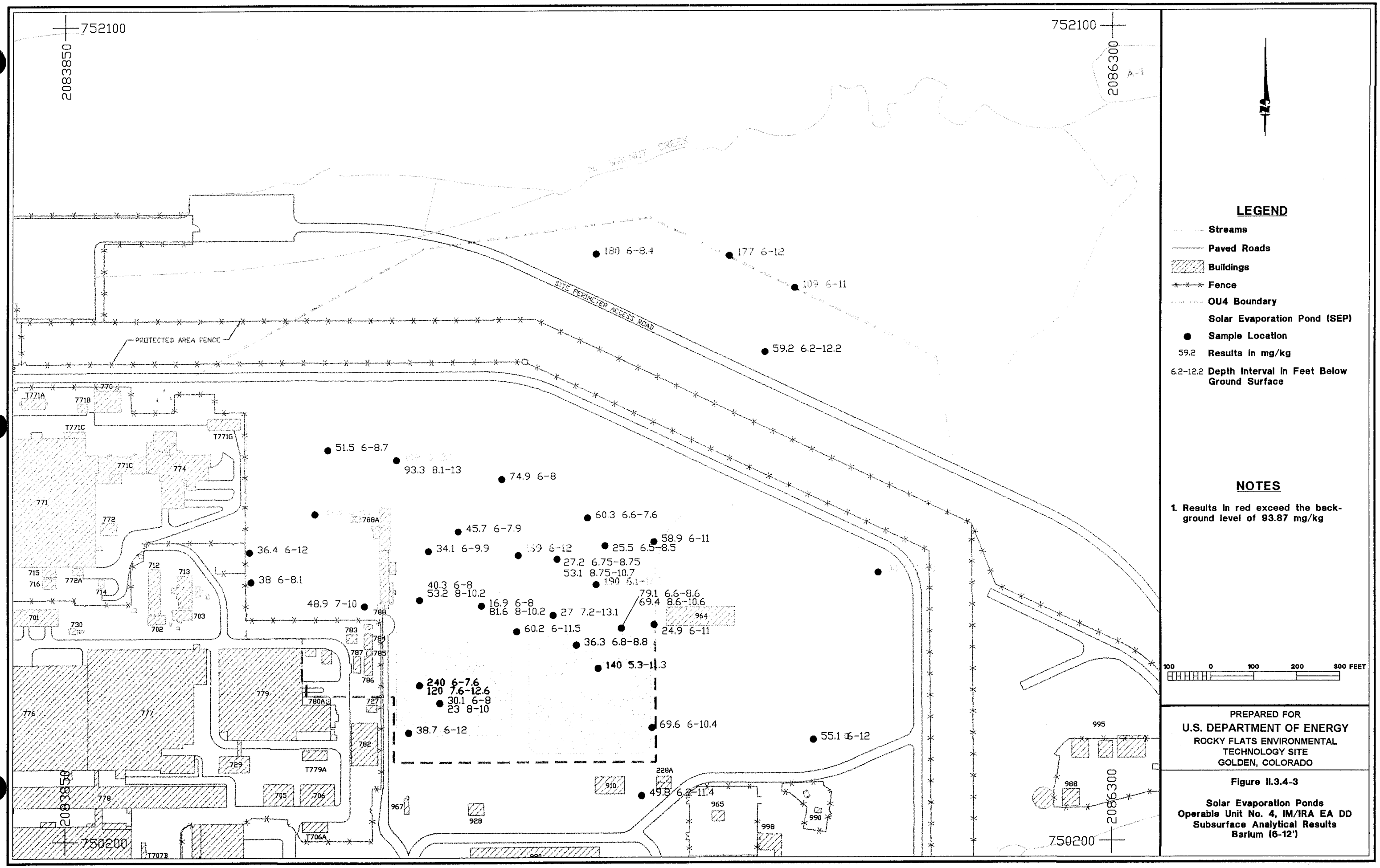
Figure II.3.4-2

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Barium (0-6')

175



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 59.2 Results in mg/kg
- 6.2-12.2 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 93.87 mg/kg

100 0 100 200 300 FEET

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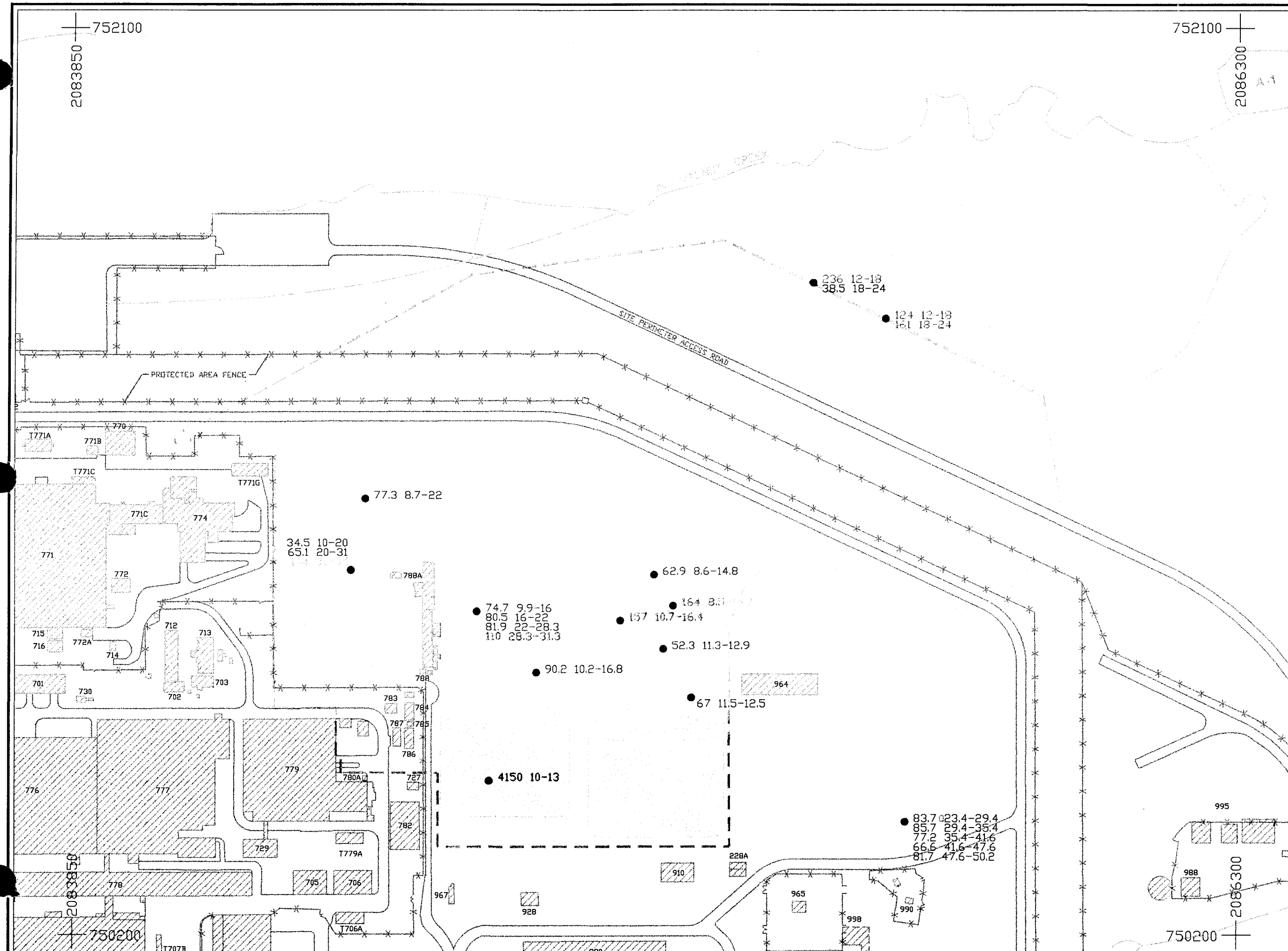
Figure II.3.4-3

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Barium (6-12')



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- 124 Results in mg/kg
- 12-18 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 93.87 mg/kg

100 0 100 200 300 FEET

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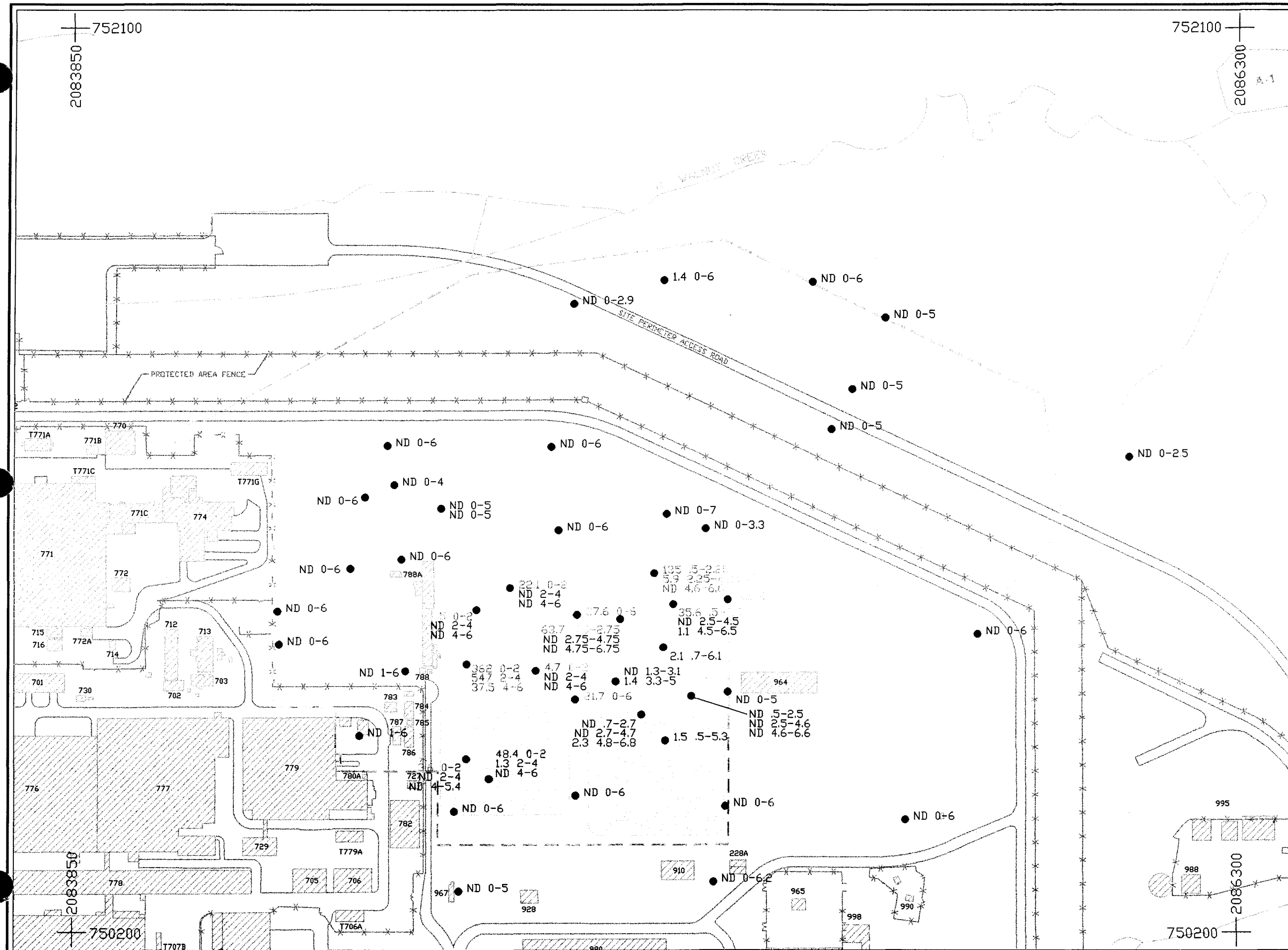
Figure II.3.4-4

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Barium (>12')



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 1.4 Results in mg/kg
- ND Not Detected
- 0-6 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 2.3 mg/kg

100 0 100 200 300 FEET

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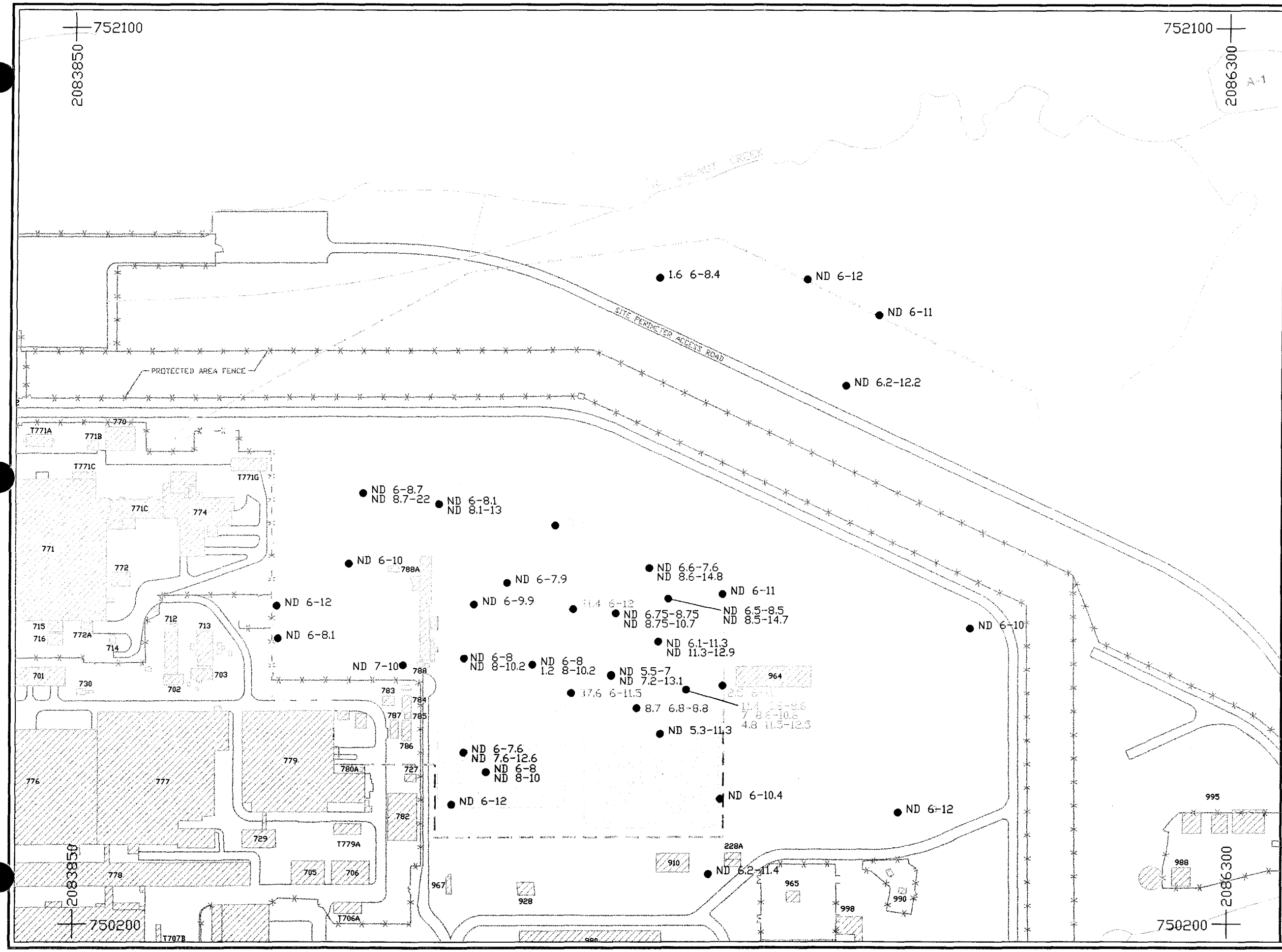
Figure II.3.4-5

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Cadmium (0-6')

178



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 15.5 Results in mg/kg
- ND Not Detected
- Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 2.3 mg/kg

100 0 100 200 300 FEET

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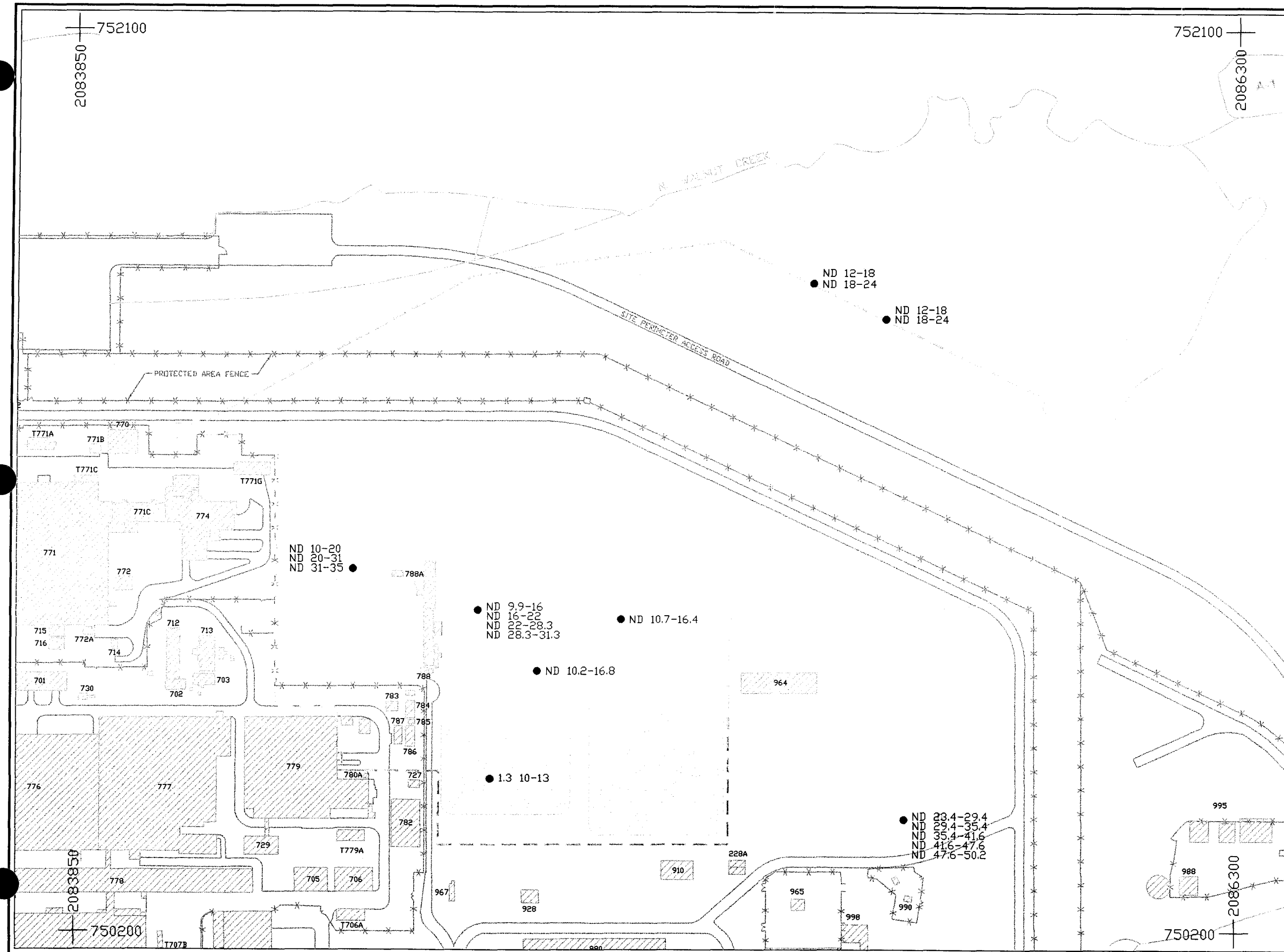
Figure II.3.4-6

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Cadmium (6-12')

179



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 1.2 Results in mg/kg
- ND Not Detected
- 18-24 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 2.3 mg/kg

100 0 100 200 300 FEET

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Figure II.3.4-7

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Cadmium (>12')

180

752100
2083850
752100
2086300
JARMEL CIRCLE
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
ND 0-6
ND 0-6
ND 0-2.9
ND 0-5
ND 0-5
ND 0-5
ND 0-2.5
ND 0-6
ND 0-4
ND 0-6
ND 0-5
ND 0-7
ND 0-6
ND 0-3.3
ND 0-6
ND 0-6
16.2 4-6
43 4-6
ND 0-6
ND .75-6.75
ND .7-6.1
ND 0-6
ND 1-6
ND 1.3-5
ND 0-6
ND .7-6.8
ND .5-5.3
ND 1-6
.896 4-5.4
1.91 4-6
ND 0-6
ND 0-6
ND 0-6
ND 0-6
ND 0-5
T771A
771B
770
T771C
T771G
771C
774
771
772
788A
715
716
772A
712
713
714
701
730
702
703
788
783
784
787
785
786
779
780A
727
776
777
782
729
T779A
778
705
706
T706A
T707B
967
928
910
228A
965
998
990
964
995
988
750200
2083850
750200
2086300

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 1.53 Results in mg/kg
- ND Not Detected
- 2-4' Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit

100 0 100 200 300 FEET

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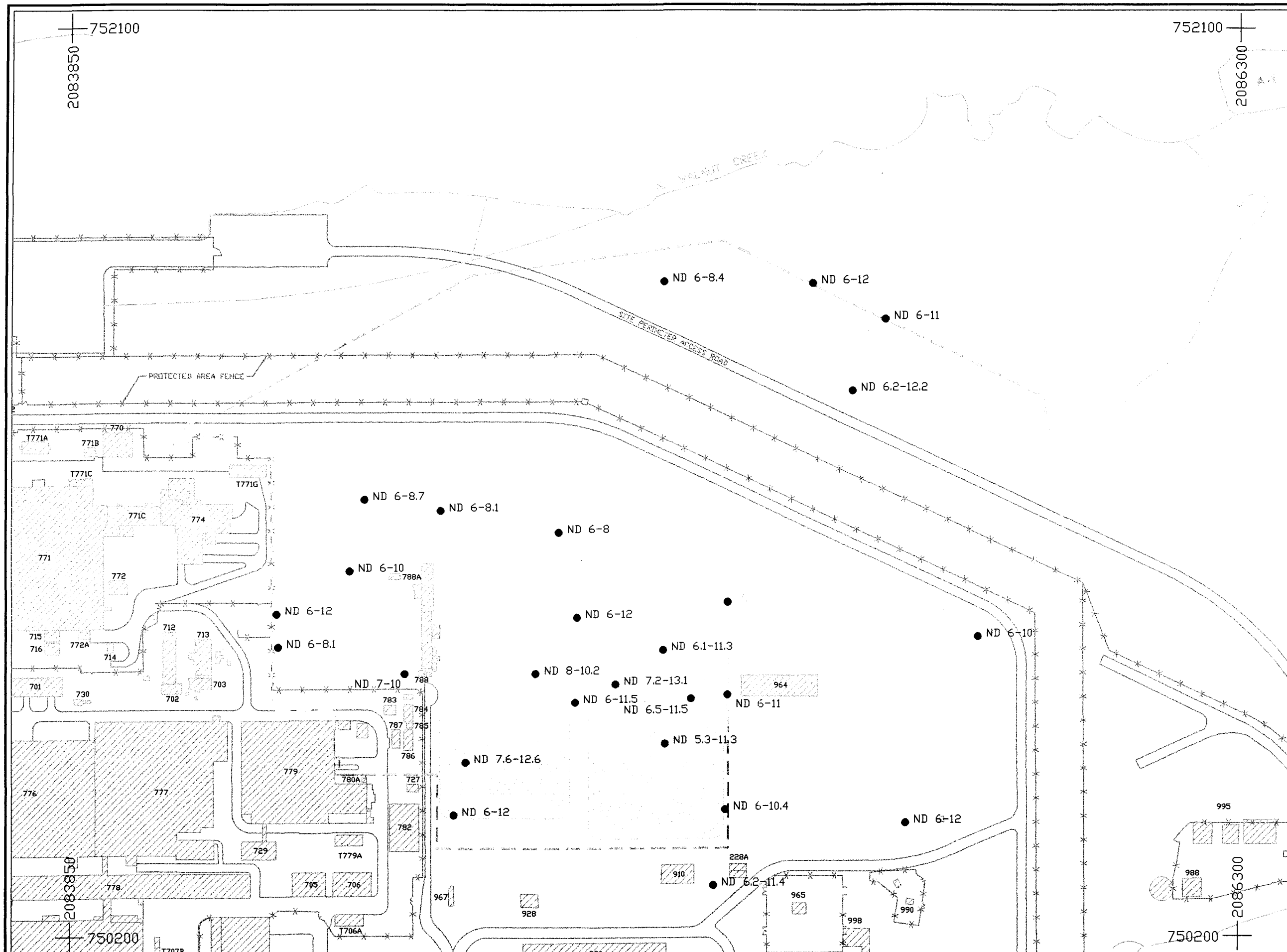
GOLDEN, COLORADO

Figure II.3.4-8

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Cyanide (0-6')

181



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .325 Results in mg/kg
- ND Not Detected
- Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit

100 0 100 200 300 FEET

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GOLDEN, COLORADO

Figure II.3.4-9

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Cyanide (6-12')

182

752100
2083850
752100
2086300
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
ND 12-18
2.68 18-24
ND 12-18
4.26 18-24
ND 8.7-22
ND 10-20
ND 20-31
ND 31-35
ND 9.9-16
ND 16-22
ND 22-28.3
ND 28.3-31.3
ND 11.3-12.9
ND 10.7-16.4
ND 10.2-16.8
ND .7-6.8
ND 23.4-29.4
ND 29.4-35.4
ND 35.4-41.6
ND 41.6-47.6
ND 47.6-50.2
T771A
770
771B
T771C
T771G
771C
774
771
772
715
716
772A
714
712
713
701
730
702
703
788
783
784
787
785
786
779
780A
727
776
777
782
729
T779A
778
705
706
T706A
T707B
967
928
788A
964
910
228A
965
998
990
995
988
750200
2083850
750200
2086300

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- 8.68 Results in mg/kg
- ND Not Detected
- 12-18 Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit

100 0 100 200 300 FEET

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ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
GOLDEN, COLORADO

Figure II.3.4-10

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Cyanide (> 12')

183

752100

2083850

752100

2086300

N

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 5.1 Results in mg/kg
- 0-6 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 83.2 mg/kg

100 0 100 200 300 FEET

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ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
GOLDEN, COLORADO

Figure II.3.4-11

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Lithium (0-6')

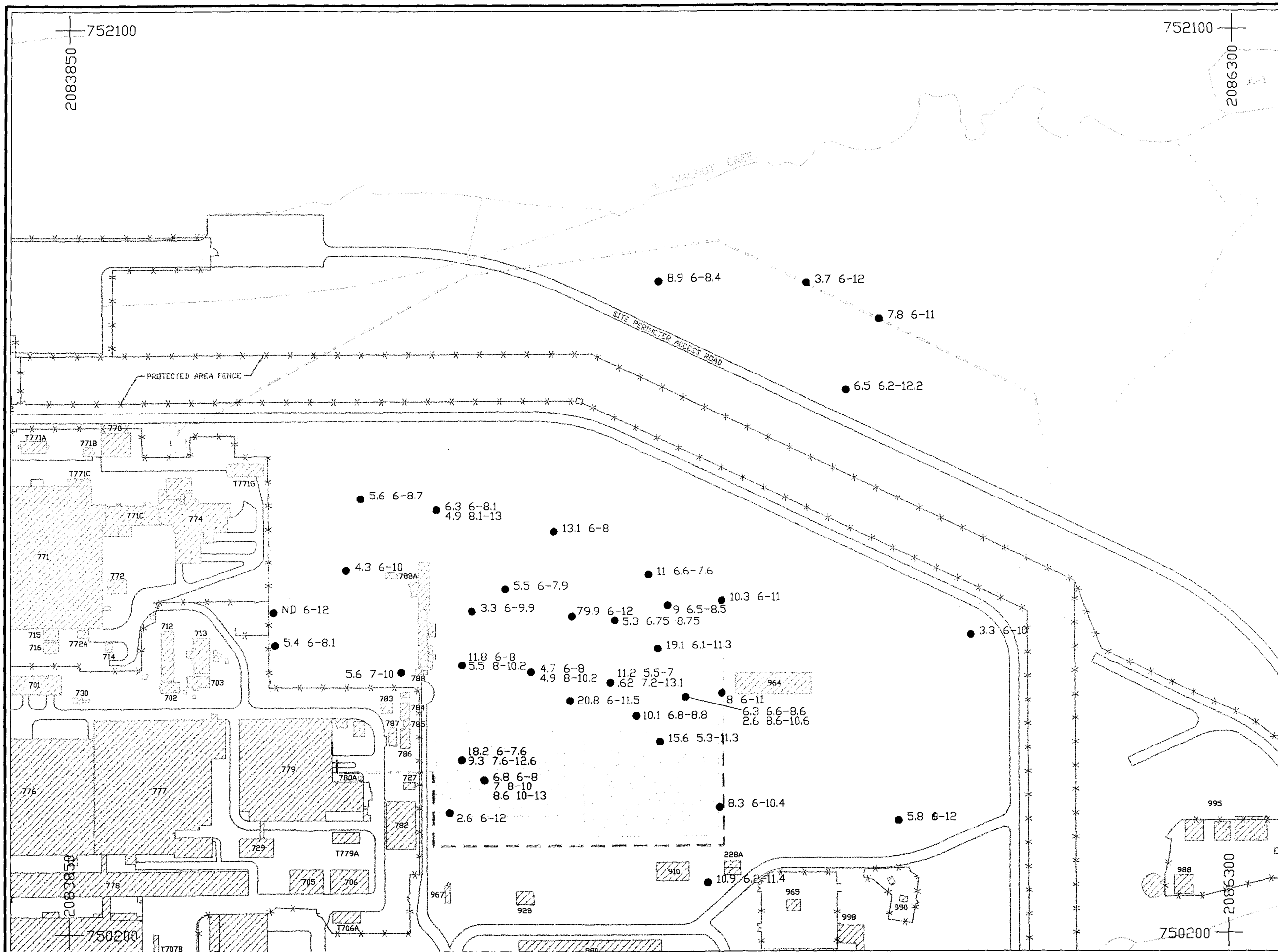
2083850

750200

2086300

750200

184



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 5.6 Results in mg/kg
- 6-8.7 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 83.2 mg/kg

100 0 100 200 300 FEET

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GOLDEN, COLORADO

Figure II.3.4-12

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Subsurface Analytical Results Lithium (6-12')

185

752100
2083850
752100
2086300
N
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
5.4 12-18
4.3 18-24
6.7 12-18
11 18-24
4.9 8.7-22
6.3 10-20
7.7 20-31
6.3 31-35
6.8 8.6-14.8
6.5 8.5-14.7
2.6 9.9-16
4.7 16-22
4.2 22-28.3
6.9 28.3-31.3
5.5 8.75-10.7
5.3 10.7-16.4
9.5 11.3-12.9
6.9 10.2-16.8
5.1 11.5-12.5
6.2 23.4-29.4
5.3 29.4-35.4
7.9 35.4-41.6
5.1 41.6-47.6
4.4 47.6-50.2
T771A
771B
770
T771C
T771G
771C
774
771
772
788A
715
716
772A
714
712
713
701
730
702
703
788
783
784
787
785
786
779
780A
727
776
777
782
729
T779A
778
705
706
T706A
T707B
967
928
910
228A
965
998
990
964
995
988
2083850
750200
2086300
750200

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 5.1 Results in mg/kg
- 11.5-12.5 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 83.2 mg/kg

100 0 100 200 300 FEET

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Figure II.3.4-13

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Lithium (> 12')

186

752100
2083850
752100
2086300
WALNUT CREEK
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
1.6 0-6
2.3 6-8.4
1.93 0-6
2.19 6-12
2.2 0-2.9
1.6 0-5
4 6-11
2.3 0-5
7.7 6.2-12.2
0 0-5
2.1 0-2.5
5 0-4
2.62 0-6
6.07 0-5
2.31 0-7
2120 0-4
4.70 4-7
4.8 0-6
33 6-12
6100 0-4
21.9 4-9.9
1.74 .7-6.1
5.78 6.1-11.3
1150 0-4
17.1 4-8
11.8 8-10.2
187
311 1.3-5
2860 5.5-7
308 7.2-13.1
964
21.3 0-6
1.65 6-11.5
46.9 .7-4.7
128 4.8-8.8
1610 0-4
2040 .4-7.6
656 7.6-12.6
2.36 .5-5.3
.71 5.3-11.3
1000 0-4
349 4-8
8.45 0-6
5.8 0-6
7.88 6.2-10.4
3.1 0-6
3.9 6-12
4.1 0-6
3.6 6-12
2.9 0-6
1.3 6-10
45.9 0-6.2
15.5 6.2-11.4
2.5 0-5
T771A
771B
770
T771C
T771G
771C
774
771
772
788A
772A
715
716
714
712
713
701
730
702
703
788
783
784
787
785
786
779
780A
727
776
777
782
729
T779A
778
705
706
T706A
T707B
967
928
910
228A
965
998
990
995
988
LEGEND
Streams
Paved Roads
Buildings
Fence
OU4 Boundary
Solar Evaporation Pond (SEP)
Sample Location
2.31 Results in mg/kg
0-7 Depth Interval in Feet Below Ground Surface
NOTES
1. Results in red exceed the background level of 7.1 mg/kg
100 0 100 200 300 FEET
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GOLDEN, COLORADO
Figure II.3.4-14
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Nitrate/Nitrite (0-12')

