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METALLURGICAL LABORATORY HAZARDOUS WASTE MANAGEMENT FACILITY GROUNDWATER MONITORING REPORT (U) SECOND QUARTER 1993

by
C. Y. Thompson

Westinghouse Savannah River Company
Savannah River Site
Aiken, South Carolina 29808

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SECOND QUARTER 1993

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WESTINGHOUSE SAVANNAH RIVER COMPANY
SAVANNAH RIVER SITE
AIKEN, SC 29808

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Abstract

During second quarter 1993, samples from AMB groundwater monitoring wells at the Metallurgical Laboratory Hazardous Waste Management Facility (HWMF) were analyzed for certain heavy metals, indicator parameters, radionuclides, volatile organic compounds, and other constituents. Six parameters exceeded standards during the quarter.

As in previous quarters, tetrachloroethylene and trichloroethylene exceeded final Primary Drinking Water Standards (PDWS), and pH and total organic halogens exceeded the Savannah River Site (SRS) Flag 2 criteria in one or more of the wells. Dichloromethane (methylene chloride), a common laboratory contaminant which was first compared to its final PDWS during first quarter 1993, was elevated in three wells.

Groundwater flow directions and rates in the water-table unit and the upper section of the Congaree were similar to previous quarters.

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Executive Summary

The AMB monitoring wells at the Metallurgical Laboratory Hazardous Waste Management Facility are sampled quarterly as part of the Savannah River Site (SRS) Groundwater Monitoring Program and to comply with Section III of the Natural Resources Defense Council et al. Consent Decree of May 1988.

During second quarter 1993, 18 wells were monitored at the facility. Nine of these wells monitor the water-table unit (AMB 4D, 5, 6, 7, 8D, 9D, 10D, 11D, and 12D); 8 wells monitor the upper and lower sections of the Congaree aquifer (AMB 4A, 4B, 7A, 7B, 10A, 10B, 11B, and 13AR); and well AMB 10DD monitors a perched groundwater zone beneath the facility. Samples from these wells were analyzed for alkalinity, herbicides, pesticides, pH, radionuclides, specific conductance, total dissolved solids, toxic metals, volatile organic compounds, and other constituents. This report describes the results that exceeded final Primary Drinking Water Standards (PDWS) and SRS flagging criteria.

As in past quarters, tetrachloroethylene and trichloroethylene exceeded the final PDWS, and pH and total organic halogens exceeded the Flag 2 criteria in several AMB wells. Dichloromethane (methylene chloride), a common laboratory contaminant, exceeded the final PDWS in wells AMB 4D, 5, and 7A. None of these elevated constituents were found either in the upgradient water-table wells or in approximately half of the downgradient wells. Aluminum, iron, and manganese, which were elevated in one or more of the AMB wells during first quarter 1993, were not analyzed for during second quarter 1993.

Groundwater flow directions and rates in the water-table unit and the upper section of the Congaree were similar to previous quarters. A reliable estimate of flow direction and rate in the lower section of the Congaree could not be calculated.

Introduction

The Metallurgical Laboratory Hazardous Waste Management Facility (Met Lab HWMF) is located in the eastern section of A Area at the Savannah River Site (SRS) (Figures 1 and 2, Appendix C). The facility consists of the process sewer line leading to the Metallurgical Laboratory Basin, the Metallurgical Laboratory Basin, the drainage outfall to a nearby Carolina bay, and the Carolina bay. The following description outlines important events at the facility:

- The Metallurgical Laboratory Basin was constructed and began receiving waste water effluent from the Metallurgical Laboratory Building in 1956 (WSRC, 1992a; WSRC, 1992c). Waste water released to the basin consisted of laboratory wastes from metallographic sample preparation and corrosion testing of stainless steel and nickel-based alloys. The quantity of waste water discharged to the basin was small, averaging approximately 1,000 gallons per day (Heffner and Exploration Resources, 1991).

- Release of hazardous waste from the Metallurgical Laboratory Building to the basin was discontinued in 1983 (WSRC, 1992a; WSRC, 1992c).

- Quarterly groundwater sampling began first quarter 1984 (WSRC, 1992a; WSRC, 1992c).

- Waste water flow to the Met Lab HWMF was terminated November 8, 1985 (WSRC, 1992a; WSRC, 1992c).

- The Met Lab HWMF was named in Section III of the Natural Resources Defense Council et al. Consent Decree, May 26, 1988, thus becoming subject to the requirements of Subtitle C of the Resource Conservation and Recovery Act (RCRA) (Civil Action 1:85-2583-6, U.S. District Court, District of South Carolina, Aiken Division).

- Revision 0 of the facility's RCRA Part B Post-Closure Care Permit Application (WSRC, 1989) was submitted to the South Carolina Department of Health and Environmental Control (SCDHEC) August 18, 1989.

- A Groundwater Quality Assessment Plan (Jerome, 1990) was submitted to SCDHEC in October 1990 .

- A revised Groundwater Quality Assessment Plan was submitted to SCDHEC in March 1991 and approved by SCDHEC in June 1991 (WSRC, 1992a).

- In September 1991, a phased closure plan for the Met Lab HWMF was approved by SCDHEC, and construction to close the basin was begun (WSRC, 1992a).

- Revision 1 of the RCRA Part B Post-Closure Care Permit application (WSRC, 1991) was submitted to SCDHEC December 16, 1991.

- Closure construction of the basin was completed on May 1, 1992; official closure for the basin was completed May 11, 1992; and closure certification of the basin was submitted to SCDHEC July 10, 1992 (letter from J. Gray, ERC, to R. Sentelle, ERC, June 11, 1992). No decision has been made on closure of the Carolina bay.

- Revision 0 of the 1992 RCRA Part B Post-Closure Care Permit Renewal Application (WSRC, 1992a) was submitted to SCDHEC in September 1992 in accordance with the regulatory requirement to update and resubmit permit applications every 5 years.

Presently, the Environmental Protection Department/Environmental Monitoring Section (EPD/EMS) samples the 18 AMB wells each quarter, and the Environmental Restoration Department reports the results of this sampling to SCDHEC to meet the requirements of the South Carolina Hazardous Waste Management Regulations (SCDHEC, 1990).

Discussion

Groundwater Monitoring Data

The EPD/EMS sampling procedure (WSRC, 1992b) requires evacuation of a minimum of two well volumes and stabilization of pH, specific conductance, and turbidity prior to sample collection. Stability is established when a minimum of three successive measurements, taken within a given time period, are within a specified tolerance range. If a well pumps dry before two well volumes are purged or before stabilization is achieved, it must be revisited within 24 hours for the data to be considered from a single sampling event. On the second visit within 24 hours, samples are taken without purging or stability measurements; thus, these samples may not be representative of groundwater quality.

During second quarter 1993, the groundwater samples were analyzed by General Engineering Laboratories of Charleston, South Carolina (South Carolina certification number 10120), for certain heavy metals, indicator parameters, radionuclides, volatile organic compounds, and other constituents. This report describes the monitoring results that equaled or exceeded the Safe Drinking Water Act final Primary Drinking Water Standards (PDWS) or drinking water screening levels, as established by the U.S. Environmental Protection Agency (EPA) (Appendix A); the South Carolina final PDWS for lead (Appendix A); or SRS flagging criteria that are based on PDWS, Secondary Drinking Water Standards, and method detection limits (Appendix B). For simplicity, results that equaled or exceeded final PDWS or SRS Flag 2 criteria are described as *exceeding* or *above* standards or as *elevated*.

The final PDWS for individual analytes provided in Appendix A may not always match the SRS flagging criteria provided in Appendix B. The final PDWS are used as guidelines in this compliance report to meet regulatory requirements; the flagging criteria are used by EPD/EMS to identify relative levels of constituents in the groundwater and as guides for scheduling groundwater sampling.

Beginning first quarter 1993, aluminum became part of comprehensive analyses, which are conducted routinely once every two years, and dichloromethane (methylene chloride) was evaluated for the first time against a final PDWS promulgated by EPA in July 1992 (enforceable beginning January 17, 1994). The status of radium isotopes was re-examined, and radium-228 is now flagged according to its proposed drinking water standard while both radium-226 and total alpha-emitting radium (radium-223, -224, and -226 analyzed together) are flagged according to the proposed DWS for radium-226. The final PDWS for total radium (as the sum of radium-226 and -228 activities) is not used for flagging.

Integrity of the Monitoring Well Network

The groundwater monitoring well network at the Met Lab HWMF has been developed over the past decade as described below (EPD/EMS, 1993a):

- Groundwater monitoring wells AMB 1, 2, and 3 were installed in 1983.
- Wells AMB 1 and 3 were abandoned and replaced by wells AMB 1A and 3A in 1984.
- In 1988, wells AMB 4, 5, 6, and 7 were installed and wells AMB 1A, 2, and 3A were abandoned.
- In 1989, wells AMB 8, 8D, 9, 9D, 10, 10D, 10DD, 11D, and 12D were installed and wells AMB 8, 9, and 10 were abandoned.
- In 1991, wells AMB 4A, 4B, 4D, 7A, 7B, 10A, 10B, 11B, and 13AR were installed and well AMB 4 was abandoned.

The current groundwater monitoring well network at the Met Lab HWMF (Figures 3, 4, and 5, Appendix C) comprises the following: wells AMB 4D, 5, 6, 7, 8D, 9D, 10D, 11D, and 12D monitor the water-table unit; wells AMB 4B, 7B, 10B, and 11B monitor the upper section of the Congaree aquifer; wells AMB 4A, 7A, 10A, and 13AR monitor the lower section of the Congaree aquifer; and well AMB 10DD monitors a perched groundwater zone beneath the Met Lab HWMF. Background wells for the facility are proposed in the recent Part B permit renewal application (WSRC, 1992a).

Table 3 (Appendix D) lists the number of well volumes purged from each well during second quarter 1993. Wells AMB 4D, 5, 6, 7, 10A, and 13AR went dry during purging and were sampled after they recovered. Thus, the samples from these wells may not be representative of the groundwater quality at the Met Lab HWMF.

Analytical Results Exceeding Standards

Results for analytes that exceeded the final PDWS (see Appendix A) during second quarter 1993 are provided in Table 1 (Appendix D). Dichloromethane (methylene chloride) exceeded the final PDWS in wells AMB 4D, 5, and 7A. Tetrachloroethylene exceeded the final PDWS in wells AMB 4A, 4D, 5, and 7A. Trichloroethylene was elevated in wells AMB 4A, 4B, 4D, 5, 6, and 7A. The highest tetrachloroethylene and trichloroethylene concentrations, 48 μg/L and 533 μg/L, respectively, were found in well AMB 4A.

Some of the values for the preceding quarter presented in Table 1 may differ from the values presented in the previous quarter's report because reanalyses may have been performed by the laboratory after the report went to press.

Constituents that exceeded half the final PDWS or other Flag 1 or Flag 2 criteria (see Appendix B) during second quarter 1993 are summarized in Table 2 (Appendix D). Total organic halogens exceeded the Flag 2 criterion in wells AMB 4A, 4D, 5, and 7A, with a

maximum concentration of 148 μg/L in well AMB 4A. The pH levels were elevated in wells AMB 10A and 13AR.

Table 3 (Appendix D) presents all of the results for individual wells and indicates the analytical laboratory that conducted the analyses and those analyses that received modifiers (which help identify laboratory accuracy and precision) or that exceeded the EPA-approved holding times during second quarter 1993. Appendix E provides an assessment of the quality and useability of the data.

Time Series Results

Time series plots of field pH, field specific conductance, tetrachloroethylene, total alpha-emitting radium, total organic carbon, total organic halogens, and trichloroethylene for the 18 AMB wells are shown in Appendix F. Trends for these indicator parameters are as follows:

pH: Field pH values for most of the AMB wells have ranged between approximately 5 and 7 since sampling began. However, the pH in well AMB 10A consistently has exceeded the alkaline Flag 2 criterion of pH 10; during second quarter 1993, it was pH 11.4. The pH in well AMB 11D has usually fluctuated around neutral, but occasionally it has risen to greater than pH 9. The pH level in well AMB 13AR has exceeded the alkaline Flag 2 criterion during recent quarters.

Specific conductance: With the exception of first quarter 1992 and second quarter 1993, field specific conductance for well AMB 10A consistently has exceeded the Flag 2 criterion of 500 μS/cm since sampling began. Specific conductance has ranged between approximately 25 and 300 μS/cm in the remaining wells in recent years.

Tetrachloroethylene: Tetrachloroethylene concentrations for most of the AMB wells have been near or below the final PDWS of 5 μg/L since sampling began. Concentrations in well AMB 5 have been above the final PDWS since mid-1989; concentrations in wells AMB 4A and 7A have consistently exceeded the final PDWS. Tetrachloroethylene concentrations above the final PDWS have been found in well AMB 4D during recent quarters.

Total alpha-emitting radium: All of the AMB wells have consistently exhibited total alpha-emitting radium activities below the Flag 2 criterion of 20 pCi/L.

Total organic carbon: Total organic carbon concentrations in the AMB well series have been consistently less than the Flag 2 criterion of 10,000 μg/L since shortly after sampling began, except for a few isolated analyses in different wells during late 1989 through early 1990.

Total organic halogens: Most of the AMB wells have exhibited total organic halogen concentrations less than the Flag 2 criterion of 50 μg/L since sampling began. However, concentrations in wells AMB 4A, 5, and 7A have exceeded this standard during most quarters that samples were analyzed, including second quarter 1993. The concentration

of total organic halogens in well AMB 4D, which has fluctuated around the Flag 2 criterion, was elevated during second quarter 1993.

Trichloroethylene: Trichloroethylene concentrations in wells AMB 4A, 4B, 4D, 5, and 7A have consistently exceeded the final PDWS of 5 μg/L since sampling began. Concentrations in wells AMB 6, 7, 7B, and 8D have fluctuated around the final PDWS; trichloroethylene was elevated in well AMB 6 during second quarter 1993. Concentrations in the remaining AMB wells have consistently been less than the final PDWS or the detection limit.

Groundwater Elevations, Flow Directions, and Flow Rates

Figure 2 (Appendix C) provides water-elevation contours for the water table in the A and M areas. Figures 3 through 5 (Appendix C) present water-elevation contours for the water table and upper and lower sections of the Congaree hydrostratigraphic unit beneath the Met Lab HWMF. Hydrographs for the AMB wells are in Appendix G, and large-scale water-elevation and potentiometric maps of the water table and the upper and lower sections of the Congaree beneath A and M areas are in Appendix H. Figures in Appendix C are oriented by SRS coordinates, while figures in Appendix H are oriented by Universal Transverse Mercator coordinates (UTM).

Historically, using SRS grid coordinates, the horizontal groundwater flow in the water table beneath the Met Lab HWMF is to the northwest, and the flow in the upper and lower sections of the Congaree aquifer is to the south. During second quarter 1993, horizontal flow in the water table was to the northwest (Figure 3, Appendix C), and flow in the upper section of the Congaree was to the southwest (Figure 4, Appendix C). The horizontal gradient in the lower section of the Congaree was not contoured because of the low horizontal gradient and the near-linear distribution of the monitoring wells.

Horizontal flow rate estimates for the three hydrostratigraphic units during the past four quarters are provided below.

Horizontal Groundwater Flow Rates (ft/yr) in the Hydrostratigraphic Units Beneath the Met Lab HWMF

Unit	3Q92	4Q92	1Q93	2Q93
Water table	140	130	160	160
Congaree, upper section	3.7	3.7	3.7	3.7
Congaree, lower section	N	N	N	N

[a] N = Horizontal gradient too low to calculate the flow rate.

The groundwater flow rate beneath the Met Lab HWMF is estimated using the following equation:

$$\text{Flow (ft/day)} = \frac{\text{Hydraulic Conductivity (ft/day)}}{\text{Porosity (unitless)}} \times \frac{dh \text{ (ft)}}{dl \text{ (ft)}}$$

Hydraulic conductivity constants estimated for the water-table unit, the upper section of the Congaree, and the lower section of the Congaree are 27, 1.05, and 1.48 ft/day, respectively, and the effective porosity values are 20%, 30%, and 30%, respectively (WSRC, 1991). The value *dh* is the difference in head, and *dl* is the length of the flow path.

Flow path length is calculated to the nearest 50 ft for each hydrostratigraphic unit. Flow rate per day is calculated to two significant figures, then multiplied by 365 and rounded to two significant figures for the flow rate per year. Flow rate estimates vary depending on the vertical gradient between wells, the size of the area under consideration, and the number of data points. The values presented here are useful as order of magnitude estimates only.

The flow rate estimate for groundwater in the water-table unit beneath the Met Lab HWMF during second quarter 1993 is as follows (Figure 3, Appendix C):

$$\frac{27}{0.20} \times \frac{2.5}{750} = 0.45 \text{ ft/day}$$

$$0.45 \text{ ft/day} \times 365 \text{ days} \approx 160 \text{ ft/yr}$$

The flow rate estimate for groundwater in the upper section of the Congaree beneath the Met Lab HWMF is as follows (Figure 4, Appendix C):

$$\frac{1.05}{0.30} \times \frac{1}{350} = 0.01 \text{ ft/day}$$

$$0.01 \text{ ft/day} \times 365 \text{ days} \approx 3.7 \text{ ft/yr}$$

Upgradient vs. Downgradient Results

Water-table wells AMB 11D and 12D are upgradient relative to the Met Lab HWMF. No AMB wells monitor upgradient groundwater quality in the Congaree. The 1992 RCRA Part B permit renewal application identifies proposed upgradient wells for this unit (WSRC, 1992a).

During second quarter 1993, upgradient wells AMB 11D and 12D did not contain any constituents that exceeded the final PDWS or Flag 2 criteria.

Downgradient water-table wells AMB 4D, 5, and 6 contained elevated levels of dichloromethane (methylene chloride), tetrachloroethylene, total organic halogens, or trichloroethylene. Downgradient well AMB 4B, in the upper section of the Congaree, contained an elevated concentration of trichloroethylene. Downgradient wells AMB 4A, 7A, 10A, and 13AR, in the lower section of the Congaree, contained elevated levels of dichloromethane

(methylene chloride), pH, specific conductance, tetrachloroethylene, total organic halogens, or trichloroethylene.

Quality Control Results

Blind replicate analyses, representing approximately 5% of the quarter's total groundwater samples, are performed by the analytical laboratories each quarter for wells selected by EPD/EMS as part of the EPD/EMS quality assurance program (see Appendix E). The results of the analyses are used for both intralaboratory and interlaboratory comparisons. **The Savannah River Site's Groundwater Monitoring Program, Second Quarter 1993 (U)**, ESH-EMS-930097 (EPD/EMS, 1993b) provides full replicate results and statistical comparisons of both blind replicate and duplicate results.

No AMB well was selected to receive blind replicate analysis during second quarter 1993. As a part of intralaboratory quality assurance procedures, certain analyses were duplicated by the laboratory. These results are reported in Table 3.

Conclusions

During second quarter 1993, as in previous quarters, tetrachloroethylene and trichloroethylene exceeded the final PDWS in several AMB wells. The RCRA Part B Post-Closure Care Permit Application for the Met Lab HWMF (WSRC, 1991) indicates that a small, isolated plume of tetrachloroethylene and trichloroethylene, located in the water-table unit near the Met Lab HWMF, is from the Metallurgical Laboratory Basin. The permit application also indicates that the primary source of the contamination in the deeper units near the Met Lab HWMF is the extensive organic halogens plume resulting from M-Area operations. SRS is addressing the effects of organic halogens near the Met Lab HWMF under the provisions of the corrective action program of the M-Area HWMF post-closure care permit renewal application (WSRC, 1992a; WSRC, 1992d).

Dichloromethane (methylene chloride), which exceeded the final PDWS (enforceable January 17, 1994) in wells AMB 4D, 5, and 7A, is a common laboratory contaminant and, thus, may not represent groundwater quality in these wells. This constituent received a final PDWS in July 1992. This standard was first applied in the SRS Groundwater Monitoring Program beginning first quarter 1993; previously, dichloromethane (methylene chloride) had no standard of comparison in the program.

Similar to past quarters, pH and total organic halogens exceeded the Flag 2 criteria in one or more of the AMB wells during second quarter 1993. Generally, maximum levels for these constituents were detected in Congaree wells. Aluminum, iron, and manganese were elevated in one or more AMB well during first quarter 1993 but were not analyzed for during second quarter 1993.

Elevated constituents were not found in upgradient water-table wells AMB 11D and 12D or in downgradient wells AMB 7, 7B, 8D, 9D, 10B, 10D, and 11B.

Historically and currently, the horizontal flow direction in the water table beneath the Met Lab HWMF is to the northwest. Historically, the flow direction in the upper and lower sections of the Congaree aquifer is to the south. During second quarter 1993, horizontal flow in the upper section of the Congaree was to the southwest. The low horizontal gradient and near-linear arrangement of the monitoring wells in the lower section of the Congaree prevented the calculation of a reliable flow direction and rate in this hydrostratigraphic unit. The flow rate estimates for groundwater in the water table and the upper section of the Congaree during the quarter were 160 ft/yr and 3.7 ft/yr, respectively. These estimated flow rates, which represent the assumed maximum contaminant migration rates, are similar to the estimated rates for previous quarters.

Errata

Second Quarter 1992:

- Page D-3: Well AMB 4A should have a second result for tetrachloroethylene of 12 μg/L.
- Page D-9: The trichloroethylene result of 81 μg/L for well AMB 4A should be 510 μg/L.

Third Quarter 1992:

- Prior to third quarter 1992, the results of certain analyses for *nitrate-nitrite as nitrogen* were reported incorrectly by the General Engineering laboratory as *nitrate as nitrogen* results. The analyses in the results tables of this report are reported correctly (*nitrate-nitrite* results have been separated from true *nitrate* results).

Fourth Quarter 1992:

- No errata reported.

First Quarter 1993:

- No errata reported.

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Appendix A – Final Primary Drinking Water Standards

Final Primary Drinking Water Standards

Analyte	Unit	Level	Status	Source
Antimony	µg/L	6	Final	EPA, 1992b
Arsenic	µg/L	50	Final	EPA, 1992a
Asbestos	fibers/L	7,000,000	Final	EPA, 1992a
Barium	µg/L	2,000	Final	EPA, 1992a
Benzene	µg/L	5	Final	EPA, 1992a
Benzo[a]pyrene	µg/L	0.2	Final	EPA, 1992b
Beryllium	µg/L	4	Final	EPA, 1992b
Bis(2-ethylhexyl) phthalate	µg/L	6	Final	EPA, 1992b
Bromodichloromethane	µg/L	100[a]	Final	EPA, 1992a
Bromoform	µg/L	100[a]	Final	EPA, 1992a
2-sec-Butyl-4,6-dinitrophenol	µg/L	7	Final	EPA, 1992b
Cadmium	µg/L	5	Final	EPA, 1992a
Carbon tetrachloride	µg/L	5	Final	EPA, 1992a
Chlordane	µg/L	2	Final	EPA, 1992a
Chlorobenzene	µg/L	100	Final	EPA, 1992a
Chloroethene (Vinyl chloride)	µg/L	2	Final	EPA, 1992a
Chloroform	µg/L	100[a]	Final	EPA, 1992a
Chromium	µg/L	100	Final	EPA, 1992a
Copper	µg/L	1,300	Final	EPA, 1992a
Cyanide	µg/L	200	Final	EPA, 1992b
Dibromochloromethane	µg/L	100[a]	Final	EPA, 1992a
Dibromochloropropane	µg/L	0.2	Final	EPA, 1992a
1,2-Dibromoethane (Ethylene dibromide)	µg/L	0.05	Final	EPA, 1992a
1,2-Dichlorobenzene	µg/L	600	Final	EPA, 1992a
1,4-Dichlorobenzene	µg/L	75	Final	EPA, 1992a
1,2-Dichloroethane	µg/L	5	Final	EPA, 1992a
1,1-Dichloroethene	µg/L	7	Final	EPA, 1992a
1,2-Dichloroethene	µg/L	50	Final	EPA, 1992b
cis-1,2-Dichloroethene	µg/L	70	Final	EPA, 1992a
trans-1,2-Dichloroethene	µg/L	100	Final	EPA, 1992a
Dichloromethane (Methylene chloride)	µg/L	5	Final	EPA, 1992b
2,4-Dichlorophenoxyacetic acid	µg/L	70	Final	EPA, 1992a
1,2-Dichloropropane	µg/L	5	Final	EPA, 1992a
Endrin	µg/L	2	Final	EPA, 1992b
Ethylbenzene	µg/L	700	Final	EPA, 1992a
Fluoride	µg/L	4,000	Final	EPA, 1992a
Gross alpha[b]	pCi/L	1.5E+01	Final	EPA, 1992a
Heptachlor	µg/L	0.4	Final	EPA, 1992a
Heptachlor epoxide	µg/L	0.2	Final	EPA, 1992a
Hexachlorobenzene	µg/L	1	Final	EPA, 1992b
Hexachlorocyclopentadiene	µg/L	50	Final	EPA, 1992b
Lead	µg/L	50	Final	SCDHEC, 1981
Lindane	µg/L	0.2	Final	EPA, 1992a
Mercury	µg/L	2	Final	EPA, 1992a
Methoxychlor	µg/L	40	Final	EPA, 1992a
Nickel	µg/L	100	Final	EPA, 1992b
Nitrate as nitrogen	µg/L	10,000	Final	EPA, 1992a
Nitrate-nitrite as nitrogen	µg/L	10,000	Final	EPA, 1992a
Nitrite as nitrogen	µg/L	1,000	Final	EPA, 1992a
Nonvolatile beta[c]	pCi/L	5E+01	Final	EPA, 1977
PCBs[d]	µg/L	0.5	Final	EPA, 1992a
Pentachlorophenol	µg/L	1	Final	EPA, 1992a
Radium, total (Radium-226 and -228)	pCi/L	5E+00	Final	EPA, 1992a

Analyte	Unit	Level	Status	Source
Selenium	µg/L	50	Final	EPA, 1992a
Strontium-89/90[e]	pCi/L	8E+00	Final	EPA, 1992a
Strontium-90	pCi/L	8E+00	Final	EPA, 1992a
Styrene	µg/L	100	Final	EPA, 1992a
2,3,7,8-TCDD	µg/L	0.00003	Final	EPA, 1992b
Tetrachloroethylene	µg/L	5	Final	EPA, 1992a
Thallium	µg/L	2	Final	EPA, 1992b
Toluene	µg/L	1,000	Final	EPA, 1992a
Total trihalomethanes	µg/L	100	Final	EPA, 1992a
Toxaphene	µg/L	3	Final	EPA, 1992a
2,4,5-TP (Silvex)	µg/L	50	Final	EPA, 1992a
1,2,4-Trichlorobenzene	µg/L	70	Final	EPA, 1992b
1,1,1-Trichloroethane	µg/L	200	Final	EPA, 1992a
1,1,2-Trichloroethane	µg/L	5	Final	EPA, 1992b
Trichloroethylene	µg/L	5	Final	EPA, 1992a
Tritium	pCi/mL	2E+01	Final	EPA, 1992a
Xylenes	µg/L	10,000	Final	EPA, 1992a

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[a] This value is the drinking water standard for total trihalomethanes (the sum of bromoform, bromodichloromethane, chloroform, and dibromochloromethane).

[b] The standard given is for gross alpha including radium-226 but excluding radon and uranium.

[c] This is the screening level above which providers of public drinking water should perform analyses for specific man-made radionuclides. The standard for the total dose equivalent from all such radionuclides is 4 mrem per year.

[d] Analyses were conducted in 1992 for the following: PCB 1016, PCB 1221, PCB 1232, PCB 1242, PCB 1248, PCB 1254, and PCB 1260.

[e] For double radionuclide analyses where each separate radionuclide has its own standard, the more stringent standard is used.

References

EPA (U.S. Environmental Protection Agency), 1977. **National Interim Primary Drinking Water Regulations**, EPA-570/9-76-003. Washington, DC.

EPA (U.S. Environmental Protection Agency), 1992a. *National Primary Drinking Water Regulations,* **Code of Federal Regulations**, Title 40, Part 141, pp. 589–729. Washington, DC.

EPA (U.S. Environmental Protection Agency), 1992b. *National Primary Drinking Water Regulations—Synthetic Organic Chemicals and Inorganic Chemicals; National Primary Drinking Water Regulations Implementation.* **Federal Register**, July 17, 1992, pp. 31776–31849. Washington, DC.

SCDHEC (South Carolina Department of Health and Environmental Control), 1981. **State Primary Drinking Water Regulations**, R.61-58.5. Columbia, SC.

Appendix B – Flagging Criteria

Flagging Criteria

The Savannah River Site Environmental Protection Department/Environmental Monitoring Section (EPD/EMS) flagging criteria are as follows:

- Flag 2 criteria for constituents equal the Safe Drinking Water Act (SDWA) final Primary Drinking Water Standard (PDWS), the SDWA proposed PDWS, or the SDWA Secondary Drinking Water Standard (SDWS). If a constituent does not have a drinking water standard, the Flag 2 criterion equals 10 times the method detection limit (MDL) calculated as the 90th percentile detection limit obtained recently by one of the primary analytical laboratories.

- Flag 1 criteria for constituents equal one-half of the final PDWS, one-half the proposed PDWS, or one-half the SDWS. If a constituent does not have a drinking water standard, the Flag 1 criterion equals 5 times the MDL calculated as the 90th percentile detection limit obtained recently by one of the primary analytical laboratories.

- Flag 0 criteria are assigned to constituent levels below Flag 1 criteria, constituent levels below the sample detection limits, or constituents having no flagging criteria.

The following parameters are not assigned flagging criteria: alkalinity, calcium, color, corrosivity, Eh, magnesium, odor, potassium, silica, sodium, total dissolved solids, total phosphates (as P), total phosphorus, and turbidity. In addition, common laboratory contaminants and cleaners including some phthalates, ketones, and toluene are not assigned flagging criteria.