187

752100
2083850
752100
2086300
A-1
N. WALNUT CREEK
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
3.99 12-18
142 18-24
13.2 12-18
327 18-24
T771A
771B
770
T771C
T771G
771C
774
771
772
788A
772A
715
716
714
712
713
701
730
702
703
788
783
784
787
785
786
779
780A
727
776
777
782
729
T779A
778
705
706
967
928
T706A
T707B
750200
2083850
25.1 29-15
51 15-22
3.62 22-28.3
5.75 28.3-31.3
668 10.7-16.4
21.1 11.3-
83.3 10.2-16.8
964
553 10-13
910
228A
1.17 23.4-29.4
.55 29.4-35.4
.44 35.4-41.6
1.3 41.6-47.6
.87 47.6-50.2
965
998
990
995
988
750200
2086300

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- 13.2 Results in mg/kg
- 12-18 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 7.1 mg/kg

100 0 100 200 300 FEET

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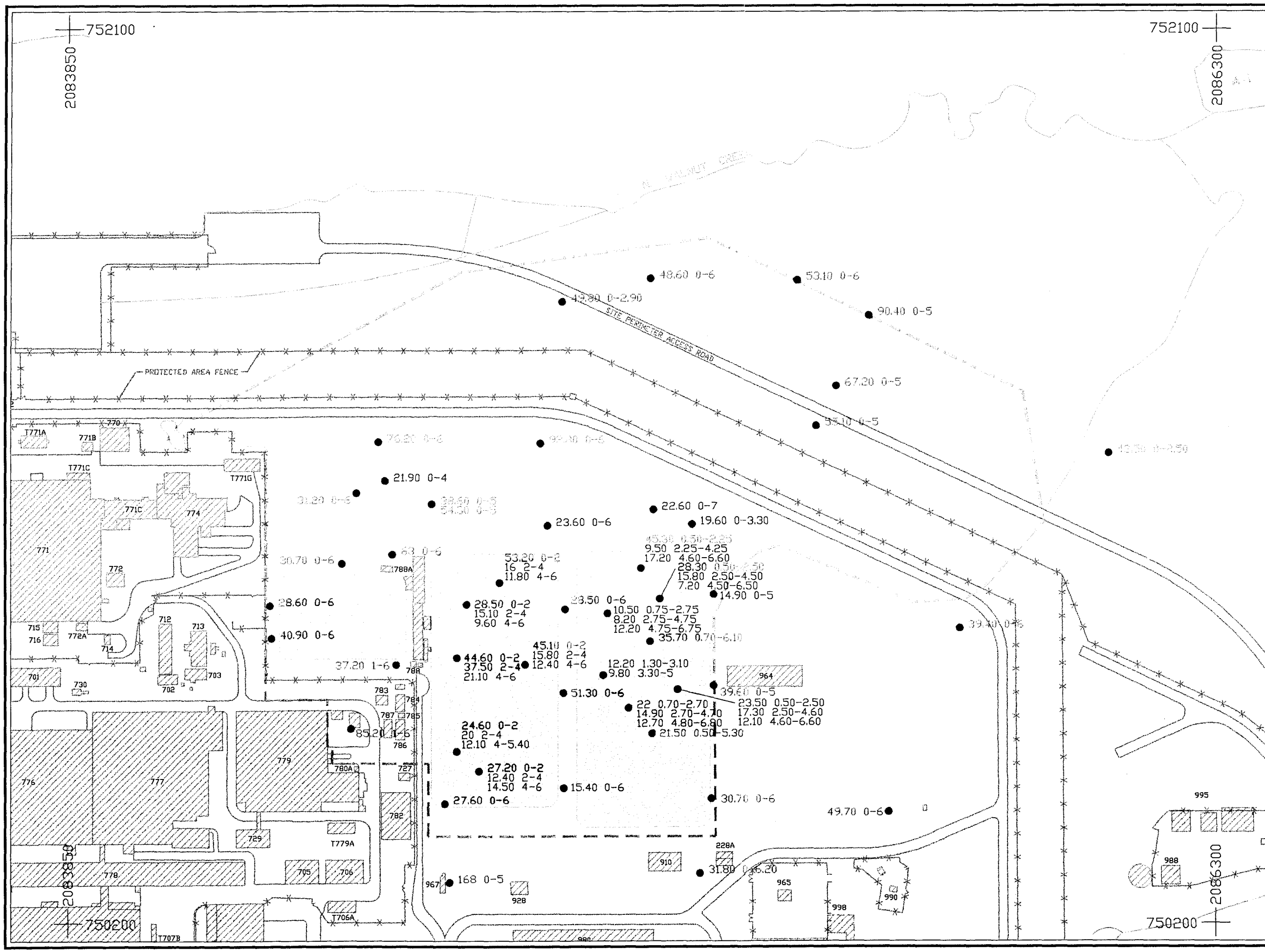
Figure II.3.4-15

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Nitrate/Nitrite (>12')

188



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 23.60 Results in mg/kg
- 0-6 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 23.64 mg/kg

100 0 100 200 300 FEET

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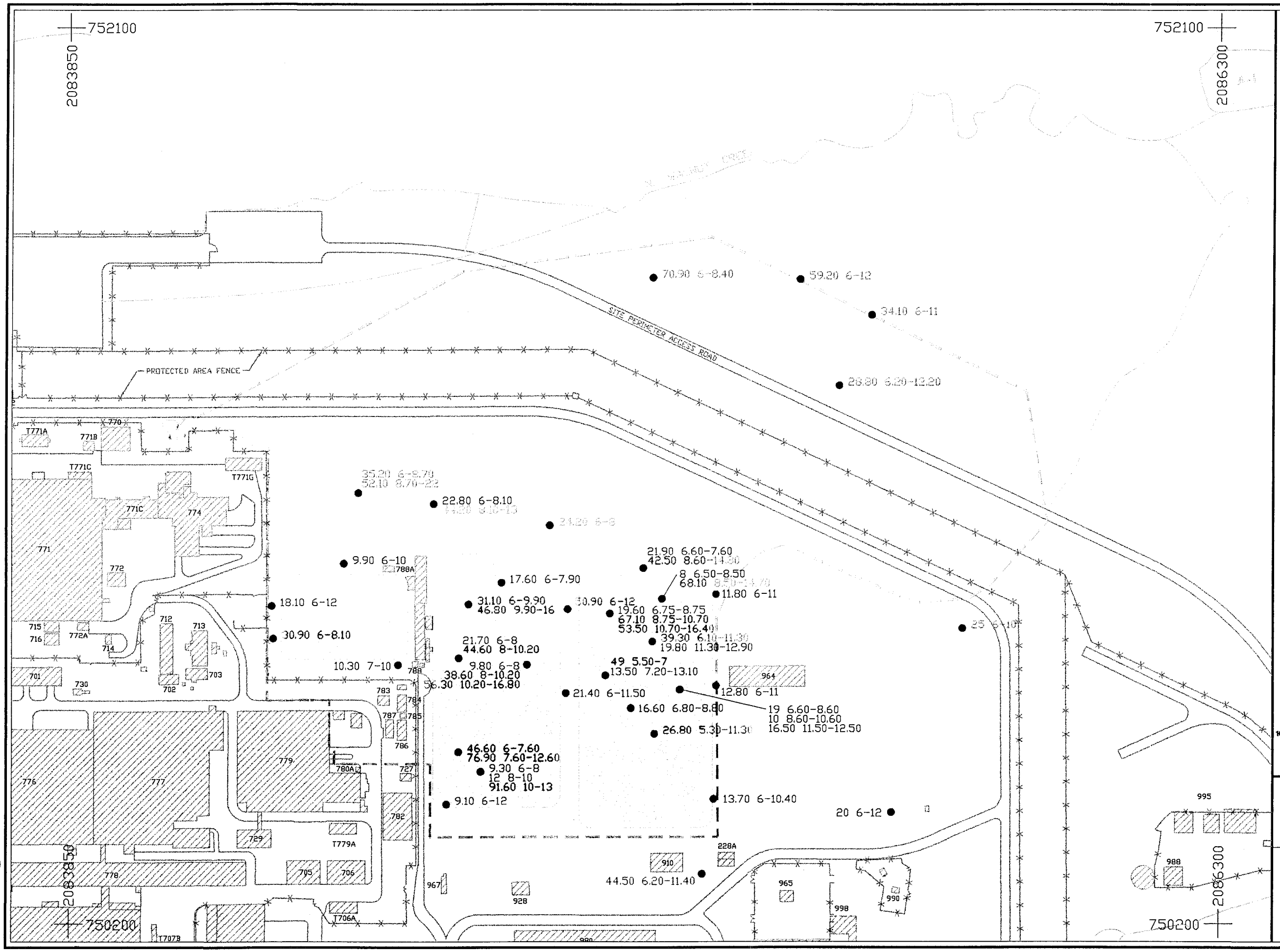
GOLDEN, COLORADO

Figure II.3.4-16

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Subsurface Analytical Results Zinc (0-6')

189



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- 24.20 Results in mg/kg
- 6-8 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 23.64 mg/kg

100 0 100 200 300 FEET

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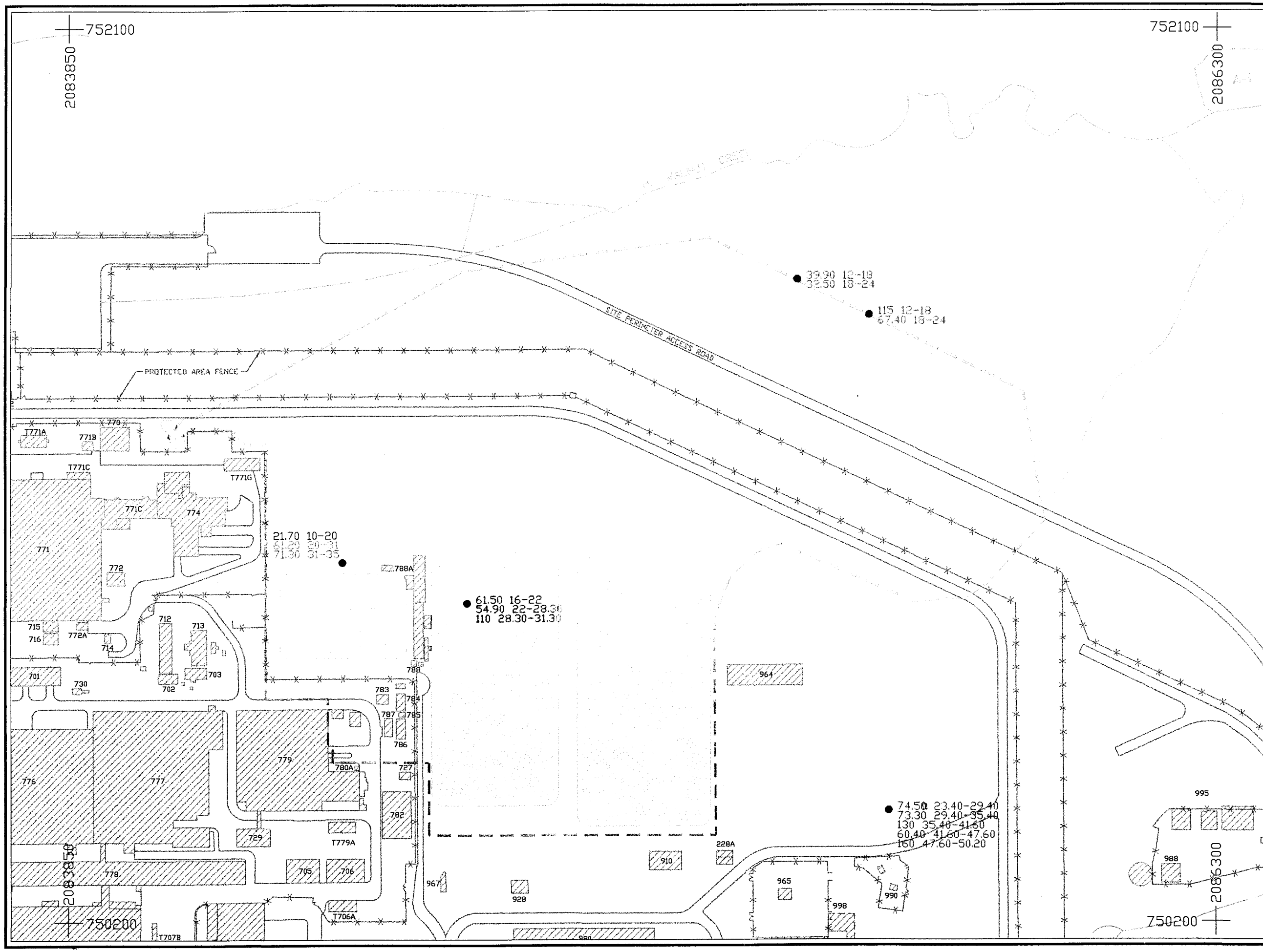
GOLDEN, COLORADO

Figure II.3.4-17

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Zinc (6-12')

197



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 39.90 Results in mg/kg
- 12-18 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 23.64 mg/kg

100 0 100 200 300 FEET

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Figure II.3.4-18

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Zinc (> 12')

191

752100
2083850
752100
2086300
A-1
N
N. WALNUT CREEK
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
T771A
770
771B
T771C
T771G
771C
774
771
772
788A
715
716
772A
714
712
713
701
730
702
703
783
784
787
785
786
779
780A
776
777
782
729
T779A
778
705
706
967
928
T706A
T707B
750200
910
228A
965
998
990
995
988
964
.038+/-.026 0-2
-.003+/-.005 2-4
.005+/-.008 4-6
.29+/-.052 0-6
.35+/-.062 0-2.5
.5+/-.076 0-2
.12+/-.046 2-4
.009+/-.01 4-6
.25+/-.058 0-6
.28+/-.03 0-6
.69+/-.088 0-6
2.7+/-.42 0-6
1.1+/-.25 0-2
.17+/-.038 2-4
.006+/-.008 4-6
.14+/-.046 1-6
.021+/-.012 0-2
.008+/-.006 2-4
-.002+/-.002 4-5.4
2.4+/-.27 0-2
.0058+/-.0052 2-4
.0034+/-.00382 4-6
1.4+/-.15 0-6
.2643+/-.0394 0-6
6.1+/-.72 0-6
.023+/-.014 0-2
-.001+/-.005 2-4
.002+/-.004 4-6
.4892+/-.065 .75-2.75
.0161+/-.0083 2.75-4.75
.0046+/-.00486 4.75-6.75
.0759+/-.0175 .7-6.1
1.8+/-.197 .5-2.25
.1607+/-.0284 2.25-4.25
.0144+/-.00755 4.6-6.6
2.1+/-.39 0-5
.1672+/-.0311 .5-2.5
.0062+/-.00524 2.5-4.5
.0217+/-.00969 4.5-6.5
.0027+/-.0035 1.3-3.1
.0063+/-.00479 3.3-5
.9+/-.12 0-5
.0166+/-.00756 .5-2.5
.0063+/-.00634 2.5-4.6
.0018+/-.00248 4.6-6.6
.0302+/-.0106 .5-5.3
.0135+/-.00813 .7-2.7
.0049+/-.00468 2.7-4.7
.0157+/-.00835 4.8-6.8
1.8+/-.19 0-6
.059+/-.01? 0-2.5

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .35+/-.062 Result and Counting Error in pCi/g
- 0-3.3 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.01 pCi/g

100 0 100 200 300 FEET

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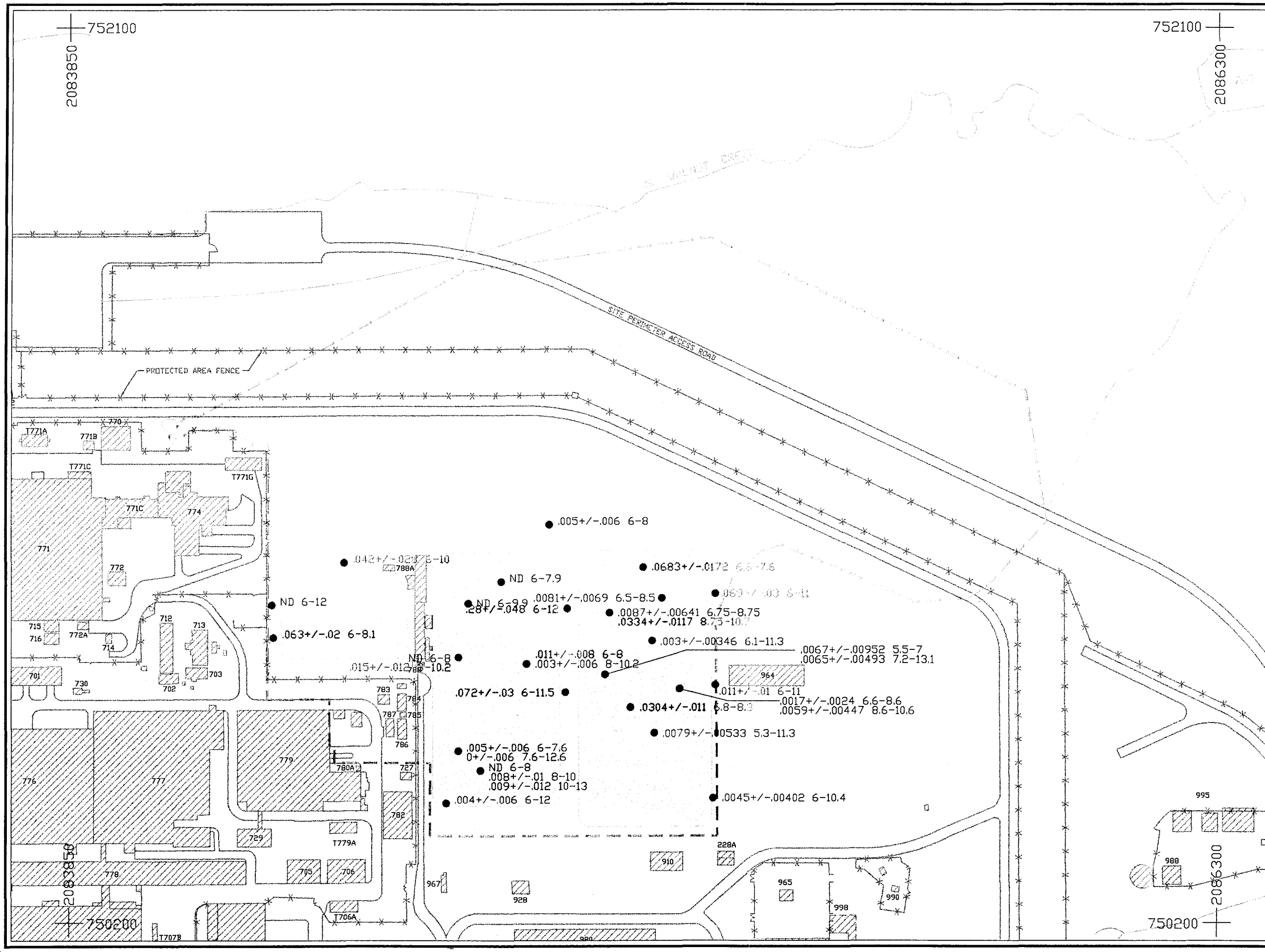
GOLDEN, COLORADO

Figure II.3.4-19

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Americium 241 (0-6')



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .005+/-.006 Result and Counting Error in pCi/g
- ND Not Detected
- 6-8 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.01 pCi/g

100 0 100 200 300 FEET

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Figure II.3.4-20

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Americium 241 (6-12')

193

752100
2083850

752100
2086300

A-1

A. WALNUT CREEK

SITE PERIMETER ACCESS ROAD

PROTECTED AREA FENCE

T771A 771B 770 T771C T771G 771C 774 771 772 772A 715 716 714 712 713 703 702 701 730 788A 788 783 784 787 785 786 779 780A 727 776 777 782 729 T779A 778 705 706 T706A T707B 967 928 910 228A 965 998 990 964 995 988

ND 10-20
.002+/-.004 20-31
.013+/-.01 31-35

ND 9.9-16
.003+/-.006 16-22
0+/-.004 22-28.3
.002+/-.006 28.3-31.3

ND 10.2-16.8

.0328+/-.0118 8.5-14.8

.0101+/-.00717 8.5-14.7

.0428+/-.0128 10.7-16.4

.0067+/-.00508 11.3-12.9

.0488+/-.0135 11.5-12.5

2083850
750200

750200
2086300

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- .003+/-.006 Result and Counting Error in pCi/g
- ND Not Detected
- 16-22 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.01 pCi/g

100 0 100 200 300 FEET

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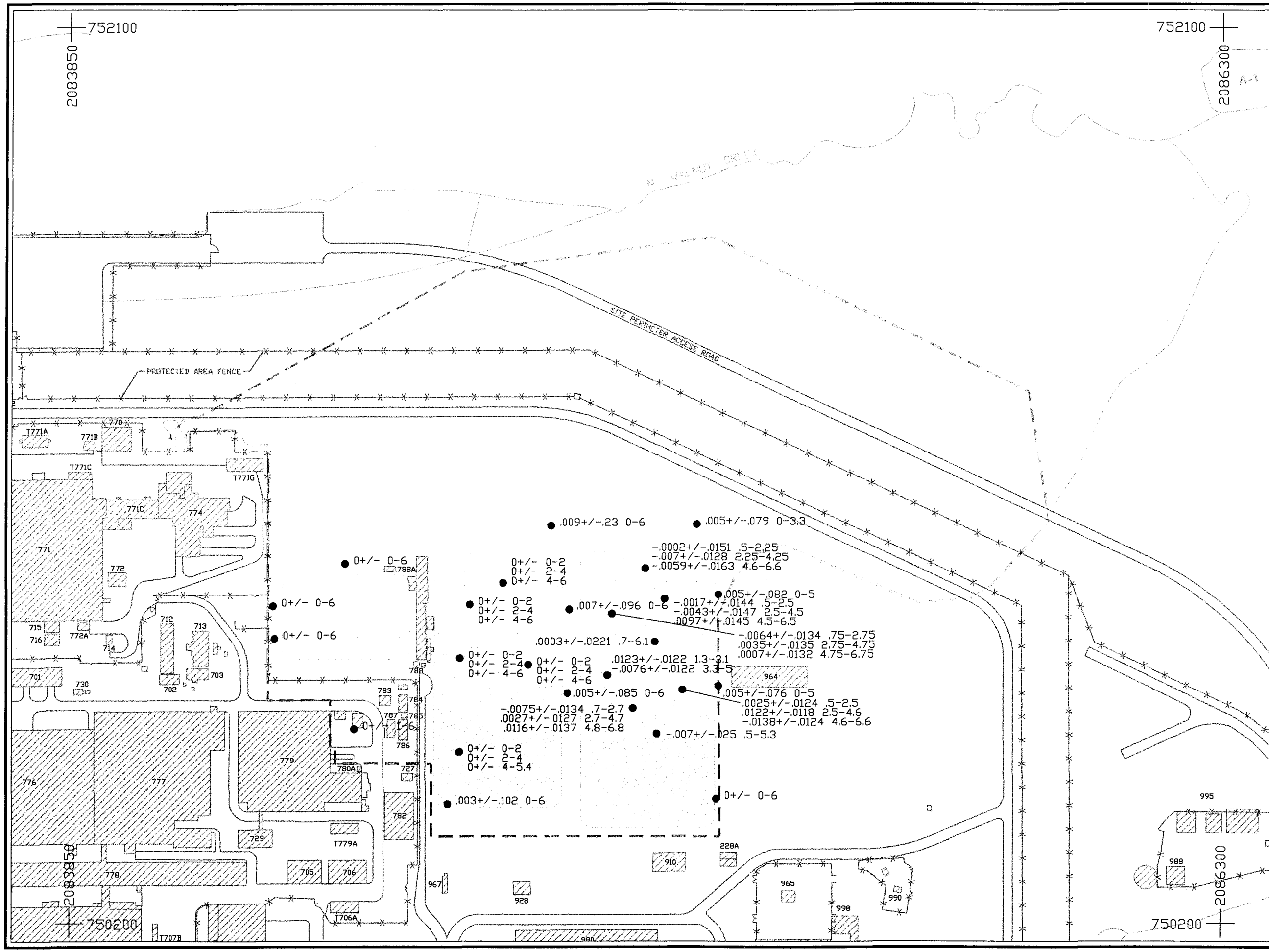
GOLDEN, COLORADO

Figure II.3.4-21

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Subsurface Analytical Results Americium 241 (> 12')

194



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .009+/-.23 Result and Counting Error in pCi/g pCi/l
- ND Not Detected
- 0-6 Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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GOLDEN, COLORADO

Figure II.3.4-22

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Subsurface Analytical Results Cesium-134 (0-6')

195

752100
2083850
752100
2086300
A-1
N. WALNUT CREEK
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
T771A
771B
770
T771C
T771G
771C
774
771
772
715
716
772A
714
712
713
701
730
702
703
776
777
779
780A
727
782
729
T779A
778
705
706
T706A
T707B
750200
2083850
.003+/-.105 6-8
0+/- 6-10
788A
0+/- 6-7.9
0+/- 6-12
0+/- 6-9.9
0+/- 6-8.1
.005+/-.08 6-12
-.0093+/-.0177 6.6-7.6
-.0147+/-.0175 8.6-14.8
.005+/-.078 6-11
.0108+/-.0142 6.5-8.5
.0077+/-.0138 8.5-14.7
-.0117+/-.0173 6.75-8.75
.0085+/-.0148 8.75-10.7
.0053+/-.0312 6.1-11.3
0+/- 6-8
0+/- 8-10.2
-.0315+/-.0198 5.5-7
-.0057+/-.0136 7.2-13.1
964
.007+/-.098 6-11.5
-.0013+/-.0101 6.8-8.8
.007+/-.098 6-11
-.0044+/-.0135 6.6-8.6
-.0043+/-.013 8.6-10.6
.0103+/-.0207 5.3-11.3
783
784
785
787
786
0+/- 6-7.6
0+/- 7.6-12.6
0+/- 6-8
0+/- 8-10
.003+/-.102 6-12
967
928
910
228A
965
998
990
980
995
988
2086300
750200

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .003+/-.105 Result and Counting Error in pCi/g
- ND Not Detected
- 6-8 Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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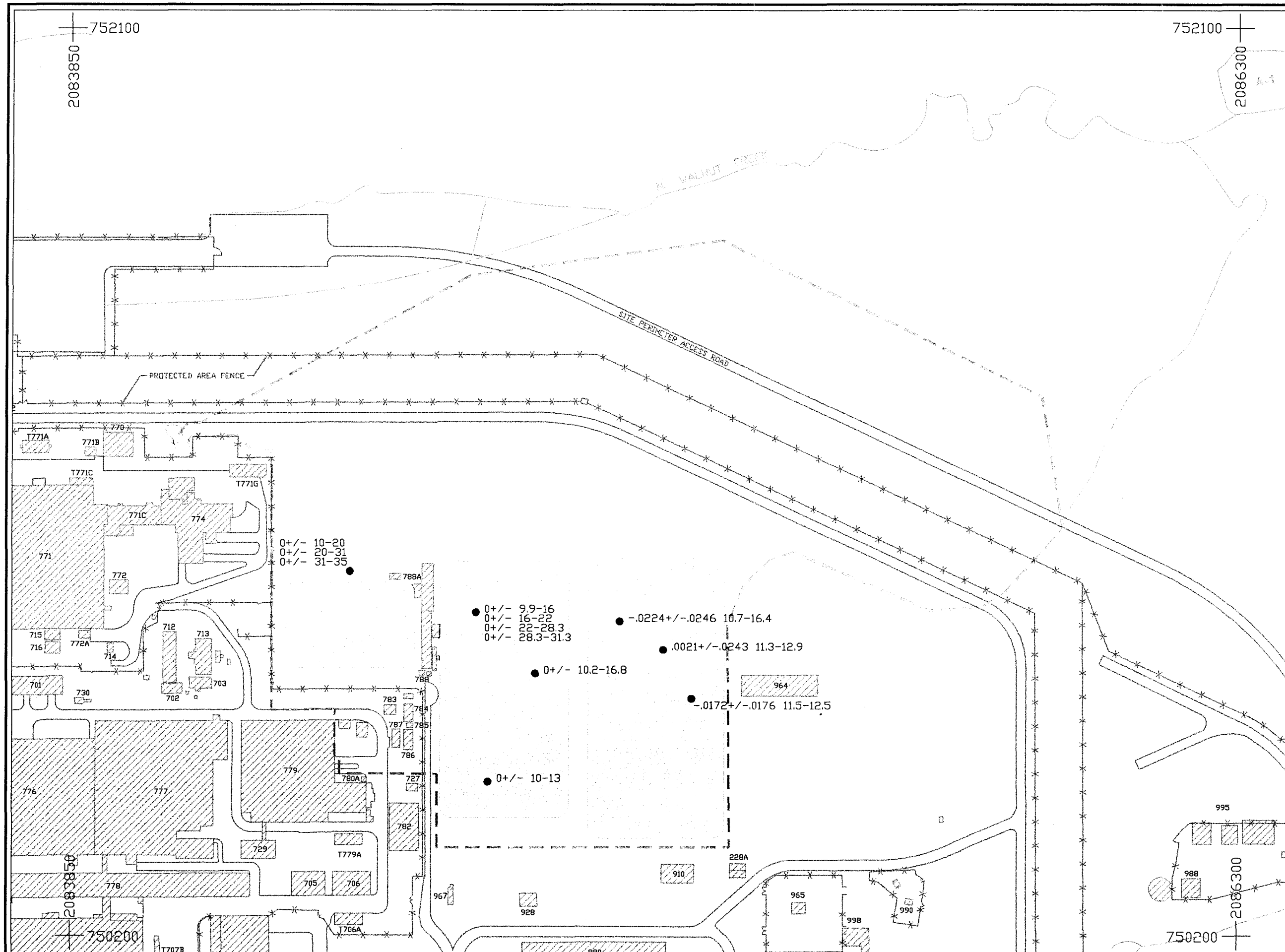
GOLDEN, COLORADO

Figure II.3.4-23

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Cesium-134 (6-12')

196



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .0021+/-.0246 Result and Counting Error in pCi/g
- ND Not Detected
- 11.3-12.9 Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the detection limit. Results qualified with a "J" are estimated values below the detection limit.