Analyte	Unit	Flag 1	Flag 2	Source[a]
Acenaphthene	µg/L	50	100	EPA Method 8270
Acenaphthylene	µg/L	50	100	EPA Method 8270
Acetone	µg/L	500	1,000	EPA Method 8240
Acetonitrile (Methyl cyanide)	µg/L	500	1,000	EPA Method 8240
Acetophenone	µg/L	50	100	EPA Method 8270
2-Acetylaminofluorene	µg/L	50	100	EPA Method 8270
Acrolein	µg/L	100	200	EPA Method 8240
Acrylonitrile	µg/L	100	200	EPA Method 8240
Actinium-228	pCi/L	1.64E+03	3.27E+03	Proposed PDWS (EPA, 1991)
Aldrin	µg/L	0.25	0.5	EPA Method 8080
Alkalinity (as $CaCO_3$)		No flag	No flag	Set by EPD/EMS
Allyl chloride	µg/L	250	500	EPA Method 8240
Aluminum	µg/L	25	50	SDWS (EPA, 1992c)
Americium-241	pCi/L	3.17E+00	6.34E+00	Proposed PDWS (EPA, 1991)
Americium-243	pCi/L	3.19E+00	6.37E+00	Proposed PDWS (EPA, 1991)
4-Aminobiphenyl	µg/L	50	100	EPA Method 8270
Ammonia	µg/L	500	1,000	APHA Method 417B
Ammonia nitrogen	µg/L	500	1,000	EPA Method 350.1
Aniline	µg/L	50	100	EPA Method 8270
Anthracene	µg/L	50	100	EPA Method 8270
Antimony	µg/L	3	6	Final PDWS (EPA, 1992b)
Antimony-125	pCi/L	1.5E+02	3E+02	Final PDWS (EPA, 1977)
Aramite	µg/L	50	100	EPA Method 8270
Arsenic	µg/L	25	50	Final PDWS (EPA, 1992a)

Analyte	Unit	Flag 1	Flag 2	Source[a]
Asbestos	Fibers/L	3,500,000	7,000,000	Final PDWS (EPA, 1992a)
Azobenzene	µg/L	50	100	EPA Method 625
Barium	µg/L	1,000	2,000	Final PDWS (EPA, 1992a)
Barium-140	pCi/L	4.5E+01	9E+01	Final PDWS (EPA, 1977)
Benzene	µg/L	2.5	5	Final PDWS (EPA, 1992a)
alpha-Benzene hexachloride	µg/L	0.25	0.5	EPA Method 8080
beta-Benzene hexachloride	µg/L	0.25	0.5	EPA Method 8080
delta-Benzene hexachloride	µg/L	0.25	0.5	EPA Method 8080
Benzidine	µg/L	250	500	EPA Method 8270
Benzo[*a*]anthracene	µg/L	0.05	0.1	Proposed PDWS (EPA, 1990)
Benzo[*b*]fluoranthene	µg/L	0.1	0.2	Proposed PDWS (EPA, 1990)
Benzo[*k*]fluoranthene	µg/L	0.1	0.2	Proposed PDWS (EPA, 1990)
Benzoic acid	µg/L	250	500	EPA Method 8270
Benzo[*g,h,i*]perylene	µg/L	50	100	EPA Method 8270
Benzo[*a*]pyrene	µg/L	0.1	0.2	Final PDWS (EPA, 1992b)
1,4-Benzoquinone	µg/L	50	100	EPA Method 8270
Benzyl alcohol	µg/L	50	100	EPA Method 8270
Beryllium	µg/L	2	4	Final PDWS (EPA, 1992b)
Beryllium-7	pCi/L	3E+03	6E+03	Final PDWS (EPA, 1977)
Bis(2-chloroethoxy) methane	µg/L	50	100	EPA Method 8270
Bis(2-chloroethyl) ether	µg/L	50	100	EPA Method 8270
Bis(2-chloroisopropyl) ether	µg/L	50	100	EPA Method 8270
Bis(chloromethyl) ether	µg/L	50	100	EPA Method 8270
Bis(2-ethylhexyl) phthalate	µg/L	3	6	Final PDWS (EPA, 1992b)
Bromide	µg/L	5,000	10,000	EPA Method 300.0
Bromodichloromethane	µg/L	50	100	Final PDWS (EPA, 1992a)
Bromoform	µg/L	50	100	Final PDWS (EPA, 1992a)
Bromomethane (Methyl bromide)	µg/L	5	10	EPA Method 8240
4-Bromophenyl phenyl ether	µg/L	50	100	EPA Method 8270
2-sec-Butyl-4,6-dinitrophenol	µg/L	3.5	7	Final PDWS (EPA, 1992b)
Butylbenzyl phthalate		No flag	No flag	Set by EPD/EMS
Cadmium	µg/L	2.5	5	Final PDWS (EPA, 1992a)
Calcium		No flag	No flag	Set by EPD/EMS
Carbon disulfide	µg/L	5	10	EPA Method 8240
Carbon tetrachloride	µg/L	2.5	5	Final PDWS (EPA, 1992a)
Carbon-14	pCi/L	1E+03	2E+03	Final PDWS (EPA, 1977)
Carbonate		No flag	No flag	Set by EPD/EMS
Cerium-141	pCi/L	1.5E+02	3E+02	Final PDWS (EPA, 1977)
Cerium-144	pCi/L	1.31E+02	2.61E+02	Proposed PDWS (EPA, 1991)
Cesium-134[b]	pCi/L	4.07E+01	8.13E+01	Proposed PDWS (EPA, 1991)
Cesium-137	pCi/L	1E+02	2E+02	Final PDWS (EPA, 1977)
Chlordane	µg/L	1	2	Final PDWS (EPA, 1992a)
Chloride	µg/L	125,000	250,000	SDWS (EPA, 1992c)
4-Chloroaniline	µg/L	50	100	EPA Method 8270
Chlorobenzene	µg/L	50	100	Final PDWS (EPA, 1992a)
Chlorobenzilate	µg/L	50	100	EPA Method 8270
Chloroethane	µg/L	5	10	EPA Method 8240
Chloroethene (Vinyl chloride)	µg/L	1	2	Final PDWS (EPA, 1992a)
Chloroethyl vinyl ether	µg/L	5	10	EPA Method 8240
2-Chloroethyl vinyl ether	µg/L	5	10	EPA Method 8240
Chloroform	µg/L	50	100	Final PDWS (EPA, 1992a)
4-Chloro-m-cresol	µg/L	50	100	EPA Method 8270
Chloromethane (Methyl chloride)	µg/L	5	10	EPA Method 8240
2-Chloronaphthalene	µg/L	50	100	EPA Method 8240
2-Chlorophenol	µg/L	50	100	EPA Method 8270

Analyte	Unit	Flag 1	Flag 2	Source[a]
4-Chlorophenyl phenyl ether	µg/L	50	100	EPA Method 8270
Chloroprene	µg/L	1,000	2,000	EPA Method 8240
Chromium	µg/L	50	100	Final PDWS (EPA, 1992a)
Chromium-51	pCi/L	3E+03	6E+03	Final PDWS (EPA, 1977)
Chrysene	µg/L	0.1	0.2	Proposed PDWS (EPA, 1990)
Cobalt	µg/L	20	40	EPA Method 6010
Cobalt-57	pCi/L	5E+02	1E+03	Final PDWS (EPA, 1977)
Cobalt-58	pCi/L	4.5E+03	9E+03	Final PDWS (EPA, 1977)
Cobalt-60	pCi/L	5E+01	1E+02	Final PDWS (EPA, 1977)
Color		No flag	No flag	Set by EPD/EMS
Copper	µg/L	650	1,300	Final PDWS (EPA, 1992a)
Corrosivity		No flag	No flag	Set by EPD/EMS
m-Cresol (3-Methylphenol)	µg/L	50	100	EPA Method 8270
o-Cresol (2-Methylphenol)	µg/L	50	100	EPA Method 8270
p-Cresol (4-Methylphenol)	µg/L	50	100	EPA Method 8270
Curium-242	pCi/L	6.65E+01	1.33E+02	Proposed PDWS (EPA, 1991)
Curium-243	pCi/L	4.15E+00	8.3E+00	Proposed PDWS (EPA, 1991)
Curium-243/244[c]	pCi/L	4.15E+00	8.3E+00	Proposed PDWS (EPA, 1991)
Curium-244	pCi/L	4.92E+00	9.84E+00	Proposed PDWS (EPA, 1991)
Curium-245/246[c]	pCi/L	3.12E+00	6.23E+00	Proposed PDWS (EPA, 1991)
Curium-246	pCi/L	3.14E+00	6.27E+00	Proposed PDWS (EPA, 1991)
Cyanide	µg/L	100	200	Final PDWS (EPA, 1992b)
p,p'-DDD	µg/L	0.5	1	EPA Method 8080
p,p'-DDE	µg/L	0.5	1	EPA Method 8080
p,p'-DDT	µg/L	0.5	1	EPA Method 8080
Di-n-butyl phthalate		No flag	No flag	Set by EPD/EMS
Di-n-octyl phthalate		No flag	No flag	Set by EPD/EMS
Diallate	µg/L	50	100	EPA Method 8270
Dibenz[*a,h*]anthracene	µg/L	0.15	0.3	Proposed PDWS (EPA, 1990)
Dibenzofuran	µg/L	50	100	EPA Method 8270
Dibromochloromethane	µg/L	50	100	Final PDWS (EPA, 1992a)
1,2-Dibromo-3-chloropropane	µg/L	0.1	0.2	Final PDWS (EPA, 1992a)
1,2-Dibromoethane (Ethylene dibromide)	µg/L	0.025	0.05	Final PDWS (EPA, 1992a)
Dibromomethane (Methylene bromide)	µg/L	5	10	EPA Method 8240
1,2-Dichlorobenzene	µg/L	300	600	Final PDWS (EPA, 1992a)
1,3-Dichlorobenzene	µg/L	50	100	EPA Method 8270
1,4-Dichlorobenzene	µg/L	37.5	75	Final PDWS (EPA, 1992a)
3,3'-Dichlorobenzidine	µg/L	50	100	EPA Method 8270
trans-1,4-Dichloro-2-butene	µg/L	150	300	EPA Method 8240
Dichlorodifluoromethane	µg/L	5	10	EPA Method 8240
1,1-Dichloroethane	µg/L	5	10	EPA Method 8240
1,2-Dichloroethane	µg/L	2.5	5	Final PDWS (EPA, 1992a)
1,1-Dichloroethene	µg/L	3.5	7	Final PDWS (EPA, 1992a)
1,2-Dichloroethene	µg/L	25	50	Final PDWS (EPA, 1992b)
cis-1,2-Dichloroethene	µg/L	35	70	Final PDWS (EPA, 1992a)
trans-1,2-Dichloroethene	µg/L	50	100	Final PDWS (EPA, 1992a)
Dichloromethane (Methylene chloride)	µg/L	2.5	5	Final PDWS (EPA, 1992b)
2,4-Dichlorophenol	µg/L	50	100	EPA Method 8270
2,6-Dichlorophenol	µg/L	50	100	EPA Method 8270
2,4-Dichlorophenoxyacetic acid	µg/L	35	70	Final PDWS (EPA, 1992a)
1,2-Dichloropropane	µg/L	2.5	5	Final PDWS (EPA, 1992a)
cis-1,3-Dichloropropene	µg/L	5	10	EPA Method 8240

Analyte	Unit	Flag 1	Flag 2	Source[a]
trans-1,3-Dichloropropene	µg/L	5	10	EPA Method 8240
Dieldrin	µg/L	2.5	5	EPA Method 8080
Diethyl phthalate		No flag	No flag	Set by EPD/EMS
Dimethoate	µg/L	50	100	EPA Method 8270
p-Dimethylaminoazobenzene	µg/L	50	100	EPA Method 8270
p-(Dimethylamino)ethylbenzene	µg/L	50	100	EPA Method 8270
7,12-Dimethylbenz[a]anthracene	µg/L	50	100	EPA Method 8270
3,3'-Dimethylbenzidine	µg/L	50	100	EPA Method 8270
a,a-Dimethylphenethylamine	µg/L	50	100	EPA Method 8270
2,4-Dimethyl phenol	µg/L	50	100	EPA Method 8270
Dimethyl phthalate		No flag	No flag	Set by EPD/EMS
1,3-Dinitrobenzene	µg/L	50	100	EPA Method 8270
2,4-Dinitrophenol	µg/L	250	500	EPA Method 8270
2,4-Dinitrotoluene	µg/L	50	100	EPA Method 8270
2,6-Dinitrotoluene	µg/L	50	100	EPA Method 8270
1,4-Dioxane	µg/L	50	100	EPA Method 8270
Diphenylamine	µg/L	50	100	EPA Method 8270
1,2-Diphenylhydrazine	µg/L	50	100	EPA Method 8270
Dissolved organic carbon	µg/L	5,000	10,000	EPA Method 9060
Disulfoton	µg/L	50	100	EPA Method 8270
Eh		No flag	No flag	Set by EPD/EMS
alpha-Endosulfan	µg/L	50	100	EPA Method 8270
beta-Endosulfan	µg/L	50	100	EPA Method 8270
Endosulfan I	µg/L	0.5	1	EPA Method 8080
Endosulfan II	µg/L	0.5	1	EPA Method 8080
Endosulfan sulfate	µg/L	0.5	1	EPA Method 8080
Endrin	µg/L	1	2	Final PDWS (EPA, 1992b)
Endrin aldehyde	µg/L	0.5	1	EPA Method 8080
Endrin ketone		No flag	No flag	Set by EPD/EMS
Ethylbenzene	µg/L	350	700	Final PDWS (EPA, 1992a)
Ethyl methacrylate	µg/L	50	100	EPA Method 8270
Ethyl methanesulfonate	µg/L	50	100	EPA Method 8270
Europium-152	pCi/L	3E+01	6E+01	Final PDWS (EPA, 1977)
Europium-154	pCi/L	1E+02	2E+02	Final PDWS (EPA, 1977)
Europium-155	pCi/L	3E+02	6E+02	Final PDWS (EPA, 1977)
Famphur	µg/L	50	100	EPA Method 8270
Fluoranthene	µg/L	50	100	EPA Method 8270
Fluorene	µg/L	50	100	EPA Method 8270
Fluoride	µg/L	2,000	4,000	Final PDWS (EPA, 1992a)
Gross alpha	pCi/L	7.5E+00	1.5E+01	Final PDWS (EPA, 1992a)
Heptachlor	µg/L	0.2	0.4	Final PDWS (EPA, 1992a)
Heptachlor epoxide	µg/L	0.1	0.2	Final PDWS (EPA, 1992a)
Heptachlorodibenzo-p-dioxin isomers	µg/L	0.00325	0.0065	EPA Method 8280
1,2,3,4,6,7,8-HPCDD	µg/L	0.00325	0.0065	EPA Method 8280
Heptachlorodibenzo-p-furan isomers	µg/L	0.00225	0.0045	EPA Method 8280
1,2,3,4,6,7,8-HPCDF	µg/L	0.00225	0.0045	EPA Method 8280
Hexachlorobenzene	µg/L	0.5	1	Final PDWS (EPA, 1992b)
Hexachlorobutadiene	µg/L	50	100	EPA Method 8270
Hexachlorocyclopentadiene	µg/L	25	50	Final PDWS (EPA, 1992b)
Hexachlorodibenzo-p-dioxin isomers	µg/L	0.00225	0.0045	EPA Method 8280
1,2,3,4,7,8-HXCDD	µg/L	0.00225	0.0045	EPA Method 8280
Hexachlorodibenzo-p-furan isomers	µg/L	0.002	0.004	EPA Method 8280
1,2,3,4,7,8-HXCDF	µg/L	0.002	0.004	EPA Method 8280

Analyte	Unit	Flag 1	Flag 2	Source[a]
Hexachloroethane	µg/L	50	100	EPA Method 8270
Hexachlorophene	µg/L	250	500	EPA Method 8270
Hexachloropropene	µg/L	50	100	EPA Method 8270
2-Hexanone	µg/L	50	100	EPA Method 8240
Indeno[1,2,3-*c,d*]pyrene	µg/L	50	100	EPA Method 8270
Iodine	µg/L	250	500	APHA Method 415A
Iodine-129	pCi/L	5E-01	1E+00	Final PDWS (EPA, 1977)
Iodine-131	pCi/L	1.5E+00	3E+00	Final PDWS (EPA, 1977)
Iodomethane (Methyl iodide)	µg/L	75	150	EPA Method 8240
Iron	µg/L	150	300	SDWS (EPA, 1992c)
Iron-55	pCi/L	1E+03	2E+03	Final PDWS (EPA, 1977)
Iron-59	pCi/L	1E+02	2E+02	Final PDWS (EPA, 1977)
Isobutyl alcohol	µg/L	500	1,000	EPA Method 8240
Isodrin	µg/L	50	100	EPA Method 8270
Isophorone	µg/L	50	100	EPA Method 8270
Isosafrole	µg/L	50	100	EPA Method 8270
Kepone	µg/L	50	100	EPA Method 8270
Lanthanum-140	pCi/L	3E+01	6E+01	Final PDWS (EPA, 1977)
Lead	µg/L	7.5	15	Final PDWS (EPA, 1992a)
Lindane	µg/L	0.1	0.2	Final PDWS (EPA, 1992a)
Lithium	µg/L	25	50	EPA Method 6010
Magnesium		No flag	No flag	Set by EPD/EMS
Manganese	µg/L	25	50	SDWS (EPA, 1992c)
Manganese-54	pCi/L	1.5E+02	3E+02	Final PDWS (EPA, 1977)
Mercury	µg/L	1	2	Final PDWS (EPA, 1992a)
Methacrylonitrile	µg/L	250	500	EPA Method 8240
Methapyrilene	µg/L	50	100	EPA Method 8270
Methoxychlor	µg/L	20	40	Final PDWS (EPA, 1992a)
3-Methylcholanthrene	µg/L	50	100	EPA Method 8270
2-Methyl-4,6-dinitrophenol	µg/L	250	500	EPA Method 8270
Methyl ethyl ketone		No flag	No flag	Set by EPD/EMS
Methyl isobutyl ketone		No flag	No flag	Set by EPD/EMS
Methyl methacrylate	µg/L	50	100	EPA Method 8270
Methyl methanesulfonate	µg/L	50	100	EPA Method 8270
2-Methylnaphthalene	µg/L	50	100	EPA Method 8270
Molybdenum	µg/L	250	500	EPA Method 6010
Naphthalene	µg/L	50	100	EPA Method 8270
1,4-Naphthoquinone	µg/L	50	100	EPA Method 8270
1-Naphthylamine	µg/L	50	100	EPA Method 8270
2-Naphthylamine	µg/L	50	100	EPA Method 8270
Neptunium-237	pCi/L	3.53E+00	7.06E+00	Proposed PDWS (EPA, 1991)
Nickel	µg/L	50	100	Final PDWS (EPA, 1992b)
Nickel-59	pCi/L	1.5E+02	3E+02	Final PDWS (EPA, 1977)
Nickel-63	pCi/L	2.5E+01	5E+01	Final PDWS (EPA, 1977)
Niobium-95	pCi/L	1.5E+02	3.E+02	Final PDWS (EPA, 1977)
Nitrate as nitrogen	µg/L	5,000	10,000	Final PDWS (EPA, 1992a)
Nitrate-nitrite as nitrogen	µg/L	5,000	10,000	Final PDWS (EPA, 1992a)
Nitrite as nitrogen	µg/L	500	1,000	Final PDWS (EPA, 1992a)
2-Nitroaniline	µg/L	50	100	EPA Method 8270
3-Nitroaniline	µg/L	50	100	EPA Method 8270
4-Nitroaniline	µg/L	50	100	EPA Method 8270
Nitrobenzene	µg/L	50	100	EPA Method 8270
Nitrogen by Kjeldahl method	µg/L	500	1,000	EPA Method 351.2
2-Nitrophenol	µg/L	50	100	EPA Method 8270
4-Nitrophenol	µg/L	50	100	EPA Method 8270

Analyte	Unit	Flag 1	Flag 2	Source[a]
4-Nitroquinoline-1-oxide	µg/L	50	100	EPA Method 8270
N-Nitrosodi-n-butylamine	µg/L	50	100	EPA Method 8270
N-Nitrosodiethylamine	µg/L	50	100	EPA Method 8270
N-Nitrosodimethylamine	µg/L	50	100	EPA Method 8270
N-Nitrosodiphenylamine	µg/L	50	100	EPA Method 8270
N-Nitrosodipropylamine	µg/L	50	100	EPA Method 8270
N-Nitrosomethylethylamine	µg/L	50	100	EPA Method 8270
N-Nitrosomorpholine	µg/L	50	100	EPA Method 8270
N-Nitrosopiperidine	µg/L	50	100	EPA Method 8270
N-Nitrosopyrrolidine	µg/L	50	100	EPA Method 8270
5-Nitro-o-toluidine	µg/L	50	100	EPA Method 8270
Nonvolatile beta	pCi/L	2.5E+01	5E+01	Proposed PDWS (EPA, 1986)
Octachlorodibenzo-p-dioxin isomers	µg/L	0.005	0.01	EPA Method 8280
Octachlorodibenzo-p-furan isomers	µg/L	0.005	0.01	EPA Method 8280
Odor		No flag	No flag	Set by EPD/EMS
Oil & Grease	µg/L	5,000	10,000	EPA Method 413.1
Parathion	µg/L	0.25	0.5	EPA Method 8080
Parathion methyl	µg/L	0.25	0.5	EPA Method 8080
PCB 1016	µg/L	0.25	0.5	Final PDWS (EPA, 1992a)
PCB 1221	µg/L	0.25	0.5	Final PDWS (EPA, 1992a)
PCB 1232	µg/L	0.25	0.5	Final PDWS (EPA, 1992a)
PCB 1242	µg/L	0.25	0.5	Final PDWS (EPA, 1992a)
PCB 1248	µg/L	0.25	0.5	Final PDWS (EPA, 1992a)
PCB 1254	µg/L	0.25	0.5	Final PDWS (EPA, 1992a)
PCB 1260	µg/L	0.25	0.5	Final PDWS (EPA, 1992a)
PCB 1262	µg/L	0.25	0.5	Final PDWS (EPA, 1992a)
Pentachlorobenzene	µg/L	50	100	EPA Method 8270
Pentachlorodibenzo-p-dioxin isomers	µg/L	0.00275	0.0055	EPA Method 8280
1,2,3,7,8-PCDD	µg/L	0.00275	0.0055	EPA Method 8280
Pentachlorodibenzo-p-furan isomers	µg/L	0.00275	0.0055	EPA Method 8280
1,2,3,7,8-PCDF	µg/L	0.00275	0.0055	EPA Method 8280
Pentachloroethane	µg/L	50	100	EPA Method 8270
Pentachloronitrobenzene	µg/L	50	100	EPA Method 8270
Pentachlorophenol	µg/L	0.5	1	Final PDWS (EPA, 1992a)
pH	pH	8	10	Set by EPD/EMS
pH	pH	4	3	Set by EPD/EMS
Phenacetin	µg/L	50	100	EPA Method 8270
Phenanthrene	µg/L	50	100	EPA Method 8270
Phenol	µg/L	50	100	EPA Method 8270
Phenols	µg/L	25	50	EPA Method 420.1
p-Phenylenediamine	µg/L	50	100	EPA Method 8270
Phorate	µg/L	0.5	1	EPA Method 8080
2-Picoline	µg/L	50	100	EPA Method 8270
Plutonium-238	pCi/L	3.51E+00	7.02E+00	Proposed PDWS (EPA, 1991)
Plutonium-239	pCi/L	3.11E+01	6.21E+01	Proposed PDWS (EPA, 1991)
Plutonium-239/240[c]	pCi/L	3.11E+01	6.21E+01	Proposed PDWS (EPA, 1991)
Plutonium-240	pCi/L	3.11E+01	6.22E+01	Proposed PDWS (EPA, 1991)
Plutonium-241	pCi/L	3.13E+01	6.26E+01	Proposed PDWS (EPA, 1991)
Plutonium-242	pCi/L	3.27E+01	6.54E+01	Proposed PDWS (EPA, 1991)
Potassium		No flag	No flag	Set by EPD/EMS
Potassium-40	pCi/L	1.5E+02	3E+02	Proposed PDWS (EPA, 1986)
Pronamid	µg/L	50	100	EPA Method 8270
Propionitrile	µg/L	1,000	2,000	EPA Method 8240
Pyrene	µg/L	50	100	EPA Method 8270
Pyridine	µg/L	50	100	EPA Method 8270

Analyte	Unit	Flag 1	Flag 2	Source[a]
Radium (alpha-emitting)[d]	pCi/L	1E+01	2E+01	Proposed PDWS (EPA, 1991)
Radium-226	pCi/L	1E+01	2E+01	Proposed PDWS (EPA, 1991)
Radium-228	pCi/L	1E+01	2E+01	Proposed PDWS (EPA, 1991)
Radon-222	pCi/L	1.5E+02	3E+02	Proposed PDWS (EPA, 1991)
Ruthenium-103	pCi/L	1E+02	2E+02	Final PDWS (EPA, 1977)
Ruthenium-106	pCi/L	1.5E+01	3E+01	Final PDWS (EPA, 1977)
Safrole	µg/L	50	100	EPA Method 8270
Selenium	µg/L	25	50	Final PDWS (EPA, 1992a)
Silica		No flag	No flag	Set by EPD/EMS
Total silica	µg/L	500	1,000	EPA Method 6010
Silver	µg/L	50	100	SDWS (EPA, 1992c)
Sodium		No flag	No flag	Set by EPD/EMS
Sodium-22	pCi/L	2.33E+02	4.66E+02	Proposed PDWS (EPA, 1991)
Specific conductance	µS/cm	250	500	Set by EPD/EMS
Strontium-89	pCi/L	1E+01	2E+01	Final PDWS (EPA, 1977)
Strontium-89/90[c]	pCi/L	4E+00	8E+00	Final PDWS (EPA, 1992a)
Strontium-90	pCi/L	4E+00	8E+00	Final PDWS (EPA, 1992a)
Styrene	µg/L	50	100	Final PDWS (EPA, 1992a)
Sulfate	µg/L	200,000	400,000	Proposed PDWS (EPA, 1990)
Sulfide	µg/L	5,000	10,000	EPA Method 9030
Sulfotepp	µg/L	50	100	EPA Method 8270
Surfactants		No flag	No flag	Set by EPD/EMS
2,3,7,8-TCDD	µg/L	0.000015	0.00003	Final PDWS (EPA, 1992b)
2,3,7,8-TCDF	µg/L	0.002	0.004	EPA Method 8280
Technetium-99	pCi/L	4.5E+02	9E+02	Final PDWS (EPA, 1977)
1,2,4,5-Tetrachlorobenzene	µg/L	50	100	EPA Method 8270
Tetrachlorodibenzo-p-dioxin isomers	µg/L	0.00225	0.0045	EPA Method 8280
Tetrachlorodibenzo-p-furan isomers	µg/L	0.002	0.004	EPA Method 8280
1,1,1,2-Tetrachloroethane	µg/L	5	10	EPA Method 8240
1,1,2,2-Tetrachloroethane	µg/L	5	10	EPA Method 8240
Tetrachloroethylene	µg/L	2.5	5	Final PDWS (EPA, 1992a)
2,3,4,6-Tetrachlorophenol	µg/L	50	100	EPA Method 8270
Tetraethyl dithiopyrophosphate	µg/L	50	100	EPA Method 8270
Thallium	µg/L	1	2	Final PDWS (EPA, 1992b)
Thionazin	µg/L	50	100	EPA Method 8270
Thorium-228	pCi/L	6.25E+01	1.25E+02	Proposed PDWS (EPA, 1991)
Thorium-230	pCi/L	3.96E+01	7.92E+01	Proposed PDWS (EPA, 1991)
Thorium-232	pCi/L	4.4E+01	8.8E+01	Proposed PDWS (EPA, 1991)
Thorium-234	pCi/L	2E+02	4.01E+02	Proposed PDWS (EPA, 1991)
Tin	µg/L	10	20	EPA Method 282.2
Tin-113	pCi/L	1.5E+02	3E+02	Final PDWS (EPA, 1977)
Toluene	µg/L	500	1,000	Final PDWS (EPA, 1992a)
o-Toluidine	µg/L	50	100	EPA Method 8270
Total carbon	µg/L	5,000	10,000	EPA Method 9060
Total dissolved solids		No flag	No flag	Set by EPD/EMS
Total hydrocarbons	µg/L	5,000	10,000	EPA Method 418.1
Total inorganic carbon	µg/L	5,000	10,000	EPA Method 9060
Total organic carbon	µg/L	5,000	10,000	EPA Method 9060
Total organic halogens	µg/L	25	50	EPA Method 9020
Total organic nitrogen	µg/L	500	1,000	APHA Method 420
Total petroleum hydrocarbons	µg/L	5,000	10,000	EPA Method 418.1
Total phosphates (as P)		No flag	No flag	Set by EPD/EMS
Total phosphorus		No flag	No flag	Set by EPD/EMS

Analyte	Unit	Flag 1	Flag 2	Source[a]
Toxaphene	µg/L	1.5	3	Final PDWS (EPA, 1992a)
2,4,5-TP (Silvex)	µg/L	25	50	Final PDWS (EPA, 1992a)
Tributyl phosphate	µg/L	50	100	EPA Method 8270
1,2,4-Trichlorobenzene	µg/L	35	70	Final PDWS (EPA, 1992b)
1,1,1-Trichloroethane	µg/L	100	200	Final PDWS (EPA, 1992a)
1,1,2-Trichloroethane	µg/L	2.5	5	Final PDWS (EPA, 1992b)
Trichloroethylene	µg/L	2.5	5	Final PDWS (EPA, 1992a)
Trichlorofluoromethane	µg/L	5	10	EPA Method 8240
2,4,5-Trichlorophenol	µg/L	50	100	EPA Method 8270
2,4,6-Trichlorophenol	µg/L	50	100	EPA Method 8270
2,4,5-Trichlorophenoxyacetic acid	µg/L	2.5	5	EPA Method 8150
1,2,3-Trichloropropane	µg/L	5	10	EPA Method 8240
O,O,O-Triethyl phosphorothioate	µg/L	50	100	EPA Method 8270
1,3,5-Trinitrobenzene	µg/L	50	100	EPA Method 8270
Tritium	pCi/mL	1E+01	2E+01	Final PDWS (EPA, 1992a)
Turbidity		No flag	No flag	Set by EPD/EMS
Uranium	µg/L	10	20	Proposed PDWS (EPA, 1991)
Uranium alpha activity	pCi/L	1.5E+01	3E+01	Proposed PDWS (EPA, 1991)
Uranium-233/234[c]	pCi/L	6.9E+00	1.38E+01	Proposed PDWS (EPA, 1991)
Uranium-234	pCi/L	6.95E+00	1.39E+01	Proposed PDWS (EPA, 1991)
Uranium-235	pCi/L	7.25E+00	1.45E+01	Proposed PDWS (EPA, 1991)
Uranium-238	pCi/L	7.3E+00	1.46E+01	Proposed PDWS (EPA, 1991)
Vanadium	µg/L	40	80	EPA Method 6010
Vinyl acetate	µg/L	5	10	EPA Method 8240
Xylenes	µg/L	5,000	10,000	Final PDWS (EPA, 1992a)
Zinc	µg/L	2,500	5,000	SDWS (EPA, 1992c)
Zinc-65	pCi/L	1.5E+02	3E+02	Final PDWS (EPA, 1977)
Zirconium-95	pCi/L	1E+02	2E+02	Final PDWS (EPA, 1977)
Zirconium/Niobium-95[c]	pCi/L	1E+02	2E+02	Final PDWS (EPA, 1977)

[a] References for methods are found in Appendix E; references for dated sources are at the end of this appendix.
[b] EPD/EMS set this flagging criterion using the 1991 proposed PDWS because the final PDWS in 1977 may have been in error.
[c] When radionuclide analyses are combined, the lower PDWS of the two isotopes is used for flagging.
[d] The applied standard is for radium-226.