100 0 100 200 300 FEET

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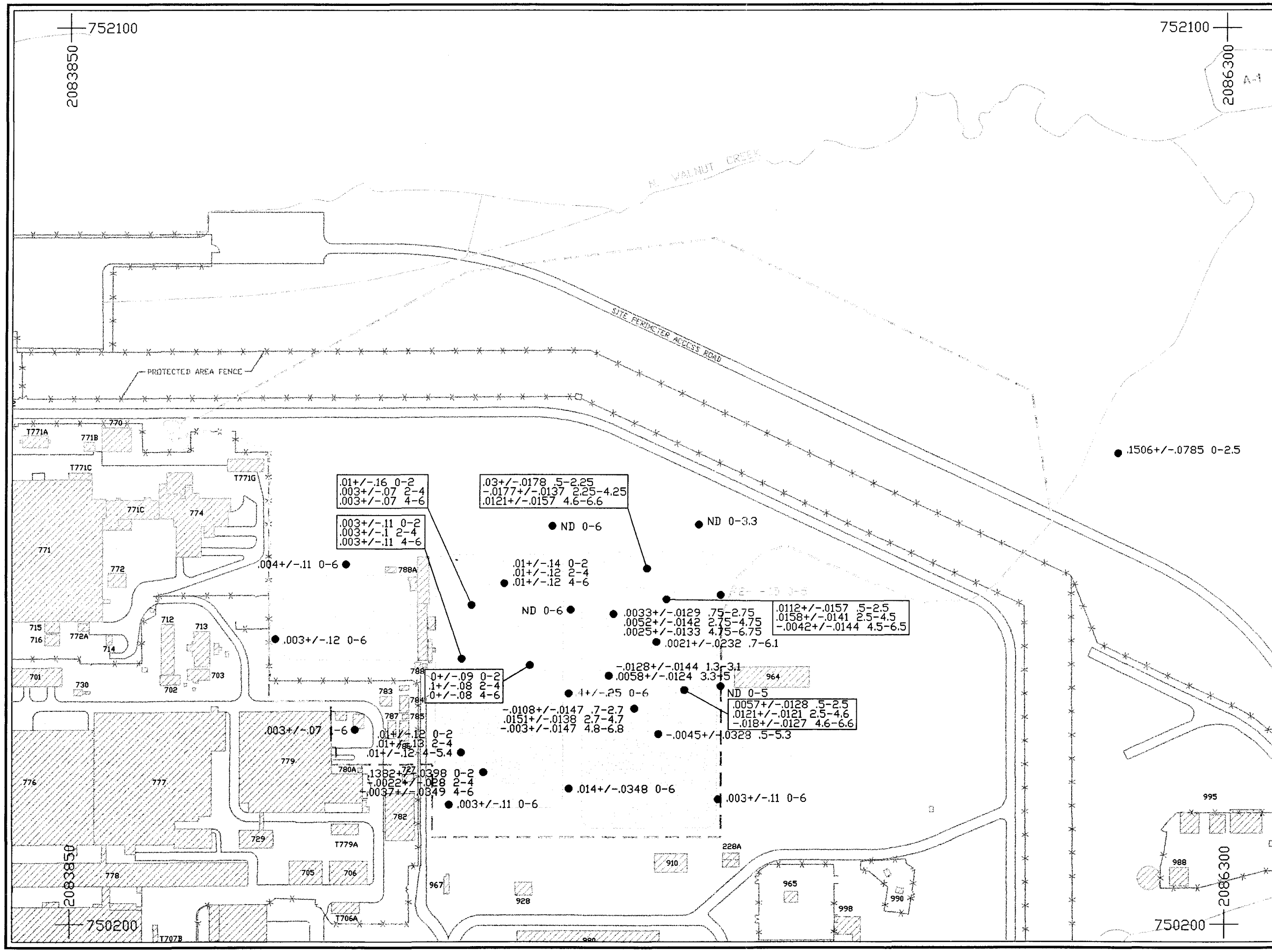
Figure II.3.4-24

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Cesium-134 (> 12')

197



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .03+/-.0178 Result and Counting Error in pCi/g
- ND Not Detected
- .5-2.25 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.166 pCi/g

100 0 100 200 300 FEET

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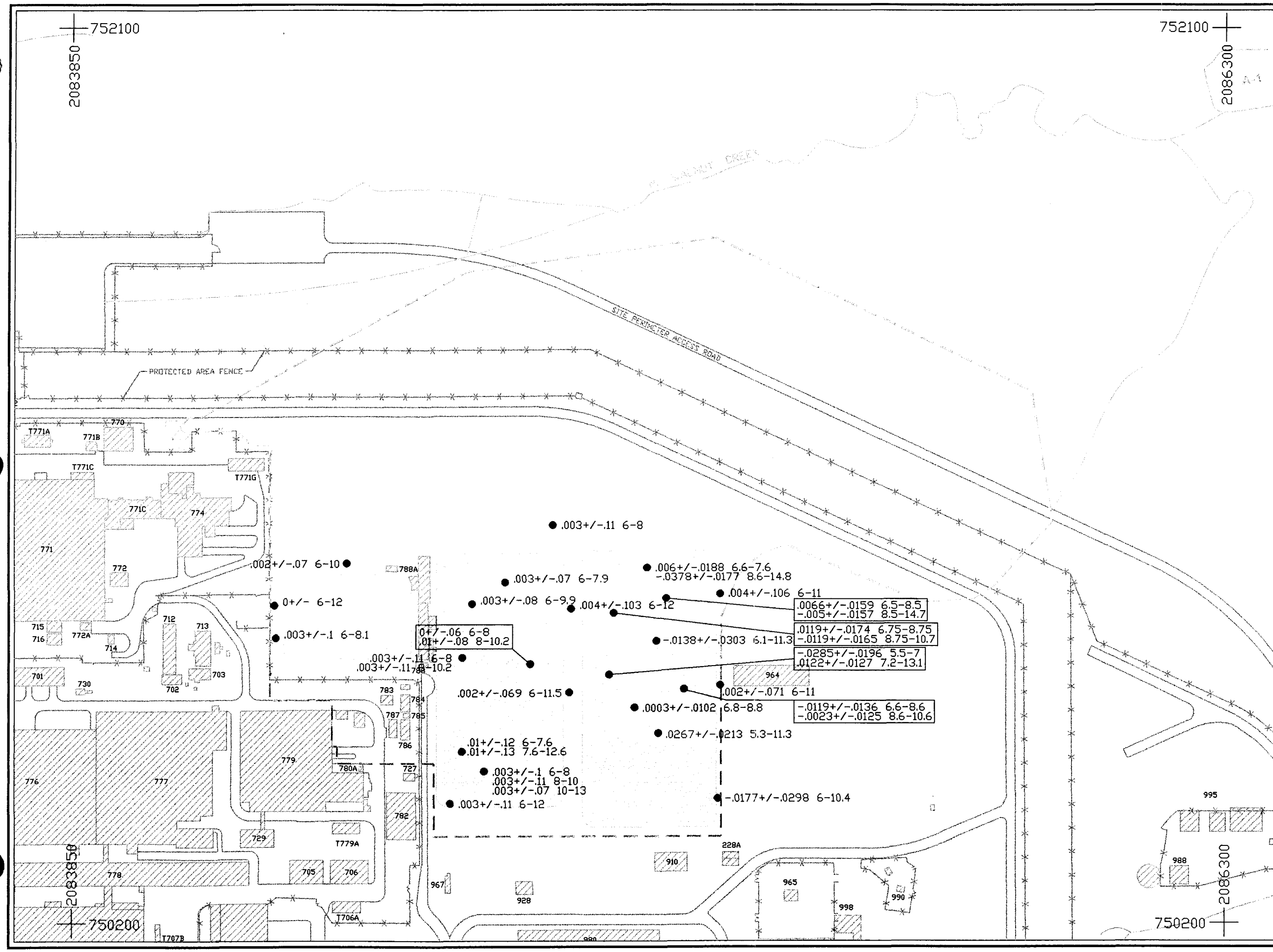
Figure II.3.4-25

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Cesium-137 (0-6')

198



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .003+/-.11 Result and Counting Error in pCi/g
- ND Not Detected
- 6-8 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.166 pCi/g

100 0 100 200 300 FEET

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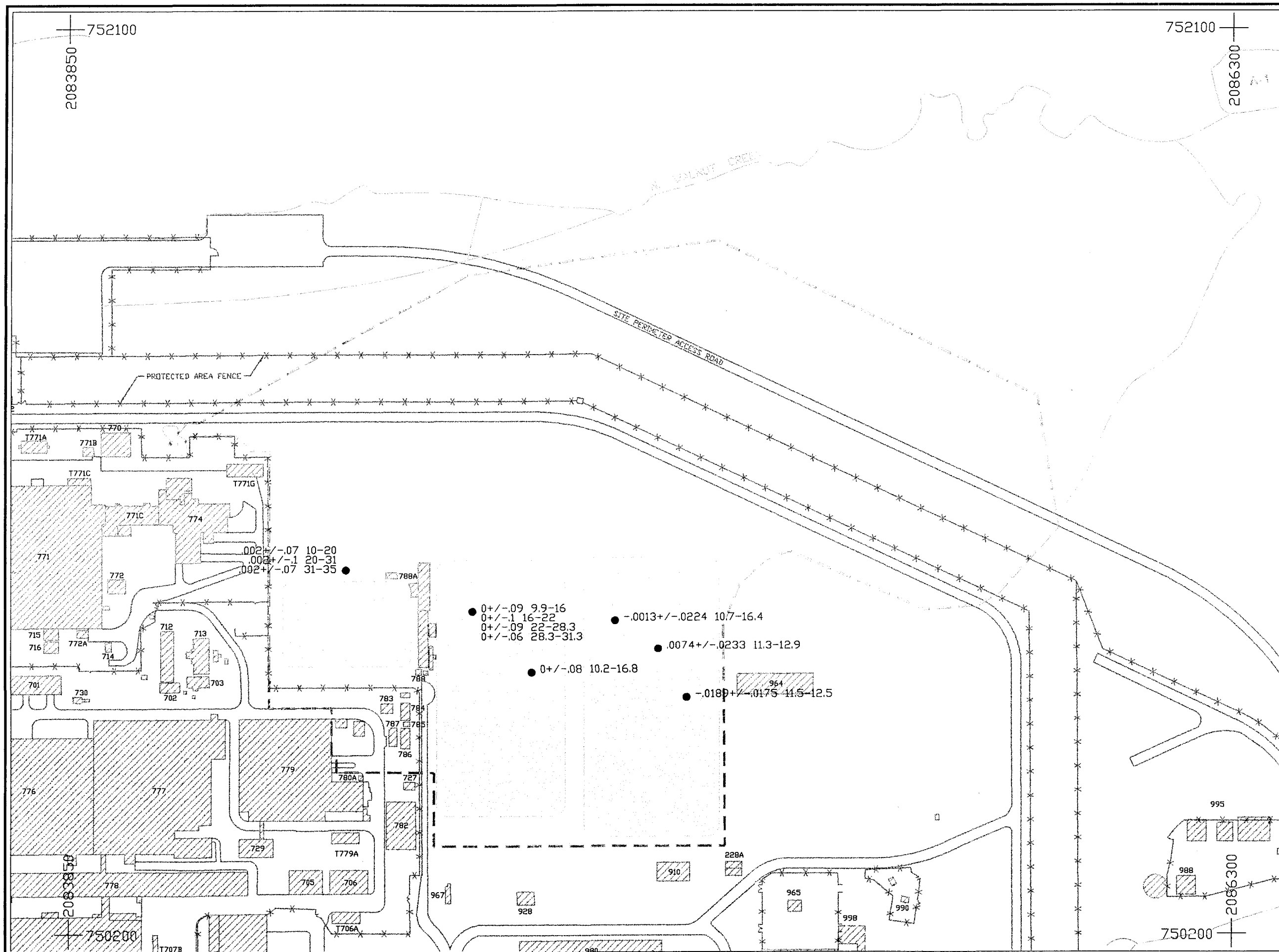
Figure II.3.4-26

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Cesium-137 (6-12')

199



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .002+/-.07 Result and Counting Error in pCi/g
- ND Not Detected
- 10-20 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.166 pCi/g

100 0 100 200 300 FEET

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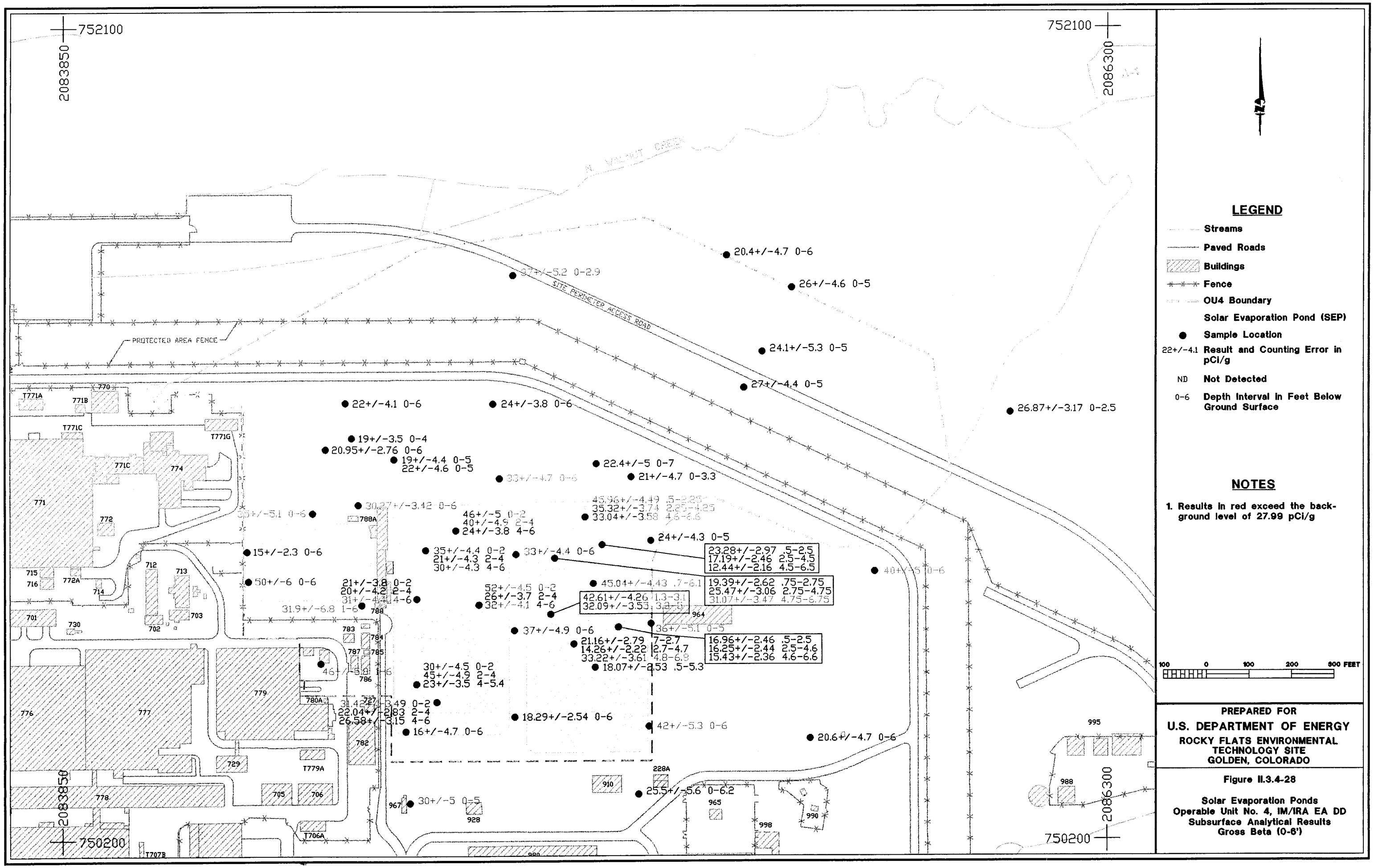
Figure II.3.4-27

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Cesium-137 (> 12')

200



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 22+/-4.1 Result and Counting Error in pCi/g
- ND Not Detected
- 0-6 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 27.99 pCi/g

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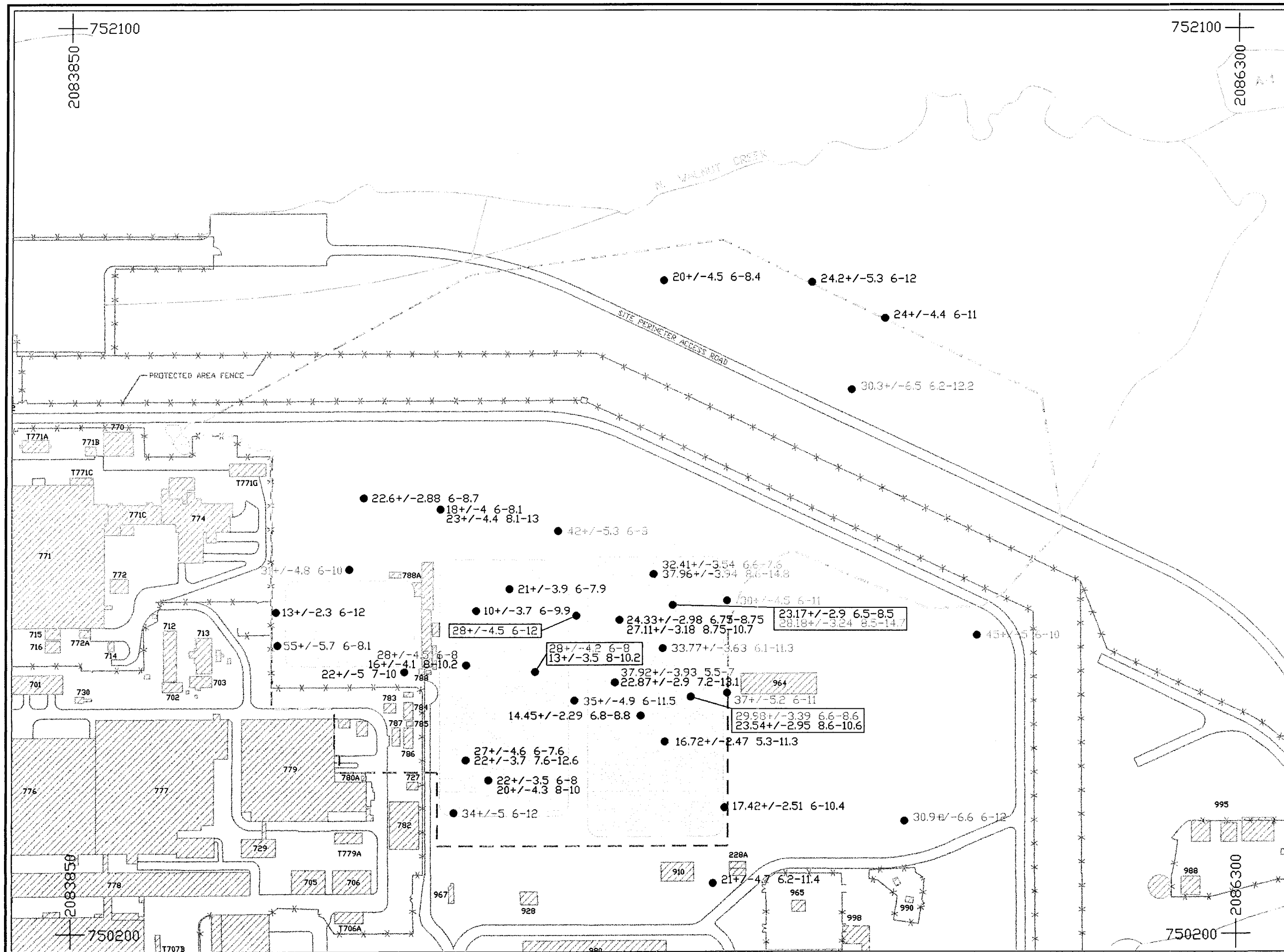
Figure II.3.4-28

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Gross Beta (0-6')

201



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 23+/-4.4 Result and Counting Error in pCi/g
- ND Not Detected
- 8.1-13 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 27.99 pCi/g

100 0 100 200 300 FEET

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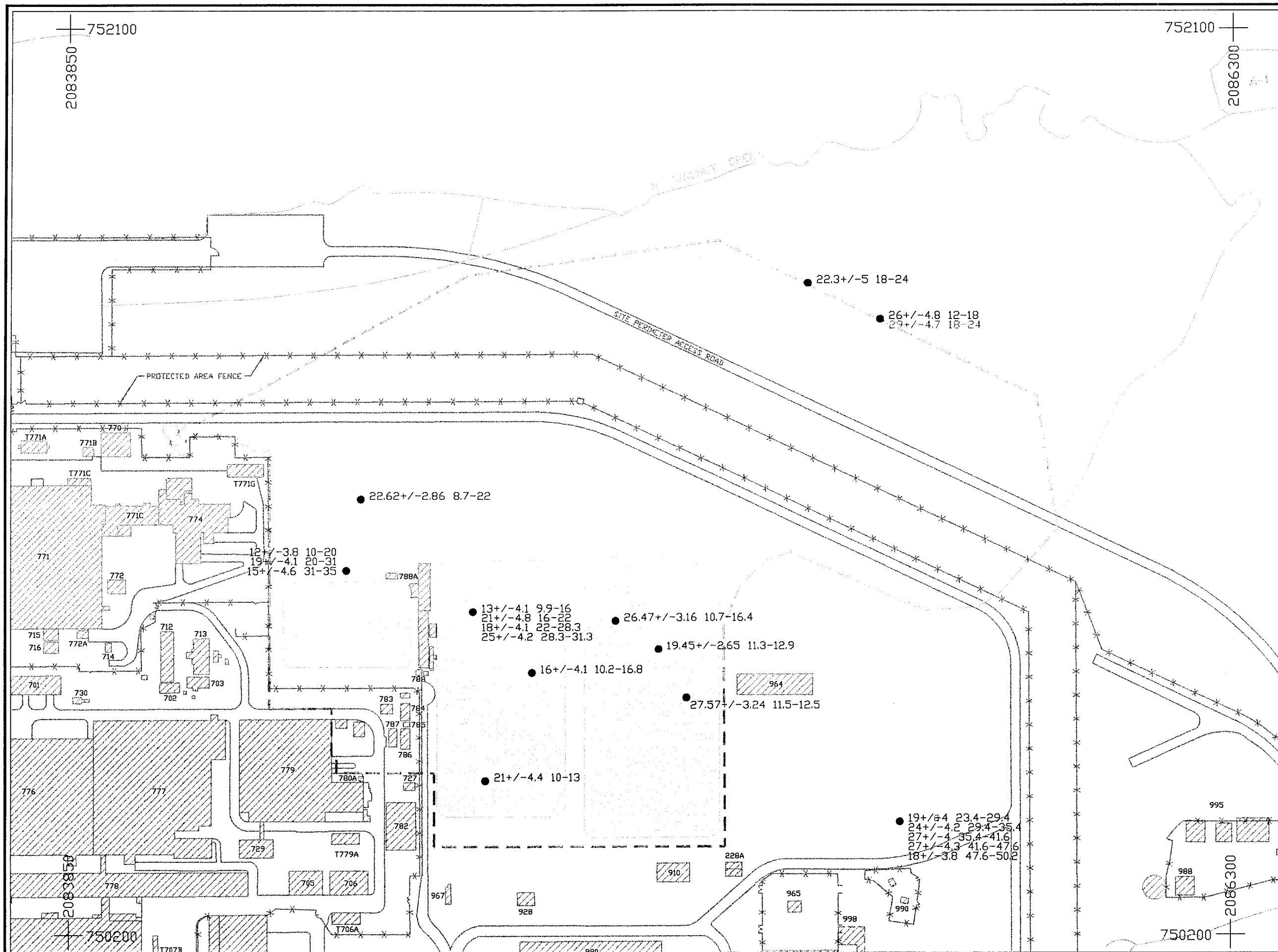
Figure II.3.4-29

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Gross Beta (6-12')



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 26+/-4.8 Result and Counting Error in pCi/g
- ND Not Detected
- 12-18 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 27.99 pCi/g

100 0 100 200 300 FEET

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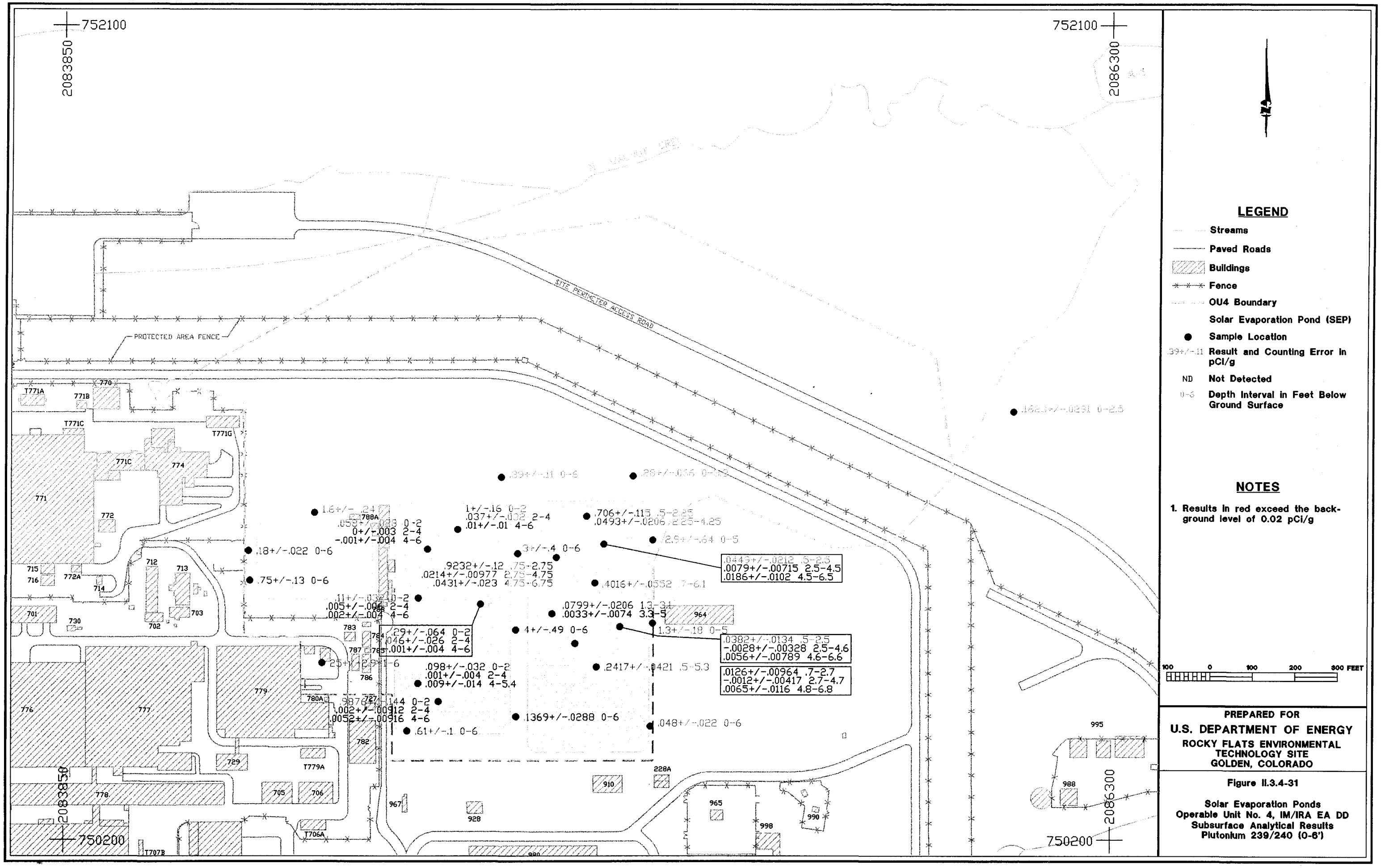
Figure II.3.4-30

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Gross Beta (> 12')

203



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .39+/-.11 Result and Counting Error in pCi/g
- ND Not Detected
- 0-6 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.02 pCi/g

100 0 100 200 300 FEET

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Figure II.3.4-31

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Plutonium 239/240 (0-6')

752100
2083850
752100
2086300
N
N. WALNUT CREEK
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
T771A
771B
770
T771C
T771G
771C
774
771
772
772A
715
716
714
712
713
703
701
730
702
788A
788
783
784
787
785
786
779
780A
727
776
777
782
729
T779A
778
705
706
T706A
T707B
967
928
910
228A
965
998
990
964
995
988
750200
2083850
2086300
.83+/-.18 6-8
.039+/-.022 6-10
.005+/-.004 6-12
.15+/-.066 6-8.1
ND 6-7.9
ND 6-9.9
.29+/-.07 6-12
.006+/-.008 6-8
.002+/-.004 8-10.2
.018+/-.01 6-8
.001+/-.005 8-10.2
ND 6-7.6
0+/-.01 7.6-12.6
ND 6-8
-.001+/-.004 8-10
.003+/-.004 10-13
.14+/-.048 6-12
.0047+/-.00662 6.6-7.6
.0005+/-.00605 8.6-14.8
.013+/-.01 6-11
.0062+/-.00765 6.5-8.5
.0056+/-.0154 8.5-14.7
.0069+/-.0096 6.75-8.75
.017+/-.0153 8.75-10.7
.0116+/-.00706 6.1-11.3
.014+/-.0198 5.5-7
.0023+/-.00323 7.2-13.1
.026+/-.014 6-11.5
ND 6-11
.0012+/-.00314 6.6-8.6
.0011+/-.00367 6.8-8.8
.0002+/-.00211 8.6-10.6
.0127+/-.00802 5.3-11.3
.0029+/-.00514 6-10.4

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- .83+/-.18 Result and Counting Error in pCi/g
- ND Not Detected
- 6-8 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.02 pCi/g

100 0 100 200 300 FEET

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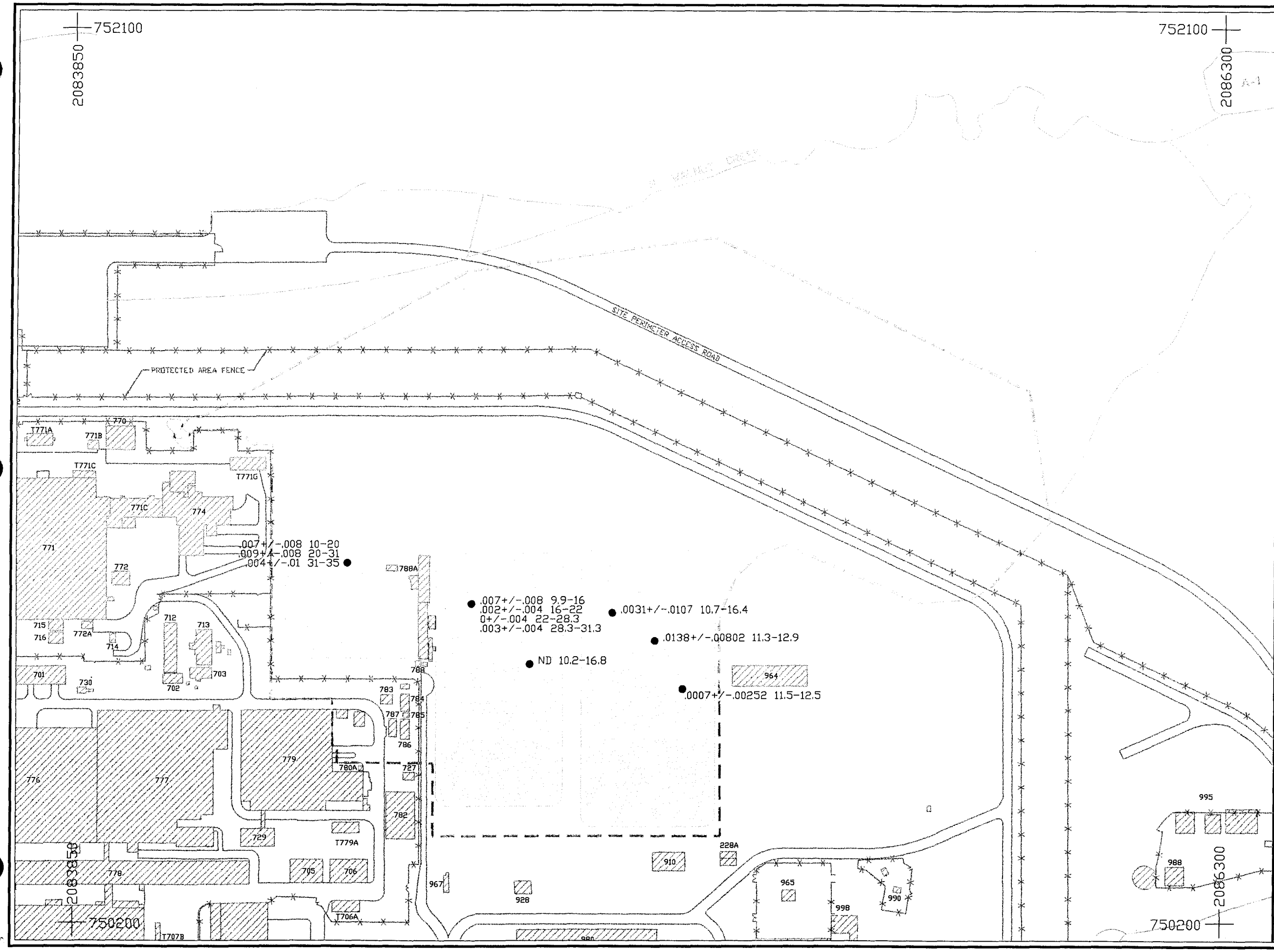
Figure II.3.4-32

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Plutonium 239/240 (6-12')



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .007+/-.008 Result and Counting Error in pCi/g
- ND Not Detected
- 9.9-16 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.02 pCi/g

100 0 100 200 300 FEET

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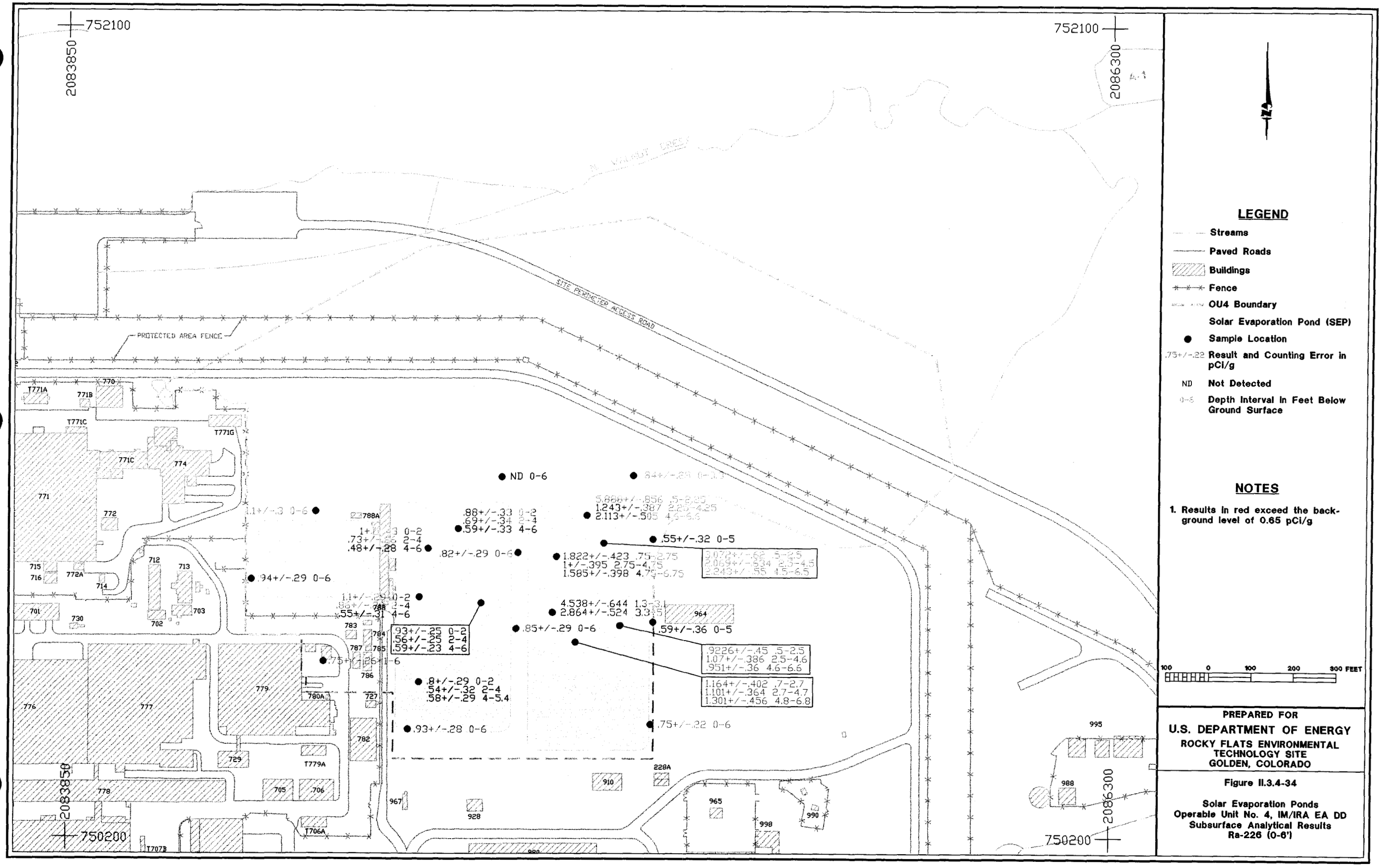
Figure II.3.4-33

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Plutonium 239/240 (> 12')

206



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .75+/-.22 Result and Counting Error in pCi/g
- ND Not Detected
- 0-6 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.65 pCi/g

100 0 100 200 300 FEET

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Figure II.3.4-34

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Ra-226 (0-6')

207

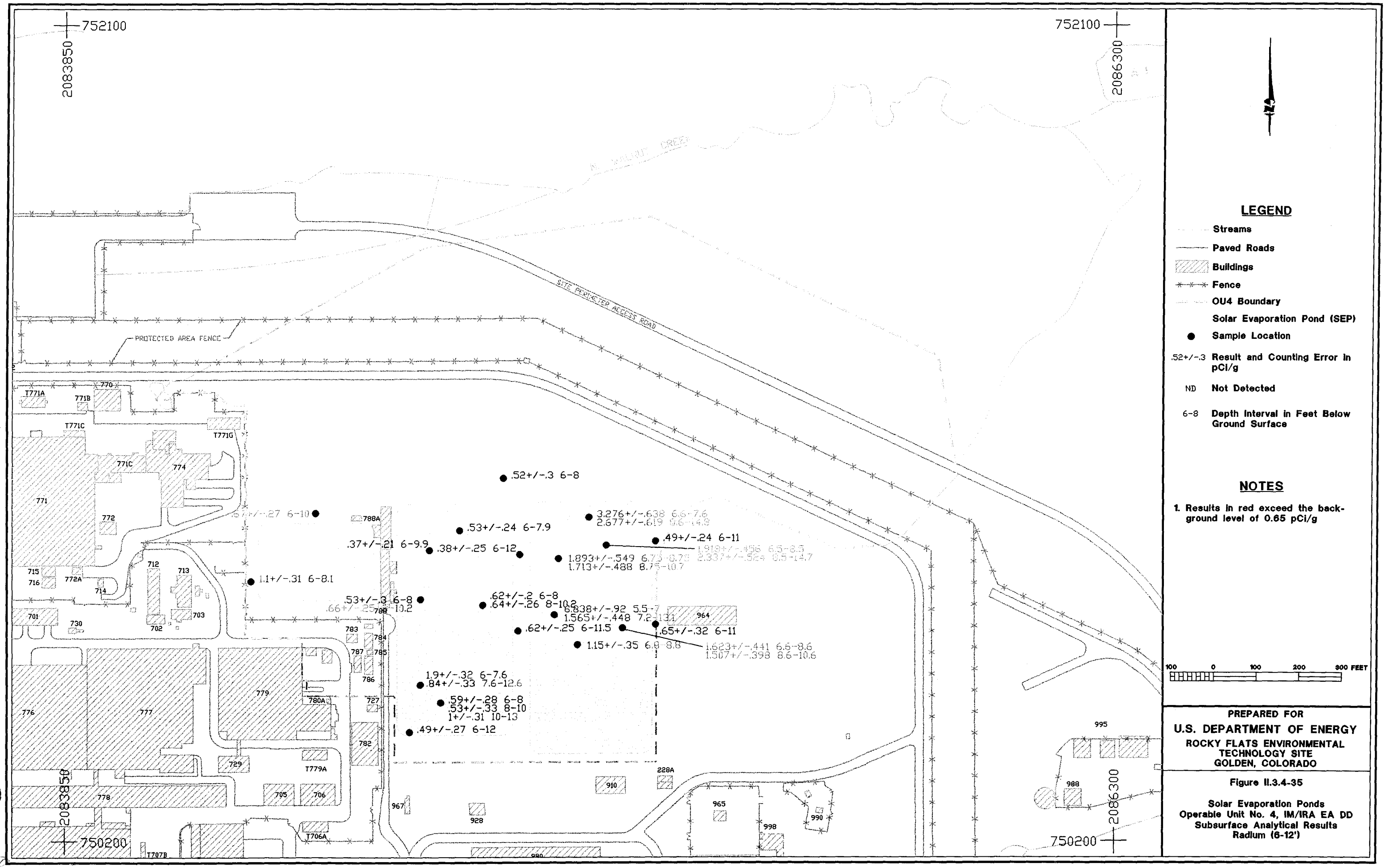
752100
2083850
752100
2086300
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
.52+/-.3 6-8
.53+/-.24 6-7.9
.37+/-.21 6-9.9
.38+/-.25 6-12
3.276+/-.638 6.6-7.6
2.677+/-.619 9.6-14.8
.49+/-.24 6-11
1.893+/-.549 6.75-8.75
1.713+/-.488 8.75-10.7
1.1+/-.31 6-8.1
.53+/-.3 6-8
.62+/-.2 6-8
.64+/-.26 8-10.2
6.838+/-.92 5.5-7
1.565+/-.448 7.2-13.1
.62+/-.25 6-11.5
.65+/-.32 6-11
1.15+/-.35 6.8-8.8
1.623+/-.441 6.6-8.6
1.507+/-.398 8.6-10.6
1.9+/-.32 6-7.6
.84+/-.33 7.6-12.6
.59+/-.28 6-8
.53+/-.33 8-10
1+/-.31 10-13
.49+/-.27 6-12
750200
2083850
750200
2086300
LEGEND
Streams
Paved Roads
Buildings
Fence
OU4 Boundary
Solar Evaporation Pond (SEP)
Sample Location
.52+/-.3 Result and Counting Error in pCi/g
ND Not Detected
6-8 Depth Interval in Feet Below Ground Surface
NOTES
1. Results in red exceed the background level of 0.65 pCi/g
100 0 100 200 300 FEET
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Figure II.3.4-35
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Radium (6-12')

205

752100
2083850
752100
2086300
N
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
T771A
770
771B
T771C
T771G
771C
774
771
772
.4+/-.17 10-20
.63+/-.16 20-31
.93+/-.17 31-35
788A
715
716
772A
714
712
713
703
702
701
730
788
783
784
787
785
786
779
780A
727
776
777
782
729
T779A
705
706
778
967
928
T706A
T707B
750200
2083850
.7+/-.21 9.9-16
.89+/-.23 16-22
.84+/-.24 22-28.3
.89+/-.24 28.3-31.3
1.954+/-.729 10.7-16.4
.9+/-.21 10.2-16.8
964
2.075+/-.561 11.5-12.5
910
228A
965
998
990
995
988
2086300
750200

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .9+/-.21 Result and Counting Error in pCi/g
- ND Not Detected
- 10.2-16.8 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.65 pCi/g

100 0 100 200 300 FEET

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Figure II.3.4-36

Solar Evaporation Ponds Operable Unit No. 4, IM/IRA EA DD Subsurface Analytical Results Ra-226 (> 12')

752100
2083850
752100
2086300
N
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
.102+/-.0373 0-2.5
.49+/-.18 0-6
ND 0-3.3
.0786+/-.041 .5-2.25
.0583+/-.0292 2.25-4.25
.1386+/-.0463 4.5-6.6
ND 0-2
.32+/-.21 2-4
.17+/-.18 4-6
.32+/-.21 0-6
.33+/-.21 0-5
.0619+/-.0299 .5-2.5
.4763+/-.127 2.5-4.5
.7136+/-.193 4.5-6.5
ND 0-6
ND 0-2
.28+/-.24 2-4
.47+/-.21 4-6
.3+/-.19 0-6
.1247+/-.0425 .75-2.75
.1313+/-.0441 2.75-4.75
.0162+/-.0216 4.75-6.75
ND 0-6
.34+/-.23 0-2
.45+/-.25 2-4
.24+/-.18 4-6
.6828+/-.178 .7-6.1
.6789+/-.182 1.3-3.1
.0139+/-.0276 3.3+5
.74+/-.32 0-2
.26+/-.21 2-4
.38+/-.18 4-6
ND 0-6
.62+/-.4 0-5
.1741+/-.0547 .5-2.5
.64+/-.045 2.5-4.6
.7258+/-.181 4.6-6.6
.26+/-.17 1-6
.1481+/-.0492 .5-5.3
.1972+/-.0602 .7-2.7
.0947+/-.0355 2.7-4.7
.0424+/-.0263 4.8-6.8
ND 0-2
.19+/-.19 4-5.4
.55+/-.148 0-2
.5343+/-.147 2-4
.0515+/-.028 4-6
.1368+/-.0465 0-6
.34+/-.21 0-6
ND 0-6
T771A
771B
770
T771C
T771G
771C
774
771
772
788A
772A
715
716
714
712
713
701
730
702
703
788
783
784
787
785
786
779
780A
727
776
777
782
729
T779A
778
705
706
967
928
T706A
T707B
750200
2083850
910
228A
965
998
990
964
995
988
2086300
750200
100 0 100 200 300 FEET

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .49+/-.18 Result and Counting Error in pCi/g
- ND Not Detected
- 0-6 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.54 pCi/g

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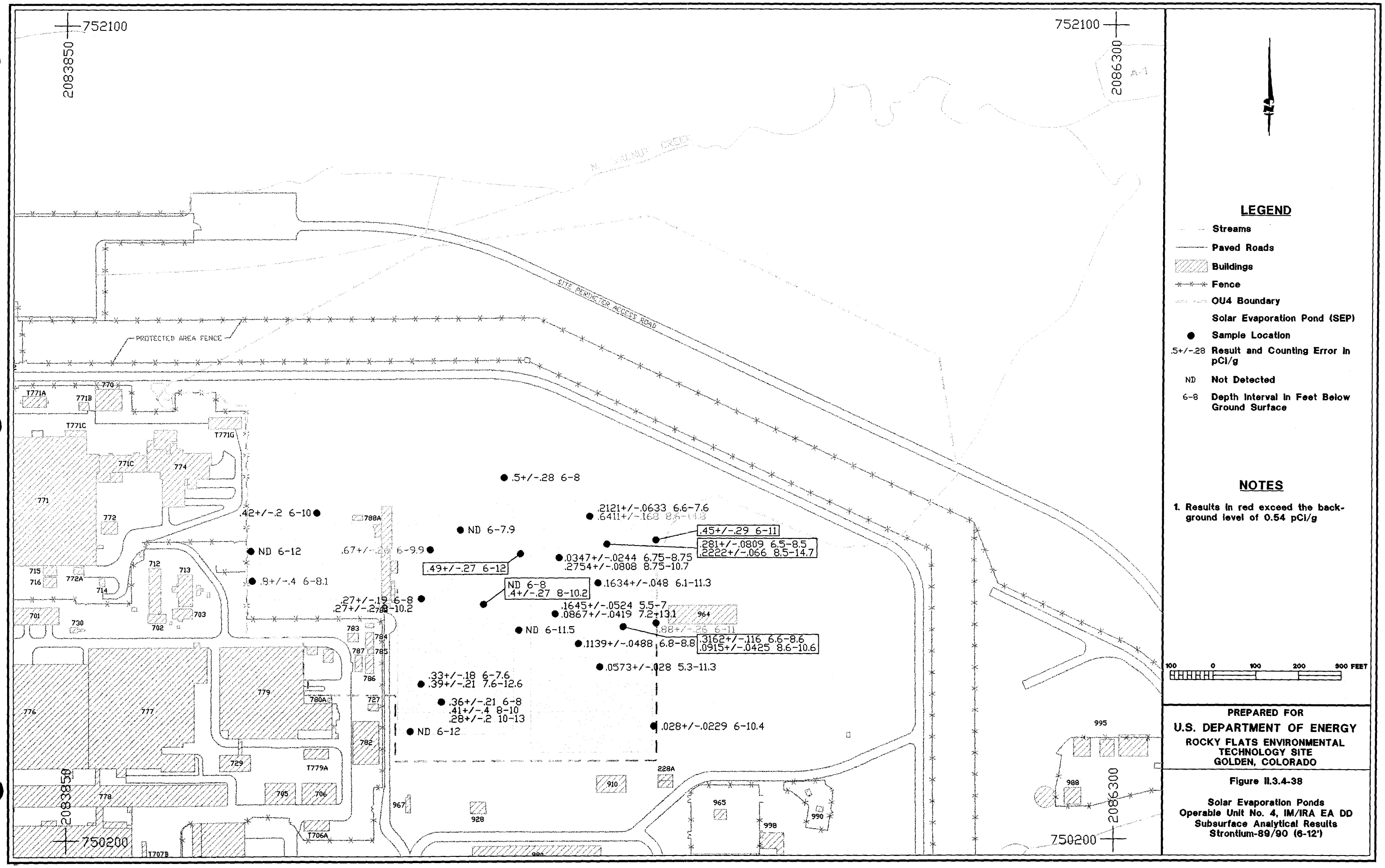
Figure II.3.4-37

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Strontium-89/90 (0-6')



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .5+/-.28 Result and Counting Error in pCi/g
- ND Not Detected
- 6-8 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.54 pCi/g

100 0 100 200 300 FEET

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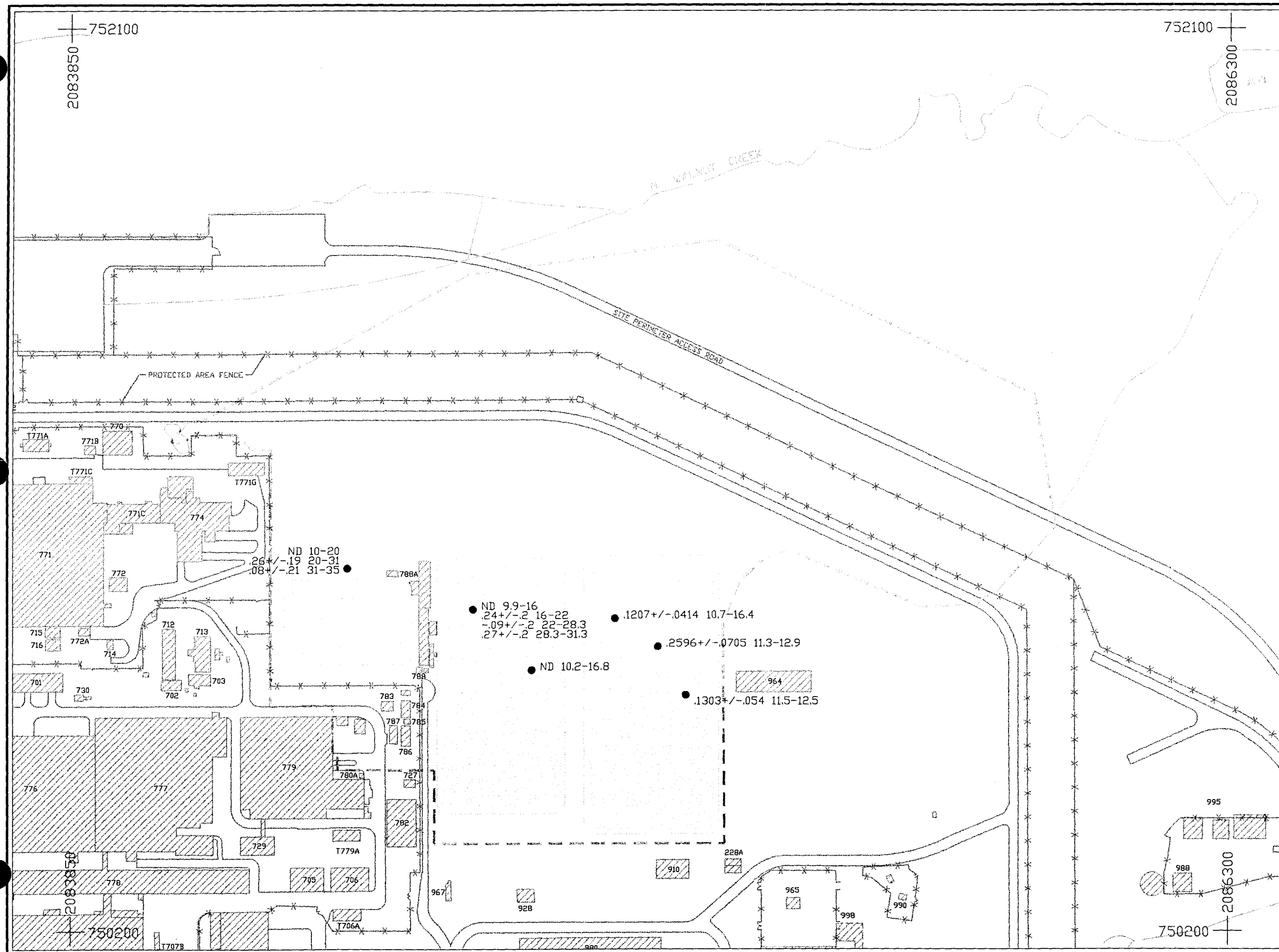
Figure II.3.4-38

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Strontium-89/90 (6-12')

211



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .24+/-.2 Result and Counting Error in pCi/g
- ND Not Detected
- 16-22 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.54 pCi/g

100 0 100 200 300 FEET

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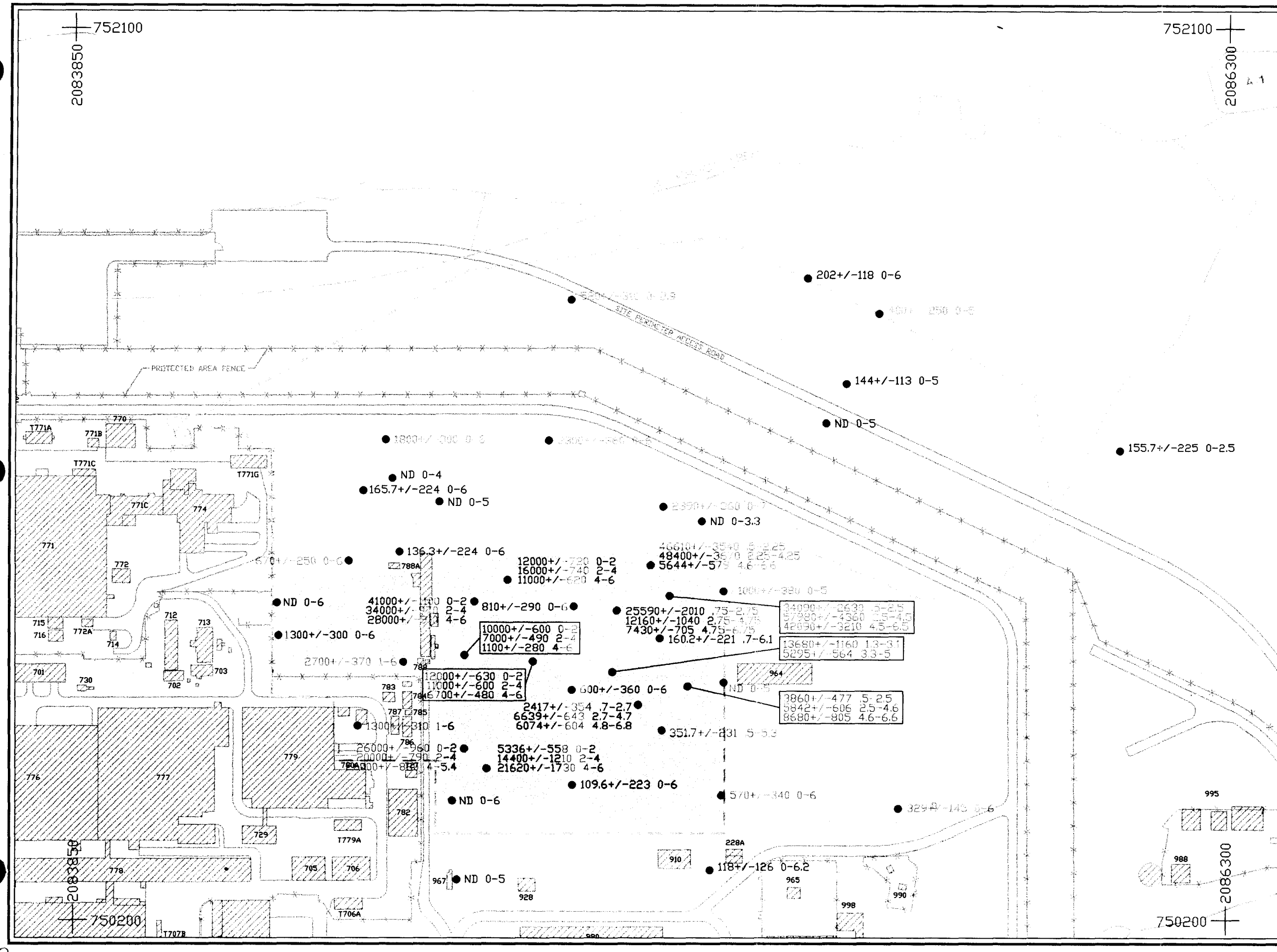
Figure II.3.4-39

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Strontium-89/90 (> 12')



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 144+/-113 Result and Counting Error in pCi/l
- ND Not Detected
- 0-5 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 212.2 pCi/l

100 0 100 200 300 FEET

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Figure II.3.4-40

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Tritium (0-6')

213

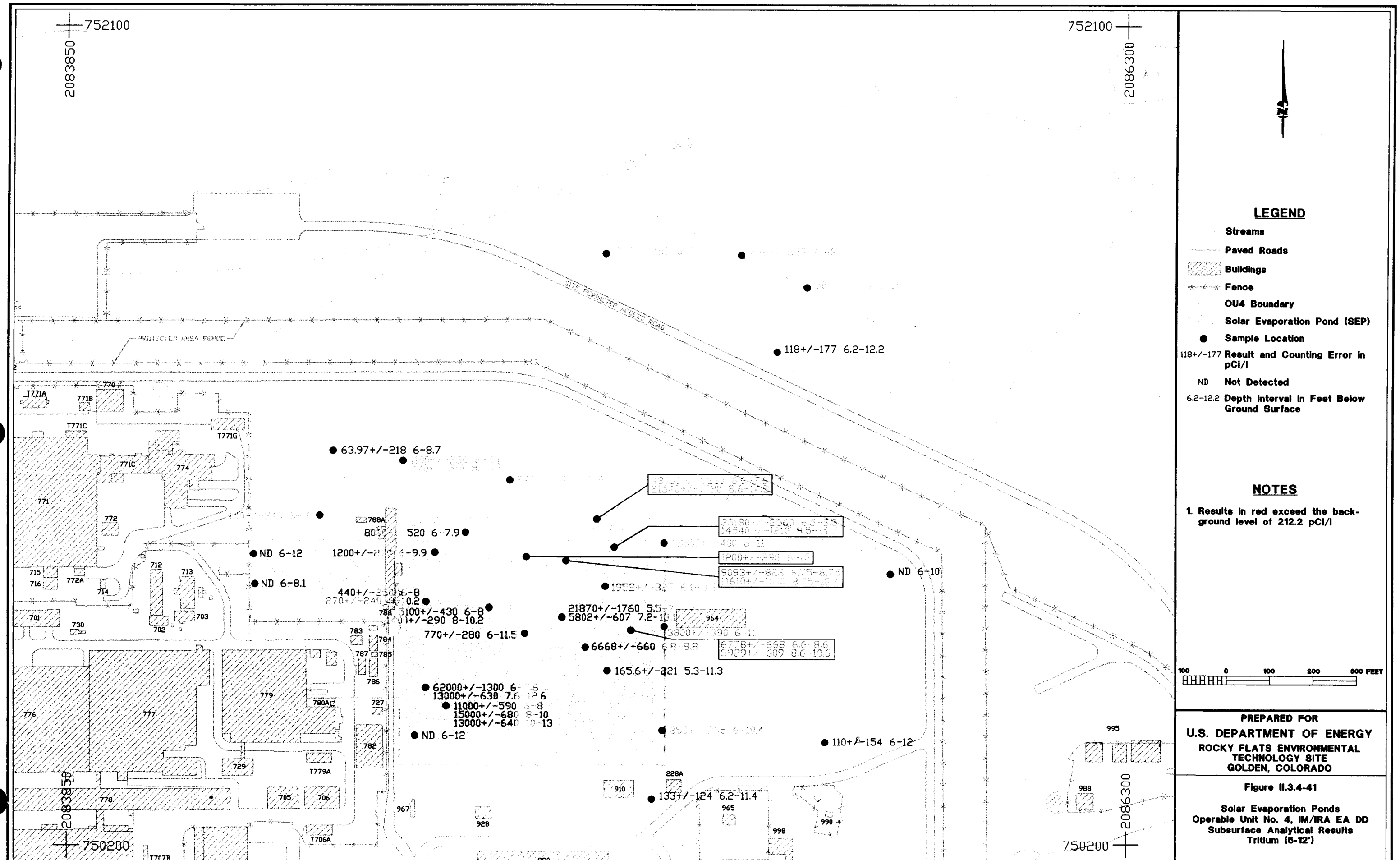
752100
2083850
752100
2086300
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
118+/-177 6.2-12.2
63.97+/-218 6-8.7
520 6-7.9
ND 6-12
ND 6-8.1
ND 6-10
21870+/-1760 5.5
5802+/-607 7.2-13
770+/-280 6-11.5
6668+/-660
165.6+/-221 5.3-11.3
62000+/-1300
13000+/-630 7.6-12.6
11000+/-590
15000+/-680
13000+/-640
ND 6-12
110+/-154 6-12
133+/-124 6.2-11.4
750200
2083850
750200
2086300
LEGEND
Streams
Paved Roads
Buildings
Fence
OU4 Boundary
Solar Evaporation Pond (SEP)
Sample Location
118+/-177 Result and Counting Error in pCi/l
ND Not Detected
6.2-12.2 Depth Interval in Feet Below Ground Surface
NOTES
1. Results in red exceed the background level of 212.2 pCi/l
100 0 100 200 300 FEET
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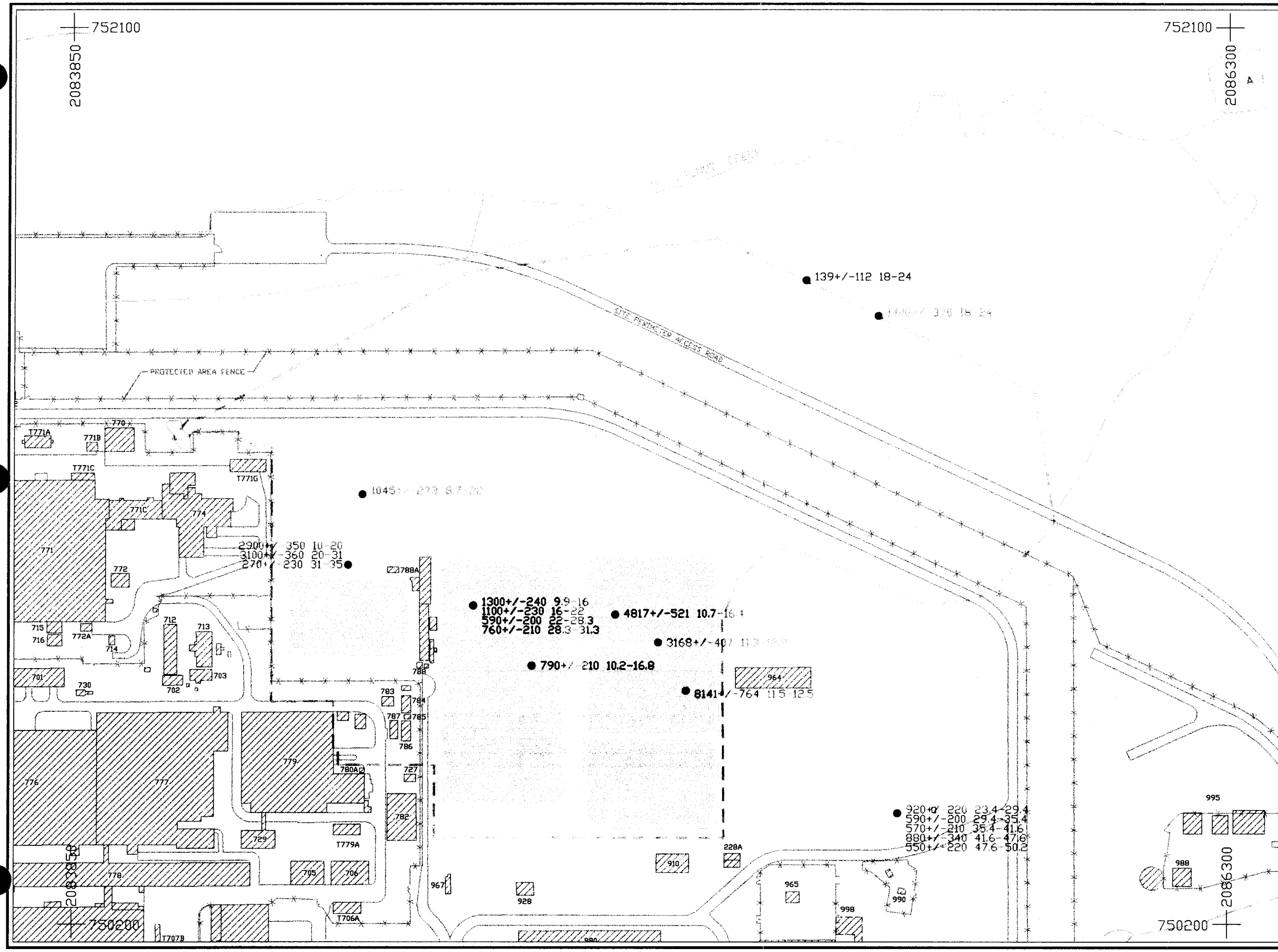
Figure II.3.4-41
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Tritium (6-12')

214



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 139+/-112 Result and Counting Error in pCi/l
- ND Not Detected
- 18-24 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 212.2 pCi/l

100 0 100 200 300 FEET

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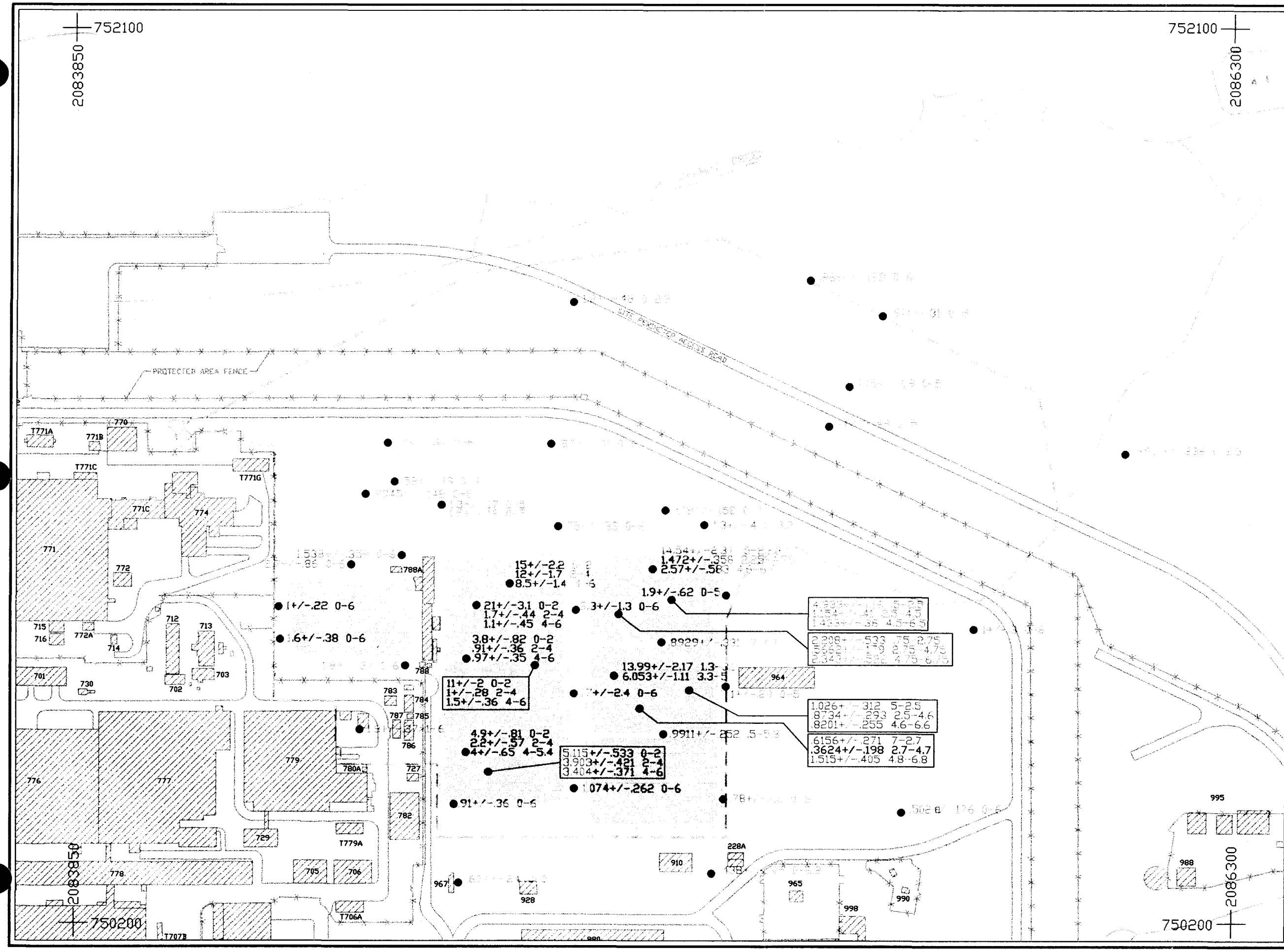
Figure II.3.4-42