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EPA (U.S. Environmental Protection Agency), 1992c. *National Secondary Drinking Water Regulations,* **Code of Federal Regulations**, Section 40, Part 143, pp. 772–776. Washington, DC.

Appendix C – Figures

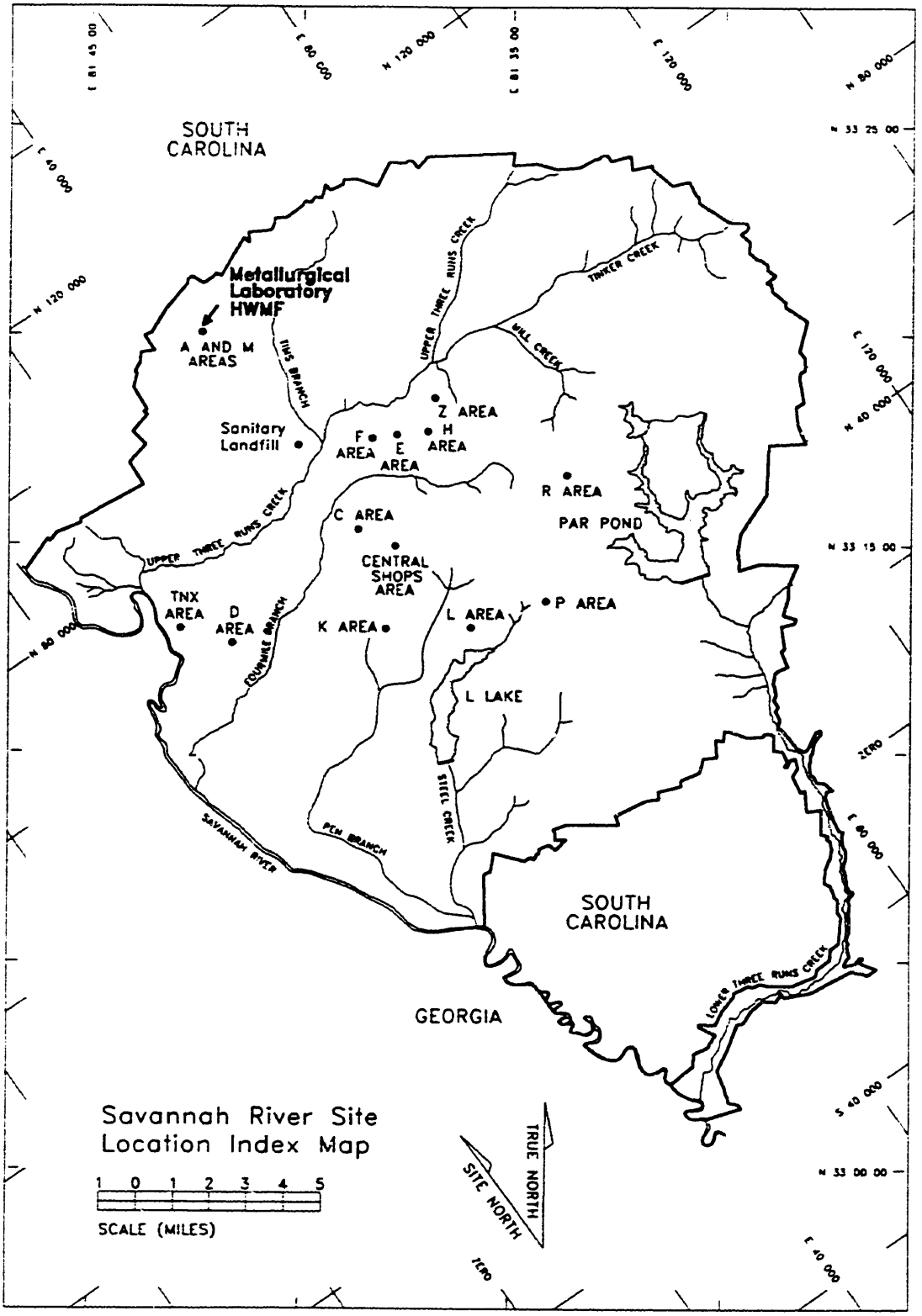

Figure 1. Location of the Metallurgical Laboratory HWMF at the Savannah River Site

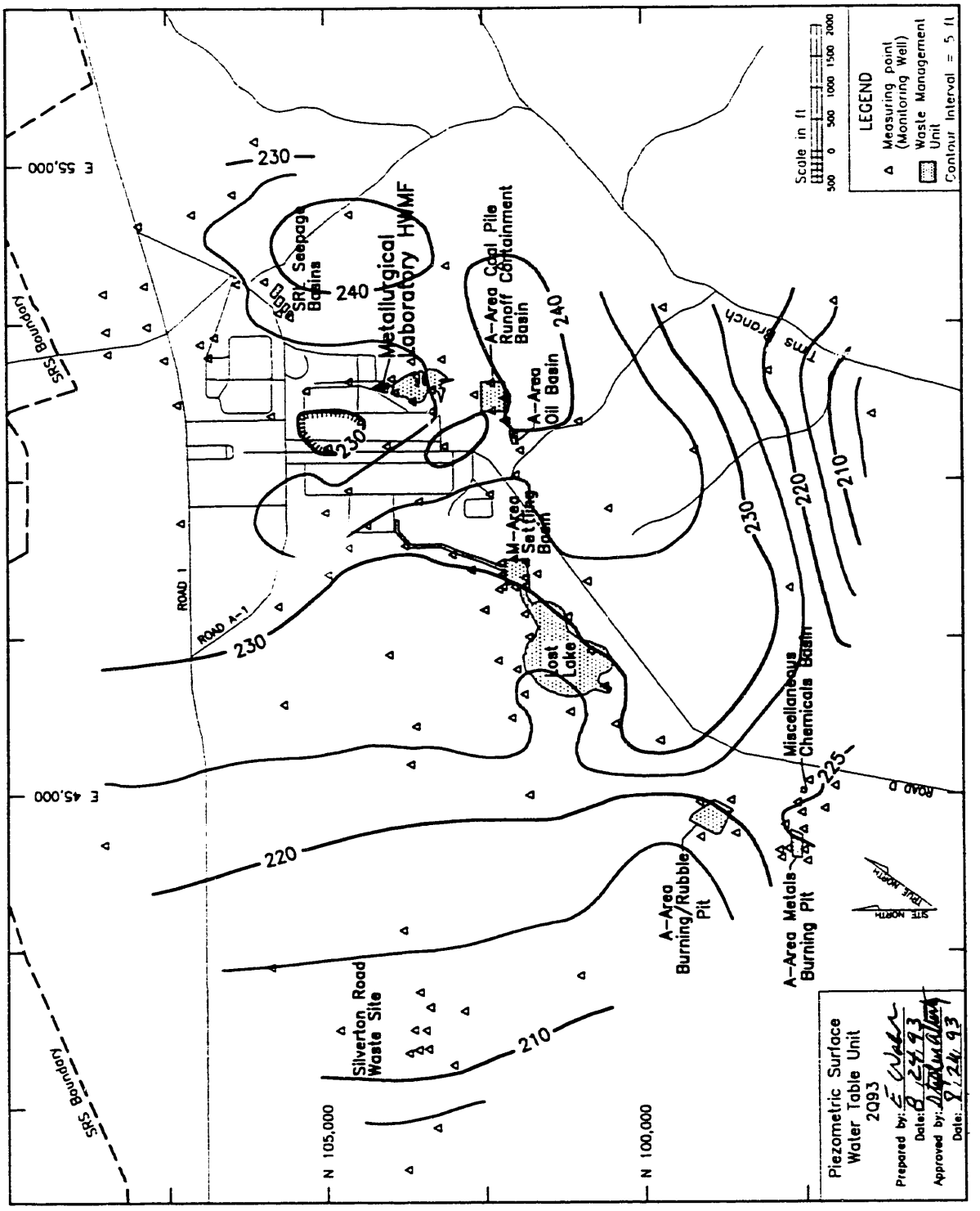

Figure 2. Water-Elevation Contour Map of the Water Table in A and M Areas

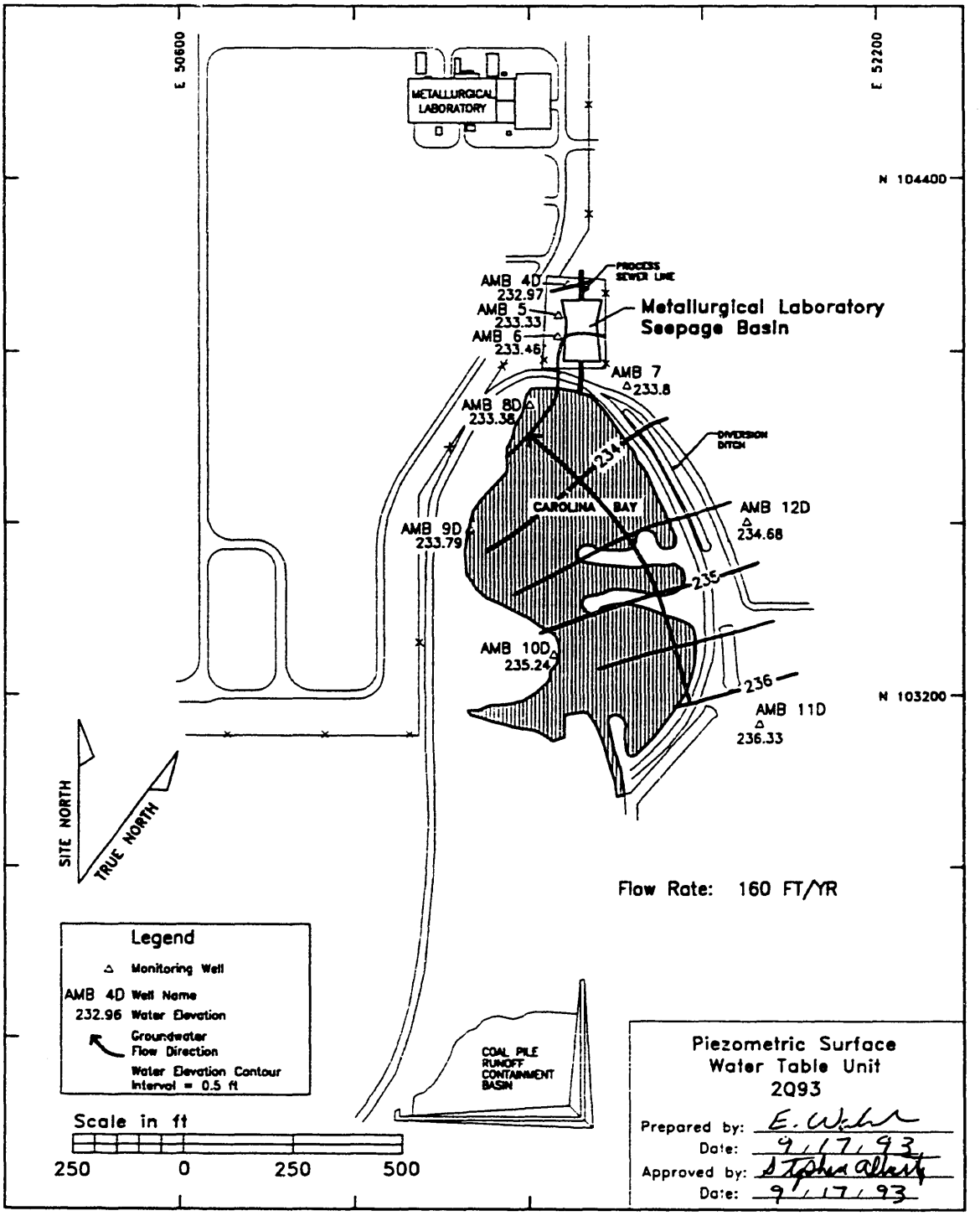

Figure 3. Water-Elevation Contour Map of the Water Table at the Metallurgical Laboratory HWMF and Locations of the Water-Table Wells

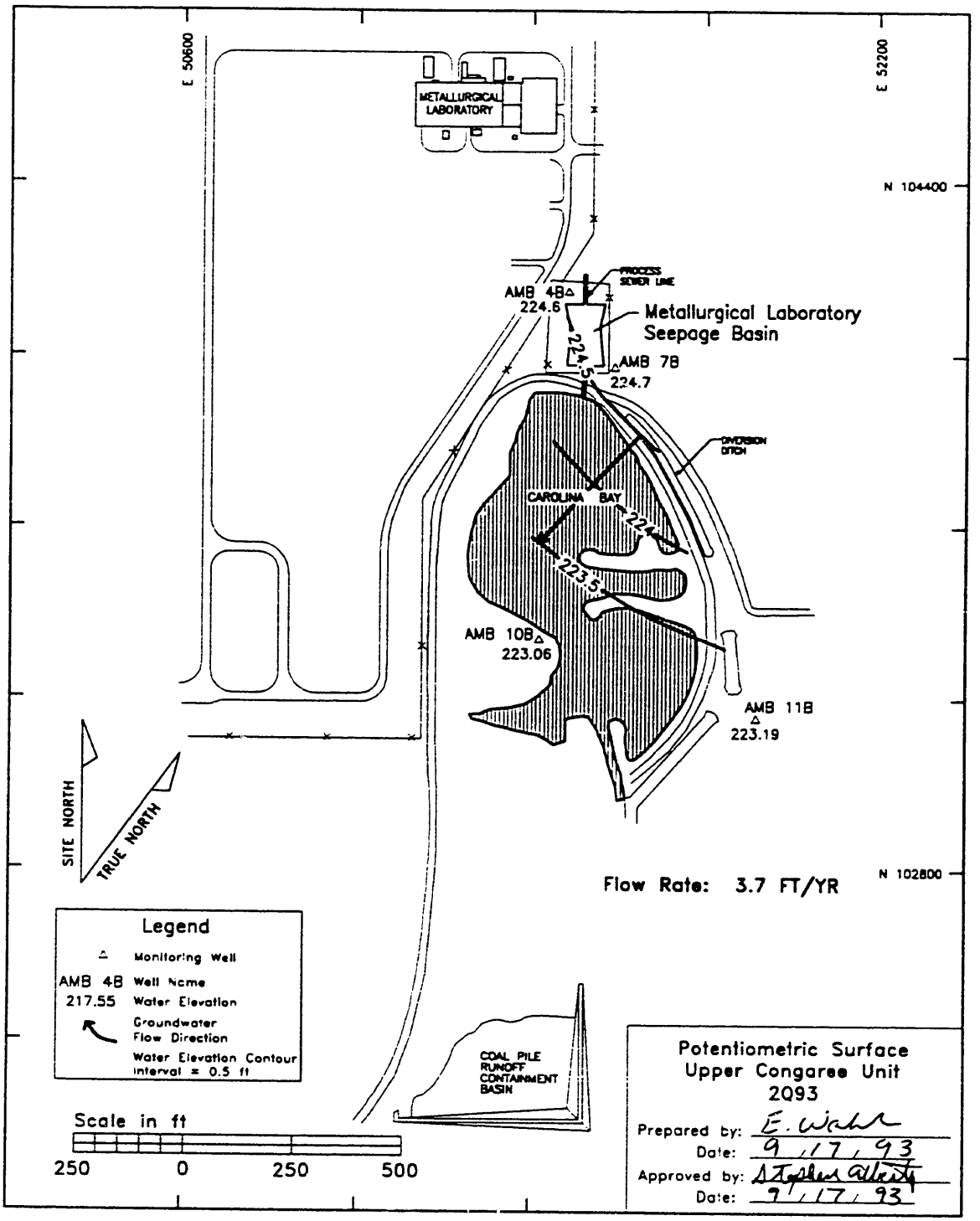

Figure 4. Potentiometric Surface Map of the Upper Section of the Congaree Aquifer at the Metallurgical Laboratory HWMF and Locations of Wells that Monitor the Upper Section of the Congaree

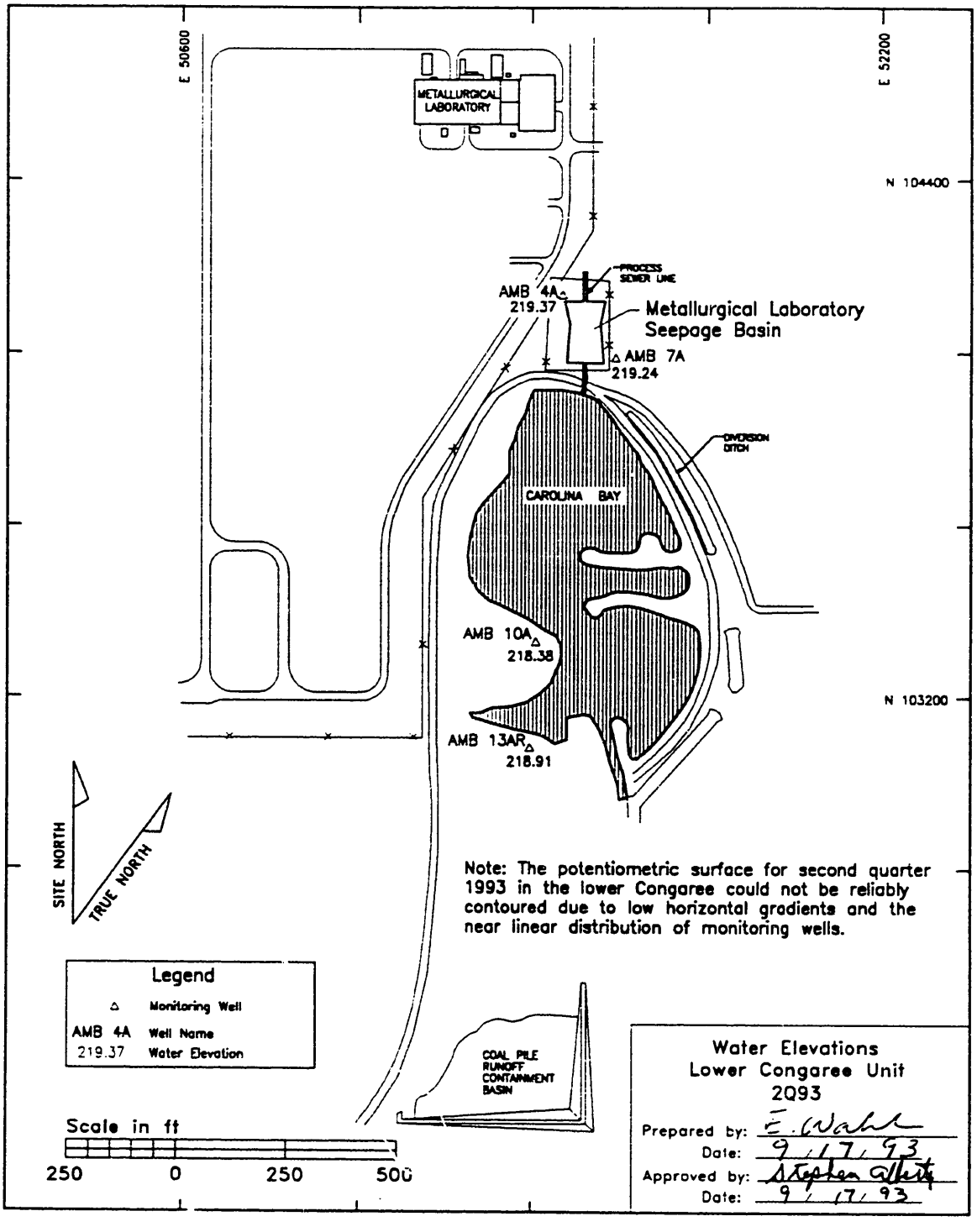

Figure 5. Water Elevations Map of the Lower Section of the Congaree Aquifer at the Metallurgical Laboratory HWMF and Locations of Wells that Monitor the Lower Section of the Congaree

Appendix D – Groundwater Monitoring Results Tables

Key to Reading the Tables

The following abbreviations may appear in the tabular data:

B = sample collected from well using an open bucket bailer
BA = Barringer Laboratories, Inc.
CN = Clemson Technical Center, Inc.
CS = carbon steel
D = primary drinking water standard (PDWS)
E = exponential notation (e.g., 1.1E−09 = 1.1 × 10^{-9} = 0.0000000011)
EM = Environmental Protection Department/Environmental Monitoring Section (EPD/EMS) Laboratory
GE = General Engineering Laboratories
GP = Environmental Physics, Inc.
H = holding time
1,2,3,4,6,7,8-HPCDD = 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-HPCDF = 1,2,3,4,6,7,8-heptachlorodibenzo-p-furan
1,2,3,4,7,8-HXCDD = 1,2,3,4,7,8-hexachlorodibenzo-p-dioxin
1,2,3,4,7,8-HXCDF = 1,2,3,4,7,8-hexachlorodibenzo-p-furan
Lindane = gamma-benzene hexachloride
mg/L = milligrams per liter
Mod = modifier
msl = mean sea level
MSL = million structures per liter
NTU = turbidity unit
P = sample collected from well using a bladder pump
PCB = polychlorinated biphenyl
1,2,3,7,8-PCDD = 1,2,3,7,8-pentachlorodibenzo-p-dioxin
1,2,3,7,8-PCDF = 1,2,3,7,8-pentachlorodibenzo-p-furan
pCi/L = picocuries per liter
pCi/mL = picocuries per milliliter
PDWS = primary drinking water standard
pH = pH unit
PVC = polyvinyl chloride
S = sample collected from well using a single-speed centrifugal downhole pump
Sp. conductance = specific conductance
SP = Spencer Testing Services, Inc.
TCDD = tetrachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzo-p-furan
TM = TMA/Eberline
TOC = top of casing
V = sample collected from well using a variable-speed pump
WA = Roy F. Weston, Inc.
µg/L = micrograms per liter
µS/cm = microsiemens per centimeter

Holding Times

Standard analytical methods include a limit, called holding time, on the maximum elapsed time between sample collection and extraction or analysis by the laboratory. In the data tables, a large dot (●) in the H (holding time) column indicates that holding time was exceeded. Analyses performed beyond holding time may not yield valid results.

The South Carolina Department of Health and Environmental Control allows only 15 minutes to elapse between sampling and analysis for pH. Thus, only field pH measurements can meet the holding time criterion; laboratory pH analyses will always exceed it.

Laboratory-initiated procedures for reducing the number of other analyses performed out of holding time include subcontracting analyses when difficulties with equipment, personnel, or work load would prevent timely analyses. SRS reduces the compensation to laboratories for analyses performed out of holding time.

Data Rounding

Constituent results in Table 3 that appear to equal the final PDWS but are not marked in the *D* column (exceeded the final PDWS or screening level) are below the final PDWS in the database. Values stored in the database contain more significant digits than the reported results. Apparent discrepancies in the tables are due to the rounding of reported results.

Data Qualification

The contract laboratories continually assess their own accuracy and precision according to U.S. Environmental Protection Agency (EPA) guidelines. They submit sample- or batch-specific quality assurance/quality control information either at the same time as analytical results or in a quarterly summary. Properly defined and used result modifiers (also referred to as qualifiers) can be a key component in assessing data useability. Result modifiers designed by Environmental Protection Department/Environmental Monitoring Section and provided to the primary laboratories are defined below. These modifiers appear in the data tables under the column "Mod." The lettered modifiers are based on EPA's STORET codes.

Result modifier	Definition
(Blank)	Data are not qualified. Number should be interpreted exactly as reported.
A	Value reported is the mean of two or more determinations.
J	Value is estimated because quantitation in the sample or in associated quality control samples did not meet specifications.
L	Value is off-scale high. The actual value is not known but is known to be greater than the value shown.
M	Presence of the analyte is verified but not quantified.

Result modifier	Definition
R	Result was rejected because performance requirements in the sample analysis or associated quality control analyses were not met.
T	Analyte was not detected; if present, it was below the criteria for detection.
V	Analyte was detected in an associated method blank.
Y	Result was obtained from an unpreserved or improperly preserved sample. Data may not be accurate.
1	Result may be an underestimation of the true value due to analytical bias.
2	Result may be an overestimation of the true value due to analytical bias.
3	The associated result may be of poor precision (high variability) due to analytical bias.
4	Result is associated with QA results indicating matrix interference.
6	The associated result is from a reanalysis performed out of holding time due to problems with an earlier analysis.

Table 1. Maximum Levels of Constituents Exceeding the Final Primary Drinking Water Standards

Water Table

Well	Constituent	Unit	1Q93	2Q93
AMB 4D	Dichloromethane (Methylene chloride)[a]	µg/L	-[b]	5.8
	Tetrachloroethylene	µg/L	15	13
	Trichloroethylene	µg/L	217	203
AMB 5	Dichloromethane (Methylene chloride)	µg/L	-	6.4
	Tetrachloroethylene	µg/L	6.5	8.5
	Trichloroethylene	µg/L	112	143
AMB 6	Trichloroethylene	µg/L	-	5.7

Upper Section of Congaree

Well	Constituent	Unit	1Q93	2Q93
AMB 4B	Trichloroethylene	µg/L	5.9	5.9

Lower Section of Congaree

Well	Constituent	Unit	1Q93	2Q93
AMB 4A	Dichloromethane (Methylene chloride)	µg/L	28	-
	Tetrachloroethylene	µg/L	45	48
	Trichloroethylene	µg/L	478	533
AMB 7A	Dichloromethane (Methylene chloride)	µg/L	-	5.4
	Tetrachloroethylene	µg/L	16	14
	Trichloroethylene	µg/L	268	298

[a] The final PDWS for dichloromethane (methylene chloride) was applied beginning first quarter 1993.
[b] - = analyzed but not above the final PDWS.

Table 2. Maximum Levels of Constituents Exceeding Half the Final Primary Drinking Water Standards or Other Flag 1 or Flag 2 Criteria

Water Table

Well	Constituent	Unit	2Q93	Mod	Flag
AMB 4D	Total organic halogens	µg/L	131		2
AMB 5	Total organic halogens	µg/L	86		2
AMB 7	*Trichloroethylene*	µg/L	4.2		1

Upper Section of Congaree

Well	Constituent	Unit	2Q93	Mod	Flag
N	None	N	N	N	N

Lower Section of Congaree

Well	Constituent	Unit	2Q93	Mod	Flag
AMB 4A	Total organic halogens	µg/L	148		2
AMB 7A	Total organic halogens	µg/L	136		2
AMB 10A	pH	pH	12	J	2
	Specific conductance	µS/cm	465		1
AMB 13AR	pH	pH	11	J	2
	Specific conductance	µS/cm	320		1

Notes: Constituents exceeding half the final PDWS appear *italicized*.
These results do not include field data.

[a] N = not applicable.

Table 3. Groundwater Monitoring Results for Individual Wells

WELL AMB 4A

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N104131.6 E51469.8	33.340041 °N 81.733589 °W	126.3-121.3 ft msl	380.5 ft msl	4" PVC	S	Lower Congaree

FIELD MEASUREMENTS

Sample date: 04/23/93
Depth to water: 161.58 ft (49.25 m) below TOC
Water elevation: 218.92 ft (66.73 m) msl
Sp. conductance: 61 µS/cm
Water evacuated before sampling: 163 gal
Time: 12:23
pH: 6.5
Alkalinity: 20 mg/L
Water temperature: 19.2 °C
Volumes purged: 2.5 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	6.8	J	pH	0	GE
		Specific conductance	57		µS/cm	0	GE
		Benzene	<25		µg/L	0	GE
		Bromodichloromethane	<25		µg/L	0	GE
		Bromoform	<25		µg/L	0	GE
		Bromomethane (Methyl bromide)	<25		µg/L	0	GE
		Carbon tetrachloride	<25		µg/L	0	GE
		Chloride	1,780		µg/L	0	GE
		Chlorobenzene	<25		µg/L	0	GE
		Chloroethane	<25		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<25		µg/L	0	GE
		2-Chloroethyl vinyl ether	<25		µg/L	0	GE
		Chloroform	<25		µg/L	0	GE
		Chloromethane (Methyl chloride)	<25		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<25		µg/L	0	GE
		1,1-Dichloroethane	<25		µg/L	0	GE
		1,2-Dichloroethane	<25		µg/L	0	GE
		1,1-Dichloroethylene	<25		µg/L	0	GE
		trans-1,2-Dichloroethylene	<25		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<25		µg/L	0	GE
		1,2-Dichloropropane	<25		µg/L	0	GE
		cis-1,3-Dichloropropene	<25		µg/L	0	GE
		trans-1,3-Dichloropropene	<25		µg/L	0	GE
		Ethylbenzene	<25		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	970		µg/L	0	GE
		Silver	<2.0	J1	µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<25		µg/L	0	GE
	■	Tetrachloroethylene	48		µg/L	2	GE
		Toluene	<25		µg/L	0	GE
		Total dissolved solids	67,000	V	µg/L	0	GE
•		Total dissolved solids	51,000	JV	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	148		µg/L	2	GE
		1,1,1-Trichloroethane	<25		µg/L	0	GE
		1,1,2-Trichloroethane	<25		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 4A collected on 04/23/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
	■	Trichloroethylene	533		µg/L	2	GE
		Trichlorofluoromethane	<25		µg/L	0	GE
		Radium, total alpha-emitting	<1.0E+00		pCi/L	0	GE

WELL AMB 4B

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N104145.6 E51482.7	33.340093 °N 81.733582 °W	157.3-152.3 ft msl	380.4 ft msl	4" PVC	S	Upper Congaree

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 156.84 ft (47.81 m) below TOC
Water elevation: 223.56 ft (68.14 m) msl
Sp. conductance: 33 µS/cm
Water evacuated before sampling: 143 gal
Time: 14:58
pH: 4.9
Alkalinity: 0 mg/L
Water temperature: 19.6 °C
Volumes purged: 3.1 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
●		pH	5.2	J	pH	0	GE
		Specific conductance	30		µS/cm	0	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	3,840		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0		µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	780		µg/L	0	GE
		Nitrate-nitrite as nitrogen	790		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE

● = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 4B collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	21,000	V	µg/L	0	GE
		Total dissolved solids	24,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	<5.0		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
	■	Trichloroethylene	5.9		µg/L	2	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	1.9E+00 ± 7.0E-01		pCi/L	0	GE

WELL AMB 4D

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N104154.7 E51489.0	33.340124 °N 81.733584 °W	233.4-213.4 ft msl	380.3 ft msl	4" PVC	S	Water table

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 147.87 ft (45.07 m) below TOC
Water elevation: 232.43 ft (70.85 m) msl
Sp. conductance: 45 µS/cm
Water evacuated before sampling: 13 gal
The well went dry during purging.
Time: 15:08
pH: 4.9
Alkalinity: 1 mg/L
Water temperature: 22.8 °C
Volumes purged: 1.0 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
●		pH	5.2	J	pH	0	GE
		Specific conductance	40		µS/cm	0	GE
		Benzene	<5.0		µg/L	0	GE
		Bromodichloromethane	<5.0		µg/L	0	GE
		Bromoform	<5.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<5.0		µg/L	0	GE
		Carbon tetrachloride	<5.0		µg/L	0	GE
		Chloride	2,760		µg/L	0	GE
		Chlorobenzene	<5.0		µg/L	0	GE
		Chloroethane	<5.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<5.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<5.0		µg/L	0	GE
		Chloroform	<5.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<5.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<5.0		µg/L	0	GE
		1,1-Dichloroethane	<5.0		µg/L	0	GE
		1,2-Dichloroethane	<5.0		µg/L	0	GE
		1,1-Dichloroethylene	<5.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<5.0		µg/L	0	GE
	■	Dichloromethane (Methylene chloride)	5.8		µg/L	2	GE
		1,2-Dichloropropane	<5.0		µg/L	0	GE

● = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 4D collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		cis-1,3-Dichloropropene	<5.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<5.0		µg/L	0	GE
		Ethylbenzene	<5.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	2,780		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<5.0		µg/L	0	GE
	■	Tetrachloroethylene	13		µg/L	2	GE
		Toluene	<5.0		µg/L	0	GE
		Total dissolved solids	30,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	131		µg/L	2	GE
		1,1,1-Trichloroethane	<5.0		µg/L	0	GE
		1,1,2-Trichloroethane	<5.0		µg/L	0	GE
	■	Trichloroethylene	203		µg/L	2	GE
		Trichlorofluoromethane	<5.0		µg/L	0	GE
		Radium, total alpha-emitting	8.9E+00 ± 1.4E+00		pCi/L	0	GE

WELL AMB 5

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N104083.4 E51467.2	33.339930 °N 81.733502 °W	242.1-222.1 ft msl	379.6 ft msl	4" PVC	S	Water table

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 145.76 ft (44.43 m) below TOC
Water elevation: 233.84 ft (71.28 m) msl
Sp. conductance: 51 µS/cm
Water evacuated before sampling: 18 gal
The well went dry during purging.

Time: 14:15
pH: 4.7
Alkalinity: 0 mg/L
Water temperature: 21.5 °C
Volumes purged: 2.3 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
●		pH	5.0	J	pH	0	GE
		Specific conductance	49		µS/cm	0	GE
		Benzene	<5.0		µg/L	J	GE
		Bromodichloromethane	<5.0		µg/L	J	GE
		Bromoform	<5.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<5.0		µg/L	0	GE
		Carbon tetrachloride	<5.0		µg/L	0	GE
		Chloride	4,110		µg/L	0	GE
		Chlorobenzene	<5.0		µg/L	0	GE
		Chloroethane	<5.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<5.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<5.0		µg/L	0	GE
		Chloroform	<5.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<5.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<5.0		µg/L	0	GE

● = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 5 collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		1,1-Dichloroethane	<5.0		µg/L	0	GE
		1,2-Dichloroethane	<5.0		µg/L	0	GE
		1,1-Dichloroethylene	<5.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<5.0		µg/L	0	GE
	■	Dichloromethane (Methylene chloride)	6.4		µg/L	2	GE
		1,2-Dichloropropane	<5.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<5.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<5.0		µg/L	0	GE
		Ethylbenzene	<5.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	1,890		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<5.0		µg/L	0	GE
	■	Tetrachloroethylene	8.5		µg/L	2	GE
		Toluene	<5.0		µg/L	0	GE
		Total dissolved solids	29,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	86		µg/L	2	GE
		1,1,1-Trichloroethane	<5.0		µg/L	0	GE
		1,1,2-Trichloroethane	<5.0		µg/L	0	GE
	■	Trichloroethylene	143		µg/L	2	GE
		Trichlorofluoromethane	<5.0		µg/L	0	GE
		Radium, total alpha-emitting	8.7E+00 ± 1.4E+00		pCi/L	0	GE

WELL AMB 6

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N104034.1 E51466.0	33.339819 °N 81.733410 °W	242.6-222.6 ft msl	377.2 ft msl	4" PVC	S	Water table

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 144.55 ft (44.06 m) below TOC
Water elevation: 232.65 ft (70.91 m) msl
Sp. conductance: 42 µS/cm
Water evacuated before sampling: 1 gal
The well went dry during purging.
Time: 14:28
pH: 5.5
Alkalinity: 11 mg/L
Water temperature: 21.8 °C
Volumes purged: 0.2 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	5.7	J	pH	0	GE
		Specific conductance	40		µS/cm	0	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	3,190		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 6 collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
•		Cyanide	<2.5	J	µg/L	0	GE
•		Cyanide	<2.5	J	µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0		µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	280		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	25,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	19		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
	■	Trichloroethylene	5.7		µg/L	2	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	1.5E+00 ± 6.0E-01		pCi/L	0	GE

WELL AMB 7

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103920.0 E51624.9	33.339827 °N 81.732769 °W	242.1-222.1 ft msl	369.9 ft msl	4" PVC	S	Water table

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 136.18 ft (41.51 m) below TOC
Water elevation: 233.72 ft (71.24 m) msl
Sp. conductance: 95 µS/cm
Water evacuated before sampling: 6 gal
The well went dry during purging.
Time: 15:22
pH: 6.1
Alkalinity: 39 mg/L
Water temperature: 19.7 °C
Volumes purged: 0.8 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	6.3	J	pH	0	GE
•		pH	6.3	J	pH	0	GE
		Specific conductance	70		µS/cm	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 7 collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	2,150		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0		µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	8.4		µg/L	0	GE
		Nitrate-nitrite as nitrogen	210		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	40,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	<5.0		µg/L	0	GE
		Total organic halogens	<5.0		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	4.2		µg/L	1	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	1.0E+00 ± 5.0E-01		pCi/L	0	GE

● = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 7A

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103987.1 E51591.0	33.339920 °N 81.732989 °W	125.6-115.6 ft msl	373.6 ft msl	4" PVC	S	Lower Congaree

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 155.23 ft (47.31 m) below TOC
Water elevation: 218.37 ft (66.56 m) msl
Sp. conductance: 35 µS/cm
Water evacuated before sampling: 205 gal
Time: 15:58
pH: 5.9
Alkalinity: 8 mg/L
Water temperature: 19.2 °C
Volumes purged: 3.0 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	6.1	J	pH	0	GE
		Specific conductance	30		µS/cm	0	GE
		Benzene	<5.0		µg/L	0	GE
		Bromodichloromethane	<5.0		µg/L	0	GE
		Bromoform	<5.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<5.0		µg/L	0	GE
		Carbon tetrachloride	<5.0		µg/L	0	GE
		Chloride	1,760		µg/L	0	GE
		Chloride	1,700		µg/L	0	GE
		Chlorobenzene	<5.0		µg/L	0	GE
		Chloroethane	<5.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<5.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<5.0		µg/L	0	GE
		Chloroform	<5.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<5.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<5.0		µg/L	0	GE
		1,1-Dichloroethane	<5.0		µg/L	0	GE
		1,2-Dichloroethane	<5.0		µg/L	0	GE
		1,1-Dichloroethylene	<5.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<5.0		µg/L	0	GE
	■	Dichloromethane (Methylene chloride)	5.4		µg/L	2	GE
		1,2-Dichloropropane	<5.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<5.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<5.0		µg/L	0	GE
		Ethylbenzene	<5.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	980		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<5.0		µg/L	0	GE
	■	Tetrachloroethylene	14		µg/L	2	GE
		Toluene	<5.0		µg/L	0	GE
		Total dissolved solids	29,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	136		µg/L	2	GE
		1,1,1-Trichloroethane	<5.0		µg/L	0	GE
		1,1,2-Trichloroethane	<5.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 7A collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
	■	Trichloroethylene	298		µg/L	2	GE
		Trichlorofluoromethane	<5.0		µg/L	0	GE
		Radium, total alpha-emitting	<1.0E+00		pCi/L	0	GE

WELL AMB 7B

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103972.0 E51590.3	33.339885 °N 81.732961 °W	162.9-152.9 ft msl	373 ft msl	4" PVC	S	Upper Congaree

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 149.18 ft (45.47 m) below TOC
Water elevation: 223.82 ft (68.22 m) msl
Sp. conductance: 31 µS/cm
Water evacuated before sampling: 233 gal
Time: 16:27
pH: 5.0
Alkalinity: 1 mg/L
Water temperature: 19.0 °C
Volumes purged: 5.0 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	5.3	J	pH	0	GE
		Specific conductance	28		µS/cm	0	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	3,420		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0		µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	320		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 7B collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	18,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	<5.0		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	1.2		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	1.2E+00 ± 5.0E-01		pCi/L	0	GE

WELL AMB 8D

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103874.7 E51400.5	33.339360 °N 81.733272 °W	240.8-220.8 ft msl	369.6 ft msl	4" PVC	S	Water table

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 137.19 ft (41.82 m) below TOC
Water elevation: 232.41 ft (70.84 m) msl
Sp. conductance: 68 µS/cm
Water evacuated before sampling: 100 gal
Time: 14:02
pH: 5.6
Alkalinity: 17 mg/L
Water temperature: 19.0 °C
Volumes purged: 13.1 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	5.9	J	pH	0	GE
		Specific conductance	59		µS/cm	0	GE
		Specific conductance	59		µS/cm	0	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	2,720		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0		µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 8D collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	360		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	43,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	5.4		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	<1.0		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	2.1E+00 ± 7.0E-01		pCi/L	0	GE

WELL AMB 9D

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103585.2 E51263.0	33.338496 °N 81.733071 °W	239.7-219.7 ft msl	367.9 ft msl	4" PVC	S	Water table

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 135.48 ft (41.29 m) below TOC
Water elevation: 232.42 ft (70.84 m) msl
Sp. conductance: 44 µS/cm
Water evacuated before sampling: 64 gal
Time: 13:43
pH: 5.6
Alkalinity: 9 mg/L
Water temperature: 19.2 °C
Volumes purged: 7.7 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	5.8	J	pH	0	GE
		Specific conductance	42		µS/cm	0	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	2,820		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 9D collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	1.5		µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	140		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	25,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	<5.0		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	<1.0		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	<1.0E+00		pCi/L	0	GE

WELL AMB 10A

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103326.4 E51410.0	33.338163 °N 81.732180 °W	111.4-106.4 ft msl	366.5 ft msl	4" PVC	S	Lower Congaree

FIELD MEASUREMENTS

Sample date: 04/23/93
Depth to water: 149.08 ft (45.44 m) below TOC
Water elevation: 217.42 ft (66.27 m) msl
Sp. conductance: 430 µS/cm
Water evacuated before sampling: 69 gal
The well went dry during purging.
Time: 11:28
pH: 11.4
Alkalinity: 97 mg/L
Water temperature: 18.6 °C
Volumes purged: 0.9 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	12	J	pH	2	GE
		Specific conductance	465		µS/cm	1	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	2,610		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 10A collected on 04/23/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0		µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	137		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	180		µg/L	0	GE
		Silver	<2.0	J1	µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	175,000	V	µg/L	0	GE
		Total organic carbon	1,720		µg/L	0	GE
		Total organic halogens	5.0		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	<1.0		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	1.1E+00 ± 5.0E-01		pCi/L	0	GE

WELL AMB 10B

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103337.3 E51418.3	33.338201 °N 81.732180 °W	154.3-149.3 ft msl	366.4 ft msl	4" PVC	S	Upper Congaree

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 144.35 ft (44.00 m) below TOC
Water elevation: 222.05 ft (67.68 m) msl
Sp. conductance: 75 µS/cm
Water evacuated before sampling: 292 gal
Time: 13:25
pH: 6.2
Alkalinity: 29 mg/L
Water temperature: 18.8 °C
Volumes purged: 6.1 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	6.4	J	pH	0	GE
		Specific conductance	79		µS/cm	0	GE
		Benzene	<1.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 10B collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	3,620		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0		µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	120		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	40,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	<5.0		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	<1.0		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	1.3E+00±5.0E-01		pCi/L	0	GE

● = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 10D

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103293.4 E51456.0	33.338166 °N 81.731995 °W	239.4-219.4 ft msl	365.5 ft msl	4" PVC	S	Water table

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 130.30 ft (39.72 m) below TOC
Water elevation: 235.20 ft (71.69 m) msl
Sp. conductance: 51 µS/cm
Water evacuated before sampling: 143 gal
Time: 12:31
pH: 5.6
Alkalinity: 10 mg/L
Water temperature: 18.9 °C
Volumes purged: 13.8 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	5.8	J	pH	0	GE
		Specific conductance	50		µS/cm	0	GE
		Benzene	<1.0		µg/L	0	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	2,900		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0	JV	µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0	JV	µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 10D collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	130		µg/L	0	GE
		Nitrate-nitrite as nitrogen	140		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	30,000	V	µg/L	0	GE
		Total dissolved solids	32,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	<5.0		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	<1.0		µg/L	0	GE
		Trichloroethylene	<1.0		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	<1.0E+00		pCi/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 10DD

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103278.7 E51456.0	33.338133 °N 81.731966 °W	358.6-338.6 ft msl	365.4 ft msl	4" PVC	S	Water table

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 6.56 ft (2.00 m) below TOC
Water elevation: 358.84 ft (109.38 m) msl
Sp. conductance: 125 µS/cm
Water evacuated before sampling: 68 gal
Time: 12:44
pH: 6.5
Alkalinity: 55 mg/L
Water temperature: 17.4 °C
Volumes purged: 5.1 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	6.5	J	pH	0	GE
		Specific conductance	112		µS/cm	0	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	1,970		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0		µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	<50		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	59,000	V	µg/L	0	GE
		Total organic carbon	1,050		µg/L	0	GE
		Total organic halogens	<5.0		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	<1.0		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 10DD collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		Radium, total alpha-emitting	1.2E+00 ± 5.0E-01		pCi/L	0	GE

WELL AMB 11B

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103154.2 E51919.5	33.338615 °N 81.730503 °W	184.5-174.5 ft msl	364.6 ft msl	4" PVC	S	Upper Congaree

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 142.93 ft (43.57 m) below TOC
Water elevation: 221.67 ft (67.57 m) msl
Sp. conductance: 54 µS/cm
Water evacuated before sampling. 174 gal
Time: 18:11
pH: 5.8
Alkalinity: 15 mg/L
Water temperature: 18.3 °C
Volumes purged: 5.6 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	6.2	J	pH	0	GE
		Specific conductance	52		µS/cm	0	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	3,920		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0		µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	380		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	33,000	V	µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 11B collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	<5.0		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	<1.0		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	1.7E+00 ± 6.0E-01		pCi/L	0	GE

WELL AMB 11D

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103132.3 E51932.6	33.338588 °N 81.730426 °W	240.5-220.5 ft msl	364 ft msl	4" PVC	S	Water table

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 128.32 ft (39.11 m) below TOC
Water elevation: 235.68 ft (71.84 m) msl
Sp. conductance: 50 µS/cm
Water evacuated before sampling: 174 gal
Time: 17:56
pH: 5.6
Alkalinity: 10 mg/L
Water temperature: 17.9 °C
Volumes purged: 17.5 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	6.0	J	pH	0	GE
		Specific conductance	50		µS/cm	0	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	2,970		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0	JV	µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 11D collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		Nitrate-nitrite as nitrogen	100		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	25,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	22		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	<1.0		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	1.3E+00±5.0E-01		pCi/L	0	GE

WELL AMB 12D

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103602.4 E51901.6	33.339576 °N 81.731422 °W	239.4-219.4 ft msl	369.8 ft msl	4" PVC	S	Water table

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 136.18 ft (41.51 m) below TOC
Water elevation: 233.62 ft (71.21 m) msl
Sp. conductance: 32 µS/cm
Water evacuated before sampling: 74 gal
Time: 17:06
pH: 5.7
Alkalinity: 5 mg/L
Water temperature: 19.1 °C
Volumes purged: 7.9 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	5.8	J	pH	0	GE
•		pH	5.9	J	pH	0	GE
		Specific conductance	29		µS/cm	0	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	1,900		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 12D collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		Dichloromethane (Methylene chloride)	<1.0	JV	µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	700		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	21,000	V	µg/L	0	GE
		Total organic carbon	<1,000		µg/L	0	GE
		Total organic halogens	10		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	<1.0		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	2.2E+00 ± 7.0E-01		pCi/L	0	GE

WELL AMB 13AR

SRS Coord.	Lat/Longitude	Screen Zone Elevation	Top of Casing	Casing	Pump	Formation
N103082.0 E51396.0	33.337600 °N 81.731742 °W	110.9-100.9 ft msl	365.1 ft msl	4" PVC	S	Lower Congaree

FIELD MEASUREMENTS

Sample date: 05/01/93
Depth to water: 147.17 ft (44.86 m) below TOC
Water elevation: 217.93 ft (66.43 m) msl
Sp. conductance: 342 µS/cm
Water evacuated before sampling: 69 gal
The well went dry during purging.
Time: 12:07
pH: 11.2
Alkalinity: 88 mg/L
Water temperature: 21.5 °C
Volumes purged: 0.9 well volumes

LABORATORY ANALYSES

H	D	Analyte	Result	Mod	Unit	Flag	Lab
•		pH	11	J	pH	2	GE
		Specific conductance	320		µS/cm	1	GE
		Benzene	<1.0		µg/L	0	GE
		Bromodichloromethane	<1.0		µg/L	0	GE
		Bromoform	<1.0		µg/L	0	GE
		Bromomethane (Methyl bromide)	<1.0		µg/L	0	GE
		Carbon tetrachloride	<1.0		µg/L	0	GE
		Chloride	2,690		µg/L	0	GE
		Chlorobenzene	<1.0		µg/L	0	GE
		Chloroethane	<1.0		µg/L	0	GE
		Chloroethene (Vinyl chloride)	<1.0		µg/L	0	GE
		2-Chloroethyl vinyl ether	<1.0		µg/L	0	GE
		Chloroform	<1.0		µg/L	0	GE
		Chloromethane (Methyl chloride)	<1.0		µg/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

WELL AMB 13AR collected on 05/01/93, laboratory analyses (cont.)

H	D	Analyte	Result	Mod	Unit	Flag	Lab
		Cyanide	<5.0		µg/L	0	GE
		Cyanide	<5.0		µg/L	0	GE
		Dibromochloromethane	<1.0		µg/L	0	GE
		1,1-Dichloroethane	<1.0		µg/L	0	GE
		1,2-Dichloroethane	<1.0		µg/L	0	GE
		1,1-Dichloroethylene	<1.0		µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0		µg/L	0	GE
		Dichloromethane (Methylene chloride)	<1.0	JV	µg/L	0	GE
		1,2-Dichloropropane	<1.0		µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0		µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0		µg/L	0	GE
		Ethylbenzene	<1.0		µg/L	0	GE
		Fluoride	<100		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nickel	<4.0		µg/L	0	GE
		Nitrate-nitrite as nitrogen	1,040		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		Silver	<2.0		µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0		µg/L	0	GE
		Tetrachloroethylene	<1.0		µg/L	0	GE
		Toluene	<1.0		µg/L	0	GE
		Total dissolved solids	142,000	V	µg/L	0	GE
		Total organic carbon	1,260		µg/L	0	GE
		Total organic carbon	1,200		µg/L	0	GE
		Total organic halogens	<5.0		µg/L	0	GE
		Total organic halogens	<5.0		µg/L	0	GE
		1,1,1-Trichloroethane	<1.0		µg/L	0	GE
		1,1,2-Trichloroethane	<1.0		µg/L	0	GE
		Trichloroethylene	<1.0		µg/L	0	GE
		Trichlorofluoromethane	<1.0		µg/L	0	GE
		Radium, total alpha-emitting	<1.0E+00		pCi/L	0	GE

• = exceeded holding time. ■ = exceeded screening level or final primary drinking water standard.

Appendix E – Data Quality/Useability Assessment

Data Quality/Useability Assessment

Quality assurance/quality control (QA/QC) procedures relating to accuracy and precision of analyses performed on groundwater samples are followed in the field and laboratory and are reviewed prior to publication of results. The Environmental Protection Department/ Environmental Monitoring Section's (EPD/EMS) review of the volume of analytical data acquired each quarter and presented in various reports is an ongoing process; its review of the QA/QC data cannot be completed in time to meet the deadlines for the reports required by the Resource Conservation and Recovery Act and associated regulations. Other site and regulatory personnel can obtain further information on the data quality and useability in a variety of ways, including those described below.

Data Qualification

The contract laboratories continually assess their own accuracy and precision according to U.S. Environmental Protection Agency (EPA) guidelines. They submit sample- or batch-specific QA/QC information either at the same time as analytical results or in a quarterly summary. Properly defined and used result modifiers (also referred to as qualifiers) can be a key component in assessing data useability. Result modifiers designed by EPD/EMS and used by the primary laboratories are presented in Appendix D.

Assessment of Accuracy of the Data

Accuracy, or the nearness of the reported result to the true concentration of a constituent in a sample, can be assessed in several ways.

A laboratory's general accuracy can be judged by analysis of results obtained from known samples. The non-radionuclide contract laboratories analyze commercial reference samples every quarter at EPD/EMS' request. The results of these analyses are presented in the EPD/EMS quarterly report, *The Savannah River Site's Groundwater Monitoring Program.* The primary laboratories also seek or maintain state certification by participating periodically in performance studies; reference samples and analysis of results are provided by EPA. Results of these studies also are published in the EPD/EMS quarterly reports.

Analysis of blanks provides a tool for assessing the accuracy of both sampling and laboratory analysis. Results for all field blanks for the quarter can be found in the EPD/EMS quarterly reports. Any field or laboratory blanks that exceeded established minimums are identified in the same reports, in tables associating them with groundwater samples analyzed in the same batches.

Surrogates, organic compounds similar in chemical behavior to the compounds of interest but not normally found in environmental samples, are used to monitor the effect of the matrix on the accuracy of analyses for organic parameters. For example, for analyses of volatile organics by EPA Method 8240, three surrogate compounds are added to all samples

and blanks in each analytical batch. In analyses of semivolatile organics, three to four acid compounds and three to four base/neutral compounds are used. Other surrogates are used in pesticides analyses. Percent recoveries for surrogate analyses are calculated by laboratory personnel, reported to EPD/EMS, reviewed, and entered into the database, but they are not published. If recoveries are not within specified limits, the laboratory is expected to re-run the samples or attach result qualifiers to the data identifying the anomalous results.

Sample-specific accuracy for both organic and inorganic parameters can be assessed by examination of matrix spike/matrix spike duplicate results. A sample is analyzed unspiked to determine a baseline set of values. A second portion of sample is spiked with known concentrations of compounds appropriate to the analyses being performed, typically 5 volatile organic compounds for volatile organics analyses, 11 semivolatile compounds for semivolatiles, 6 pesticide compounds for pesticides, all metals for metals analyses, and a known quantity of cyanide for cyanide analysis. The percentage of the spike compound that is recovered (i.e., measured in excess of the value obtained for the unspiked sample) is a direct measure of analytical accuracy. EPA requires matrix spike/matrix spike duplicates to be run at least once per 20 samples of similar matrix.

Matrix spike/matrix spike duplicate results are reported to EPD/EMS but are not published. For organic compounds, according to EPA guidelines, no action is taken on the basis of matrix spike/matrix spike duplicate data alone (i.e., no result modifiers are assigned solely on the basis of matrix spike results); however, the results can indicate if a lab is having a systematic problem in the analysis of one or more analytes.

In the case of inorganic compounds, such as metals, the matrix spike sample analysis provides information about the effect of each sample matrix on the digestion and measurement methodology. Data qualifiers can be assigned on the basis of the percentage of spike recovery and are reported in the published results tables.

Assessment of Precision

Precision of the analyses, or agreement of a set of replicate results among themselves, is assessed through the use of duplicates (laboratory-initiated) and blind replicates (provided by EPD/EMS). The results of duplicate and replicate analyses are presented in the results tables of the first, second, and third quarter reports. Duplicate and replicate results are not presented in fourth quarter reports; the results tables present instead only the highest result for each analyte for each quarter of the year.

The laboratories assess precision by calculating the relative percent difference, or RPD, for each pair of laboratory-initiated duplicate results. During 1992, at least one of the contract laboratories used a data qualifier (J3) to modify metals analyses when the RPD for laboratory duplicates was greater than 20%.

Additional statistical comparisons of laboratory duplicate and blind replicate results, both intra- and interlaboratory, are presented in the EPD/EMS quarterly reports. The calculation used for these reports is the MRD, or mean relative difference, which is similar to EPA's RPD except that the MRD provides a single value for all of the analyses of a particular com-

pound, either inter- or intralaboratory, during one quarter. Because detection limits may vary among samples, the MRD requires calculation of a reference detection limit, which is the detection limit at the 90th percentile of the array of limits in the population of all replicate and duplicate analyses for a given analyte during a particular quarter. The MRD is not method-specific.

Method-Specific Accuracy and Precision

The contract laboratories' EPA-approved laboratory procedures include QA/QC requirements as an integral part of the methods. Thus, knowledge of the method used in obtaining data is an important component of determining data useability. EPA has conducted extensive research and development on the methods approved for the analysis of water and waste water; information on the accuracy and precision of the method is available from EPA publications, as is full information on required QA/QC procedures. A listing of the methods used by the primary laboratories during first quarter 1992 is given below along with the source for the method description. Many, if not all, of these sources include presentations of representative accuracy and precision results.