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Tritium (> 12')

215



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- Result and Counting Error in pCi/g
- ND Not Detected
- Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.53 pCi/g

100 0 100 200 300 FEET

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GOLDEN, COLORADO

Figure II.3.4-43

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Uranium 233/234 (0-6')

216

752100
2083850
752100
2086300
N
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
T771A
771B
770
T771C
T771G
771C
774
771
772
788A
715
716
772A
714
712
713
703
702
701
730
788
784
787
785
786
779
780A
727
776
777
782
729
T779A
778
705
706
T706A
T707B
967
928
910
228A
965
998
990
964
995
988
750200
2083850
2086300
.38+/-.17 6-12
.91+/-.28 6-8.1
1.8+/-.42 7.9
.72+/-.23 6-9
3.4+/-.63 6-12
1.2+ 6-8
1.2+ 8-10.2
1.1+/-.47 6-11.5
1.416+/-.3 6.8-8.8
2.5+/-.51 6-7.6
1+/-.34 7.6-12.6
2.2+/-.55 6-
5.4+/-1.1 8-
1.5+/-.46 10-
1.2+/-.38 6-12
3.825+/-.75
1.547+/-.41
1.445+/-.458 8.5-14.7
.48+/-.19 6-10
2.082+/-.448 6.6-8.6
1.994+/-.482 8.6-10.6
10.99+/-1.76 5.5-7
1.113+/-.343 7.2-13.1
.404+/-.143 6-12
.242+/-.107 6.2-11.4

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- Result and Counting Error in pCi/g
- ND Not Detected
- Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.53 pCi/g

100 0 100 200 300 FEET

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GOLDEN, COLORADO

Figure II.3.4-44

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Uranium 233/234 (6-12')

217

752100

2083850

752100

2086300

A-1

SITE PERIMETER ACCESS ROAD

PROTECTED AREA FENCE

T771A 771B 770 T771C T771G 771C 774 771 772 772A 715 716 714 712 713 703 702 701 730 788A 788 783 784 787 785 786 779 780A 727 776 777 782 729 T779A 778 705 706 T706A T707B 967 928 910 228A 965 998 990 964 995 988

125+/-.26 18-24

85+/-.3 12-18
95+/-.32 18-24

2.7+/-.71 10-20
1.9+/-.5 20-31
36+/-.39 31-35

.99+/-.17 9.9-16
.78+/-.15 16-22
.83+/-.15 22-28.3
1+/-.18 28.3-31.3

1.055+/-.321 10.7-16.4

.9361+/-.257 11.3-12.9

.84+/-.16 10.2-16.8

1.048+/-.3 1.5-12.5

.95+/-.31 23.4-29.4
1.5+/-.54 29.4-35.4
2.2+/-.55 35.4-41.6
1.7+/-.25 41.6-47.6
1.5+/-.22 47.6-50.2

2083850

750200

2086300

750200

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- 2.7+/-.71 Result and Counting Error in pCi/g
- ND Not Detected
- 10-20 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.53 pCi/g

100 0 100 200 300 FEET

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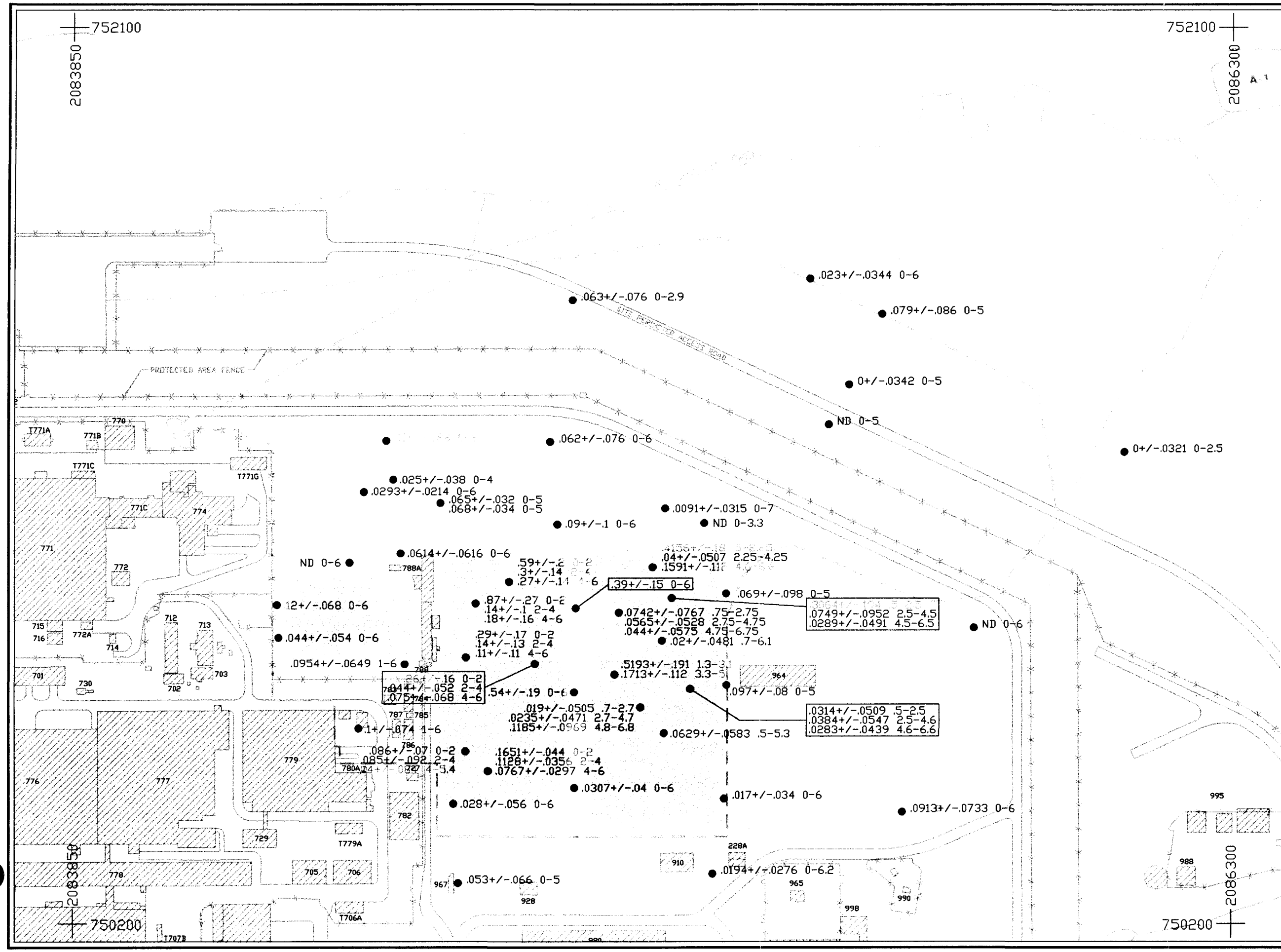
GOLDEN, COLORADO

Figure II.3.4-45

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Uranium 233/234 (> 12')

218



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .025+/-.038 Result and Counting Error in pCi/g
- ND Not Detected
- 0-4 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.1 pCi/g

100 0 100 200 300 FEET

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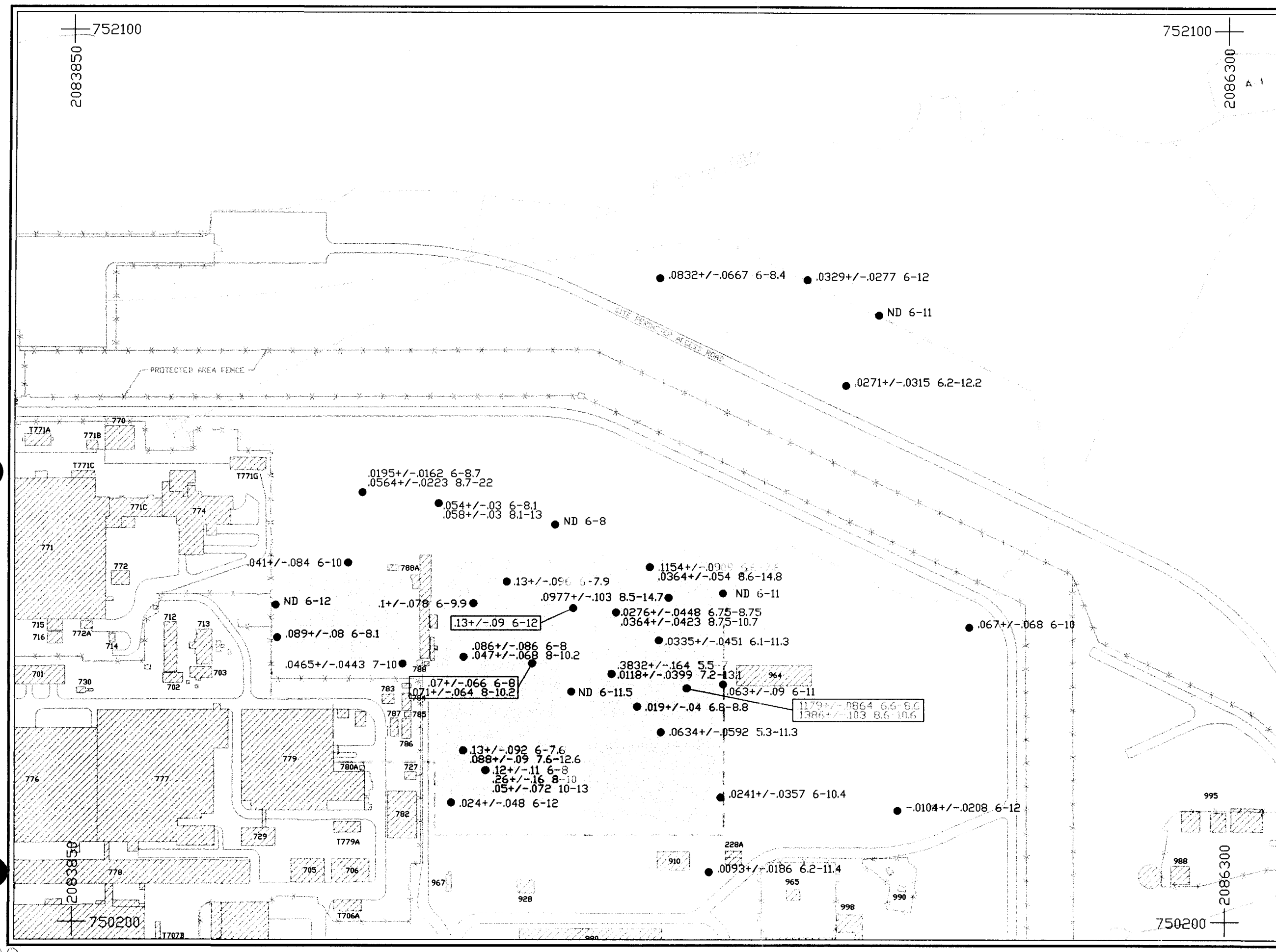
GOLDEN, COLORADO

Figure II.3.4-46

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Uranium 235 (0-6')

219



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .019+/-.04 Result and Counting Error in pCi/g
- ND Not Detected
- 6.8-8.8 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.1 pCi/g

100 0 100 200 300 FEET

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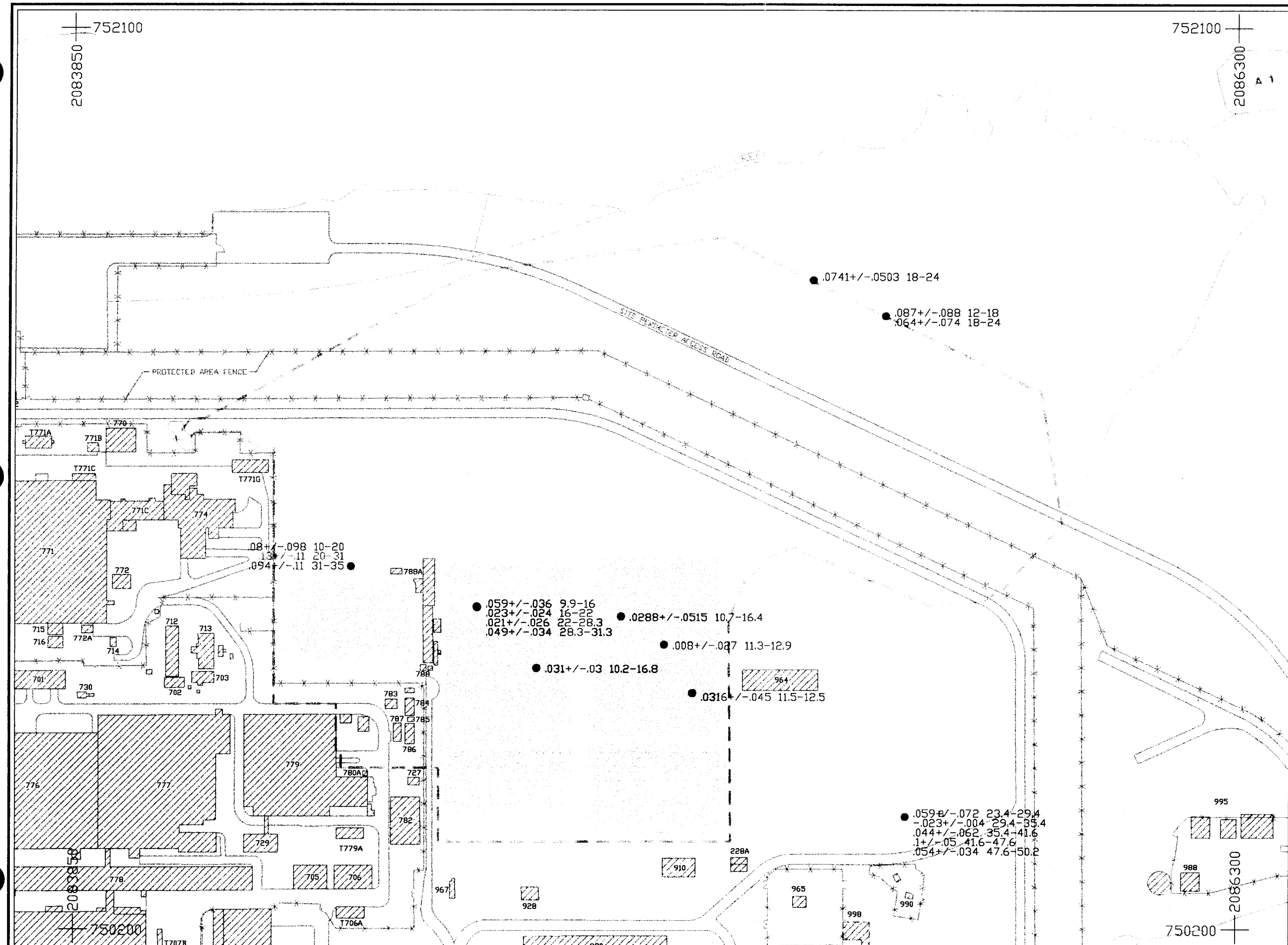
GOLDEN, COLORADO

Figure II.3.4-47

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Uranium 235 (6-12')

220



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .087+/-.088 Result and Counting Error in pCi/g
- ND Not Detected
- 12-18 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.1 pCi/g

100 0 100 200 300 FEET

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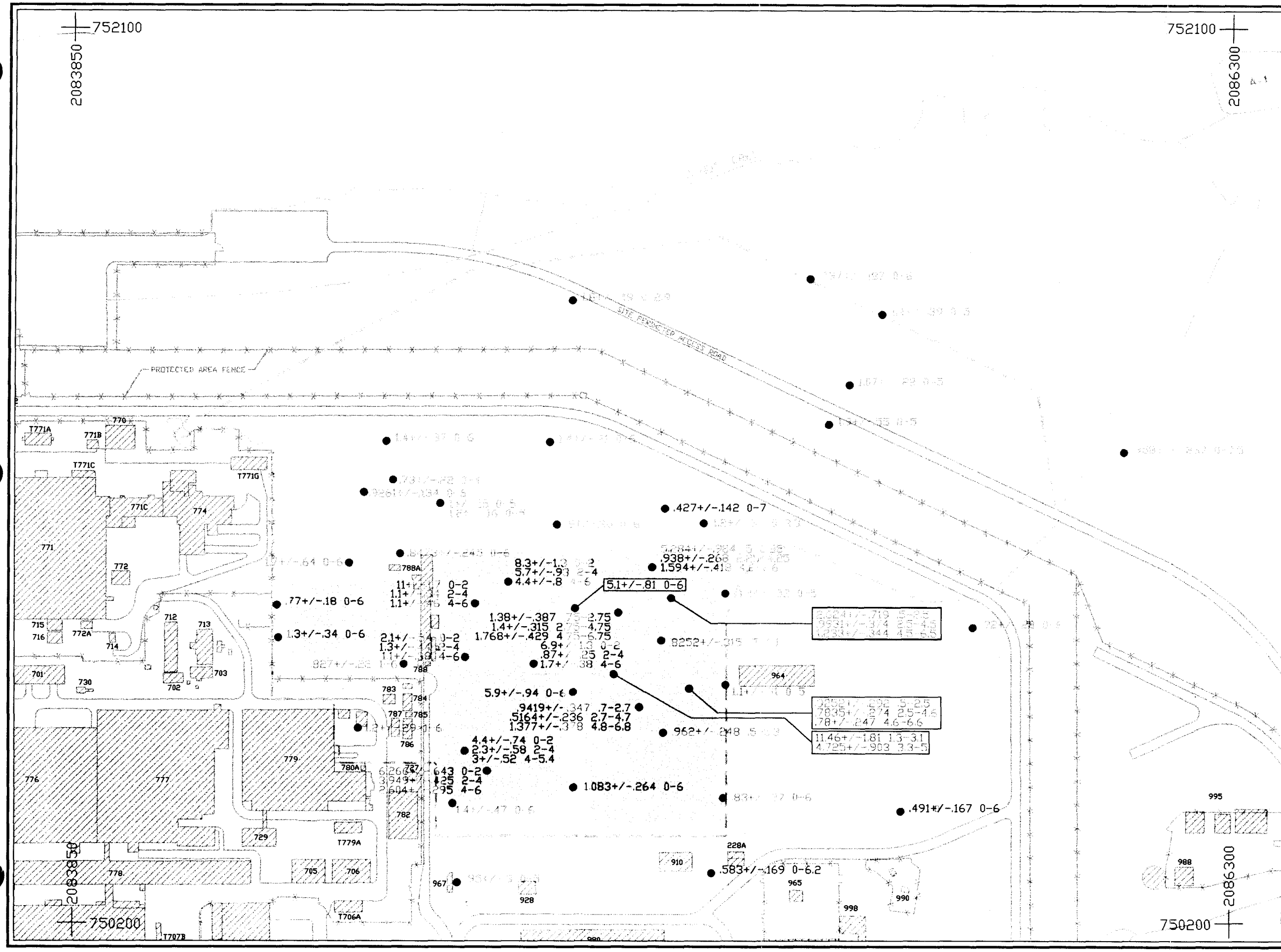
GOLDEN, COLORADO

Figure II.3.4-48

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Uranium 235 (> 12')

221



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- .92+/-.28 Result and Counting Error in pCi/g
- ND Not Detected
- 0-6 Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.63 pCi/g

100 0 100 200 300 FEET

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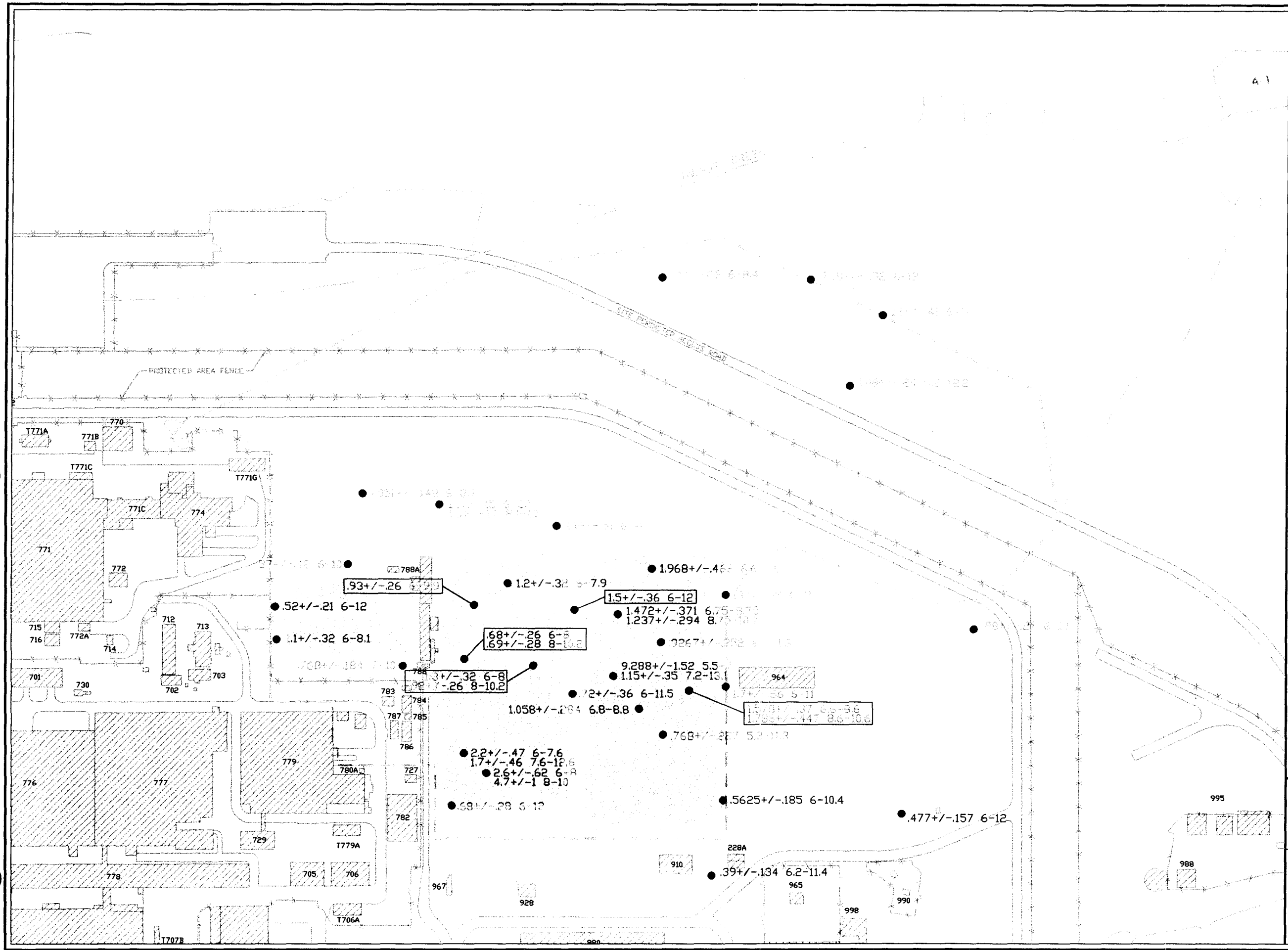
GOLDEN, COLORADO

Figure II.3.4-49

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Uranium 238 (0-6')

222



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- Result and Counting Error in pCi/g
- ND Not Detected
- Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.63 pCi/g

100 0 100 200 300 FEET

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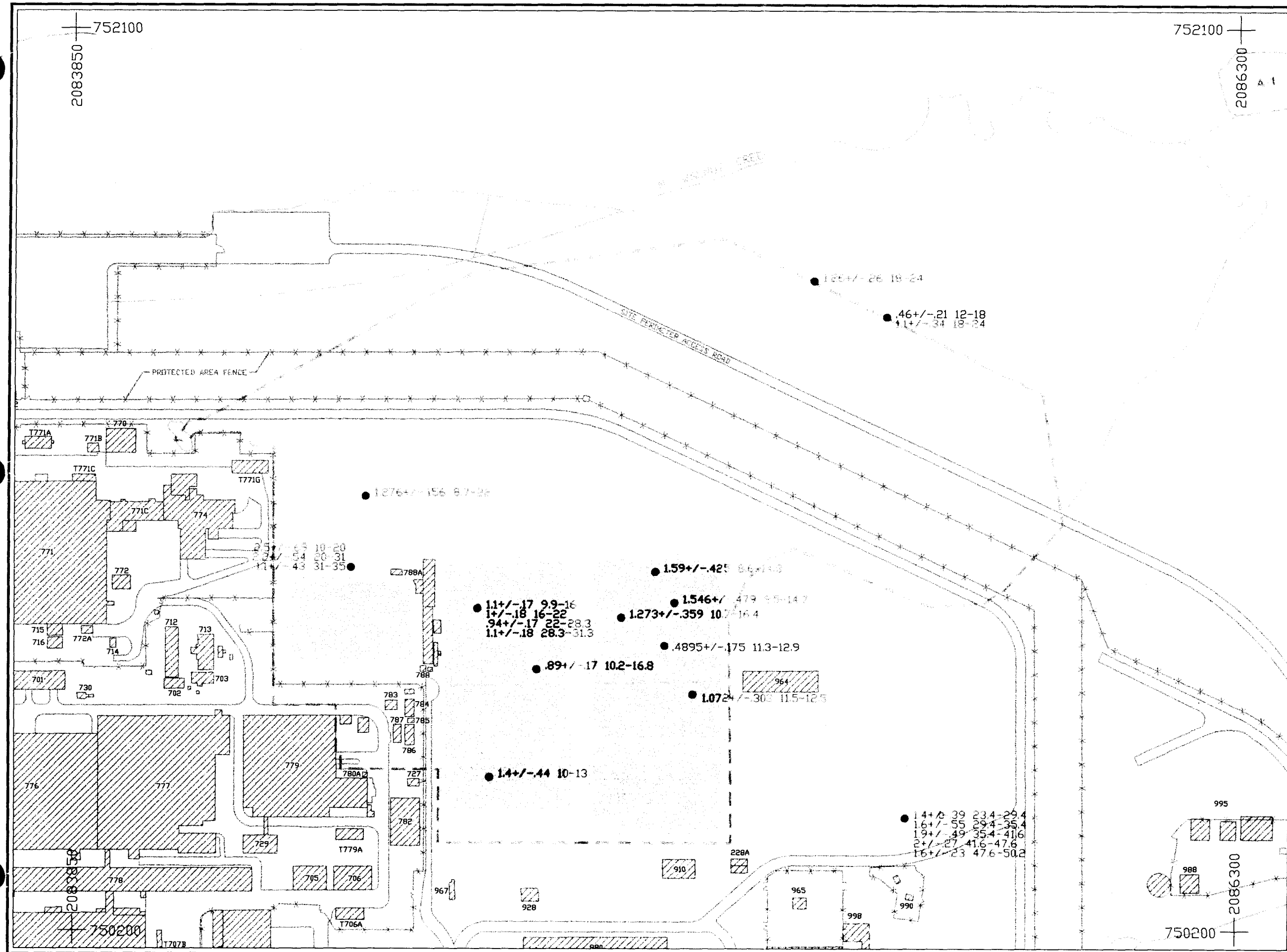
GOLDEN, COLORADO

Figure II.3.4-50

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Uranium 238 (6-12')

223



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- Result and Counting Error in pCi/g
- ND Not Detected
- Depth Interval in Feet Below Ground Surface

NOTES

1. Results in red exceed the background level of 0.63 pCi/g

100 0 100 200 300 FEET

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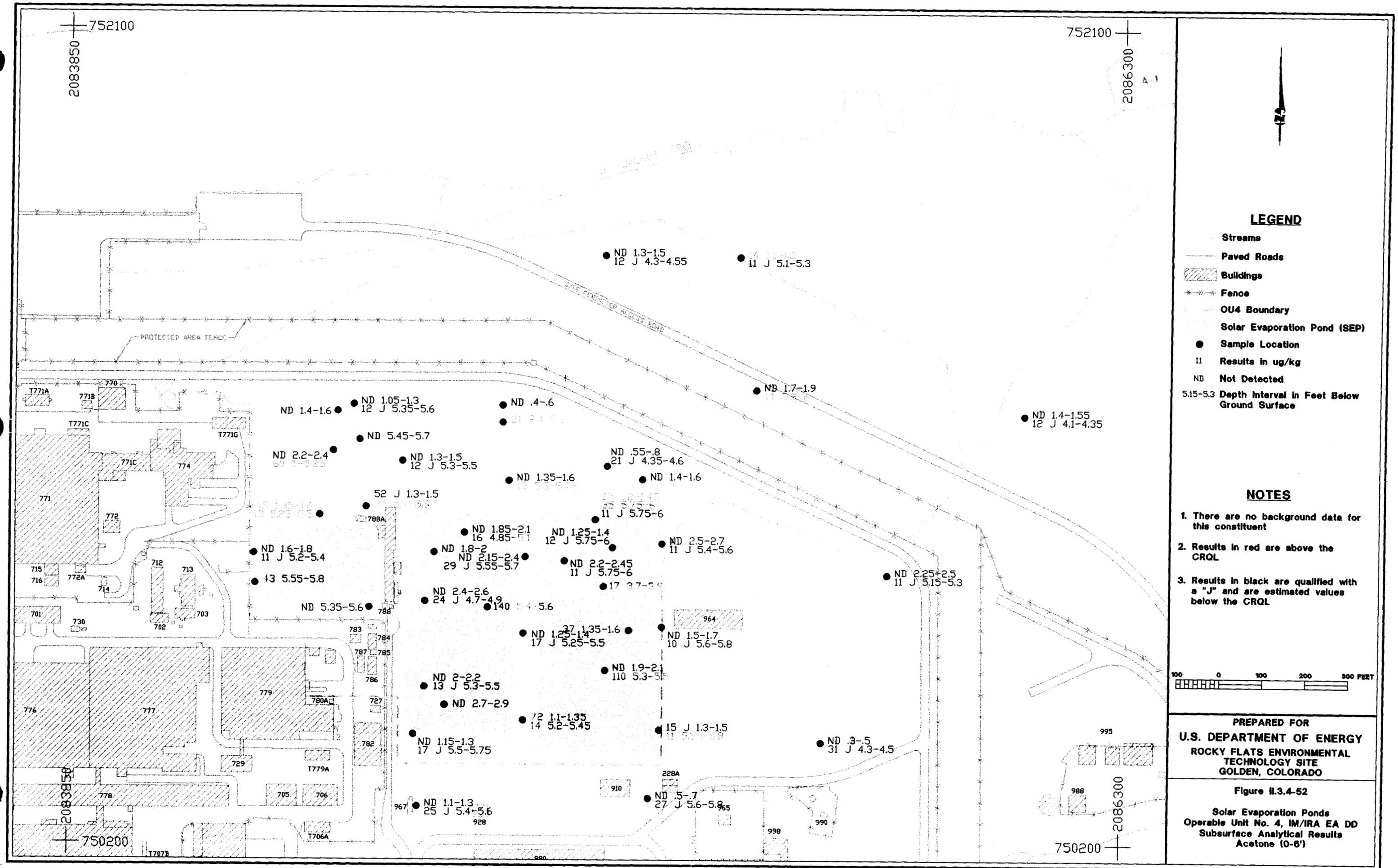
GOLDEN, COLORADO

Figure II.3.4-51

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Uranium 238 (> 12')

224



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 11 Results in ug/kg
- ND Not Detected
- 5.15-5.3 Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the CRQL
3. Results in black are qualified with a "J" and are estimated values below the CRQL