Method	Used to Analyze	Source
EPA120.1	Specific conductance	EPA EMSL 1983
EPA150.1	pH	EPA EMSL 1983
EPA160.1	Filterable residue (total dissolved solids)	EPA EMSL 1983
EPA160.2	Nonfilterable residue	EPA EMSL 1983
EPA180.1	Turbidity	EPA EMSL 1983
EPA200.7	Trace elements	EPA EMSL 1983
EPA206.2	Arsenic	EPA EMSL 1983
EPA208.2	Barium	EPA EMSL 1983
EPA239.2	Lead	EPA EMSL 1983
EPA245.1	Mercury	EPA EMSL 1983
EPA270.2	Selenium	EPA EMSL 1983
EPA279.2	Thallium	EPA EMSL 1983
EPA300.0	Inorganics, non-metallics	EPA EMSL 1991
EPA310.1	Alkalinity	EPA EMSL 1983
EPA325.2	Chloride	EPA EMSL 1983
EPA335.3	Cyanide	EPA EMSL 1983
EPA340.2	Fluoride	EPA EMSL 1983
EPA353.1	Nitrogen, nitrate-nitrite	EPA EMSL 1983
EPA353.2	Nitrogen, nitrate, nitrite, or combined	EPA EMSL 1983
EPA353.3	Nitrogen, nitrate-nitrite, or nitrite only	EPA EMSL 1983
EPA354.1	Nitrogen, nitrite	EPA EMSL 1983
EPA365.1	Phosphorus, all forms (reported as total phosphates)	EPA EMSL 1983
EPA365.2	Phosphorus, all forms (reported as total phosphates)	EPA EMSL 1983
EPA375.4	Sulfate, turbidimetric	EPA EMSL 1983
EPA376.2	Sulfide	EPA EMSL 1983
APHA403	Alkalinity	APHA 1985
EPA413.1	Oil & grease	EPA EMSL 1983
APHA415A	Iodine	APHA 1985
EPA415.1	Total organic carbon	EPA EMSL 1983
EPA418.1	Petroleum hydrocarbons	EPA EMSL 1983
EPA420.1	Phenolics	EPA EMSL 1983
EPA420.2	Phenolics	EPA EMSL 1983
APHA7[illegible]5	Total alpha-emitting radium	APHA 1985

Method	Used to Analyze	Source
ASTMD3869C	Iodide	ASTM 1992
APHA5320	Dissolved organic halogen	APHA 1989
EPA6010	Metals	EPA 1986
EPA7041	Antimony	EPA 1986
EPA7060	Arsenic	EPA 1986
EPA7421	Lead	EPA 1986
EPA7470	Mercury	EPA 1986
EPA7740	Selenium	EPA 1986
EPA7841	Thallium	EPA 1986
EPA8010	Halogenated volatile organics	EPA 1986
EPA8020	Aromatic volatile organics	EPA 1986
EPA8080	Organochlorine pesticides and PCBs	EPA 1986
EPA8140	Organophosphorus pesticides	EPA 1986
EPA8150	Chlorinated herbicides	EPA 1986
EPA8240	GCMS VOA	EPA 1986
EPA8270	GCMS semivolatiles	EPA 1986
EPA8280	Dioxins and furans	EPA 1986
EPA9012	Total cyanide	EPA 1986
EPA9020	Total organic halides	EPA 1986
EPA9030	Sulfides	EPA 1986

An example of the available method-specific QA/QC information is that for the analysis of metals by EPA Method 6010/200.7 (EPA, 1986/EPA EMSL, 1983). The primary laboratories, General Engineering Laboratories (GE) and Roy F. Weston, Inc. (Weston), use this inductively coupled plasma (ICP) atomic emission spectrometric method.

The following precision and accuracy data are based on the experience of seven laboratories that applied the ICP technique to acid-distilled water matrices that had been dosed with various metal concentrates. (Note: not all seven laboratories analyzed all 14 elements.) The references give results for samples having three concentration ranges; the results here are for samples having the lowest values, similar to actual groundwater results for SRS.

ICP Precision and Accuracy Data

Element	True value (µg/L)	Mean reported value (µg/L)	Mean percent RSD[a]
Aluminum	60	62	33
Arsenic	22	19	23
Beryllium	20	20	9.8
Cadmium	2.5	2.9	16
Chromium	10	10	18
Cobalt	20	20	4.1
Copper	11	11	40
Iron	20	19	15
Lead	24	30	32
Manganese	15	15	6.7
Nickel	30	28	11
Selenium	6	8.5	42

Element	True value (µg/L)	Mean reported value (µg/L)	Mean percent RSD[a]
Vanadium	70	69	2.9
Zinc	16	19	45

Note: In EPA (1986), the column heading is Mean Standard Deviation (%).

[a] Relative standard deviation.

As another example, EPA Method 601/8010 (EPA, 1991/EPA, 1986) is used by both GE and Weston for analyses of halogenated volatile organics. In the presentation of the method in both references, the following table gives method-specific accuracy and precision as functions of concentration. Contract laboratories are expected to achieve or at least approach these limits.

Accuracy and Precision as Functions of Concentration for EPA Method 601/8010

Parameter	Accuracy as recovery, X'[a] (µg/L)	Single analyst precision (µg/L)[b]	Overall precision (µg/L)[c]
Bromodichloromethane	$1.12C-1.02$[d]	$0.11\bar{X}+0.04$[e]	$0.20\bar{X}+1.00$
Bromoform	$0.96C-2.05$	$0.12\bar{X}+0.58$	$0.21\bar{X}+2.41$
Bromomethane	$0.76C-1.27$	$0.28\bar{X}+0.27$	$0.36\bar{X}+0.94$
Carbon tetrachloride	$0.98C-1.04$	$0.15\bar{X}+0.38$	$0.20\bar{X}+0.39$
Chlorobenzene	$1.00C-1.23$	$0.15\bar{X}-0.02$	$0.18\bar{X}+1.21$
Chloroethane	$0.99C-1.53$	$0.14\bar{X}-0.13$	$0.17\bar{X}+0.63$
2-Chloroethyl vinyl ether[f]	$1.00C$	$0.20\bar{X}$	$0.35\bar{X}$
Chloroform	$0.93C-0.39$	$0.13\bar{X}+0.15$	$0.19\bar{X}-0.02$
Chloromethane	$0.77C+0.18$	$0.28\bar{X}-0.31$	$0.52\bar{X}+1.31$
Dibromochloromethane	$0.94C+2.72$	$0.11\bar{X}+1.10$	$0.24\bar{X}+1.68$
1,2-Dichlorobenzene	$0.93C+1.70$	$0.20\bar{X}+0.97$	$0.13\bar{X}+6.13$
1,3-Dichlorobenzene	$0.95C+0.43$	$0.14\bar{X}+2.33$	$0.26\bar{X}+2.34$
1,4-Dichlorobenzene	$0.93C-0.09$	$0.15\bar{X}+0.29$	$0.20\bar{X}+0.41$
1,1-Dichloroethane	$0.95C-1.08$	$0.09\bar{X}+0.17$	$0.14\bar{X}+0.94$
1,2-Dichloroethane	$1.04C-1.06$	$0.11\bar{X}+0.70$	$0.15\bar{X}+0.94$
1,1-Dichloroethene	$0.98C-0.87$	$0.21\bar{X}-0.23$	$0.29\bar{X}-0.40$
trans-1,2-Dichloroethene	$0.97C-0.16$	$0.11\bar{X}+1.46$	$0.17\bar{X}+1.46$
1,2-Dichloropropane[f]	$1.00C$	$0.13\bar{X}$	$0.23\bar{X}$
cis-1,3-Dichloropropene[f]	$1.00C$	$0.18\bar{X}$	$0.32\bar{X}$
trans-1,3-Dichloropropene[f]	1.00C	$0.18\bar{X}$	$0.32\bar{X}$
Methylene chloride	$0.91C-0.93$	$0.11\bar{X}+0.33$	$0.21\bar{X}+1.43$
1,1,2,2-Tetrachlorethane	$0.95C+0.19$	$0.14\bar{X}+2.41$	$0.23\bar{X}+2.79$
Tetrachloroethylene	$0.94C+0.06$	$0.14\bar{X}+0.38$	$0.18\bar{X}+2.21$
1,1,1-Trichloroethane	$0.90C-0.16$	$0.15\bar{X}+0.04$	$0.20\bar{X}+0.37$
1,1,2-Trichloroethane	$0.86C+0.30$	$0.13\bar{X}-0.14$	$0.19\bar{X}+0.67$
Trichloroethylene	$0.87C+0.48$	$0.13\bar{X}-0.03$	$0.23\bar{X}+0.30$
Trichlorofluoromethane	$0.89C-0.07$	$0.15\bar{X}+0.67$	$0.26\bar{X}+0.91$
Vinyl chloride	$0.97C-0.36$	$0.13\bar{X}+0.65$	$0.27\bar{X}+0.40$

[a] X' = expected recovery for one or more measurements of a sample containing a concentration of C, in µg/L.
[b] Expected single analyst standard deviation of measurements.

[c] Expected interlaboratory standard deviation of measurements.
[d] C = true value for the concentration, in µg/L.
[e] $\bar{X}$ = average recovery found for measurements of samples containing a concentration of C, in µg/L.
[f] Estimates based on performance in a single laboratory.

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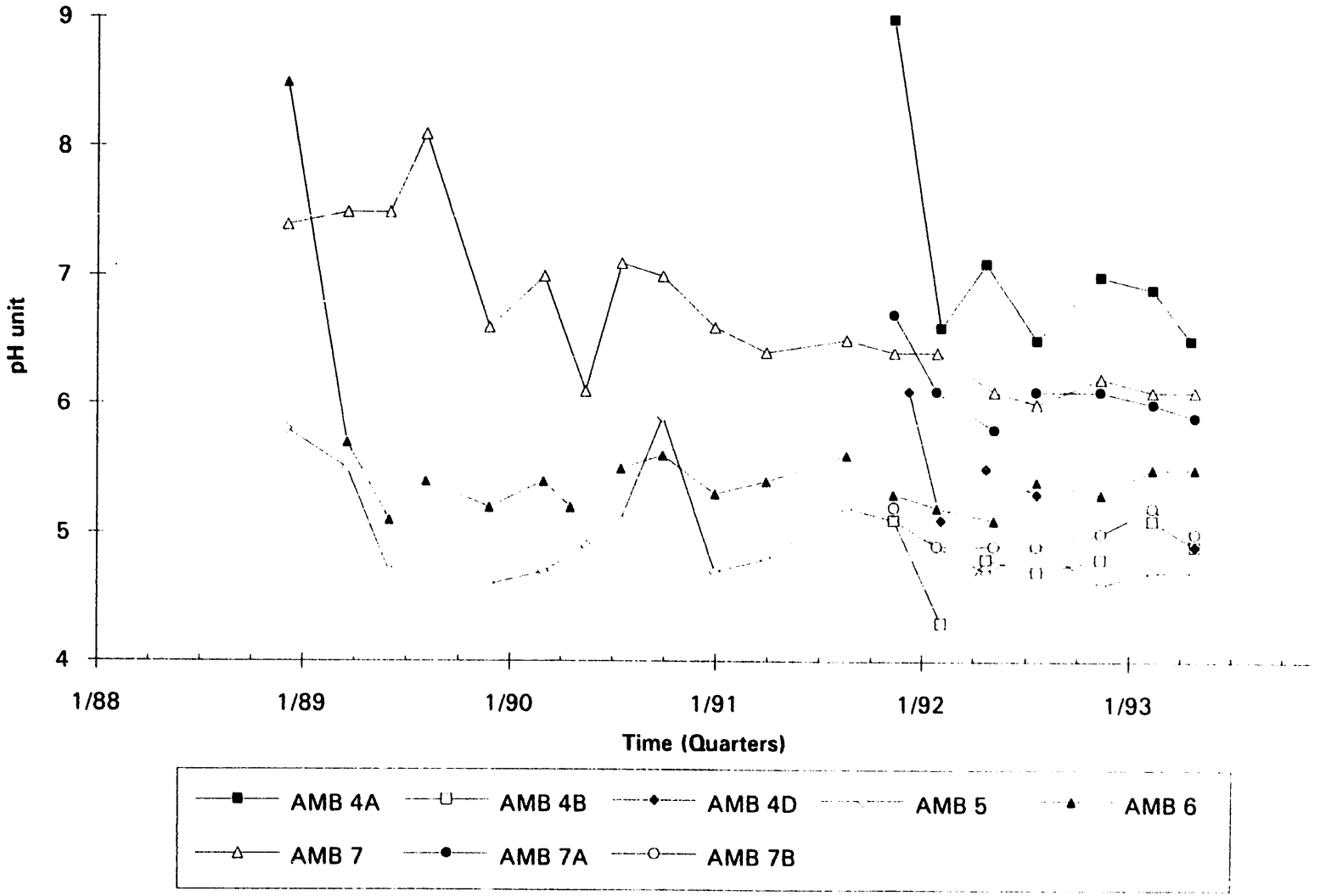
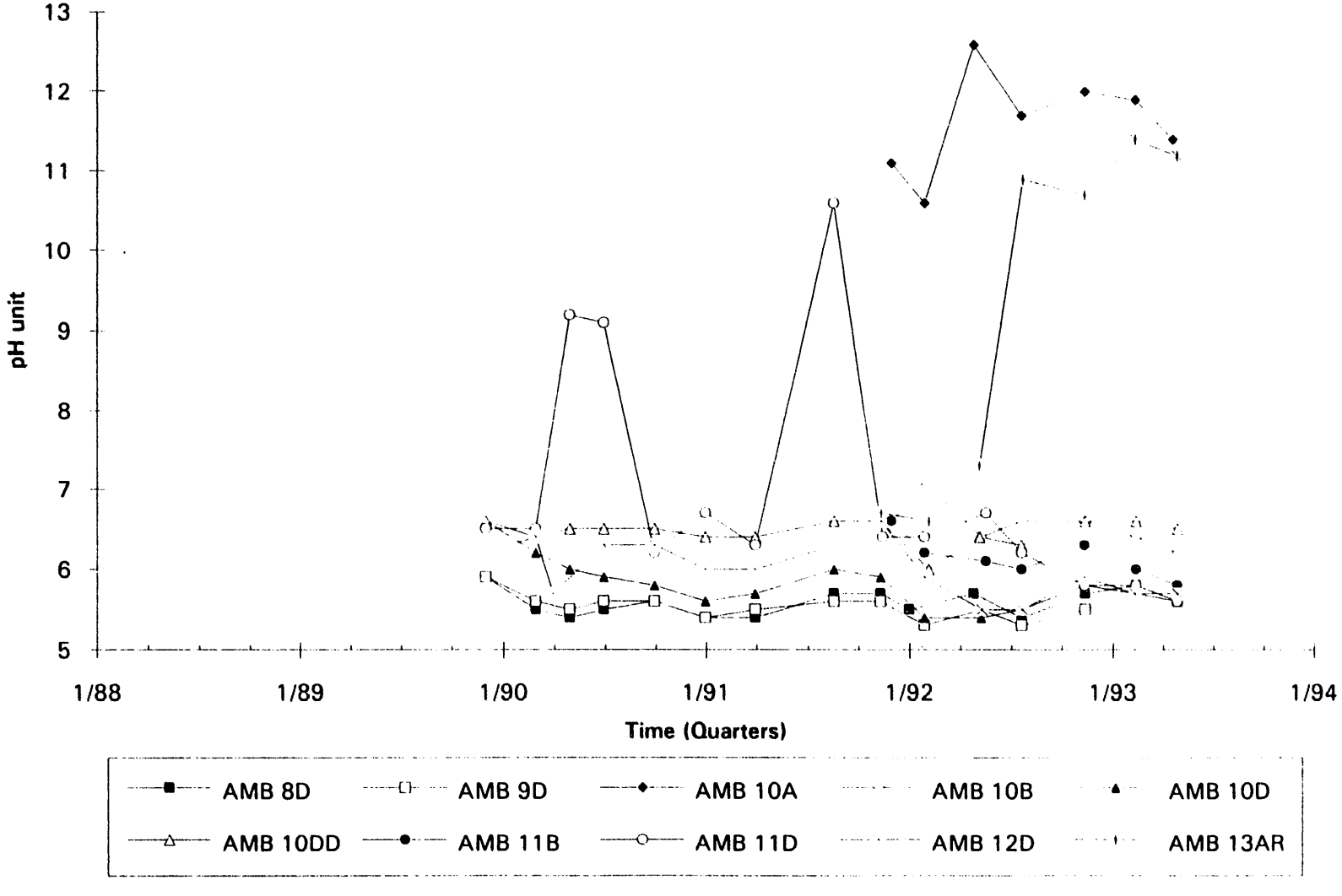
EPA EMSL (U.S. Environmental Protection Agency, Environmental Monitoring and Systems Laboratory), 1991. **Test Method, The Determination of Inorganic Anions in Water by Ion Chromatography–Method 300.0**. Revised August 1991. Cincinnati, OH.

Appendix F – Time Series Plots

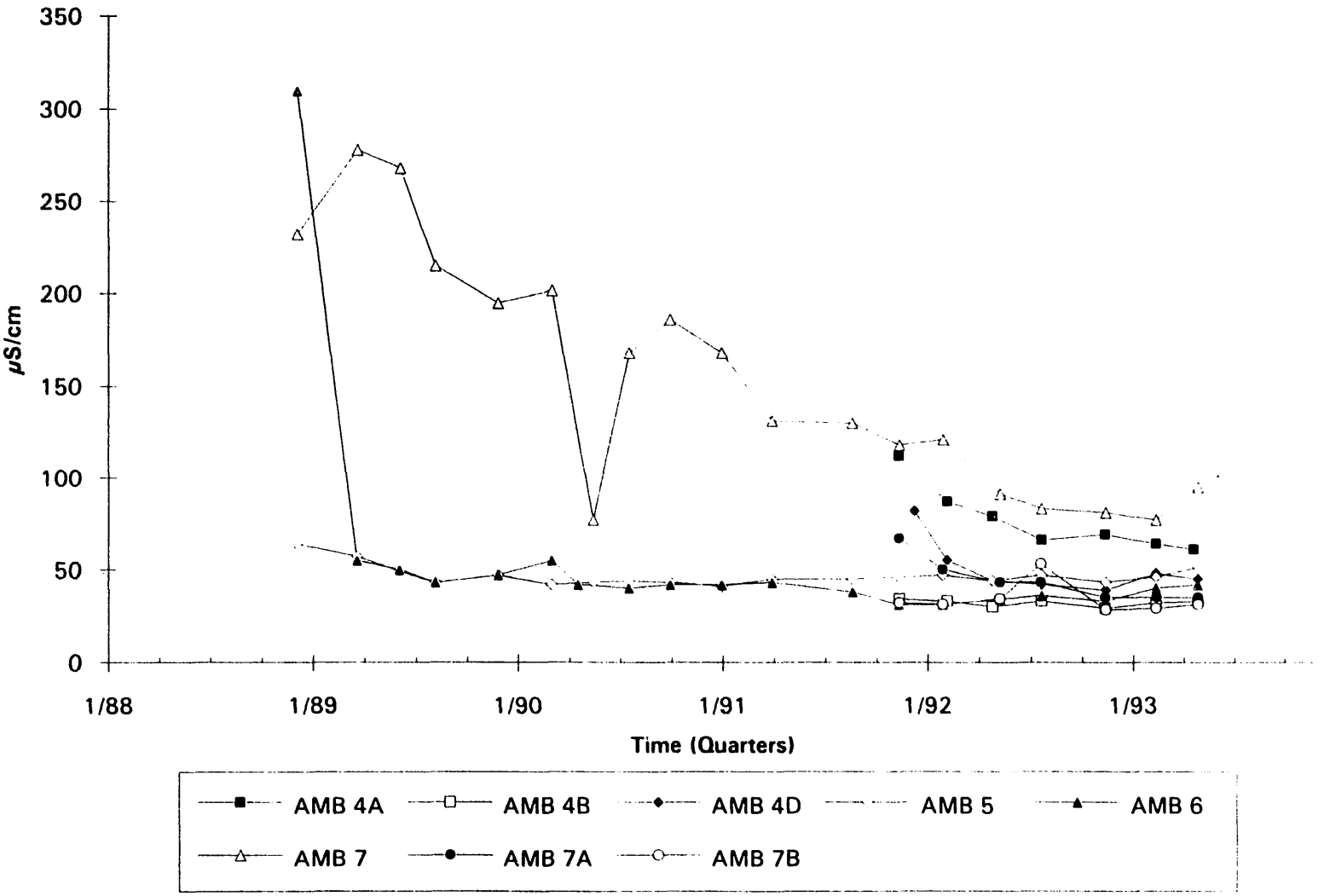
Time Series Plot of Field pH for Wells AMB 4A Through AMB 7B



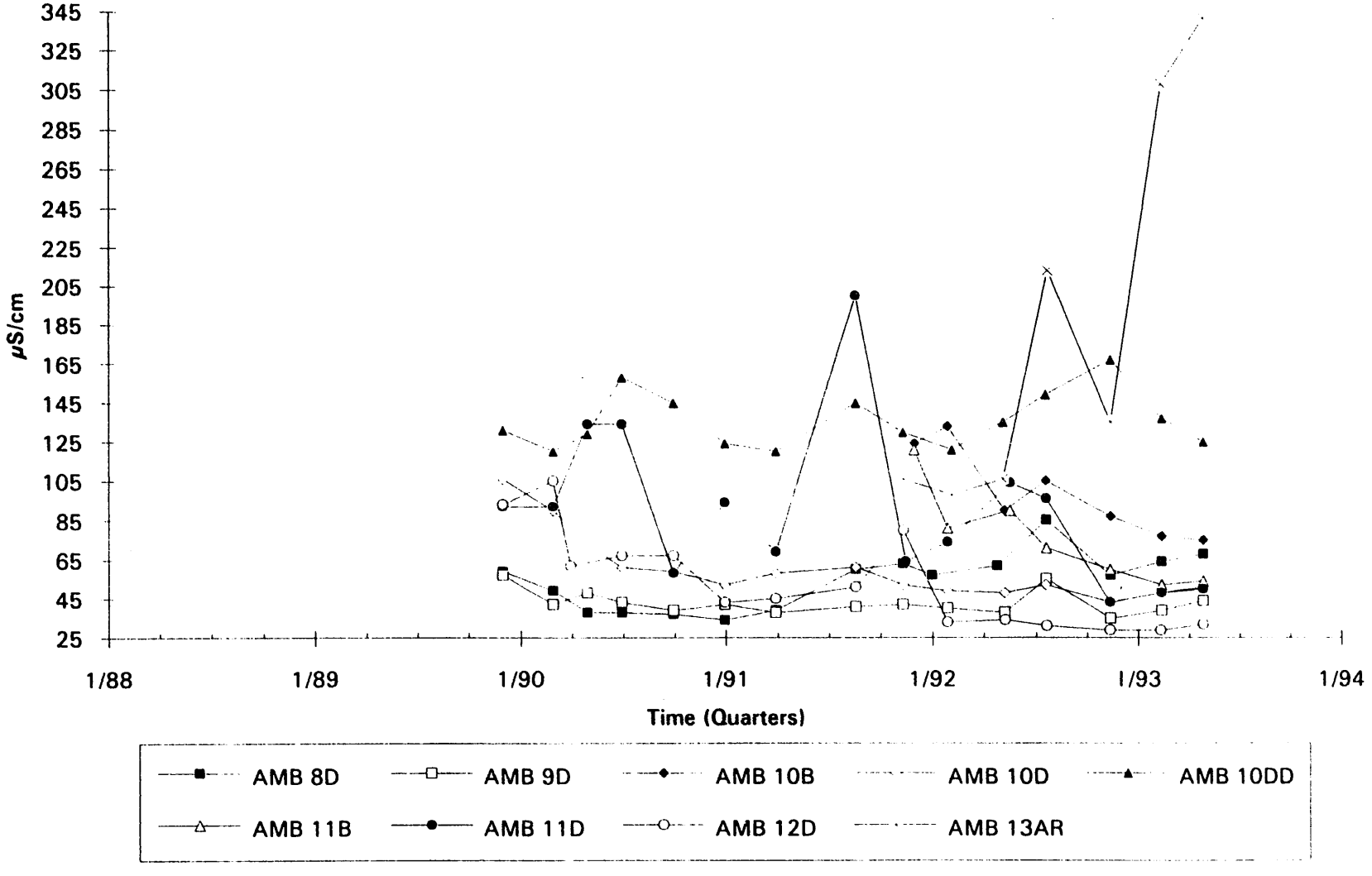
Time Series Plot of Field pH for Wells AMB 8D Through AMB 13AR



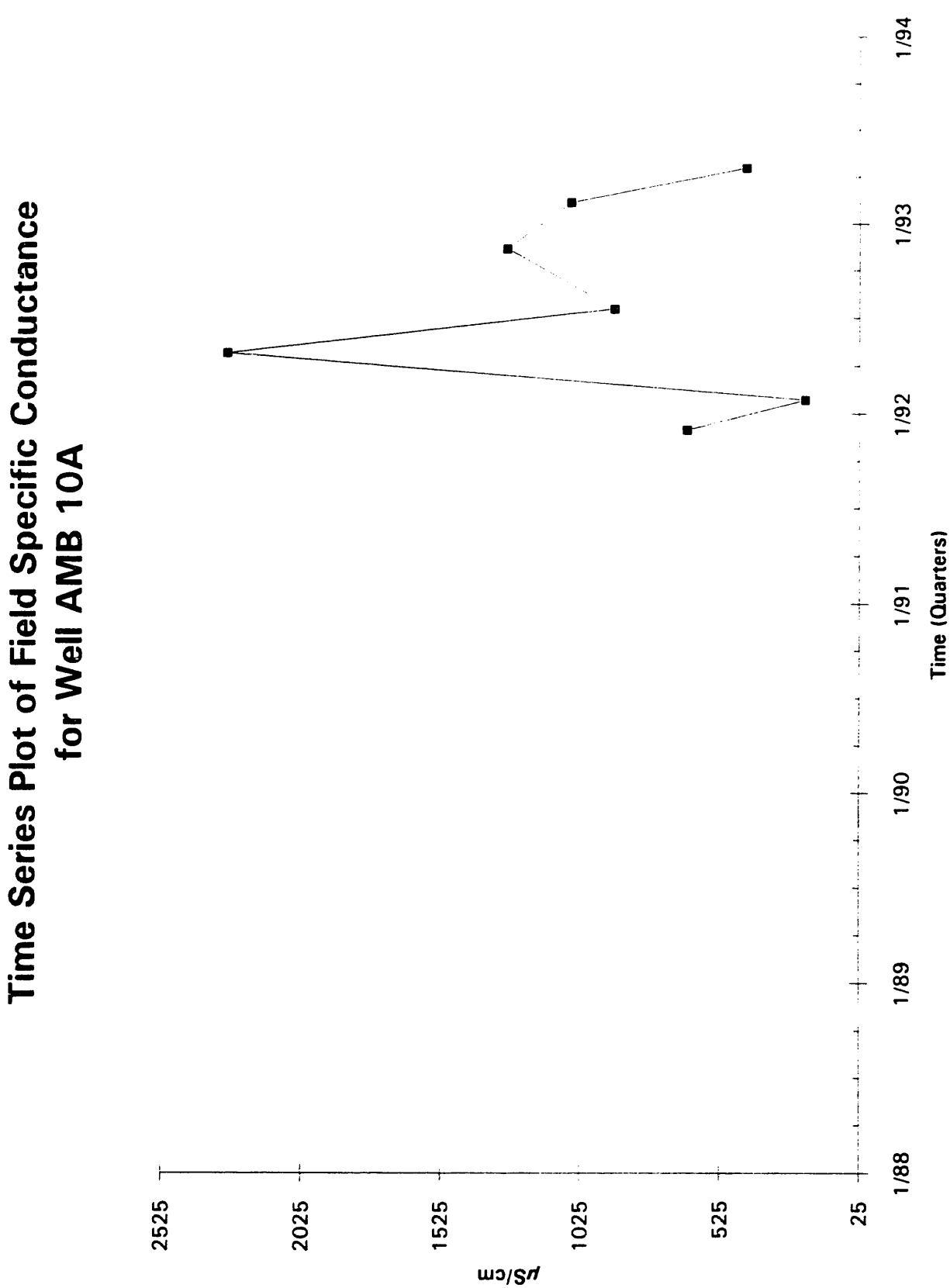
Time Series Plot of Field Specific Conductance for Wells AMB 4A Through AMB 7B

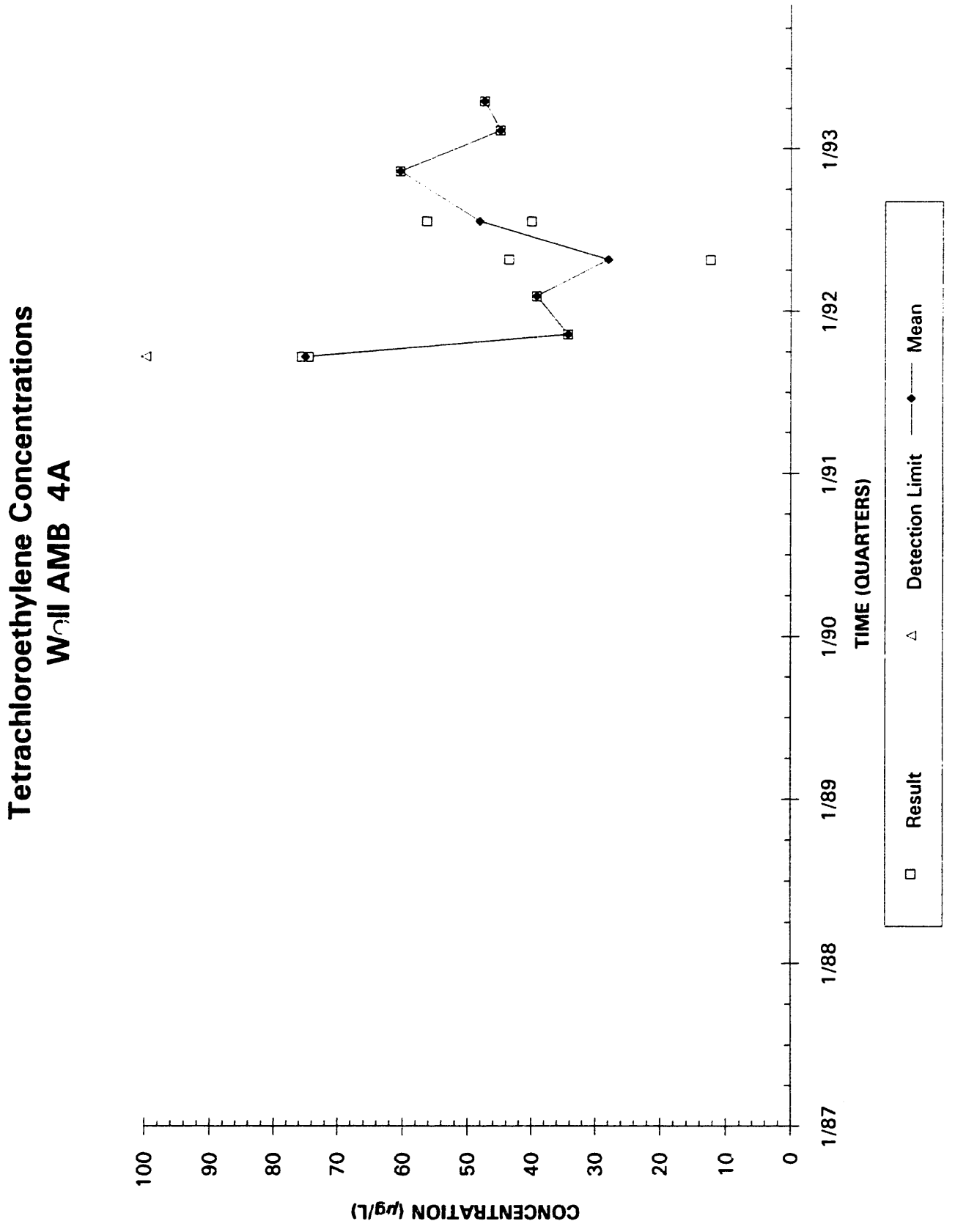


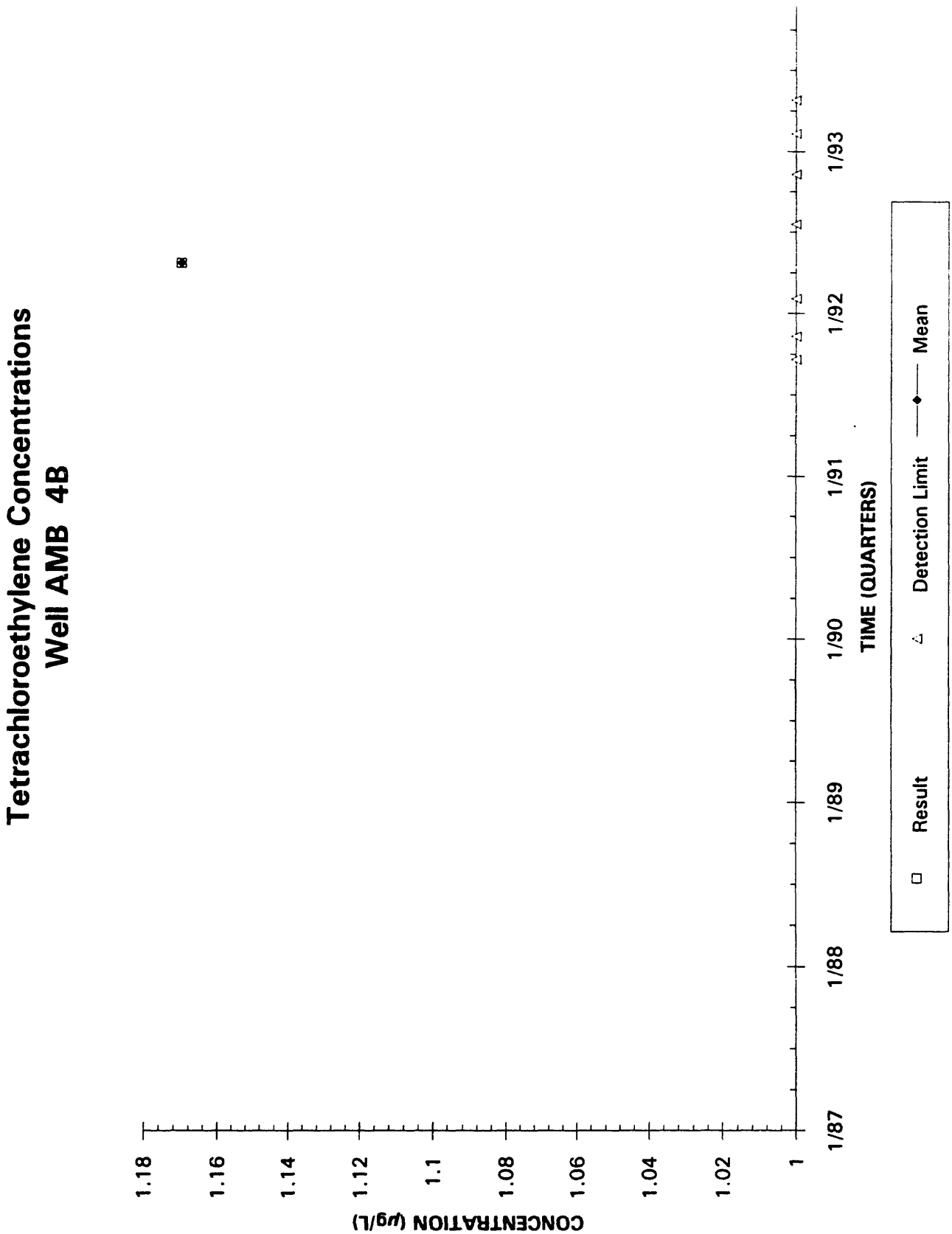
Time Series Plot of Field Specific Conductance for Wells AMB 8D Through AMB 13AR

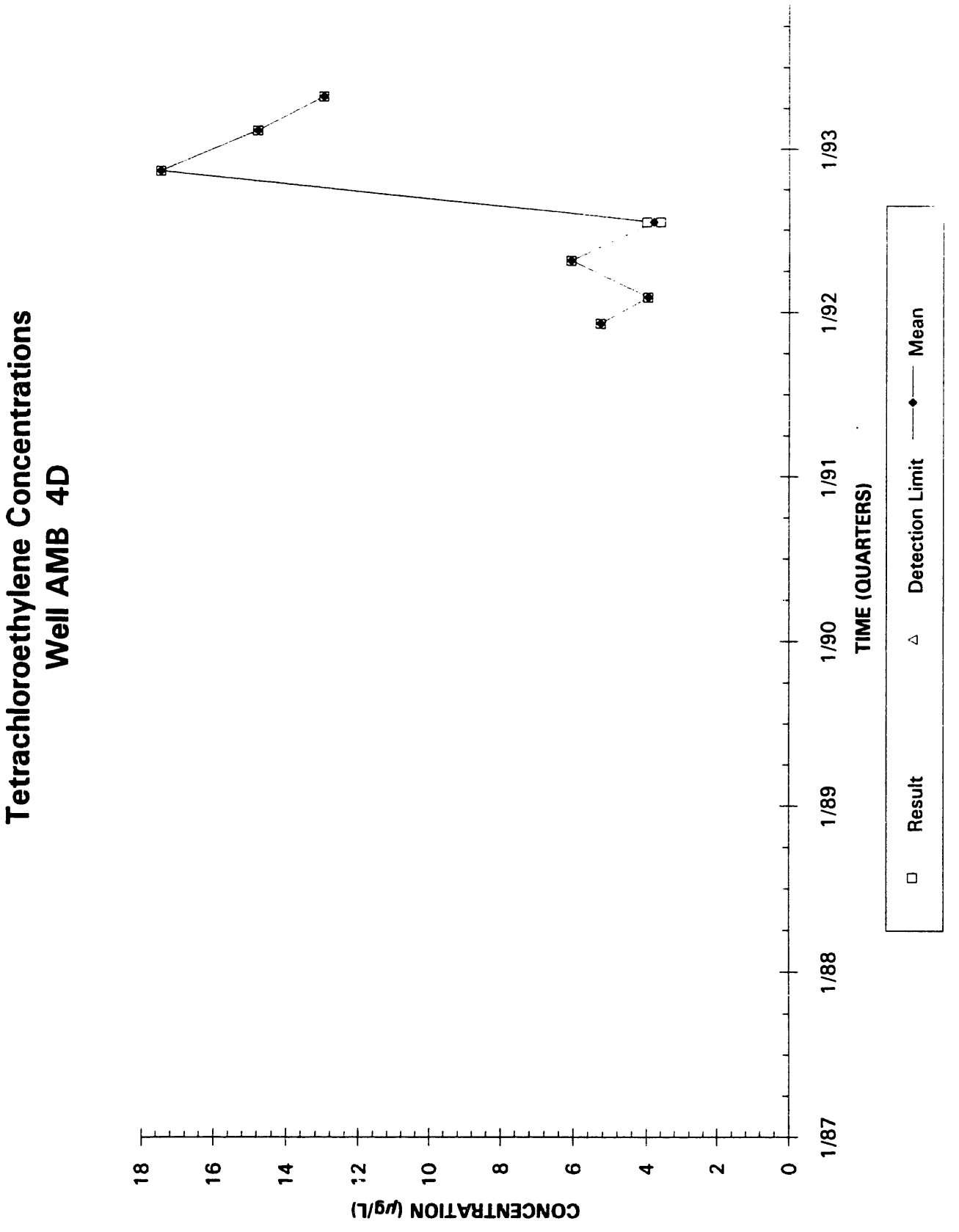


AMB 10A is plotted separately because its values distort the scale of this chart.

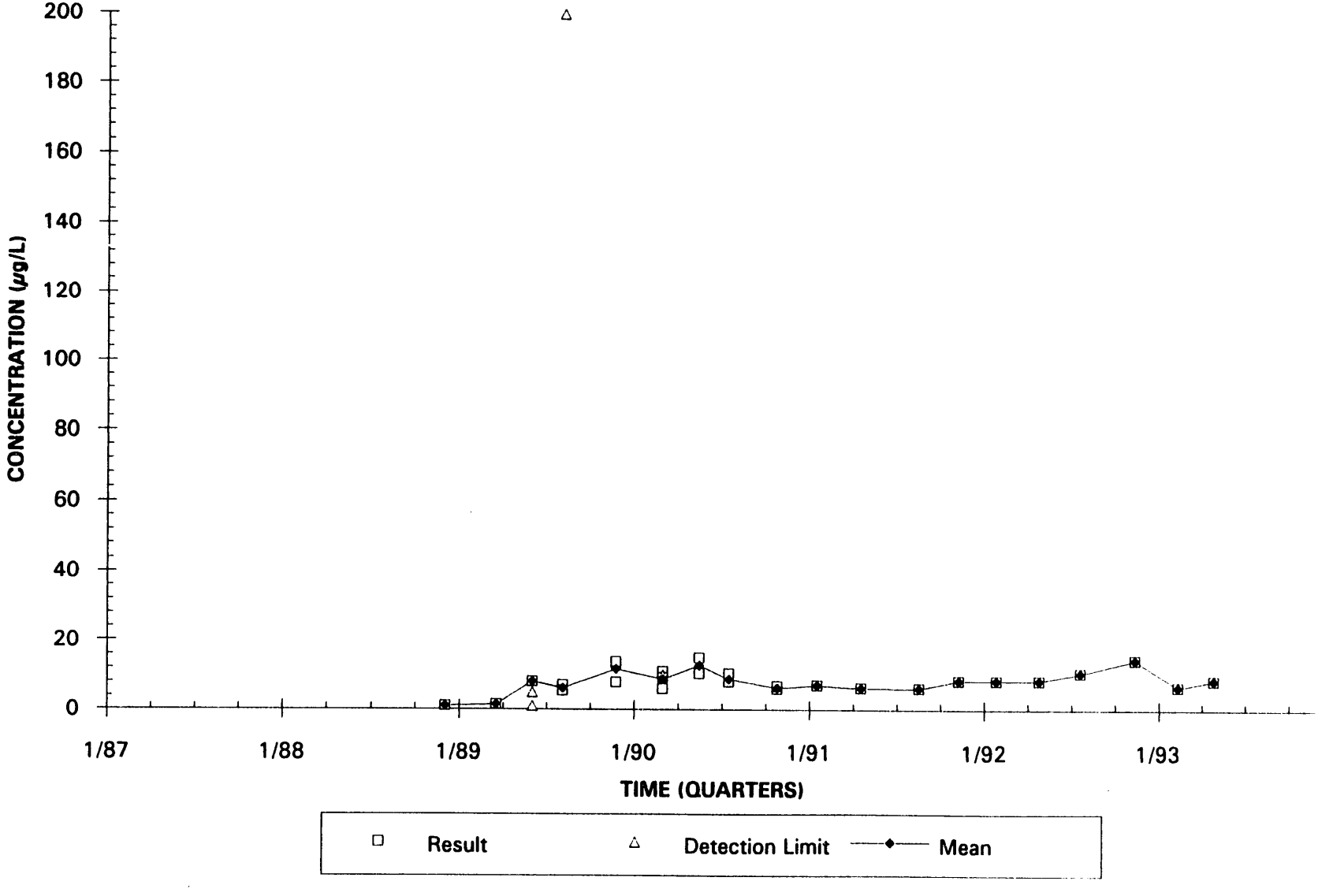

Time Series Plot of Field Specific Conductance for Well AMB 10A
2525
2025
1525
1025
525
25
µS/cm
1/88
1/89
1/90
1/91
1/92
1/93
1/94
Time (Quarters)

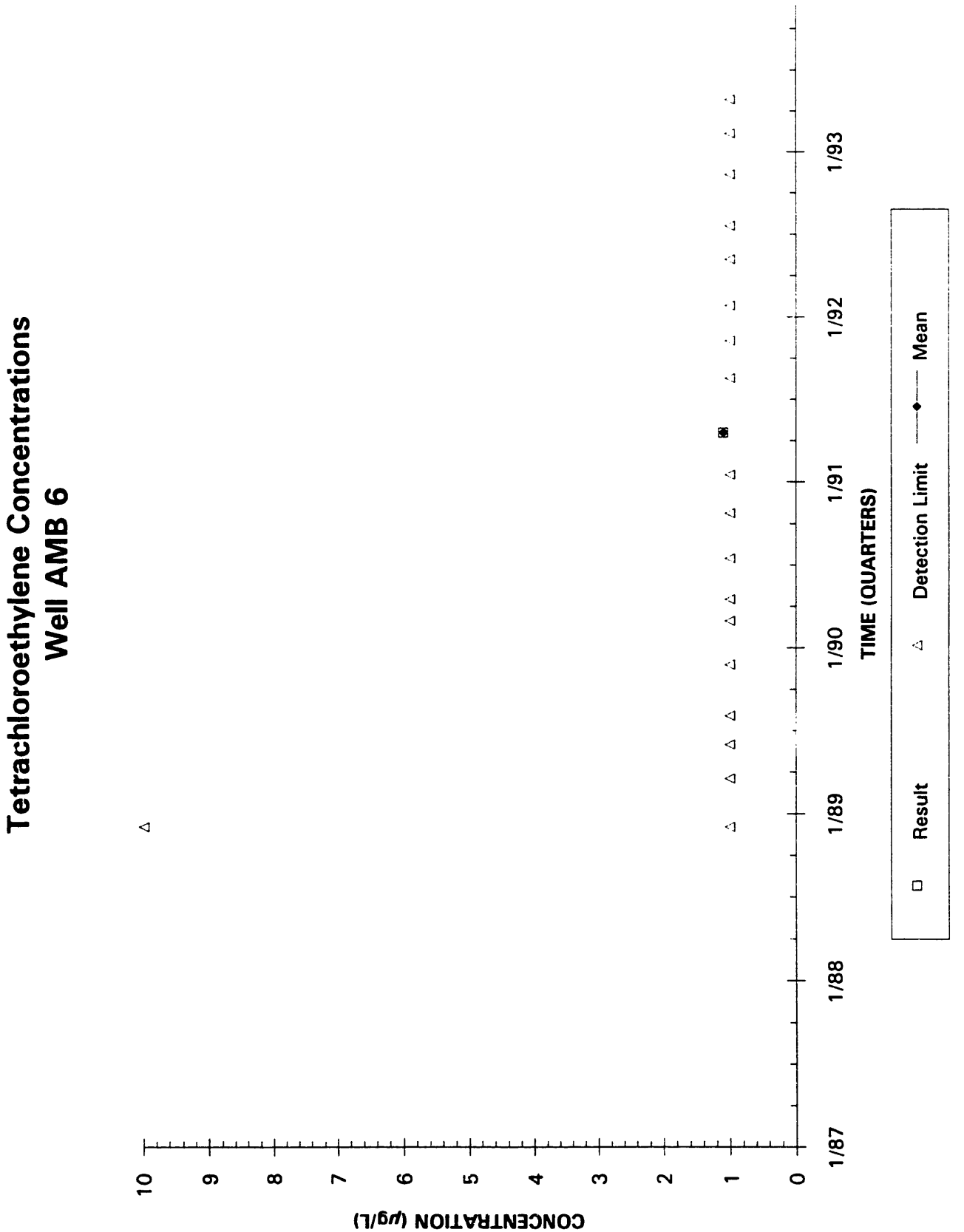

Tetrachloroethylene Concentrations
Well AMB 4A
CONCENTRATION (µg/L)
100
90
80
70
60
50
40
30
20
10
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean


Tetrachloroethylene Concentrations
Well AMB 4B
CONCENTRATION (µg/L)
1.18
1.16
1.14
1.12
1.1
1.08
1.06
1.04
1.02
1
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

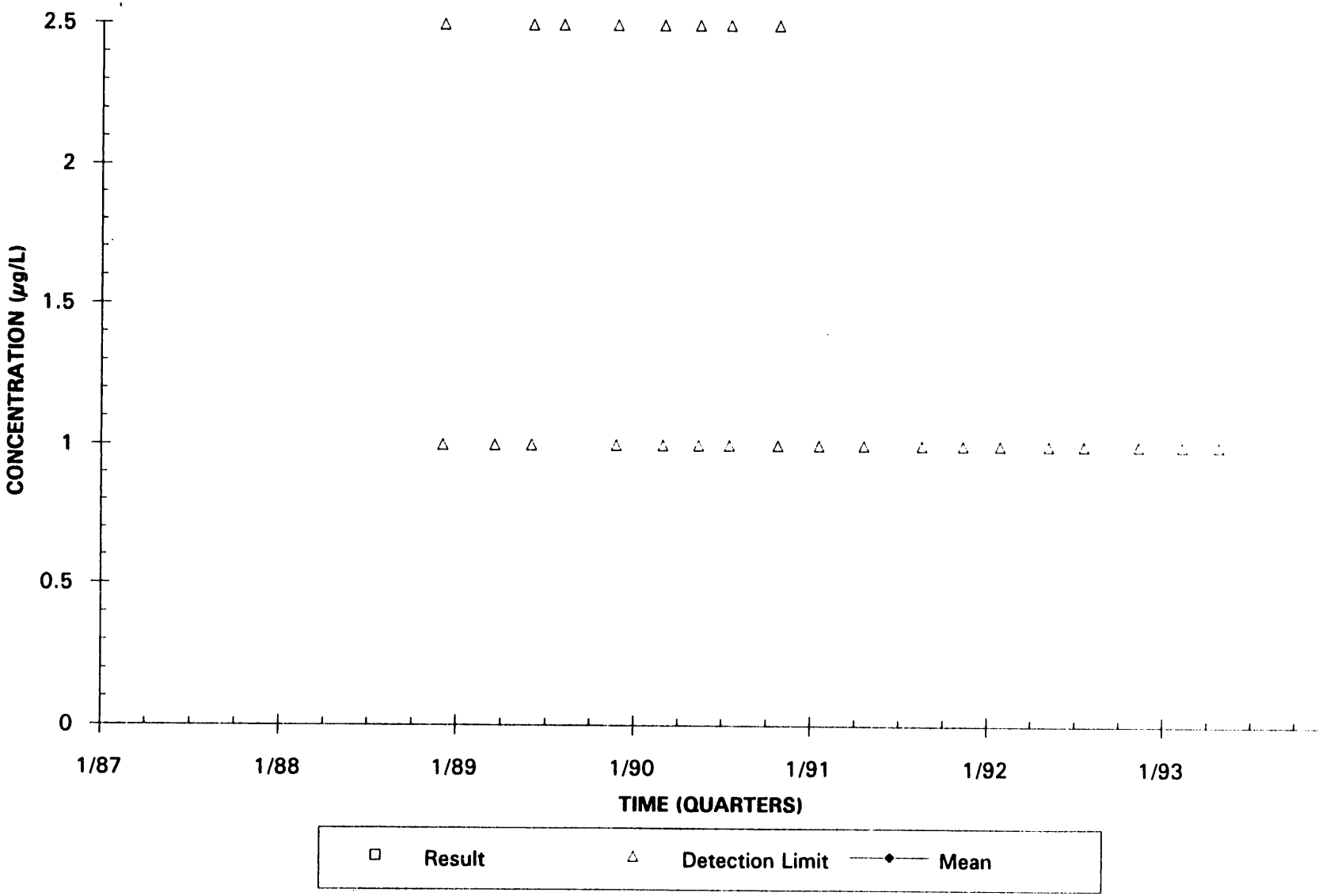

Tetrachloroethylene Concentrations
Well AMB 4D
CONCENTRATION (µg/L)
0
2
4
6
8
10
12
14
16
18
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

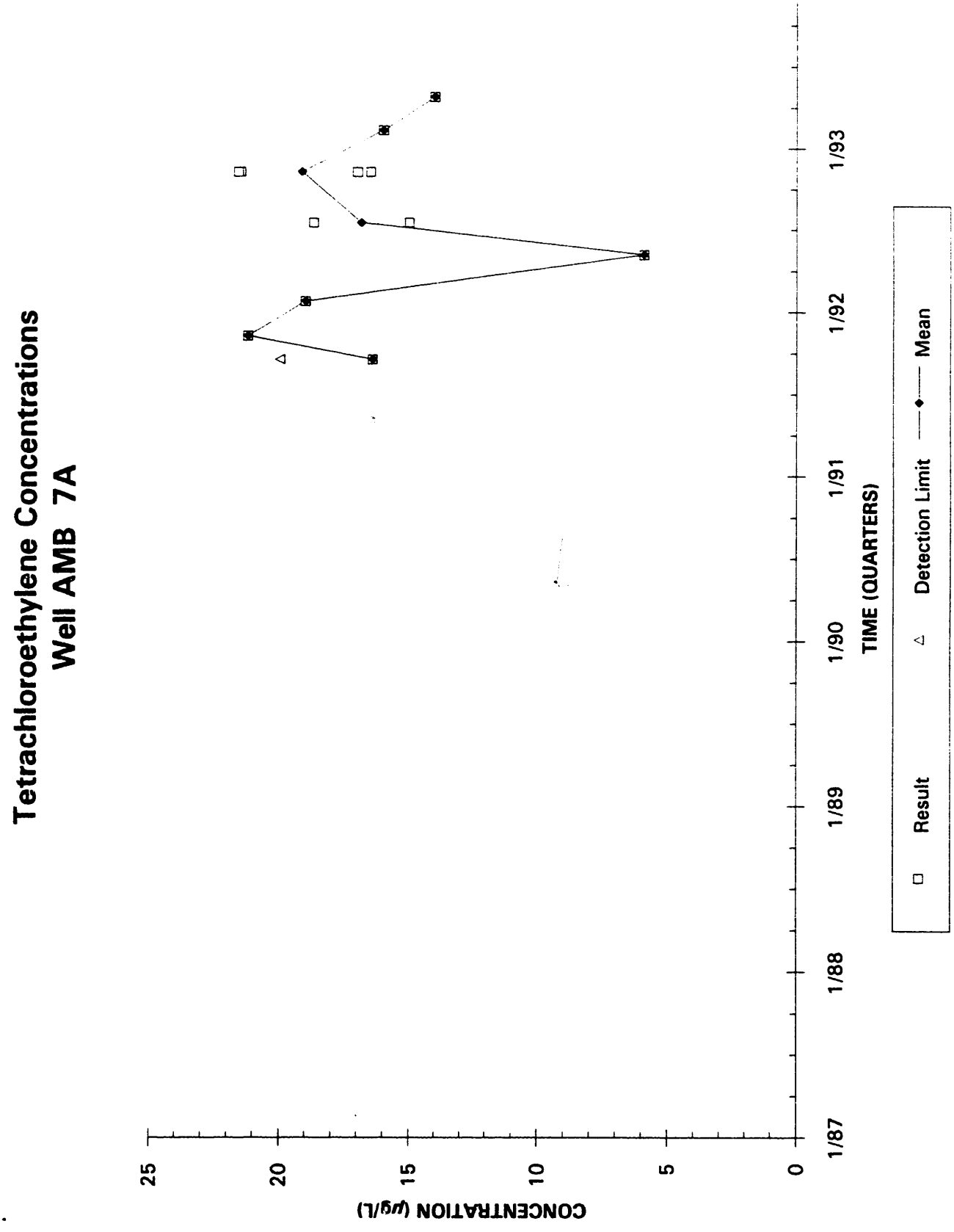
Tetrachloroethylene Concentrations
Well AMB 5

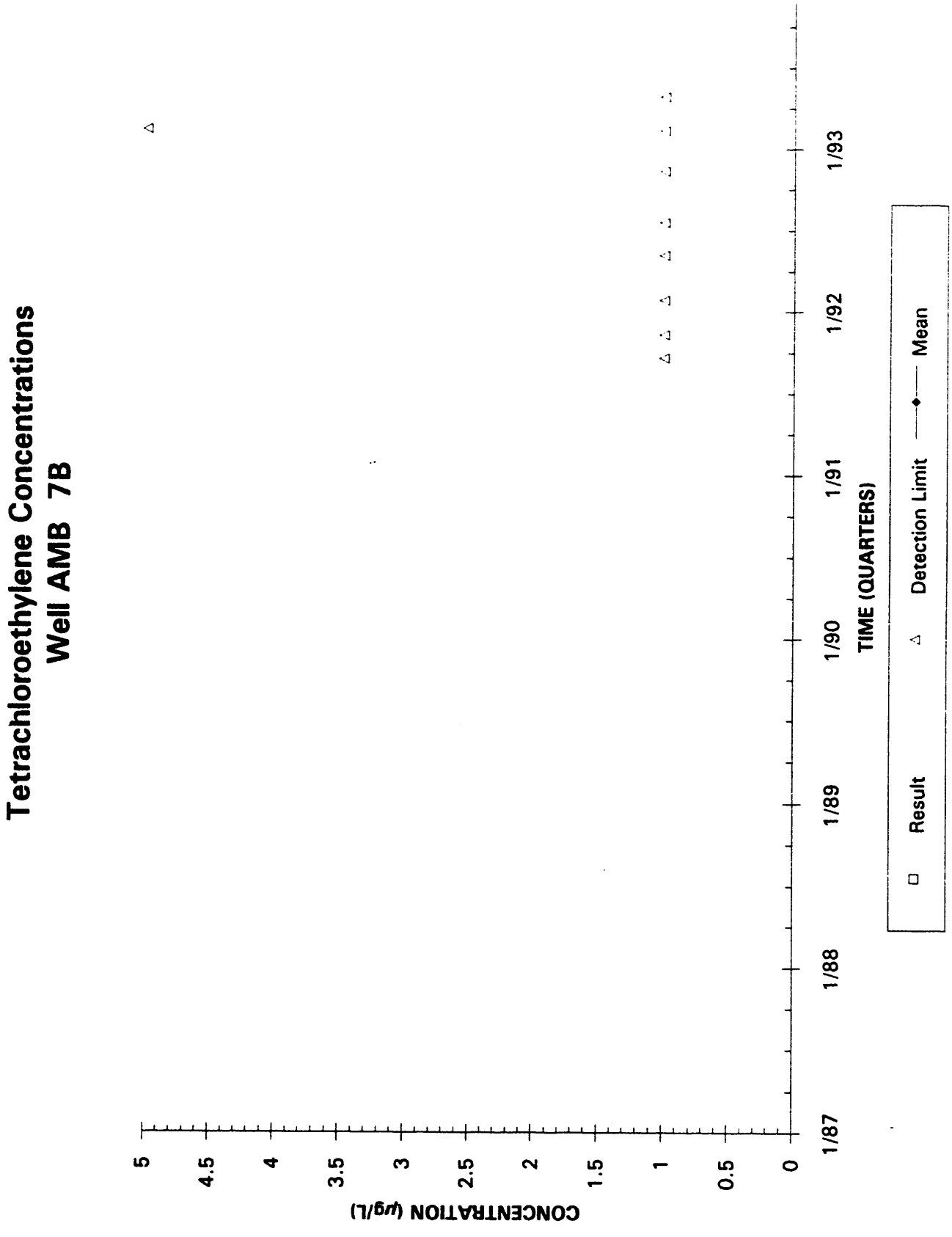



Tetrachloroethylene Concentrations
Well AMB 6
CONCENTRATION (µg/L)
0
1
2
3
4
5
6
7
8
9
10
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