100 0 100 200 300 FEET

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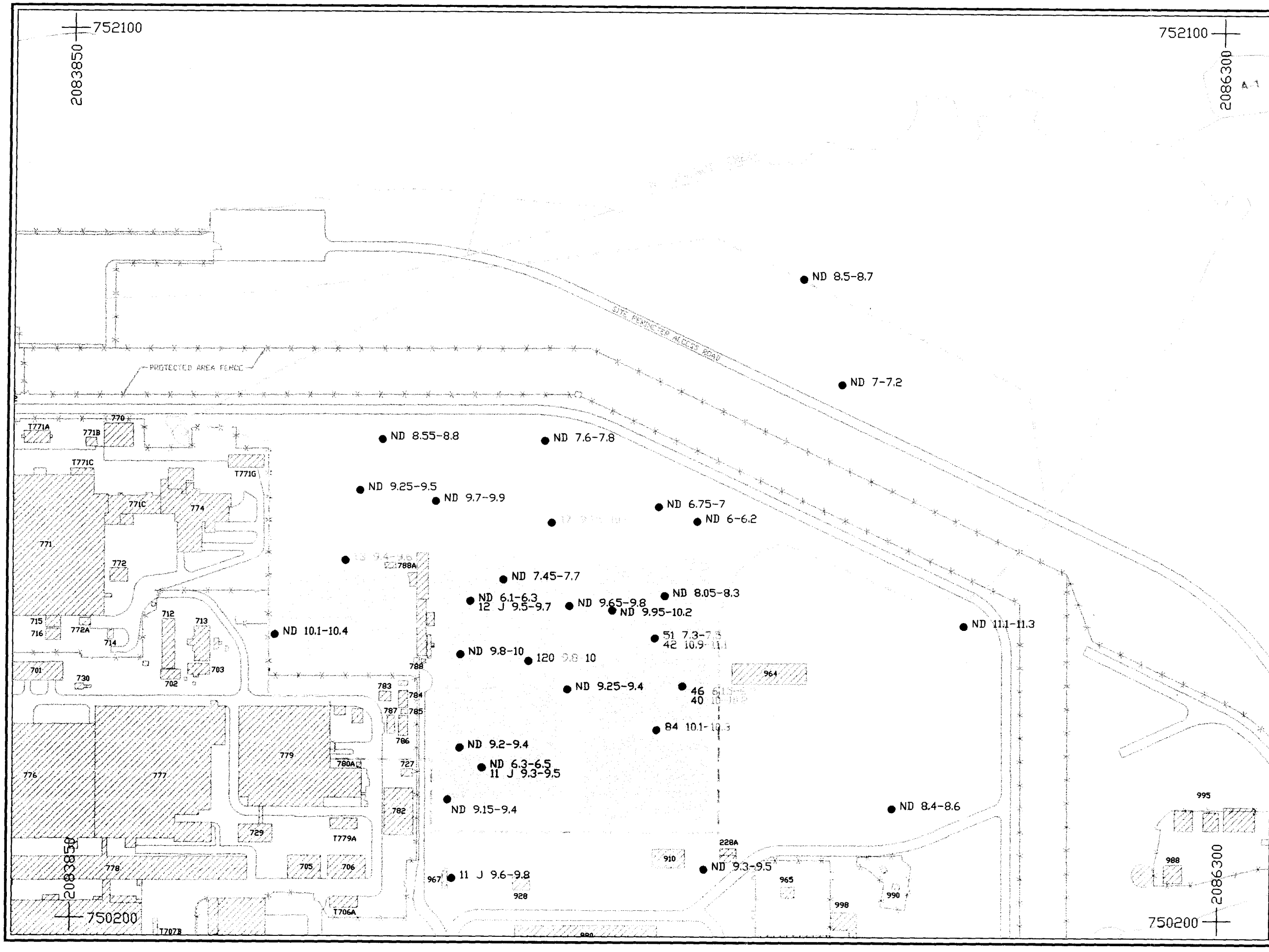
GOLDEN, COLORADO

Figure II.3.4-52

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Acetone (0-6')

225



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- Results in ug/kg
- ND Not Detected
- 7.6-7.8 Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the CRQL
3. Results in black are qualified with a "J" and are estimated values below the CRQL

100 0 100 200 300 FEET

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Figure II.3.4-53

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Acetone (6-12')

226

752100
2083850

752100
2086300

A 1

PROTECTED AREA FENCE

SITE FENCE OR ACCESS ROAD

8 J 12.9-13.1
34 J 21.2-21.4
35 J 24.7-24.9

ND 12-12.2
12 J 15.9-16.1

ND 17.1-17.4

ND 13.8-14

ND 14.2-14.5

28 12.6-12.8

ND 17-17.25

ND 12.35-12.6
61 J 15-15.25

ND 13.8-14

ND 13.8-14

T771A 770 771B T771C T771G 771C 774 771 772 715 716 772A 714 712 713 703 702 701 730 788A 788 783 784 787 785 786 779 780A 727 776 777 782 729 T779A 778 795 706 T706A T707B 964 910 228A 967 928 965 990 998 995 988

2083850
750200

2086300
750200

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 17 Results in ug/kg
- ND Not Detected
- 17.1-17.4 Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the CRQL
3. Results in black are qualified with a "J" and are estimated values below the CRQL

100 0 100 200 300 FEET

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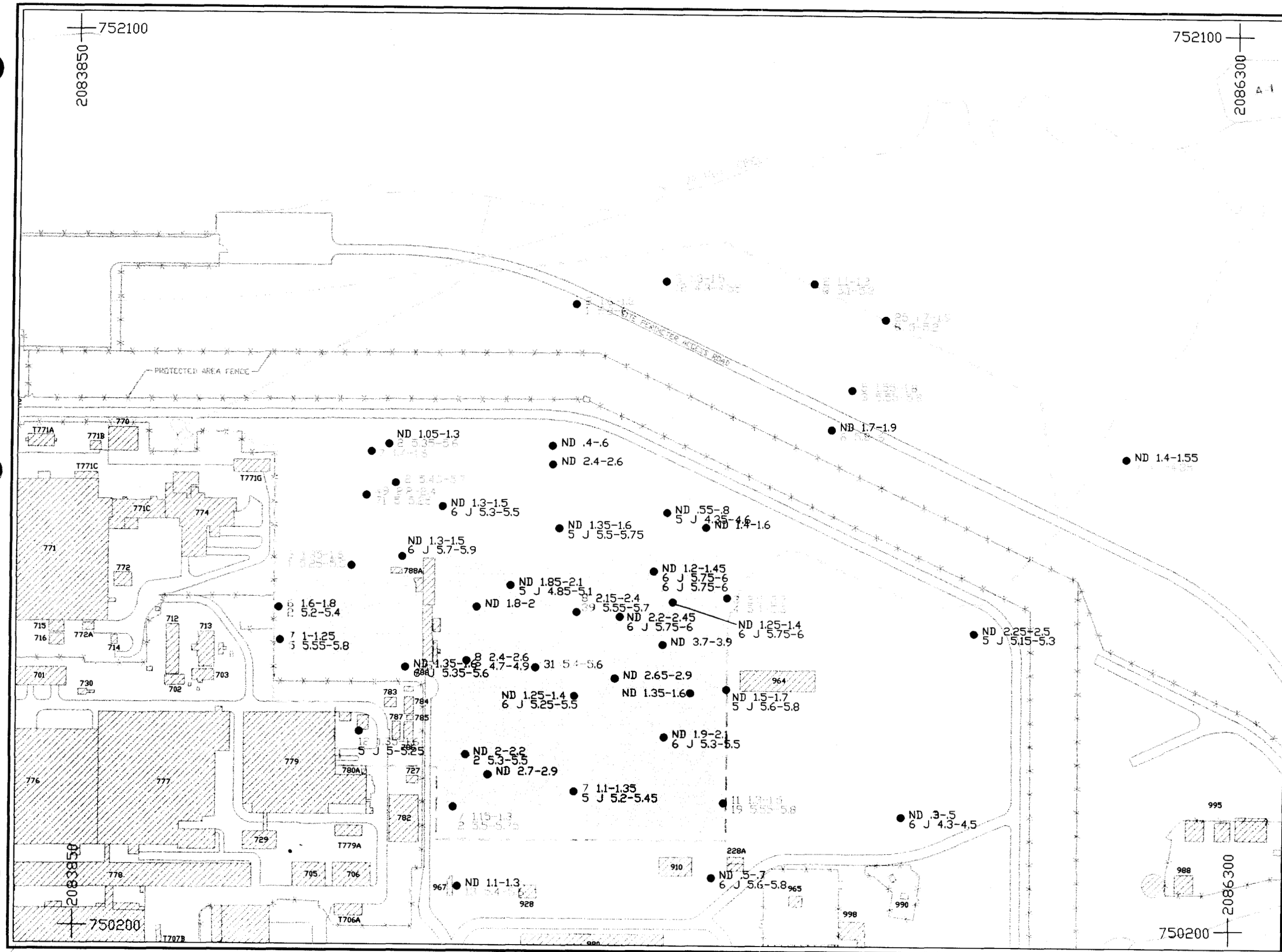
GOLDEN, COLORADO

Figure II.3.4-54

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Acetone (> 12')

227



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- 5 Results in ug/kg
- ND Not Detected
- 5.5-5.75 Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the CRQL
3. Results in black are qualified with a "J" and are estimated values below the CRQL

100 0 100 200 300 FEET

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GOLDEN, COLORADO

Figure II.3.4-55

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Methylene Chloride (0-6')

228

752100
2083850
752100
2086300
A-1
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
T771A
771B
770
T771C
T771G
771C
774
771
772
715
716
772A
714
712
713
701
730
702
703
788A
788
783
784
787
785
786
779
780A
727
776
777
782
729
T779A
778
705
706
T706A
T707B
750200
2083350
ND 9.7-9.9
ND 6.75-7
ND 6-6.2
ND 9.4-9.6
5 9.6-9.8
5 10.1-10.4
ND 9.35-9.5
2 7.45-7.7
ND 6.1-6.3
5 J 9.5-9.7
16 9.65-9.8
ND 8.05-8.3
ND 9.95-10.2
ND 7.3-7.5
6 J 10.9-11.1
7 9.8-10
65 9.8-10
ND 6.55-6.75
964
ND 9.25-9.4
4 6.5-6.3
5 J 10-10.25
5 11.9-12.1
ND 10.1-10.3
3 9.2-9.4
ND 6.3-6.5
5 J 9.3-9.5
ND 8.4-8.6
910
228A
ND 9.3-9.5
967
928
965
998
990
995
988
2086300
750200

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- Results in ug/kg
- ND Not Detected
- Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the CRQL
3. Results in black are qualified with a "J" and are estimated values below the CRQL

100 0 100 200 300 FEET

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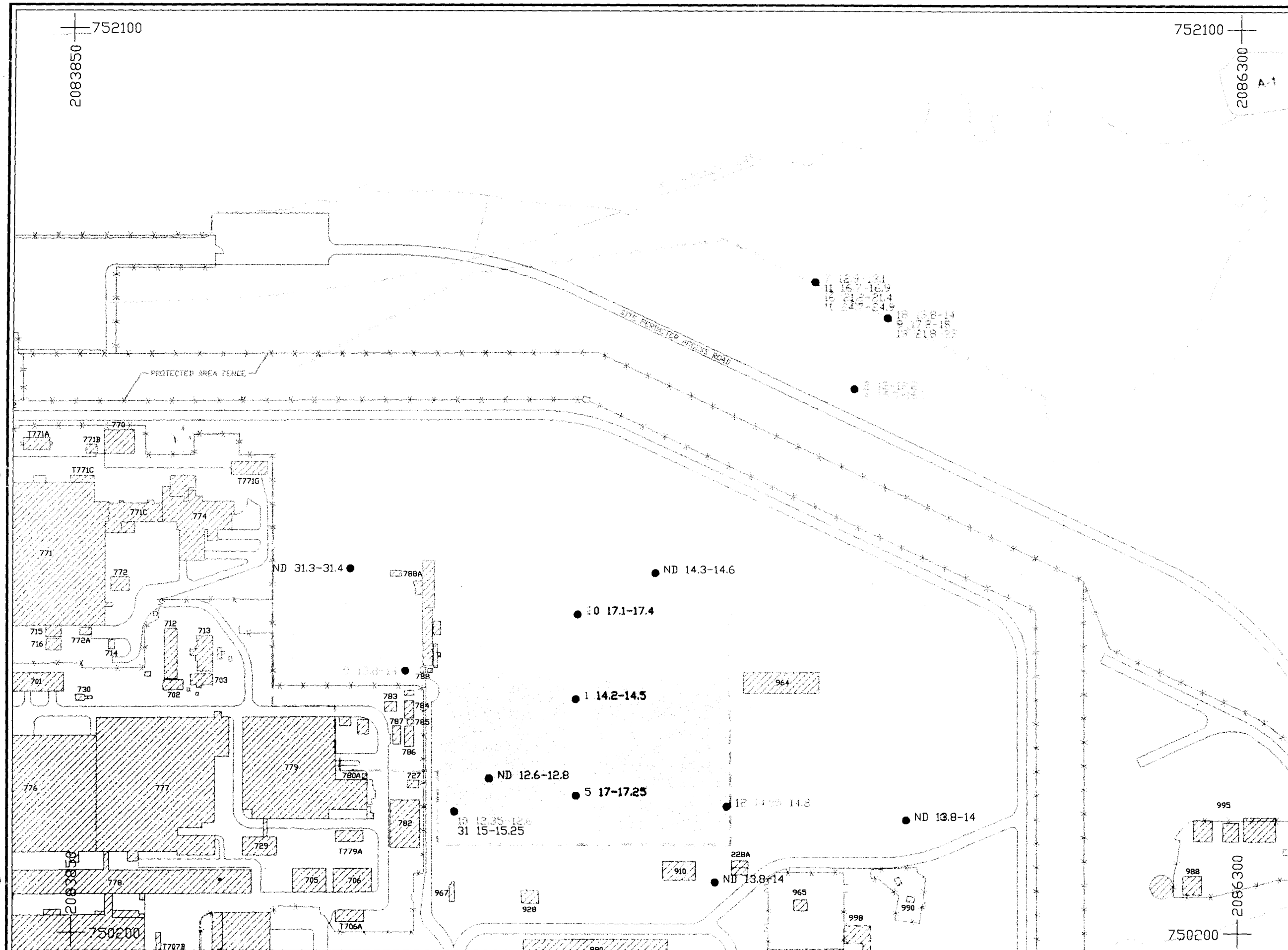
GOLDEN, COLORADO

Figure II.3.4-56

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Methylene Chloride (6-12')



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- 2 Results in ug/kg
- ND Not Detected
- Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the CRQL

100 0 100 200 300 FEET

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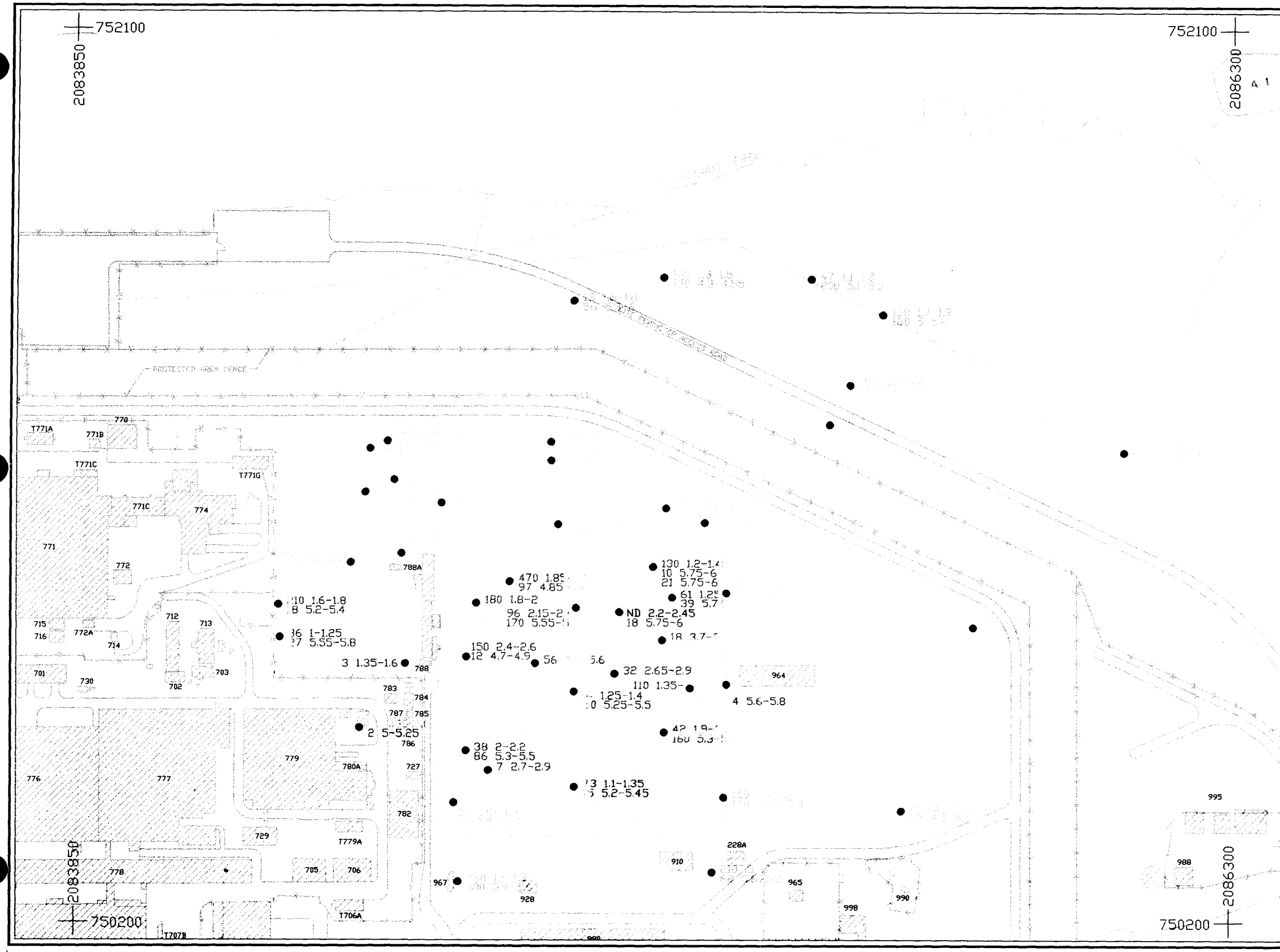
GOLDEN, COLORADO

Figure II.3.4-57

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Methylene Chloride (> 12')

230



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- Results in ug/kg
- ND Not Detected
- Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the CRQL, results in black are estimated below the CRQL

100 0 100 200 300 FEET

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GOLDEN, COLORADO

Figure II.3.4-58

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Toluene (0-6')

23

752100
2083850
752100
2086300
A 1
SITE PERIMETER ACCESS ROAD
PROTECTED AREA FENCE
T771A
771B
770
T771C
T771G
771C
774
771
772
788A
715
716
772A
714
712
713
703
701
730
702
788
783
784
787
785
786
779
780A
727
776
777
782
729
T779A
778
705
706
T706A
T707B
967
928
910
228A
965
998
990
964
995
988
46 7.45
21 6.1-6.3
76 9.5-9.7
66 9.95-10.2
84 9.8-10
66 6.55-6.75
4 9.25-9.4
69 9.2-9.4
34 6.3-6.5
30 9.3-9.5
110 9.15-9.4
2083850
750200
2086300
750200

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- Results in ug/kg
- ND Not Detected
- Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the CRQL, results in black are estimated below the CRQL

100 0 100 200 300 FEET

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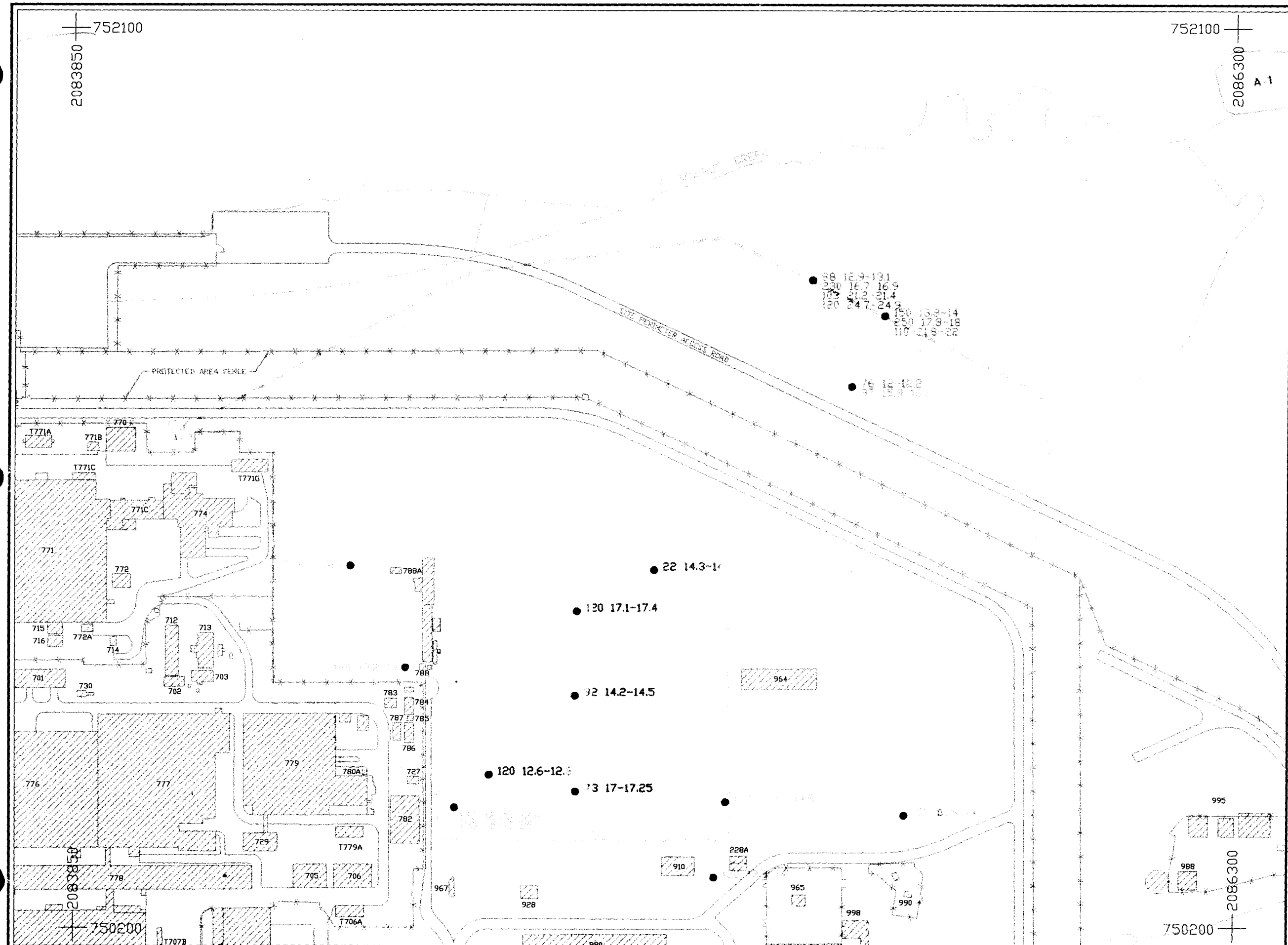
GOLDEN, COLORADO

Figure II.3.4-59

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Toluene (6-12')



LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- Sample Location
- Results in ug/kg
- Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the CRQL

100 0 100 200 300 FEET

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GOLDEN, COLORADO

Figure II.3.4-60

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Toluene (> 12')

233

752100
2083850

752100
2086300

PROTECTED AREA FENCE

SITE RESTRICTED ACCESS ROAD

T771A 770 771B T771C T771G 771C 774 771 772 788A 715 716 772A 714 712 713 701 730 702 703 788 783 784 787 785 786 727 776 777 779 780A 782 729 T779A 778 705 706 967 928 T706A T707B 964 910 228A 965 998 990 995 988

ND 4-6

45 J 4-6
ND 9.9-16
ND 16-22
ND 22-28.3
210 J 28.3-31.3

38 J 4-6

ND 4-6
ND 8-10.2
ND 10.2-16.8

ND 4-5.4
ND 7.6-12.6
50 J 4-6

ND.5-6.6
ND 8.6-14.8

ND .5-6.5
ND 8.5-14.7

ND .75-6.75
46 J 10.7-16.4

ND .7-6.1
ND 6.1-11.3
ND 11.3-12.9

ND 1.3-5
ND 7.2-13.1

ND .5-6.6
ND 6.5-11.5

ND .7-6.8

ND .5-5.3
ND 5.3-11.3

82 J 23.4-29.4
ND 29.4-35.4
46 J 35.4-41.6
ND 47.6-50.2

2083850
750200

2086300
750200

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- ● Sample Location
- Results in ug/kg
- ND Not Detected
- Depth Interval in Feet Below Ground Surface

NOTES

1. There are no background data for this constituent
2. Results in red are above the CRQL
3. Results in black are qualified with a "J" and are estimated values below the CRQL
4. This map represents all results for all depth intervals

100 0 100 200 300 FEET

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Figure II.3.4-61

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Subsurface Analytical Results
Bis(2-ethylhexyl)phthalate

234

752100

2083850

752100

2086300

A-1

N

LEGEND

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Solar Evaporation Pond (SEP)
- 1886 Alluvial Monitoring Well and Identification
- 76292 Bedrock Monitoring Well and Identification
- 0366 Abandoned Monitoring Well and Identification
- 45093 Phase I Piezometer Location and Identification
- 41993 Phase I Bedrock Piezometer Location and Identification
- 41293 Phase I Vadose Zone Monitoring Well and Identification
- 44693 Phase I Soil Borehole Location and Identification
- 72992 Historical Soil Borehole Location and Identification

100 0 100 200 300 FEET

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Figure II.3.5-1

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Phase I and Historical Borehole
and Well Locations in OU4

2083850

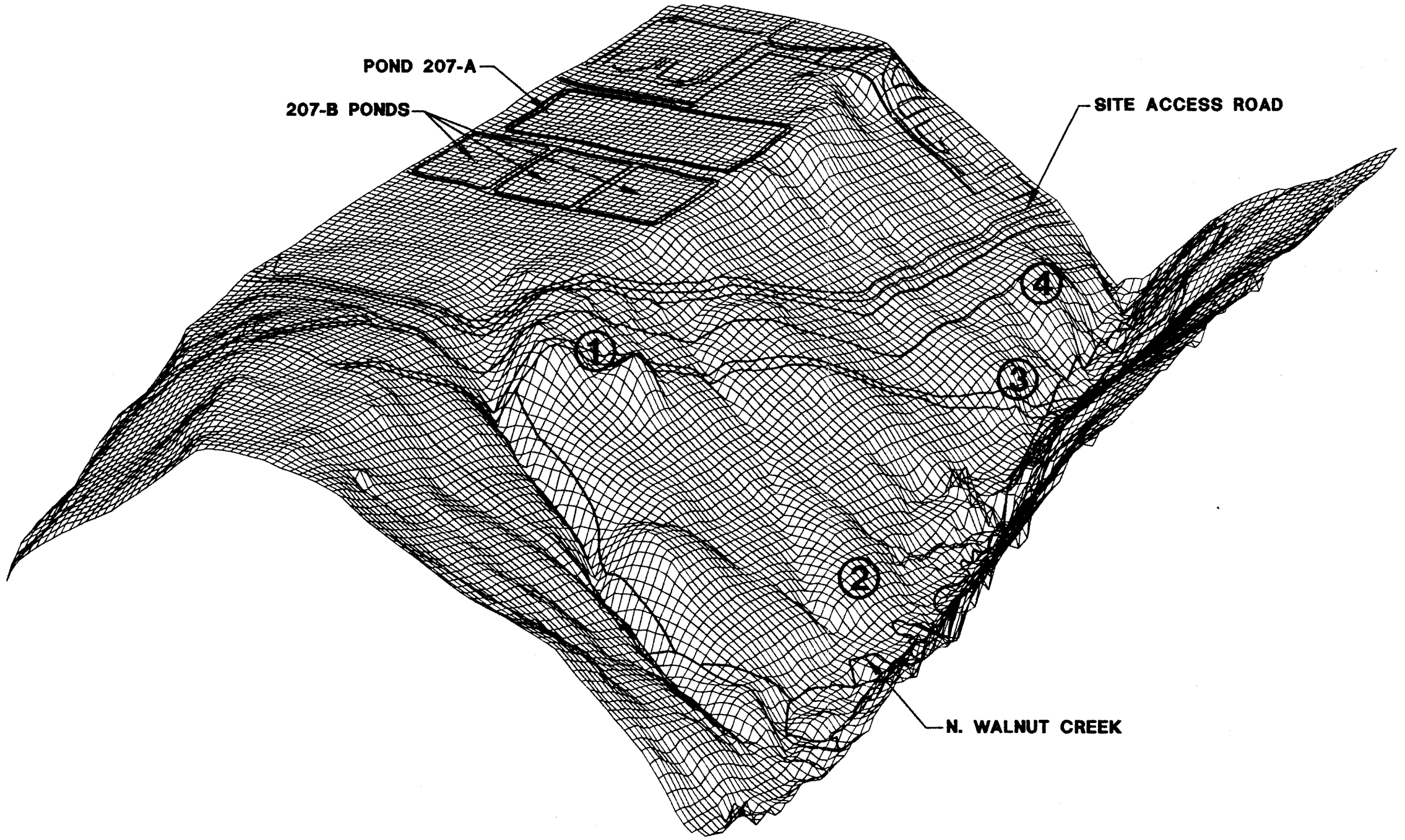
750200

2086300

750200

936

1951 Surface Topography



Note: Pond Outlines and Other Cultural Features Shown For Comparative Purposes.

LEGEND:

○ Inferred Slump Block Locations

100 0 100 200 300 FEET

Note: Vertical Exaggeration 5X

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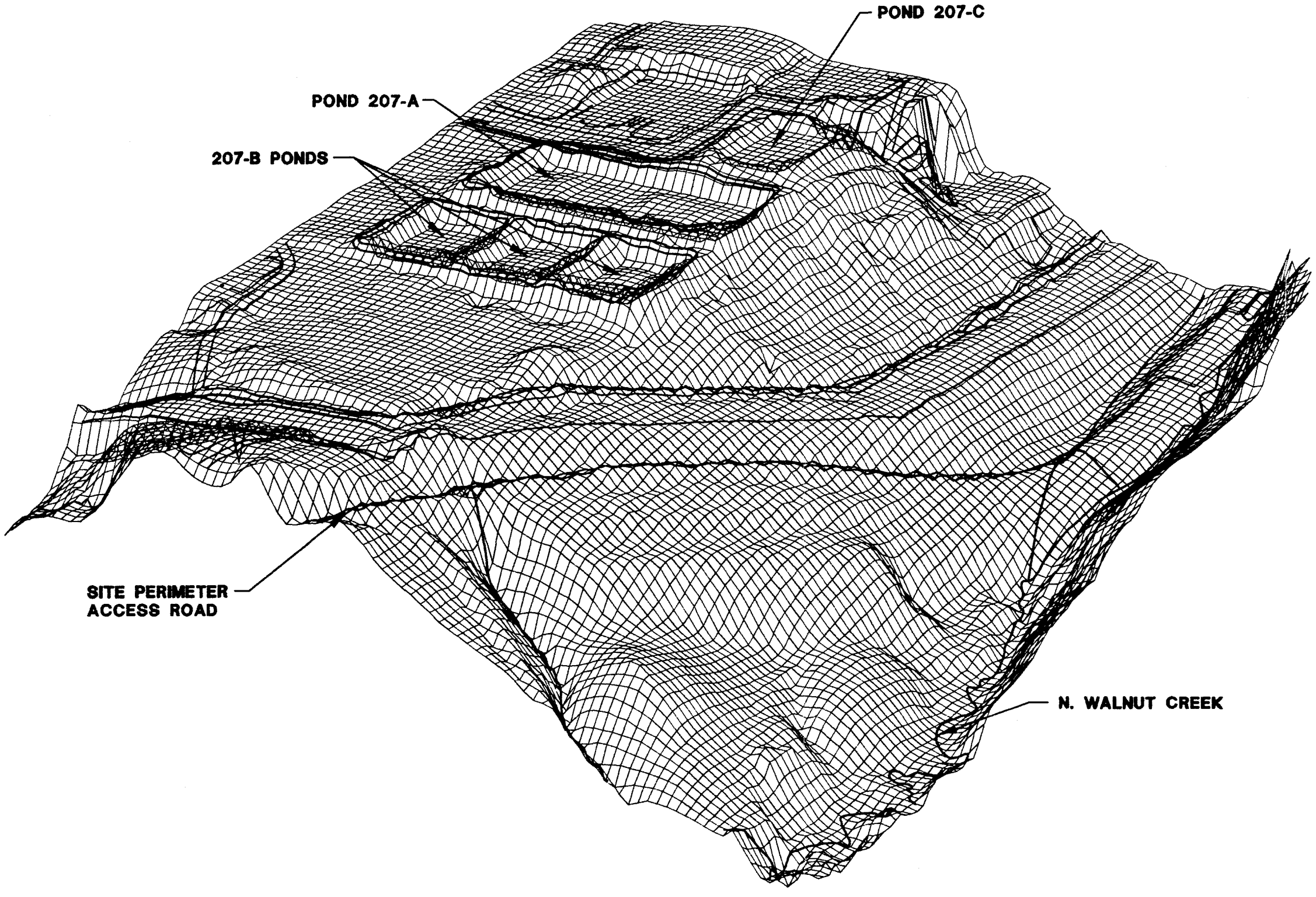
Figure II.3.5-2

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
1951 Surface Topography
OU4 Area

1986 Surface Topography



Note: Pond Outlines and Other Cultural Features Shown For Comparative Purposes.