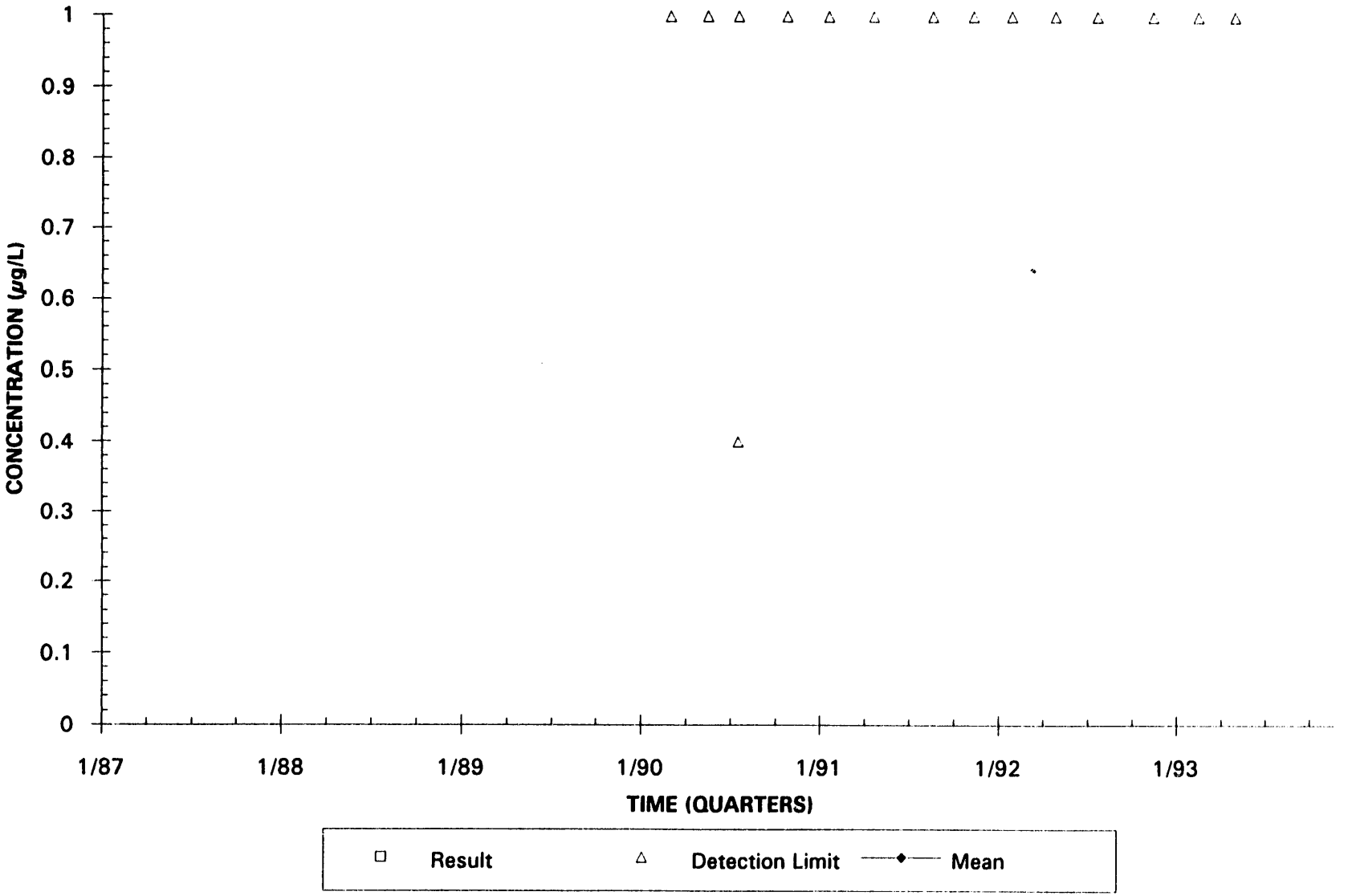
Tetrachloroethylene Concentrations
Well AMB 7




Tetrachloroethylene Concentrations
Well AMB 7A
CONCENTRATION (µg/L)
0
5
10
15
20
25
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

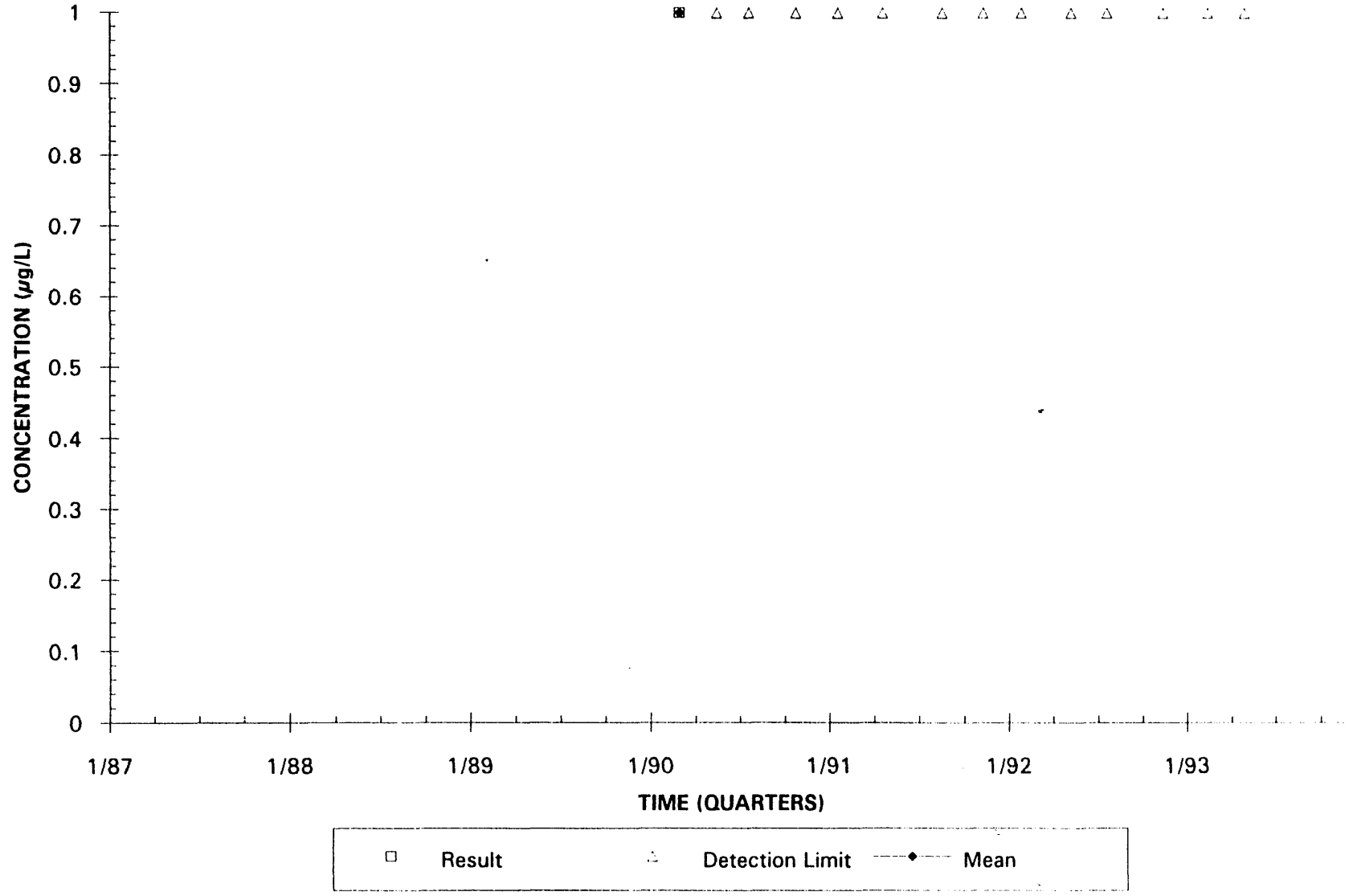

Tetrachloroethylene Concentrations
Well AMB 7B
CONCENTRATION (µg/L)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

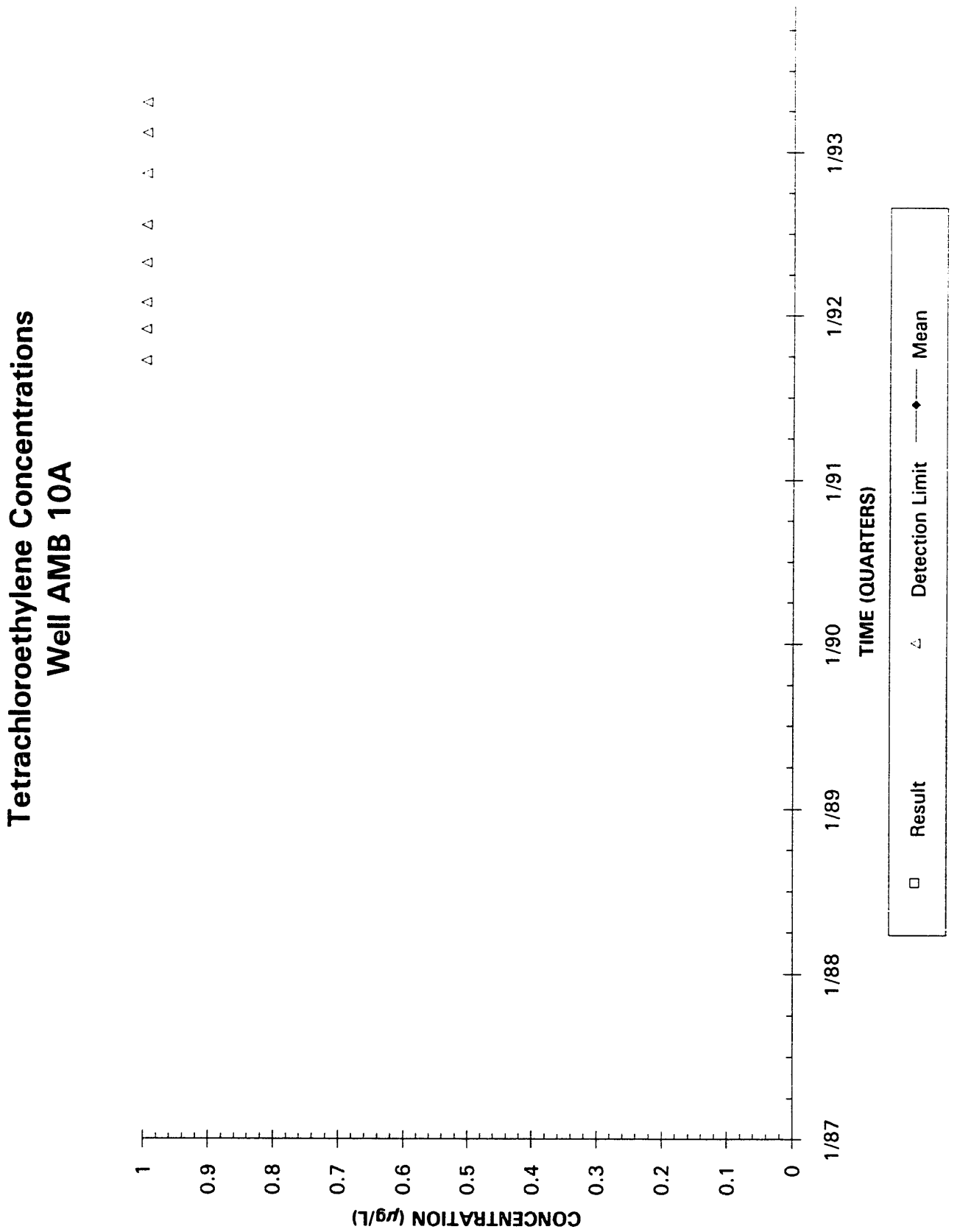
Tetrachloroethylene Concentrations
Well AMB 8D



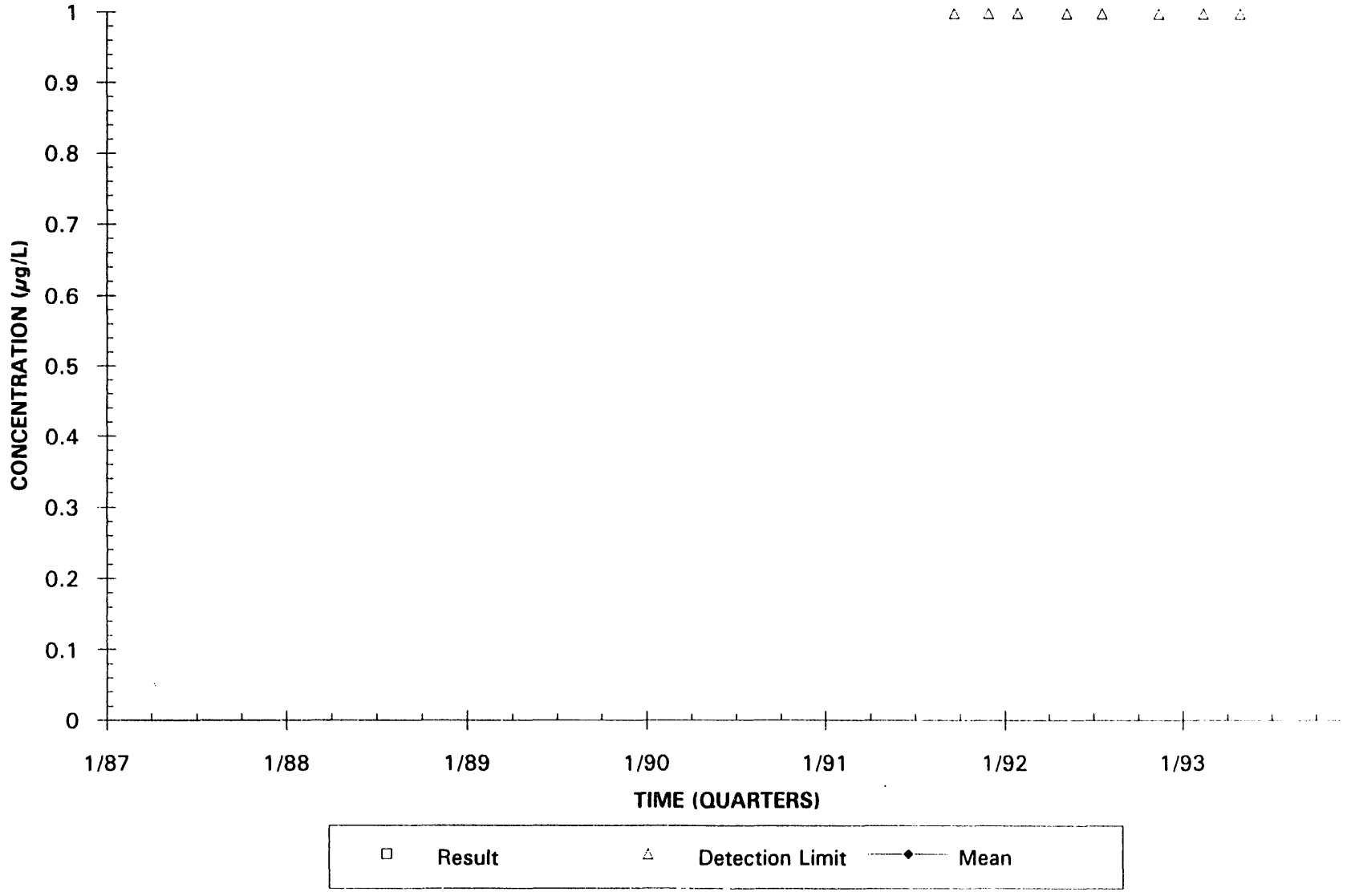

OF
1.0
2.8
2.5
2.2
1.1
2.0
1.8
1.25
1.4
1.6

Tetrachloroethylene Concentrations
Well AMB 9D

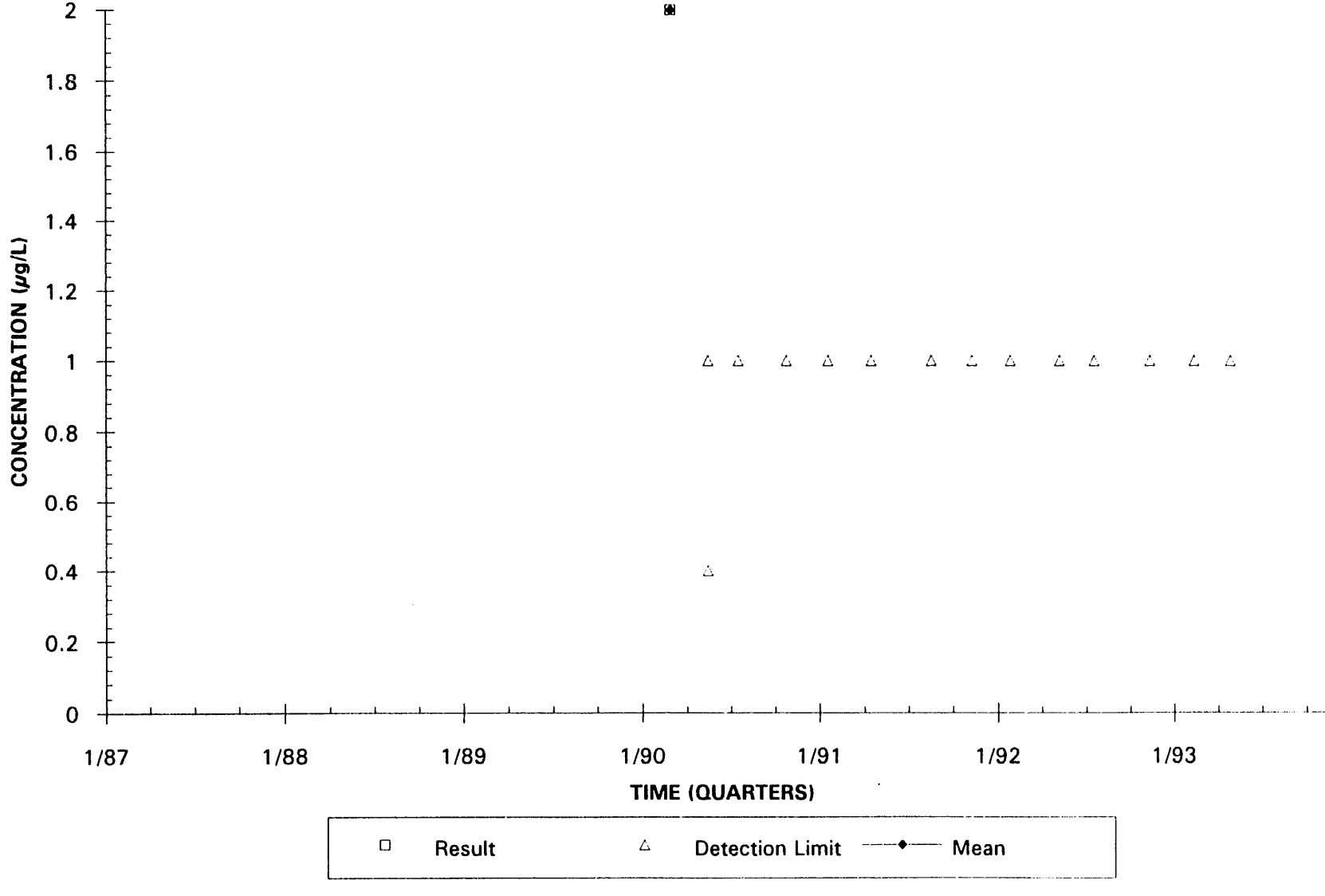



Tetrachloroethylene Concentrations
Well AMB 10A
CONCENTRATION (µg/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

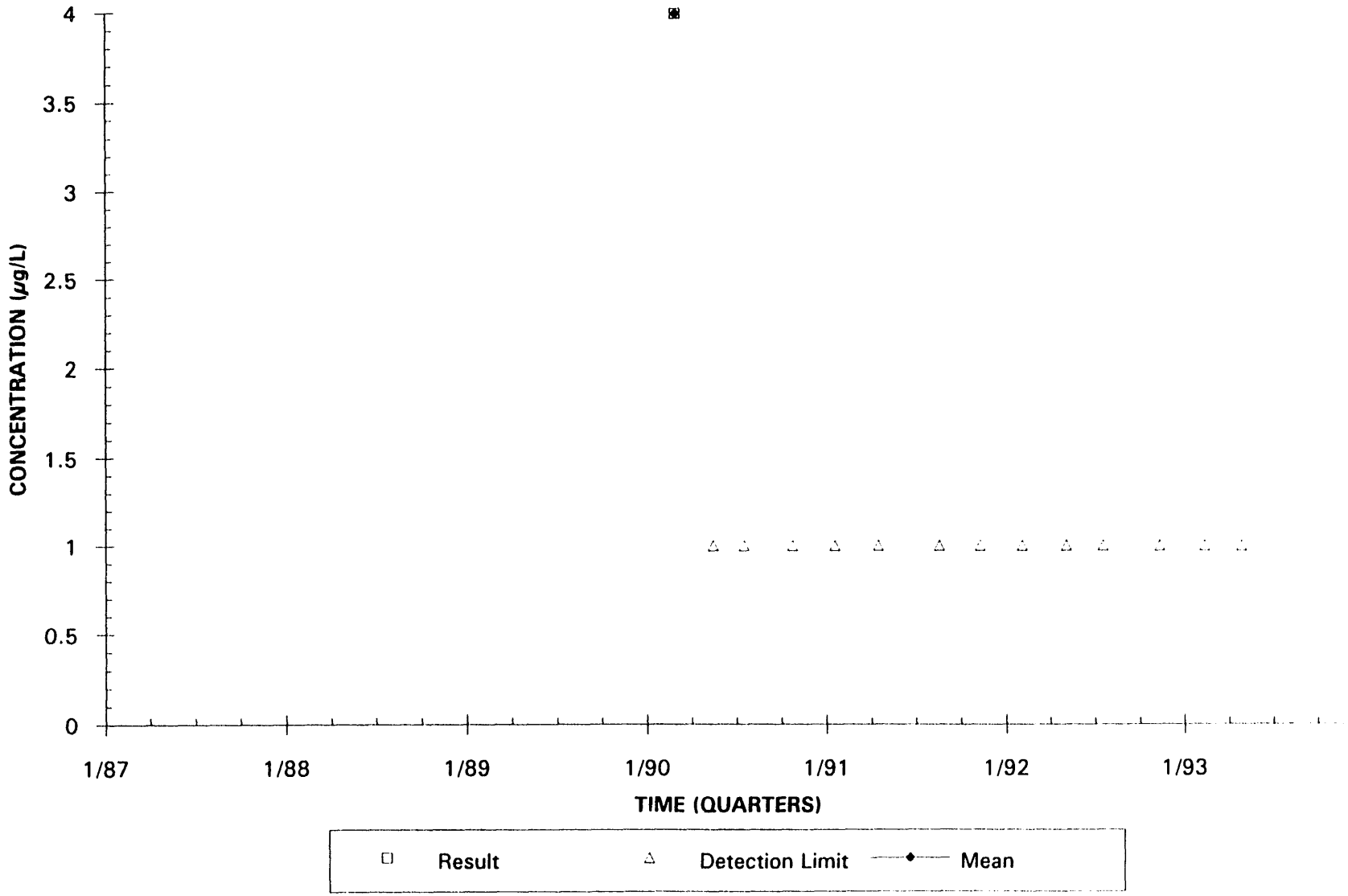
Tetrachloroethylene Concentrations
Well AMB 10B

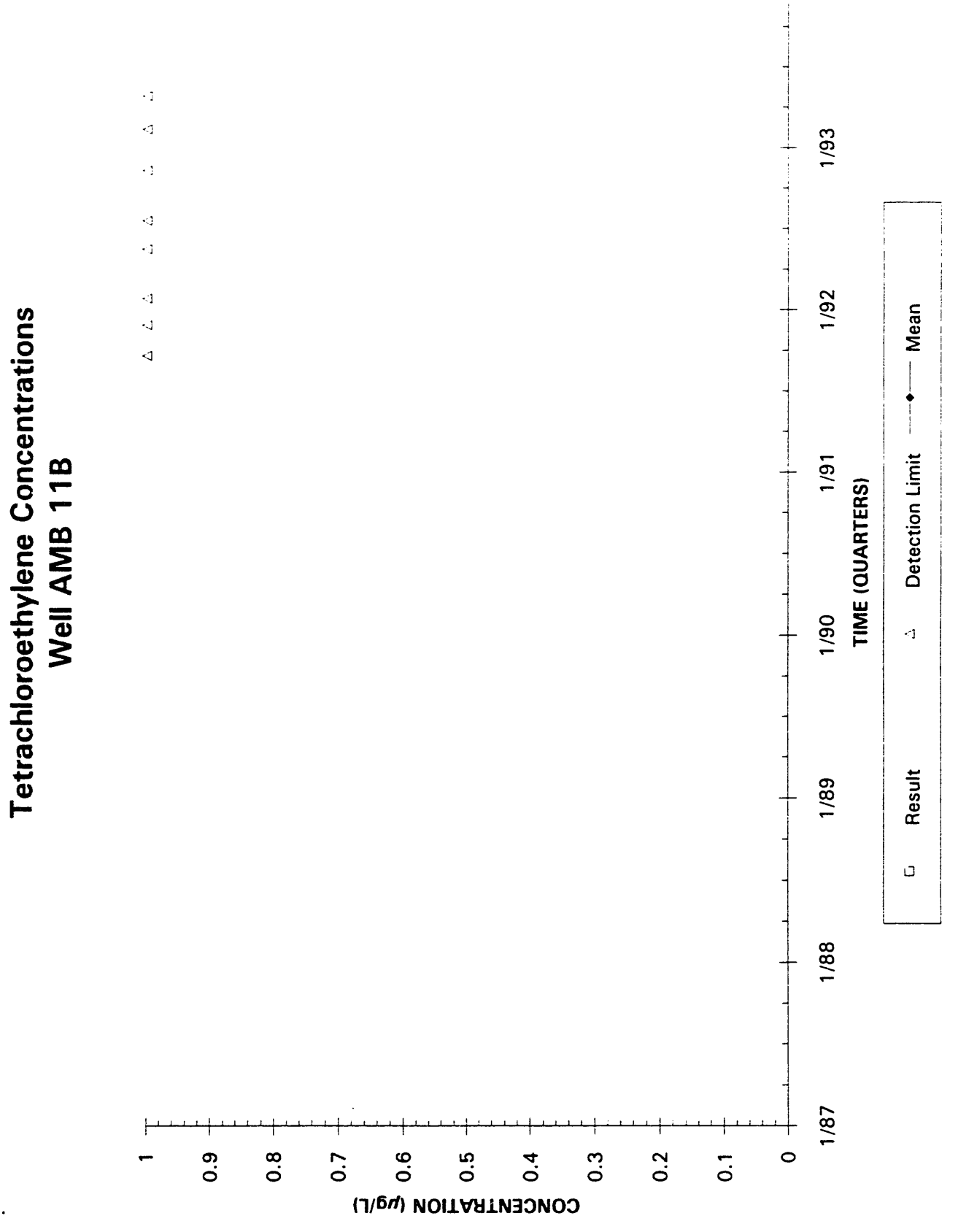


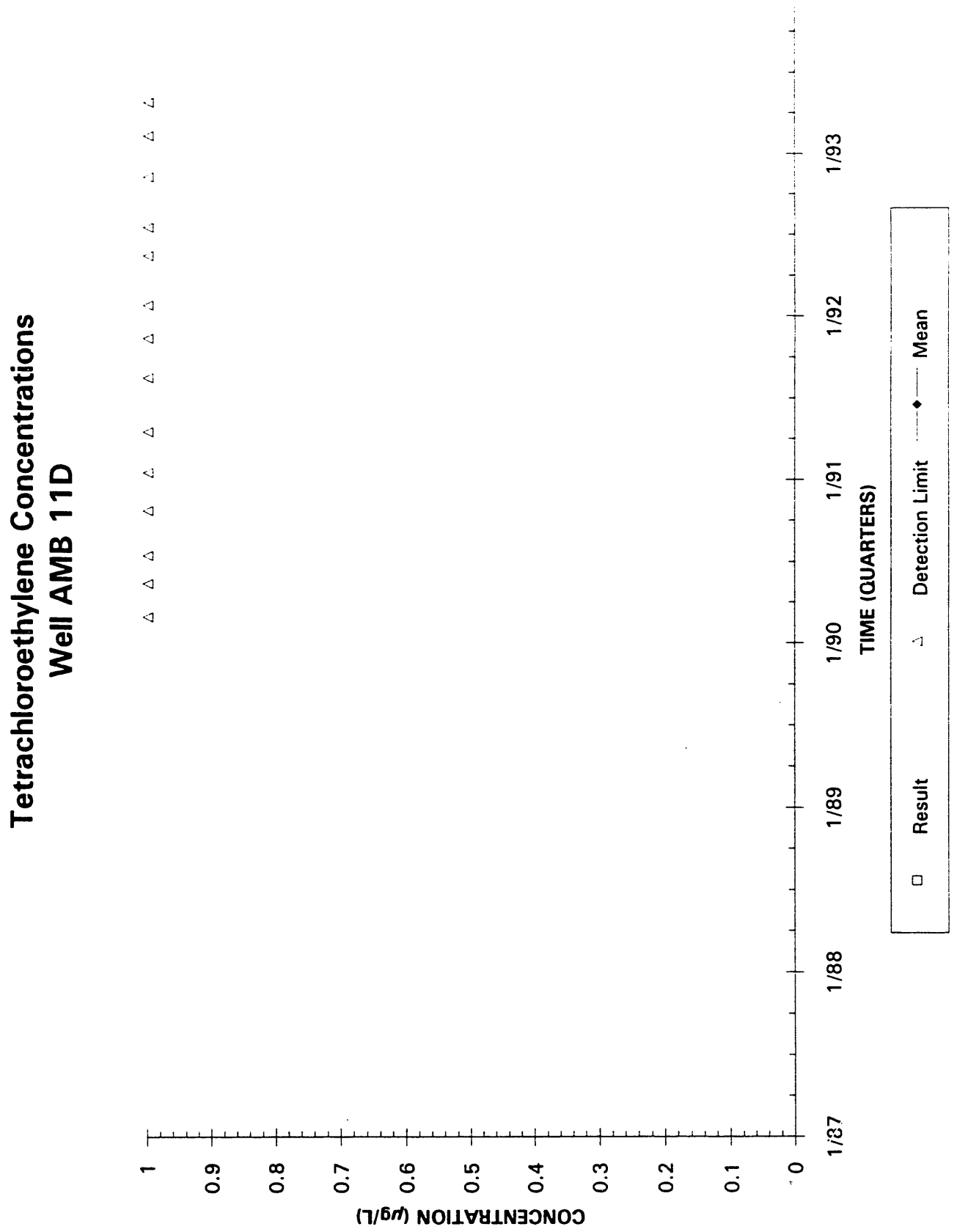
Tetrachloroethylene Concentrations
Well AMB 10D