100 0 100 200 300 FEET

Note: Vertical Exaggeration 5X

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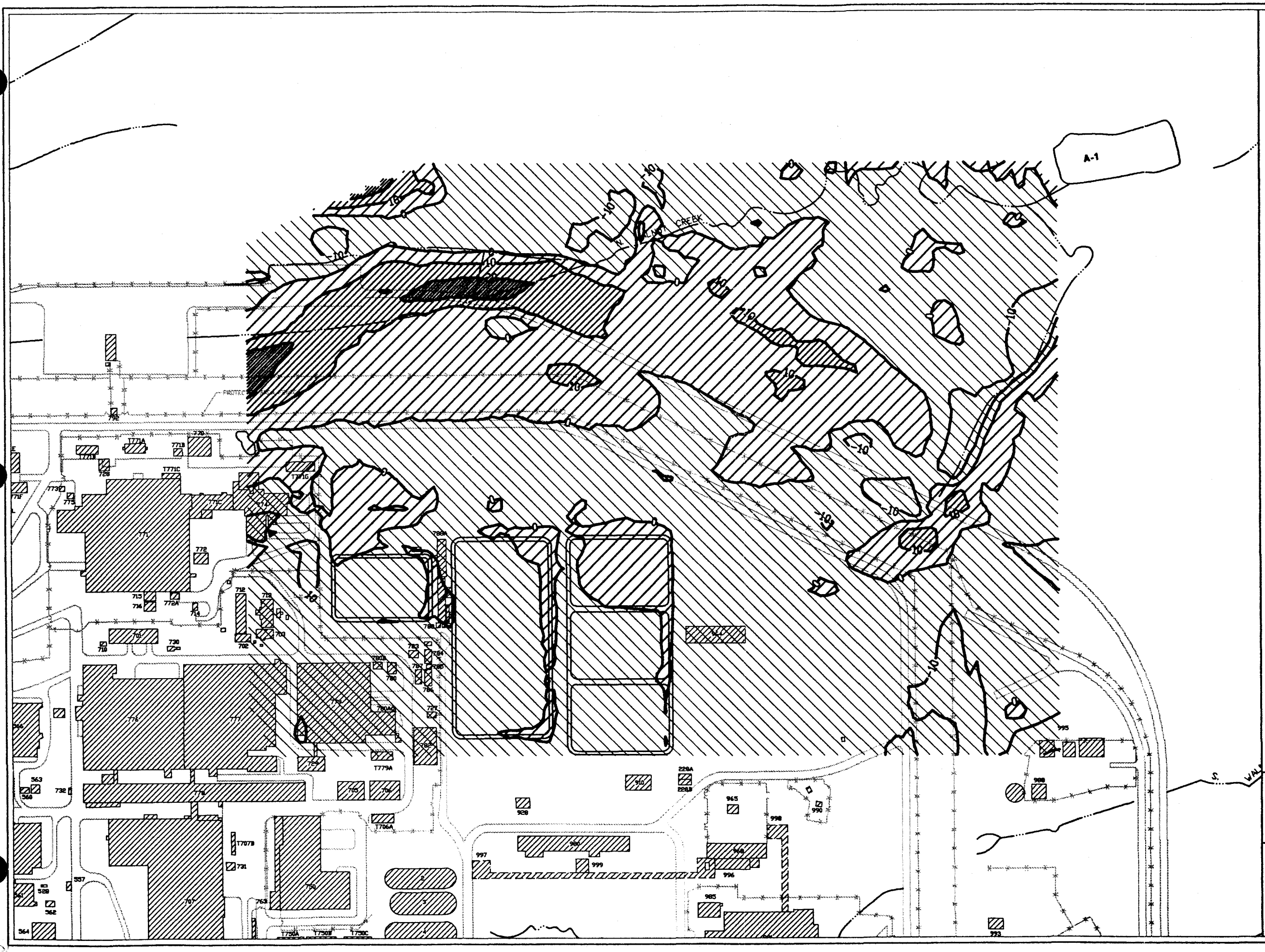
Figure II.3.5-3

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
1986 Surface Topography
OU4 Area

237



LEGEND:

- Streams
- Paved Roads
- Buildings
- Fence
- Excavated Areas
- Artificially Filled Areas
- —10— Thickness of Artificial Fill (in feet)
- —10— Depth of Excavation (in feet)

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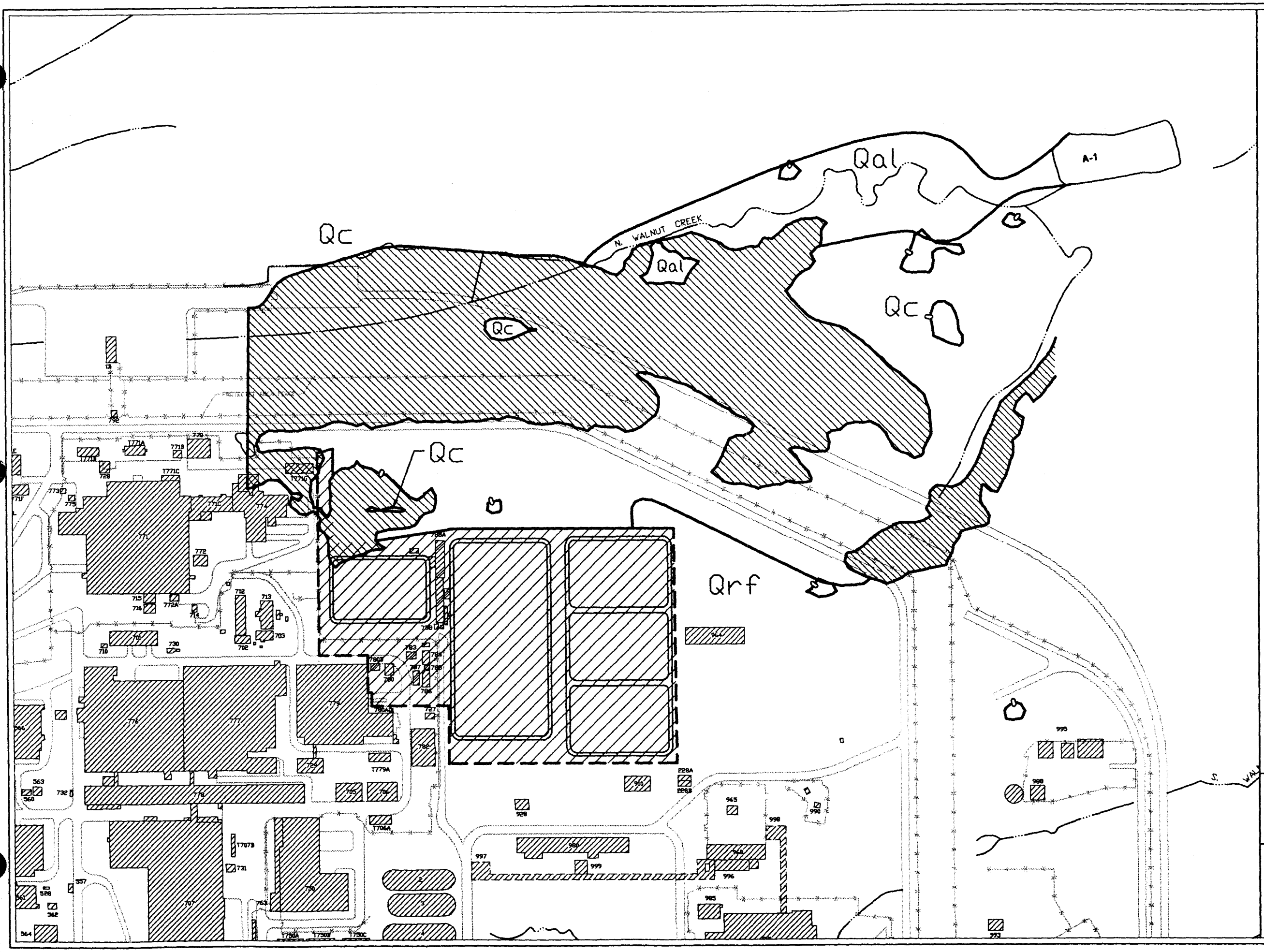
Figure II.3.5-4

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
1986/1951 Topographic Map Comparison



LEGEND:

- Streams
- Paved Roads
- Buildings
- Fence
- Qal Valley Fill Alluvium
- Qc Landslide/Colluvium
- Qrf Rocky Flats Alluvium
- Artificial Fill
- Disturbed Ground

100 0 100 200 300 FEET

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Figure II.3.5-5

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Materials Map

231

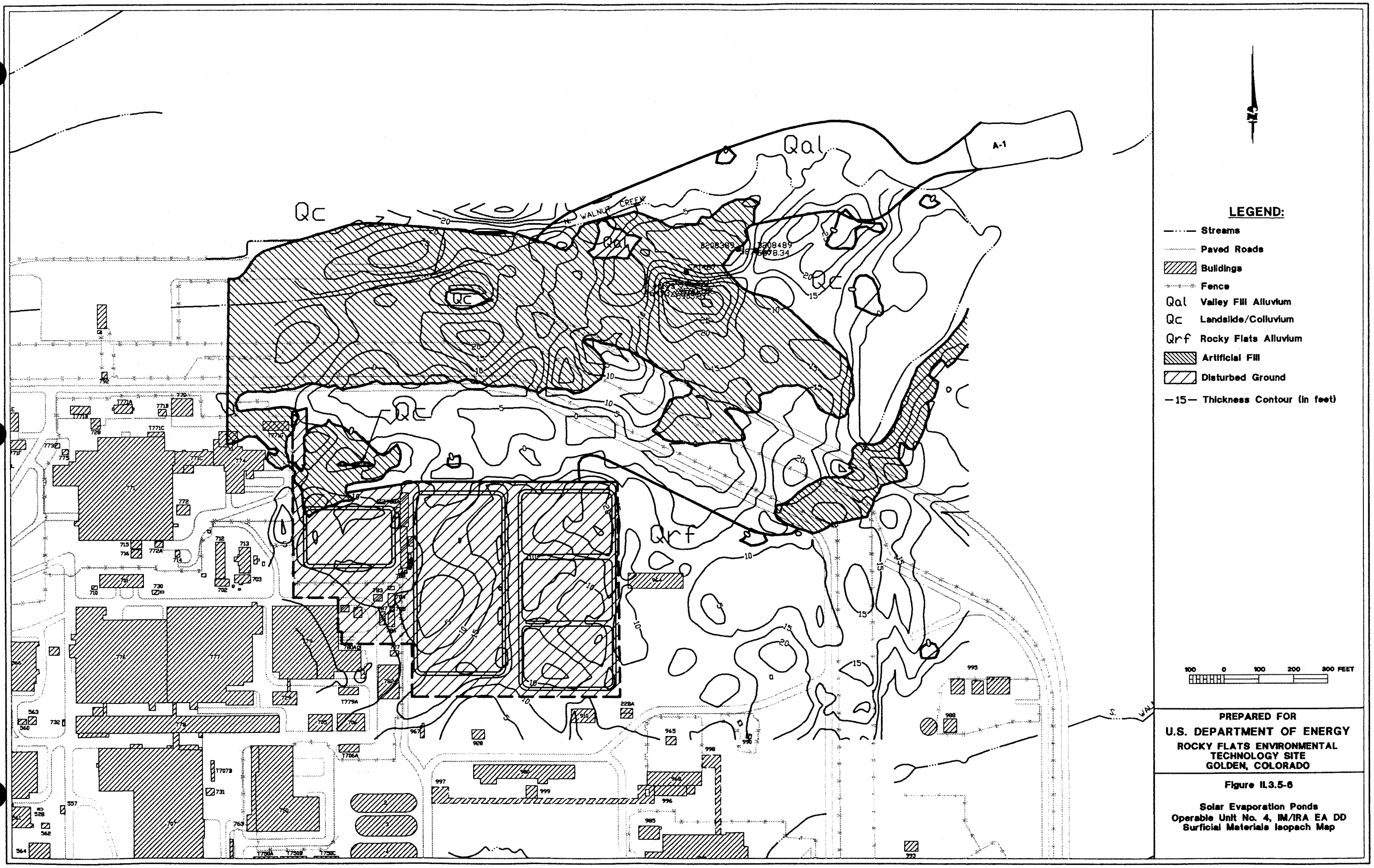

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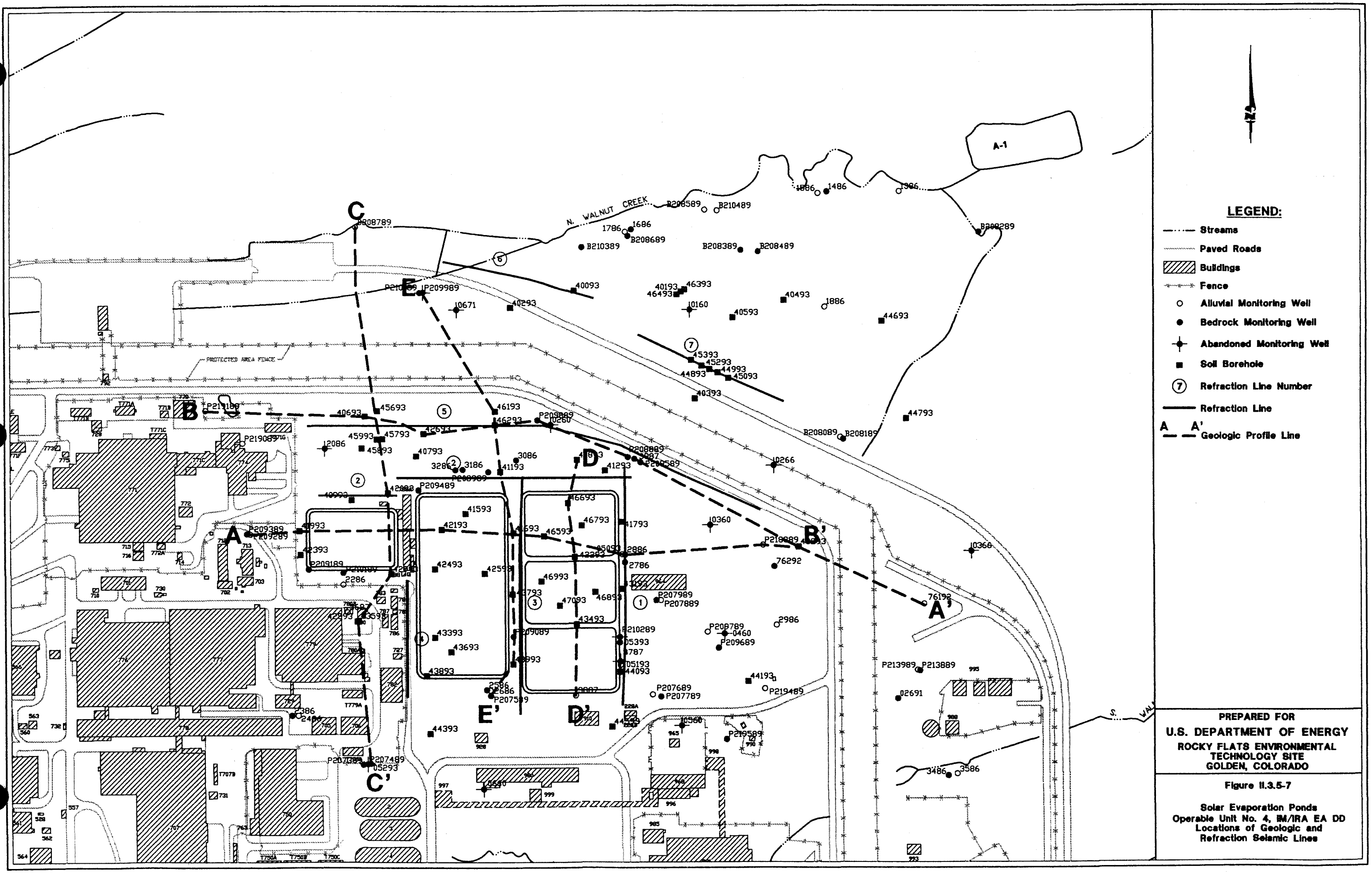
Figure II.3.5-6

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Surficial Materials Isopach Map


N. WALNUT CREEK
PROTECTED AREA FENCE
A-1
A
A'
B
B'
C
C'
D
D'
E
E'
LEGEND:
Streams
Paved Roads
Buildings
Fence
Alluvial Monitoring Well
Bedrock Monitoring Well
Abandoned Monitoring Well
Soil Borehole
Refraction Line Number
Refraction Line
A A'
Geologic Profile Line
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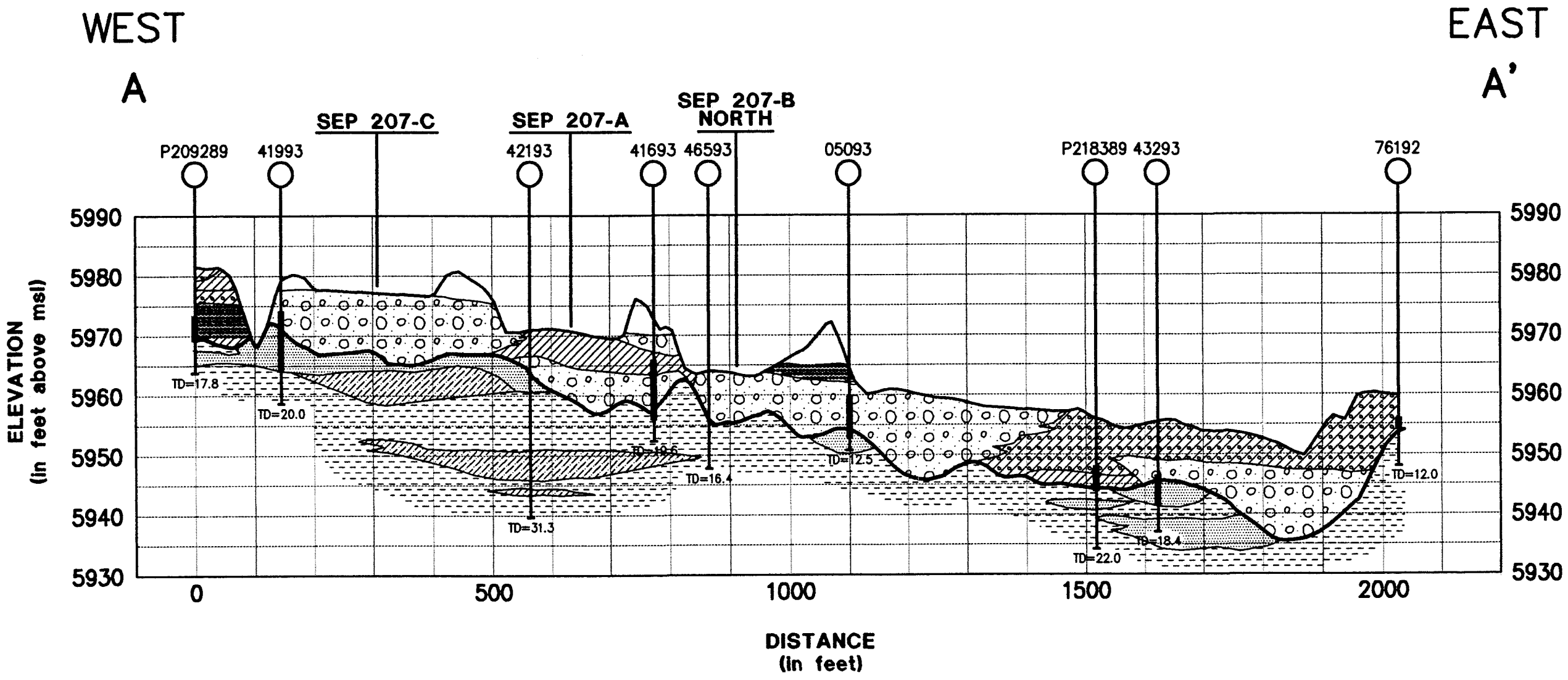
GOLDEN, COLORADO
Figure II.3.5-7
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Locations of Geologic and Refraction Seismic Lines



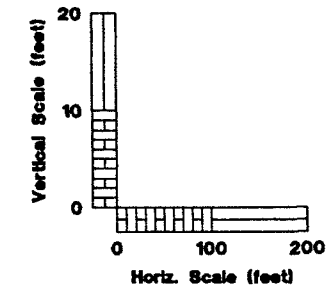
LEGEND

UNCONSOLIDATED MATERIALS

- Sandy Lithofacies
- Sandy Gravel Lithofacies
- Clayey Silty Gravel Lithofacies
- Clayey & Silty Lithofacies
- Artificial Fill or Colluvium

BEDROCK

- Sandstone
- Siltstone
- Claystone
- Screened Interval
- Borehole/Well No.
- Bedrock - Unconsolidated Materials Contact



Note: Vertical Exaggeration 10x

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GOLDEN, COLORADO

Figure II.3.5-8

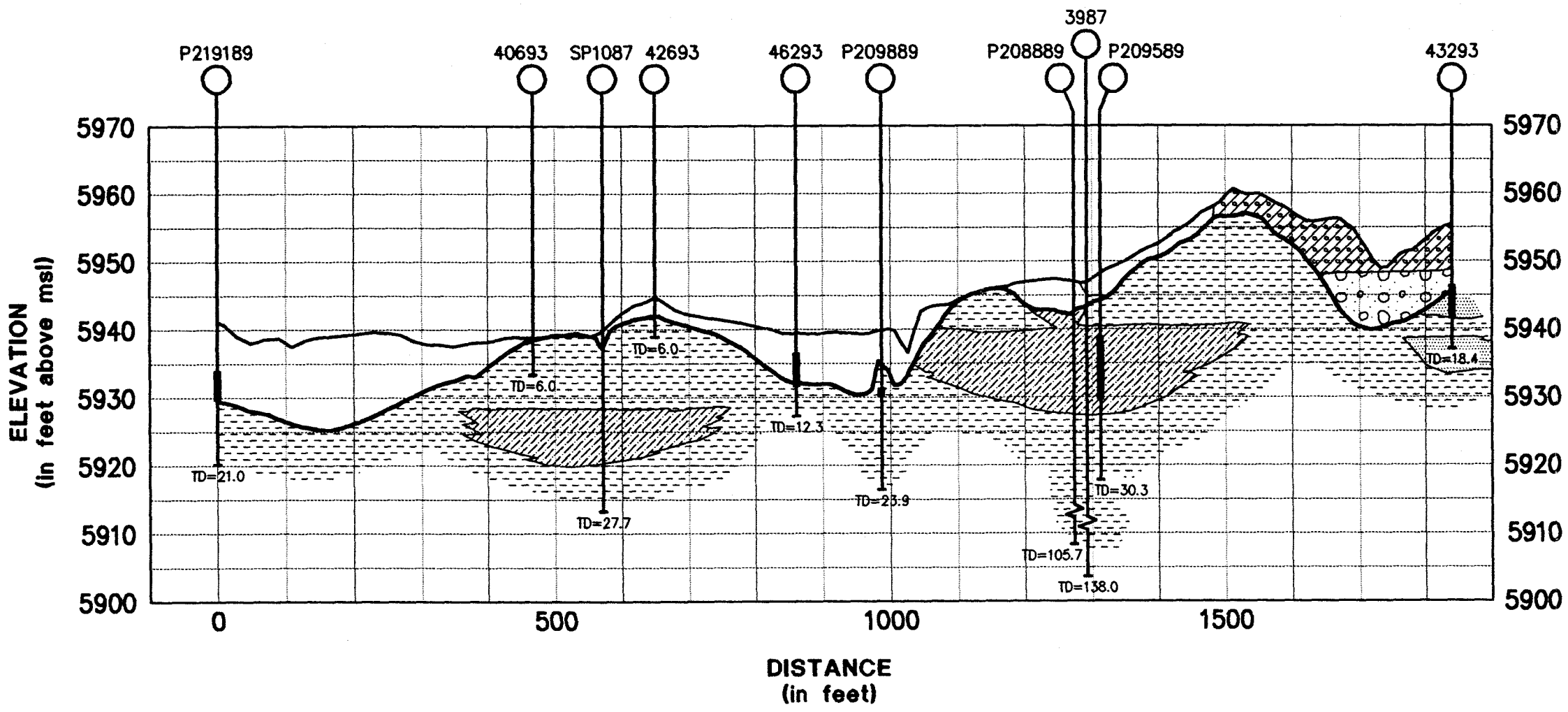
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Alluvium and Bedrock Cross-Section A-A'

WEST

B

EAST

B'



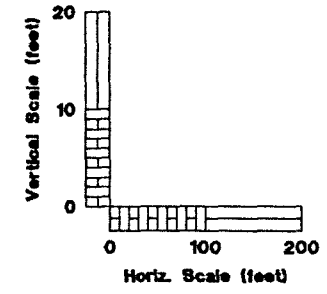
LEGEND

UNCONSOLIDATED MATERIALS

- Sandy Lithofacies
- Sandy Gravel Lithofacies
- Clayey Silty Gravel Lithofacies
- Clayey & Silty Lithofacies
- Artificial Fill or Colluvium

BEDROCK

- Sandstone
- Siltstone
- Claystone
- Screened Interval
- Borehole/Well No.
- Bedrock - Unconsolidated Materials Contact



Note: Vertical Exaggeration 10x

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Figure II.3.5-9

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Alluvium and Bedrock Cross-Section B-B'

NORTH

C

SOUTH

C'

SEP 207-C

B208789 SP1187 45693 45793 42093 42993 43593 05293

5990 5980 5970 5960 5950 5940 5930 5920 5910 5900 5890 5880 5870 5860

ELEVATION
(in feet above msl)

TD=14.4
TD=34.0
TD=10.0
TD=8.5
TD=10.8
TD=18.4
TD=13.3
TD=10.3

0 500 1000 1500

DISTANCE
(in feet)

LEGEND

UNCONSOIDATED MATERIALS

- Sandy Lithofacies
- Sandy Gravel Lithofacies
- Clayey Silty Gravel Lithofacies
- Clayey & Silty Lithofacies
- Artificial Fill or Colluvium

BEDROCK

- Sandstone
- Siltstone
- Claystone
- Screened Interval
- Borehole/Well No.
- Bedrock - Unconsolidated Materials Contact

Vertical Scale (feet): 20, 10, 0

Horiz. Scale (feet): 0, 100, 200

Note: Vertical Exaggeration 10x

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Figure II.3.5-10

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Alluvium and Bedrock Cross-Section C-C'

NORTH

D

SOUTH

D'

SEP 207-B NORTH

SEP 207-B CENTER

SEP 207-B SOUTH

40893 46693 42293 43493 3887

TD=14.8

TD=12.8

TD=11.2

TD=14.3

TD=15.2

5980 5970 5960 5950 5940 5930

ELEVATION (in feet above msl)

0 500

DISTANCE (in feet)

LEGEND

UNCONSOLIDATED MATERIALS

- Sandy Lithofacies
- Sandy Gravel Lithofacies
- Clayey Silty Gravel Lithofacies
- Clayey & Silty Lithofacies
- Artificial Fill or Colluvium

BEDROCK

- Sandstone
- Siltstone
- Claystone
- Screened Interval
- Borehole/Well No.
- Bedrock - Unconsolidated Materials Contact

Vertical Scale (feet): 10, 0

Horiz. Scale (feet): 0, 100, 200

Note: Vertical Exaggeration 20x

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Figure II.3.5-11

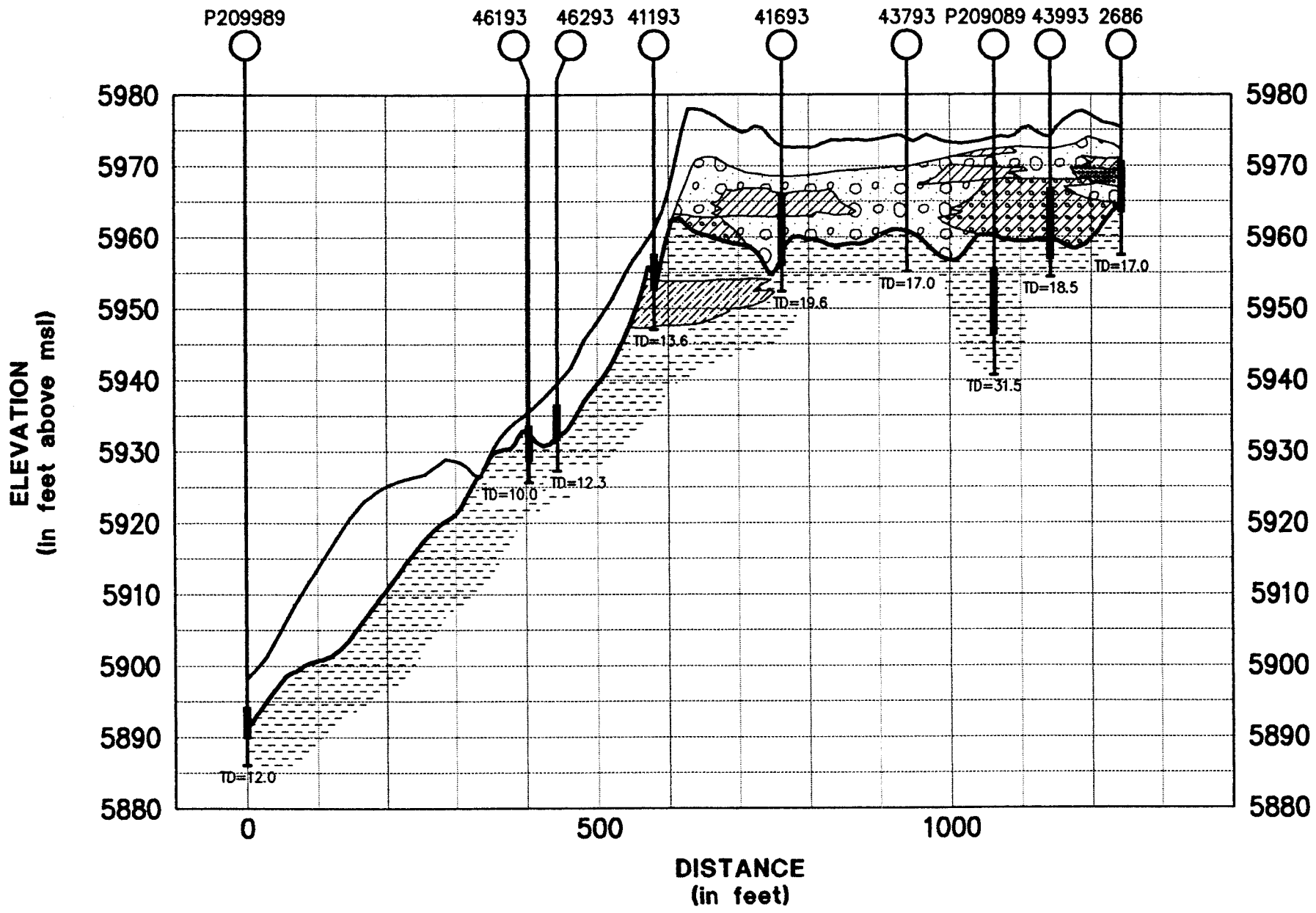
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Alluvium and Bedrock Cross-Section D-D'

NORTH

E

SOUTH

E'



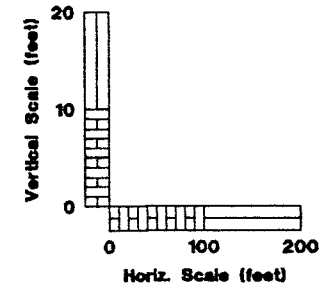
LEGEND

UNCONSOLIDATED MATERIALS

- Sandy Lithofacies
- Sandy Gravel Lithofacies
- Clayey Silty Gravel Lithofacies
- Clayey & Silty Lithofacies
- Artificial Fill or Colluvium

BEDROCK

- Sandstone
- Siltstone
- Claystone
- Screened Interval
- Borehole/Well No.
- Bedrock - Unconsolidated Materials Contact



Note: Vertical Exaggeration 10x

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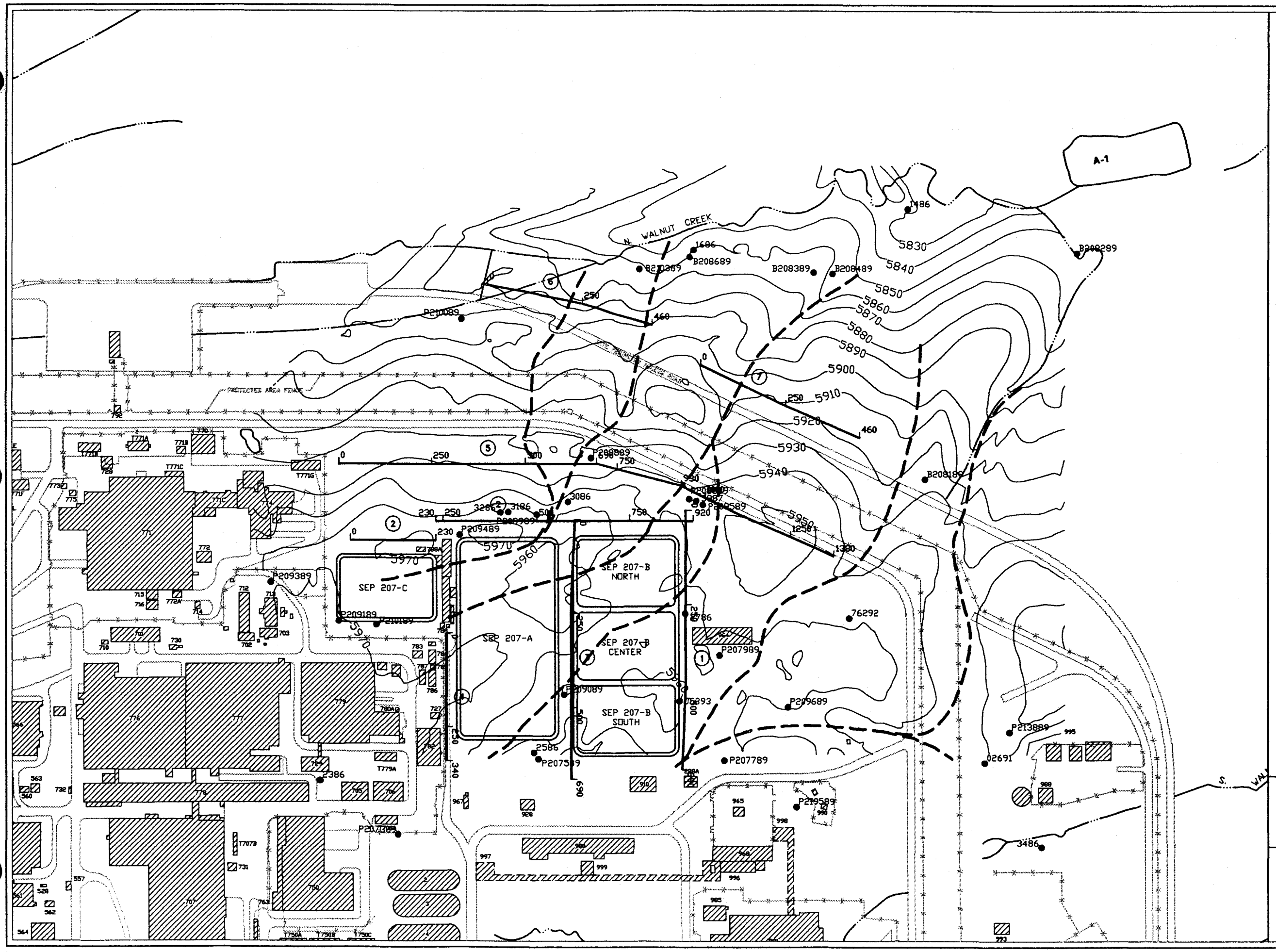
Figure II.3.5-12

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Alluvium and Bedrock Cross-Section E-E'

146



LEGEND:

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Boundary
- Incised Channel
- (1) Refraction Line with Identification
- Bedrock Monitoring Well
- Bedrock Surface Contour
- 5940 Bedrock Structure Contour Elevation (ft msl)

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Figure II.3.5-13

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Bedrock Paleotopograph

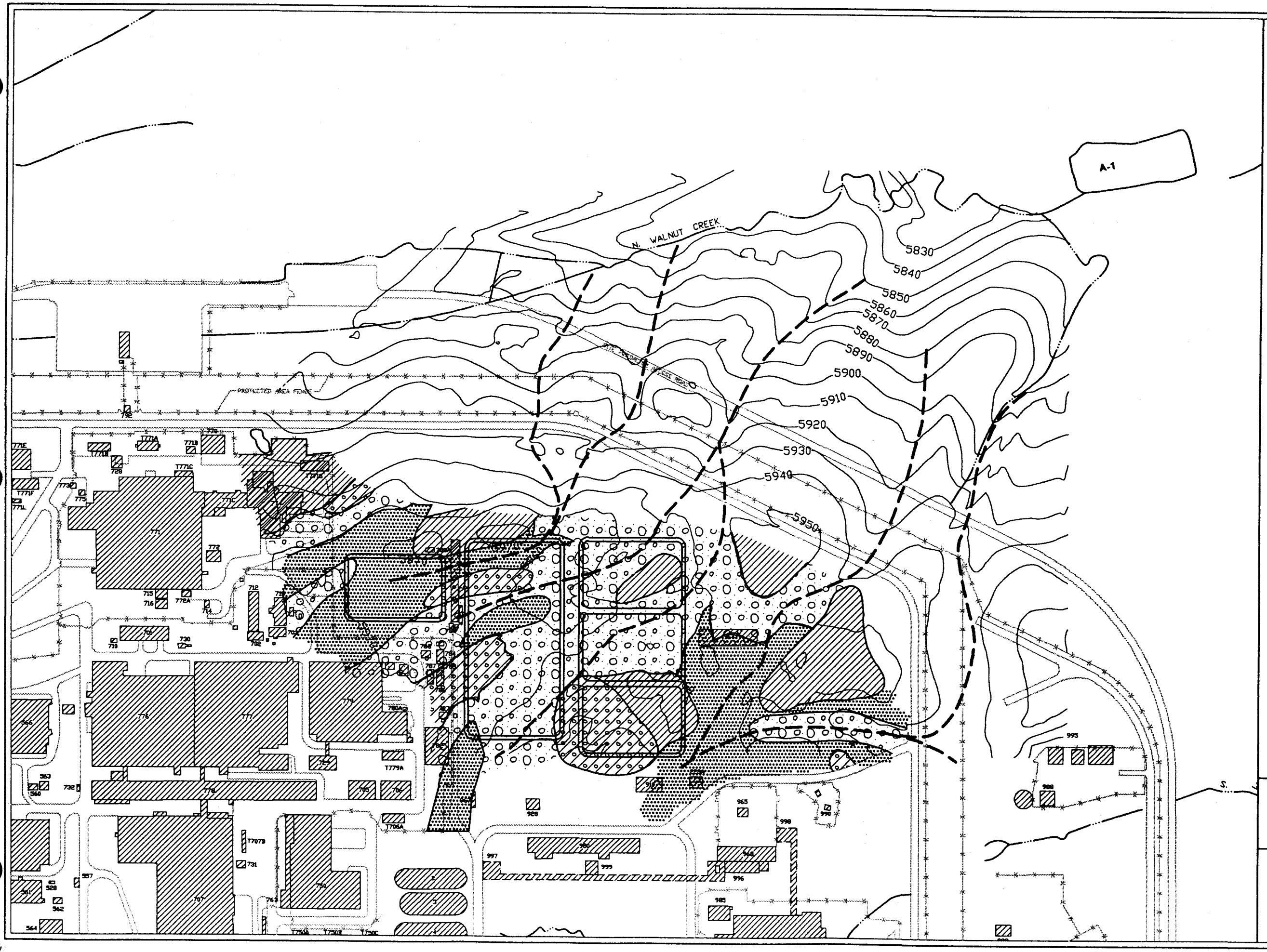
N. WALNUT CREEK
PROTECTED AREA FENCE
A-1
5830
5840
5850
5860
5870
5880
5890
5900
5910
5920
5930
5940
5950
N
LEGEND:
Streams
Paved Roads
Buildings
Fence
Incised Channel
Bedrock Surface Contour
5930 Bedrock Surface Elevation (ft msl)
Sandy Lithofacies
Sandy Gravel Lithofacies
Clayey Silty Gravel Lithofacies
Clayey & Silty Lithofacies
100 0 100 200 300 FEET
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Figure II.3.5-14
Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Lithofacies Map of Basal
Rocky Flats Alluvium

248

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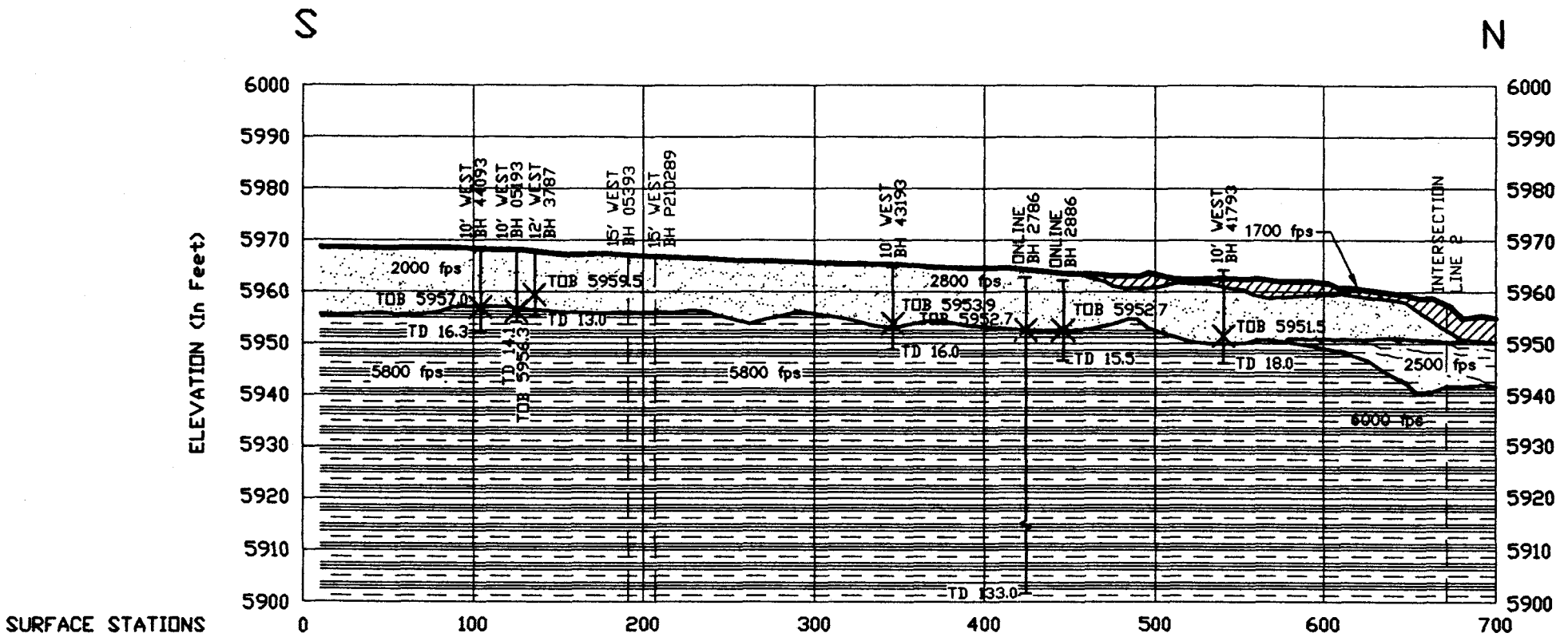
Figure II.3.5-16

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA E& DD
Subcropping Bedrock
Lithology Map



LINE 1

LEGEND

- Primarily Fine Grained Alluvium
- Primarily Coarse Grained Alluvium
- Semi-Consolidated Bedrock
- Consolidated Bedrock

2500 fps — Acoustic velocity of the subsurface materials measured in feet per second

BH 42093 — Borehole number

5' NORTH — Borehole location relative to the survey line

Borehole bedrock elevation

Borehole total depth

Indicates spotted borehole (no surface elevation or TD)

LINE 3 INTERSECTION

Indicates intersection of this line with another geophysical line

VERT. SCALE (FT.) 20 10 0

HORIZ. SCALE (FT.) 0 50

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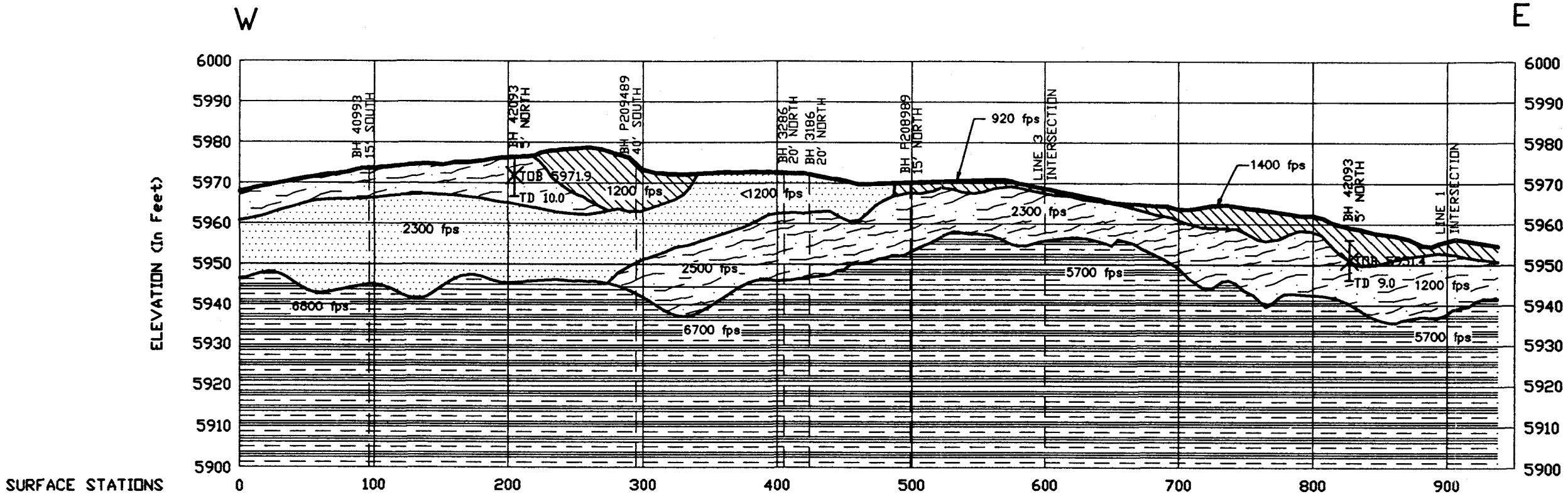
Figure II.3.5-19

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Geophysical Line 1



LINE 2

LEGEND

- Primarily Fine Grained Alluvium
- Semi-Consolidated Bedrock
- Sandstone
- Consolidated Bedrock

2500 fps — Acoustic velocity of the subsurface materials measured in feet per second

BH 42093 — Borehole Number

5' NORTH — Borehole Location Relative To The Survey Line

Borehole bedrock elevation

Borehole total depth

Indicates spotted borehole (no surface elevation or TD)

LINE 3 INTERSECTION — Indicates intersection of this line with another geophysical line

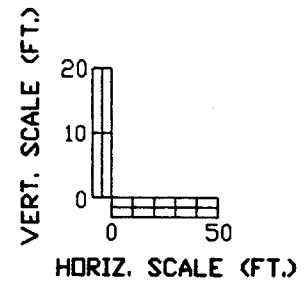


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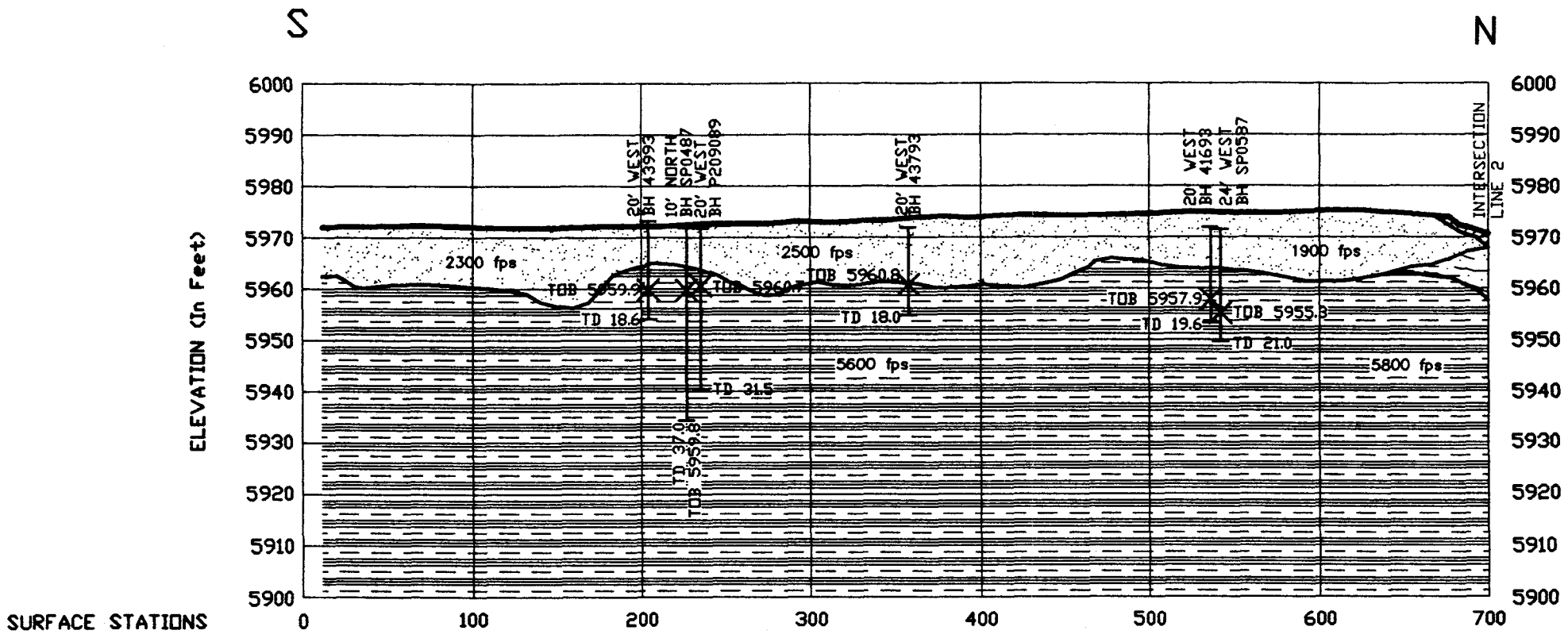
Figure II.3.5-20

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Geophysical Line 2



LINE 3

LEGEND

- Primarily Fine Grained Alluvium
- Primarily Coarse Grained Alluvium
- Semi-Consolidated Bedrock
- Consolidated Bedrock

2500 fps — Acoustic velocity of the subsurface materials measured in feet per second

BH 42093 — Borehole number

5' NORTH — Borehole location relative to the survey line

Borehole bedrock elevation

Borehole total depth

Indicates spotted borehole (no surface elevation or TD)

LINE 3 INTERSECTION — Indicates intersection of this line with another geophysical line

VERT. SCALE (FT.) 20 10 0

HORIZ. SCALE (FT.) 0 50

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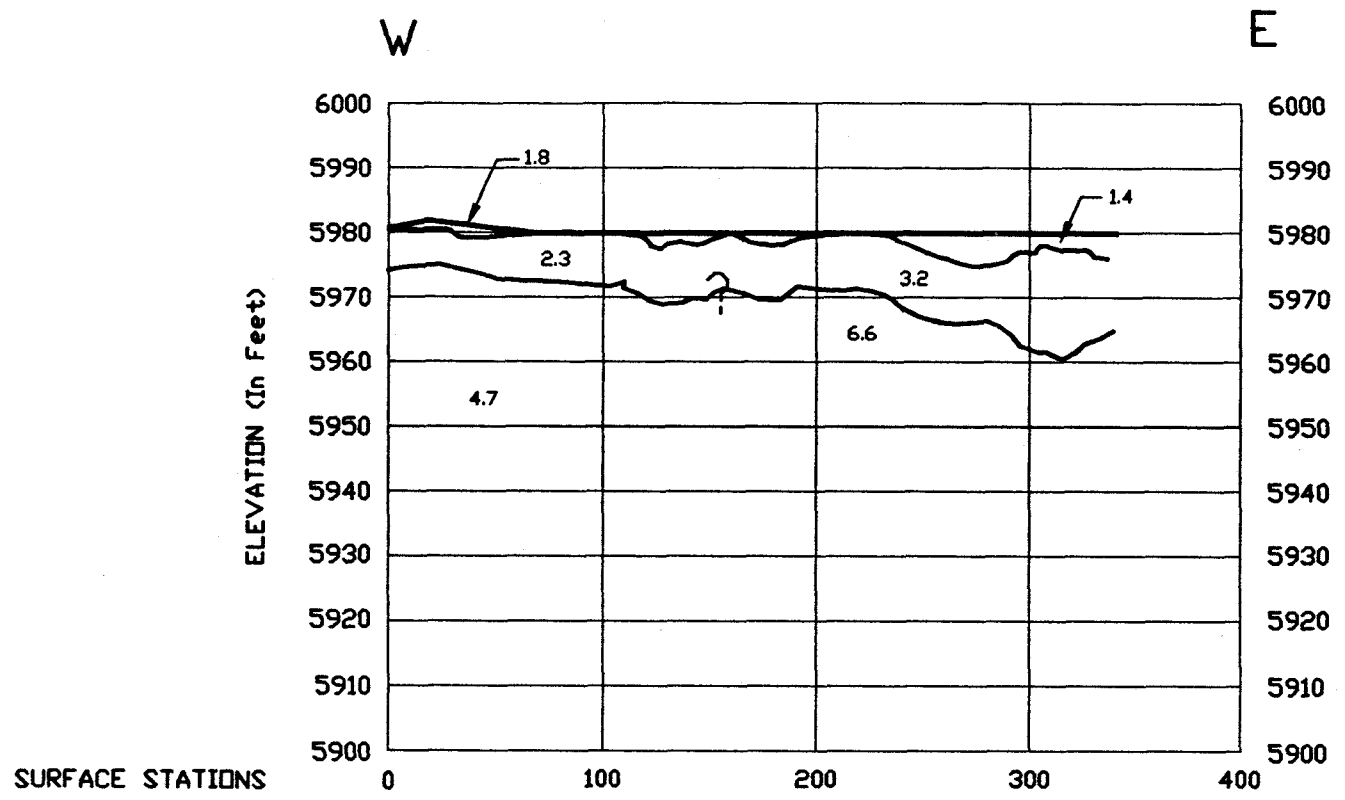
Figure II.3.5-21

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Geophysical Line 3



LINE 4

LEGEND

1.4	Acoustic velocity of the subsurface materials measured in kilofeet per seconds
?	Questionable velocity contacts along profile
———	Ground surface

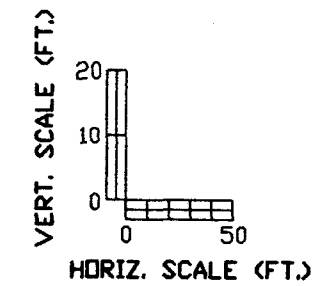


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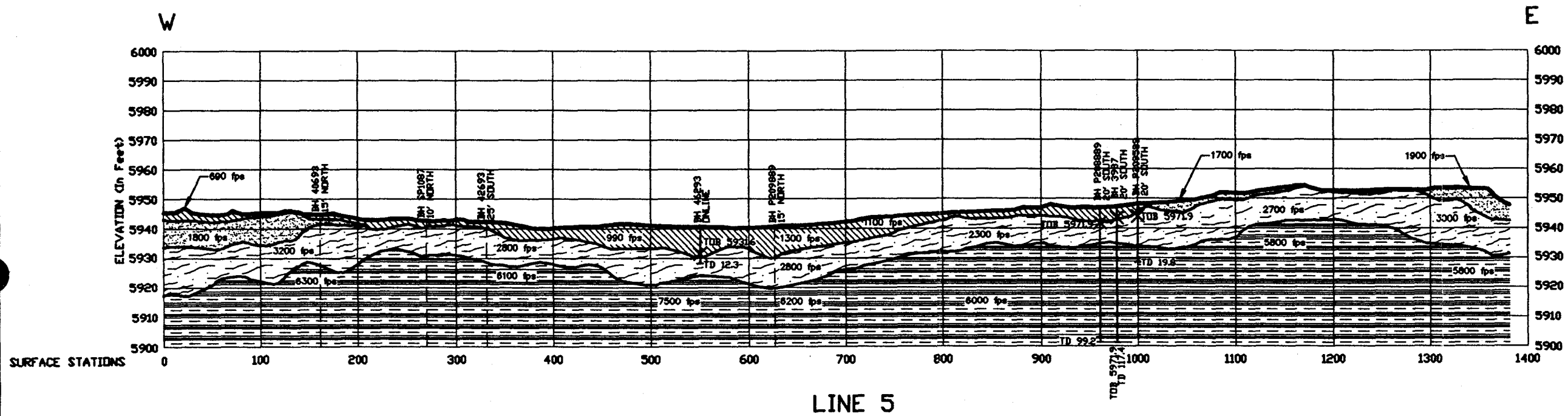
Figure II.3.5-22

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Geophysical Line 4



LINE 5

LEGEND

- Primarily Fine Grained Alluvium
- Primarily Coarse Grained Alluvium
- Semi-Consolidated Bedrock
- Consolidated Bedrock

2500 fps — Acoustic velocity of the subsurface materials measured in feet per seconds

BH 42093 — Borehole number

5' NORTH — Borehole location relative to the survey line

Borehole bedrock elevation

Borehole total depth

Indicates spotted borehole (no surface elevation or TD)

LINE 3 INTERSECTION — Indicates intersection of this line with another geophysical line

VERT. SCALE (FT.) 20 10 0

HORIZ. SCALE (FT.) 0 50

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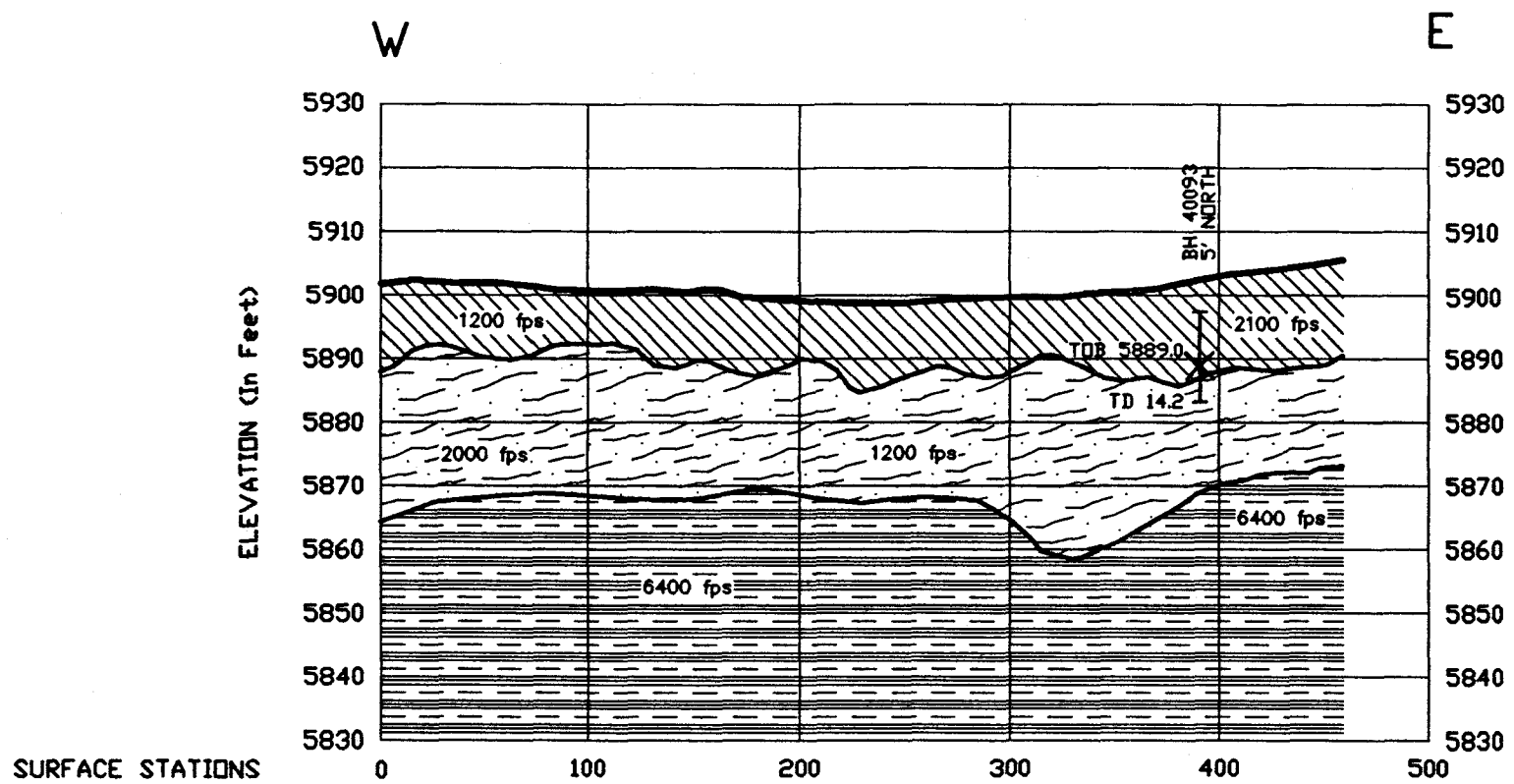
Figure II.3.5-23

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Geophysical Line 5



LINE 6

LEGEND

- Primarily Fine Grained Alluvium
- Primarily Coarse Grained Alluvium
- Semi-Consolidated Bedrock
- Consolidated Bedrock

2500 fps — Acoustic velocity of the subsurface materials measured in feet per second

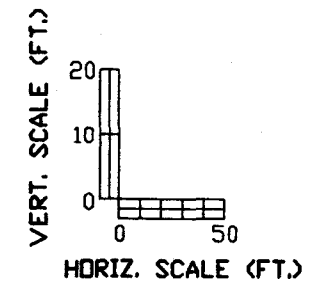
BH 42093 — Borehole number

5' NORTH — Borehole location relative to the survey line

Borehole Surface Elevation
Borehole Bedrock Elevation
Borehole Total Depth

Indicates Spotted Borehole (No Surface Elevation or TD)

LINE 3 INTERSECTION — Indicates intersection of this line with another Geophysical Line



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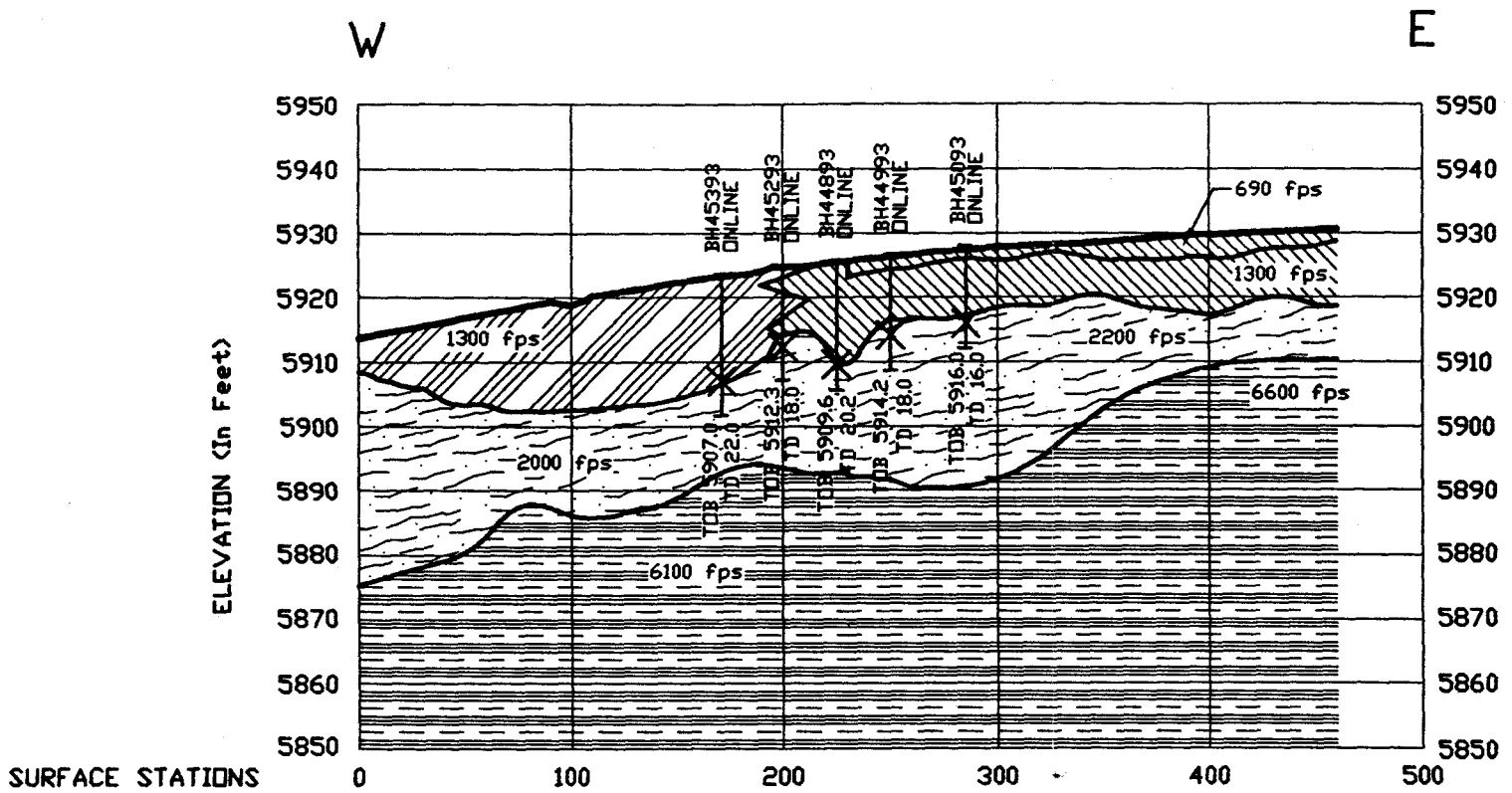
GOLDEN, COLORADO

Figure II.3.5-24

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Geophysical Line 6



LINE 7

LEGEND

- Primarily Fine Grained Alluvium
- Sandy Alluvium
- Semi-Consolidated Bedrock
- Consolidated Bedrock

2500 fps — Acoustic velocity of the subsurface materials measured in feet per second

BH 42093 — Borehole number

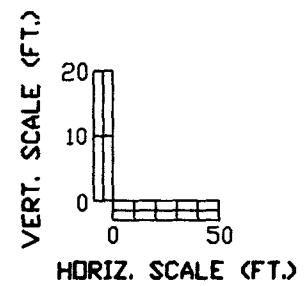
5' NORTH — Borehole location relative to the survey line

Borehole bedrock elevation

Borehole total depth

Indicates spotted borehole (no surface elevation or TD)

LINE 3 INTERSECTION — Indicates intersection of this line with another geophysical line



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U.S. DEPARTMENT OF ENERGY

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
GOLDEN, COLORADO

Figure II.3.5-25

Solar Evaporation Ponds
Operable Unit No. 4, IM/IRA EA DD
Geophysical Line 7

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