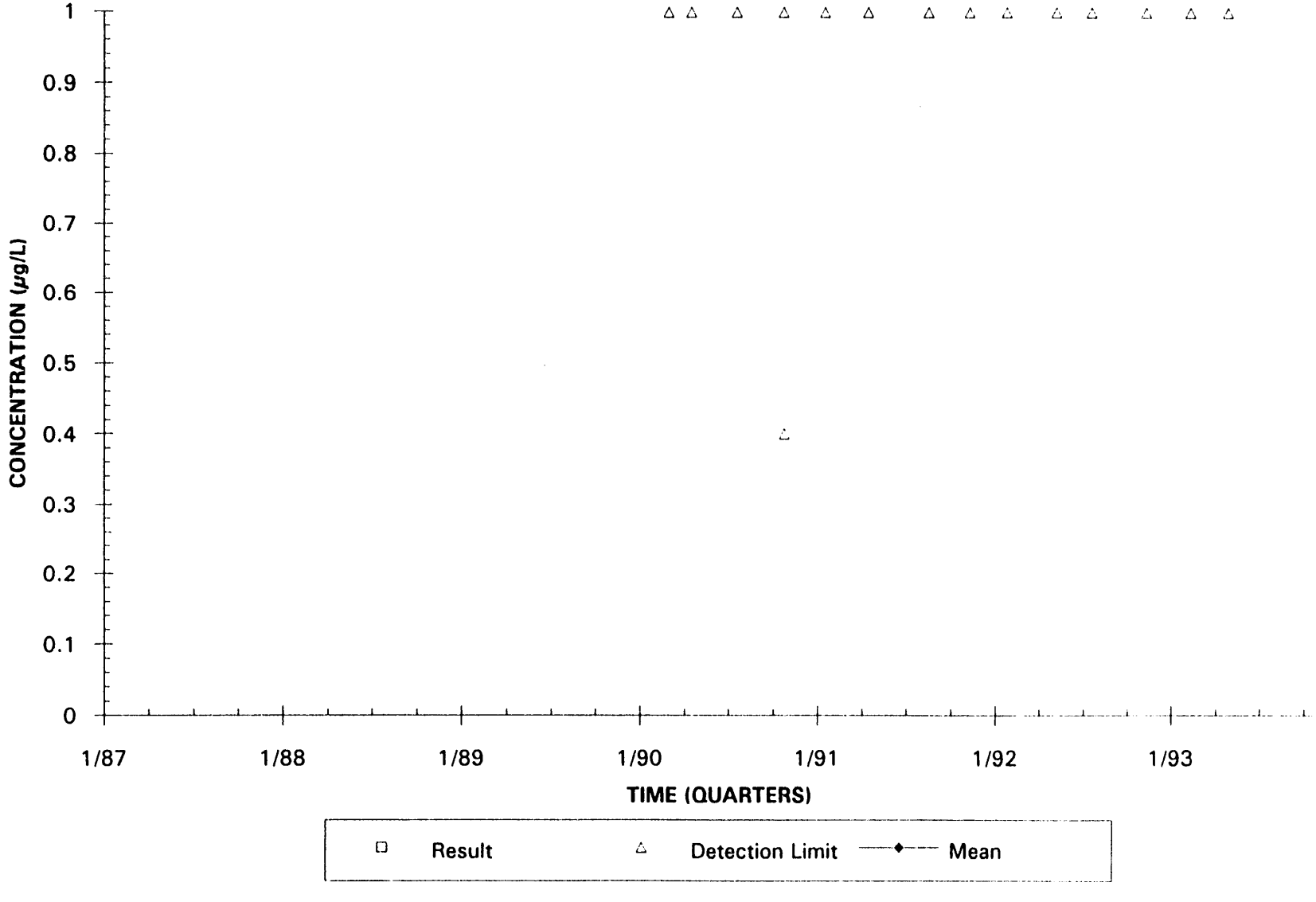
Tetrachloroethylene Concentrations
Well AMB 10DD



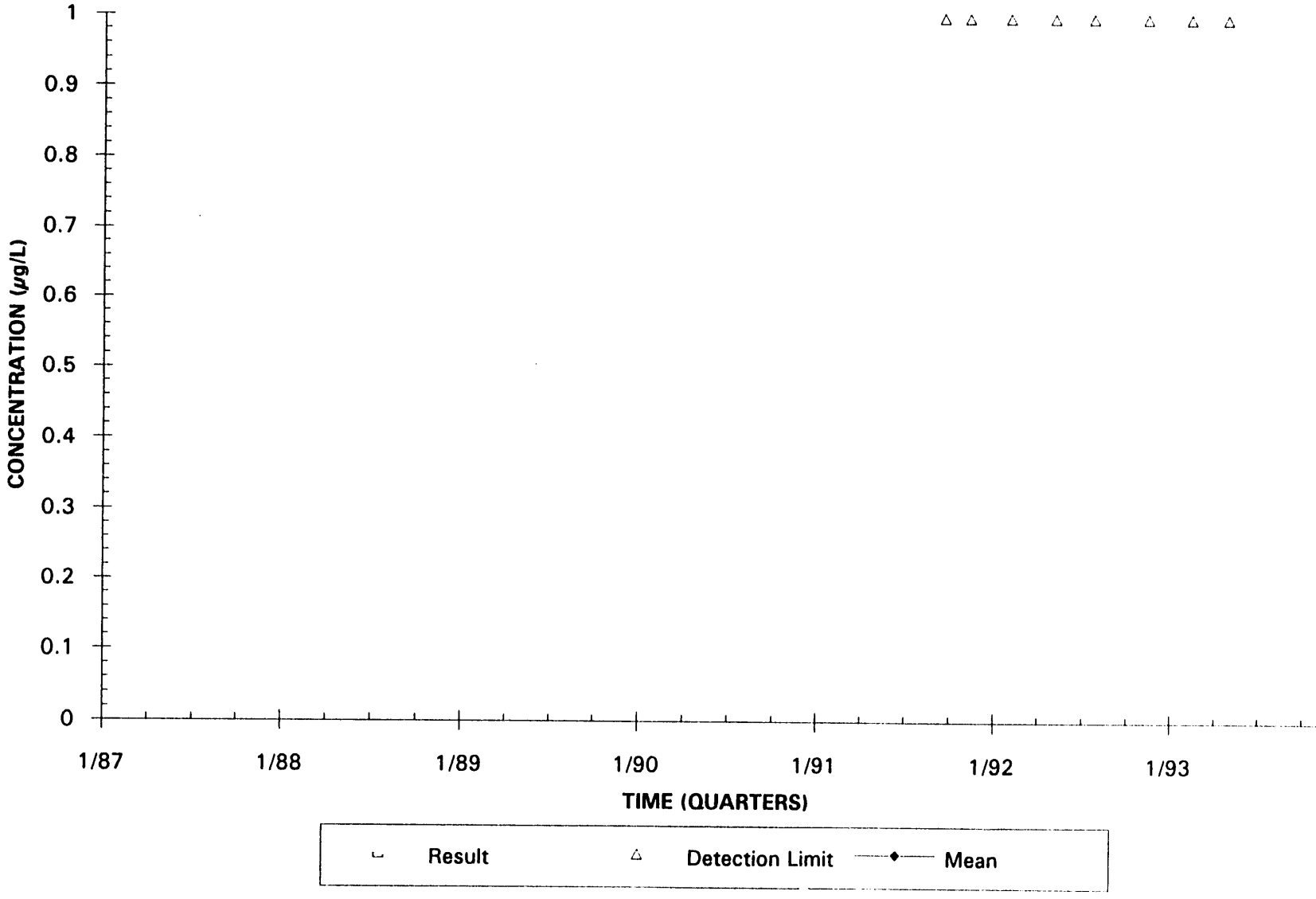

Tetrachloroethylene Concentrations
Well AMB 11B
CONCENTRATION (µg/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean


Tetrachloroethylene Concentrations
Well AMB 11D
CONCENTRATION (µg/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

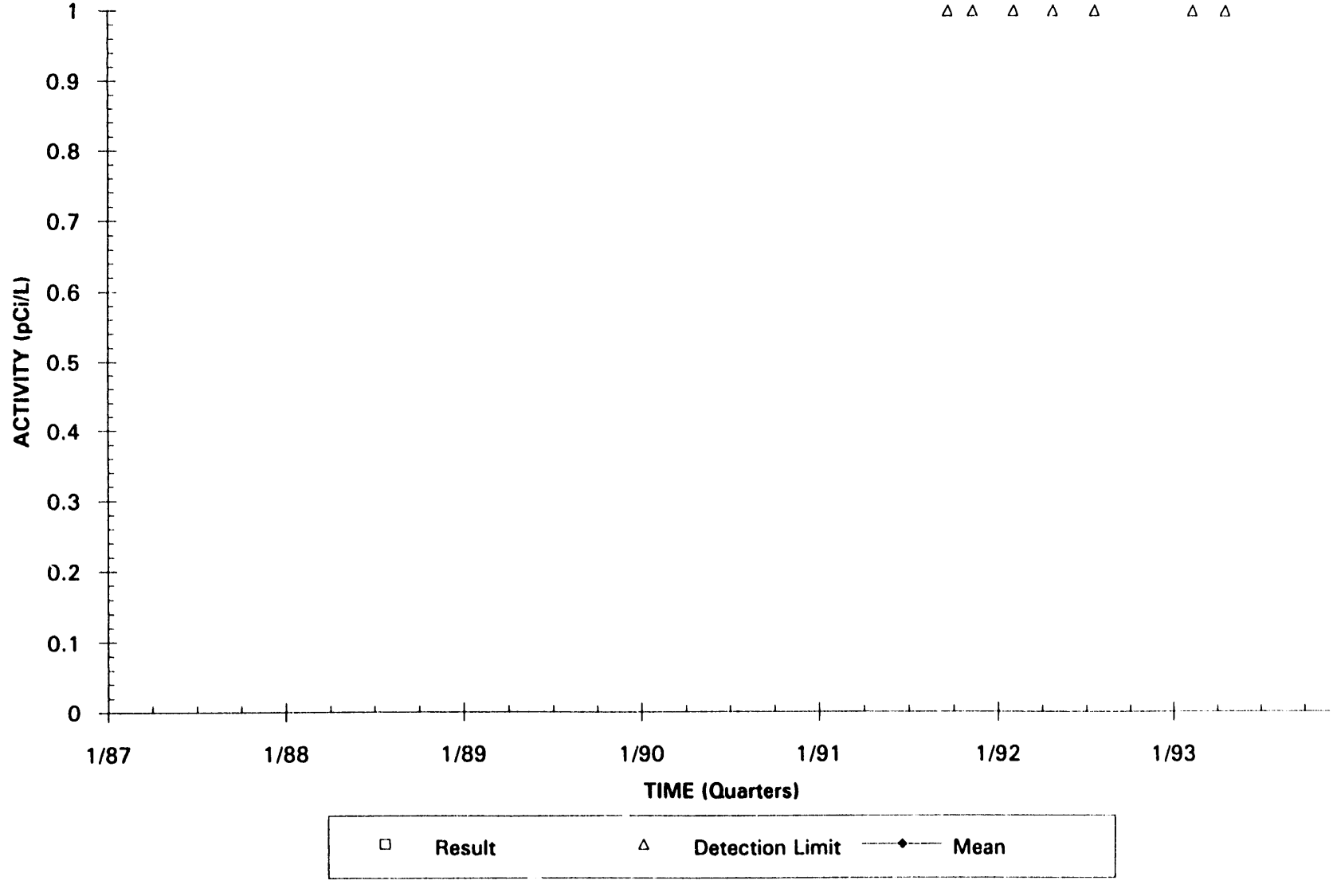
Tetrachloroethylene Concentrations
Well AMB 12D



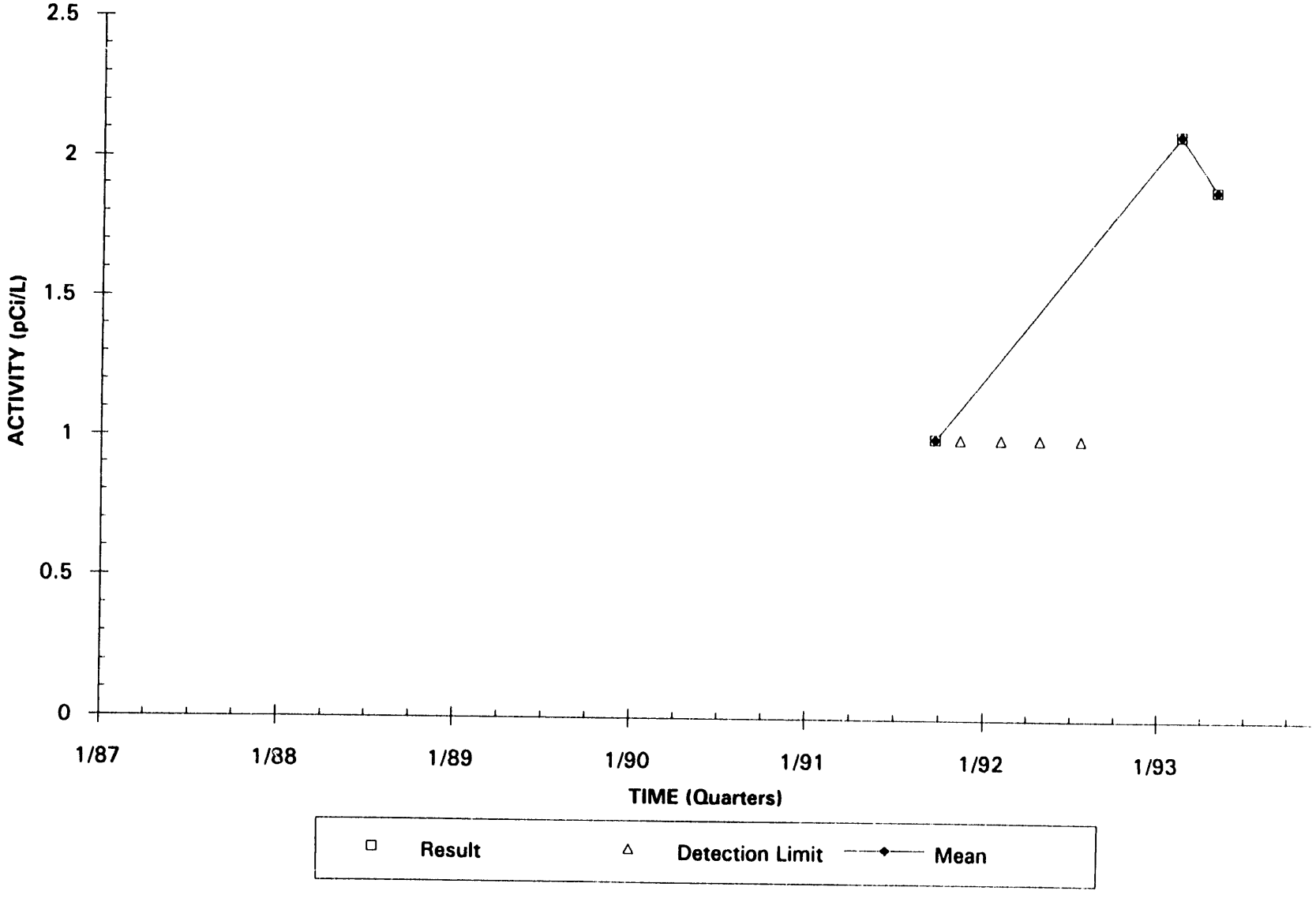
Tetrachloroethylene Concentrations
Well AMB 13AR

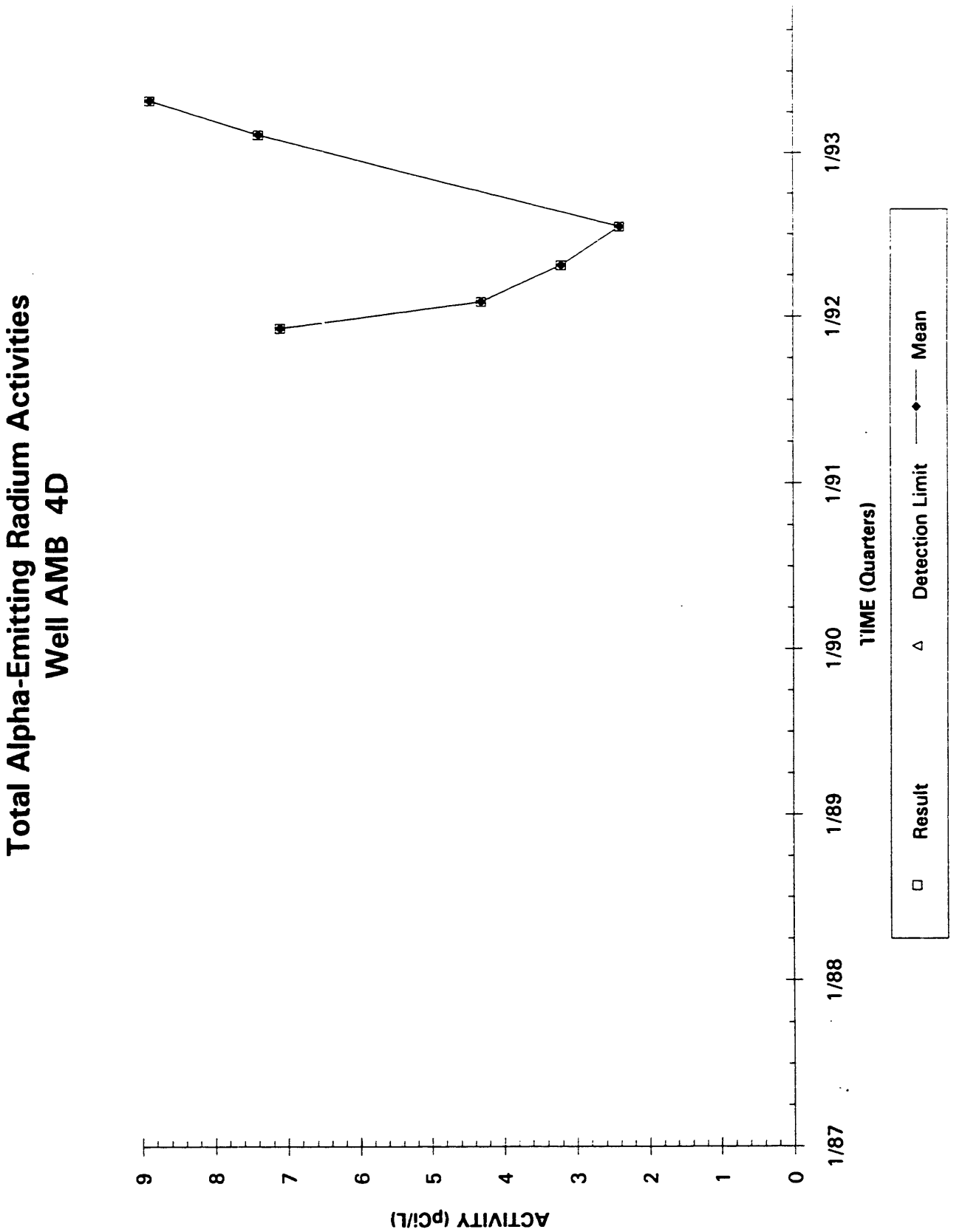


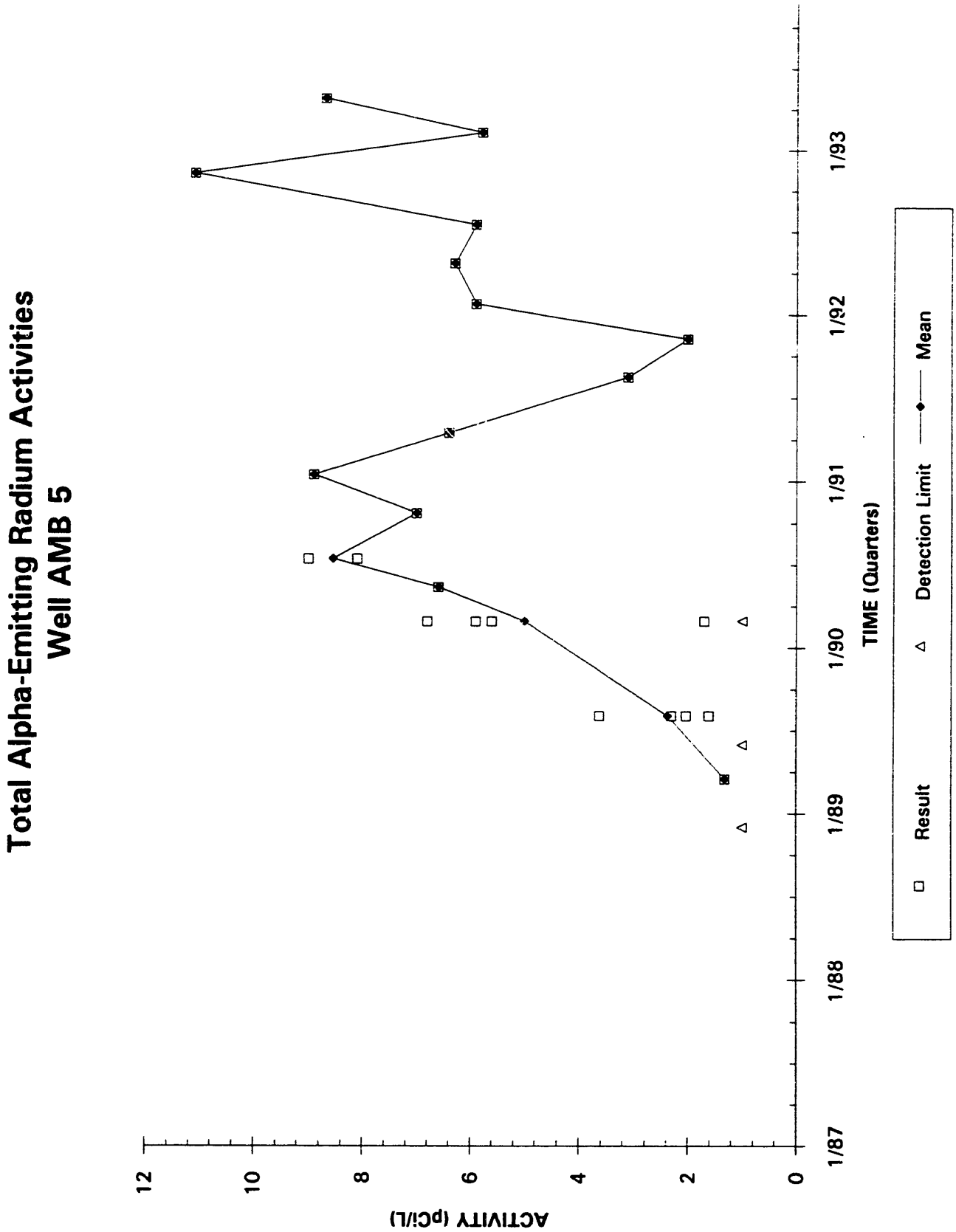
Total Alpha-Emitting Radium Activities
Well AMB 4A

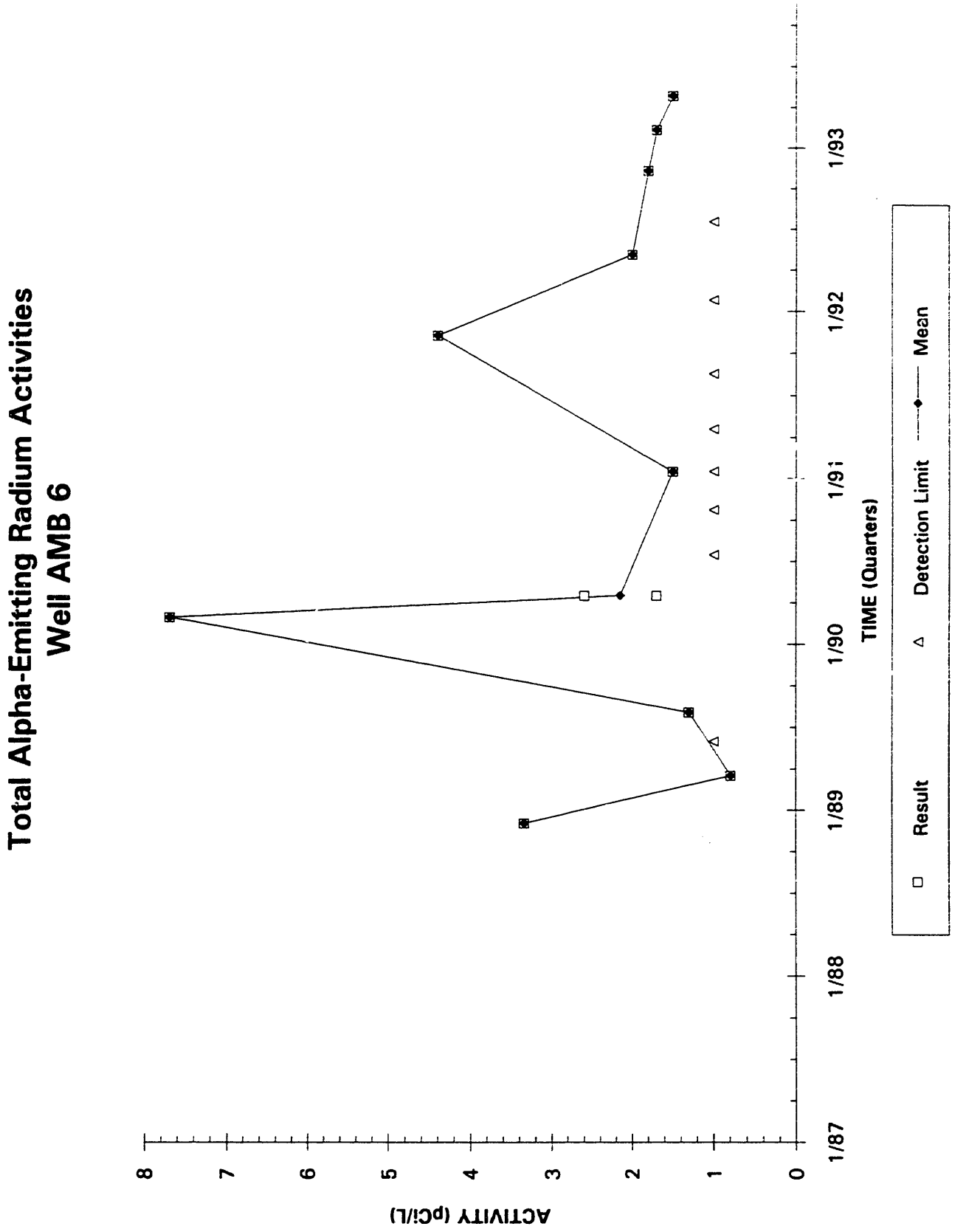


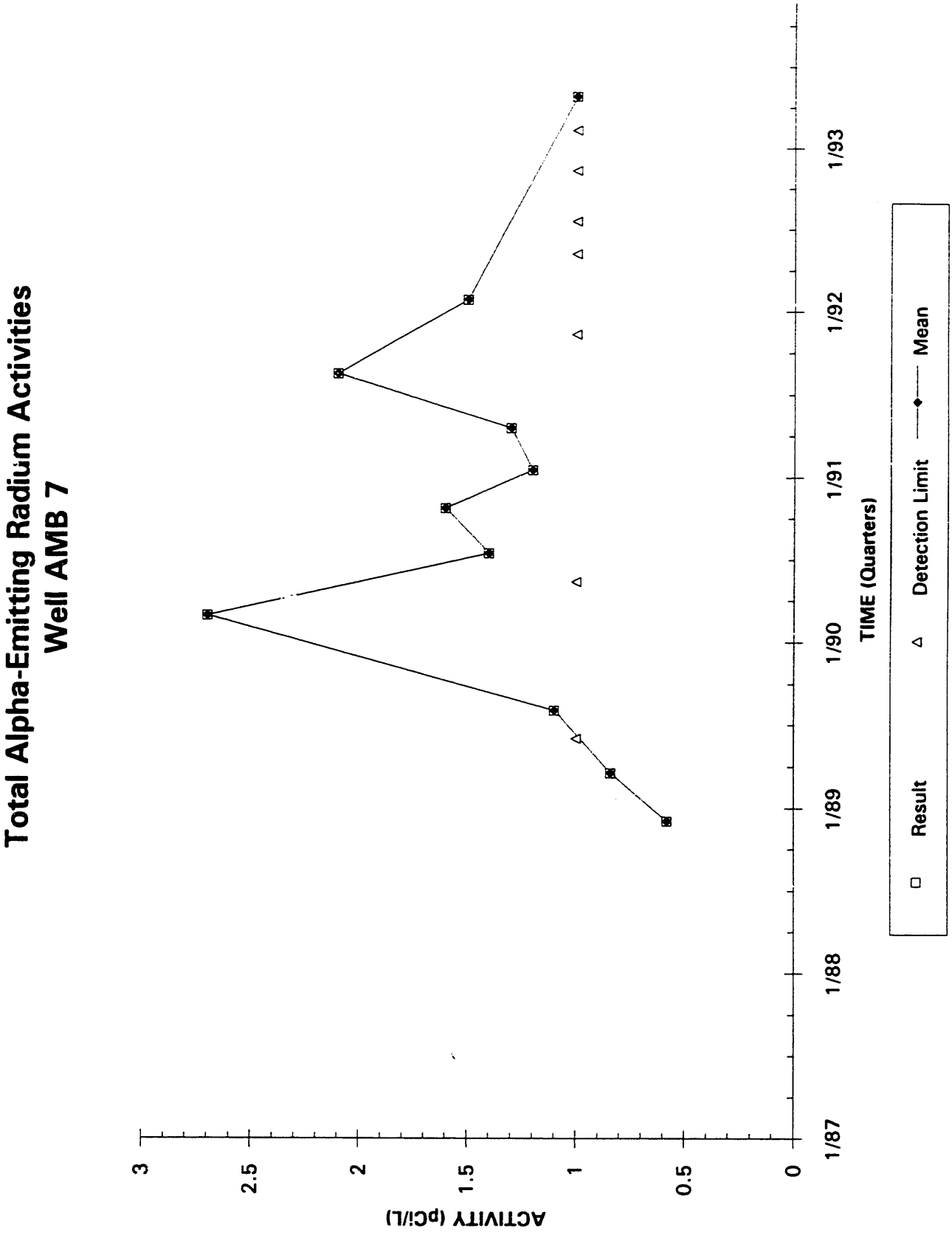
Total Alpha-Emitting Radium Activities
Well AMB 4B



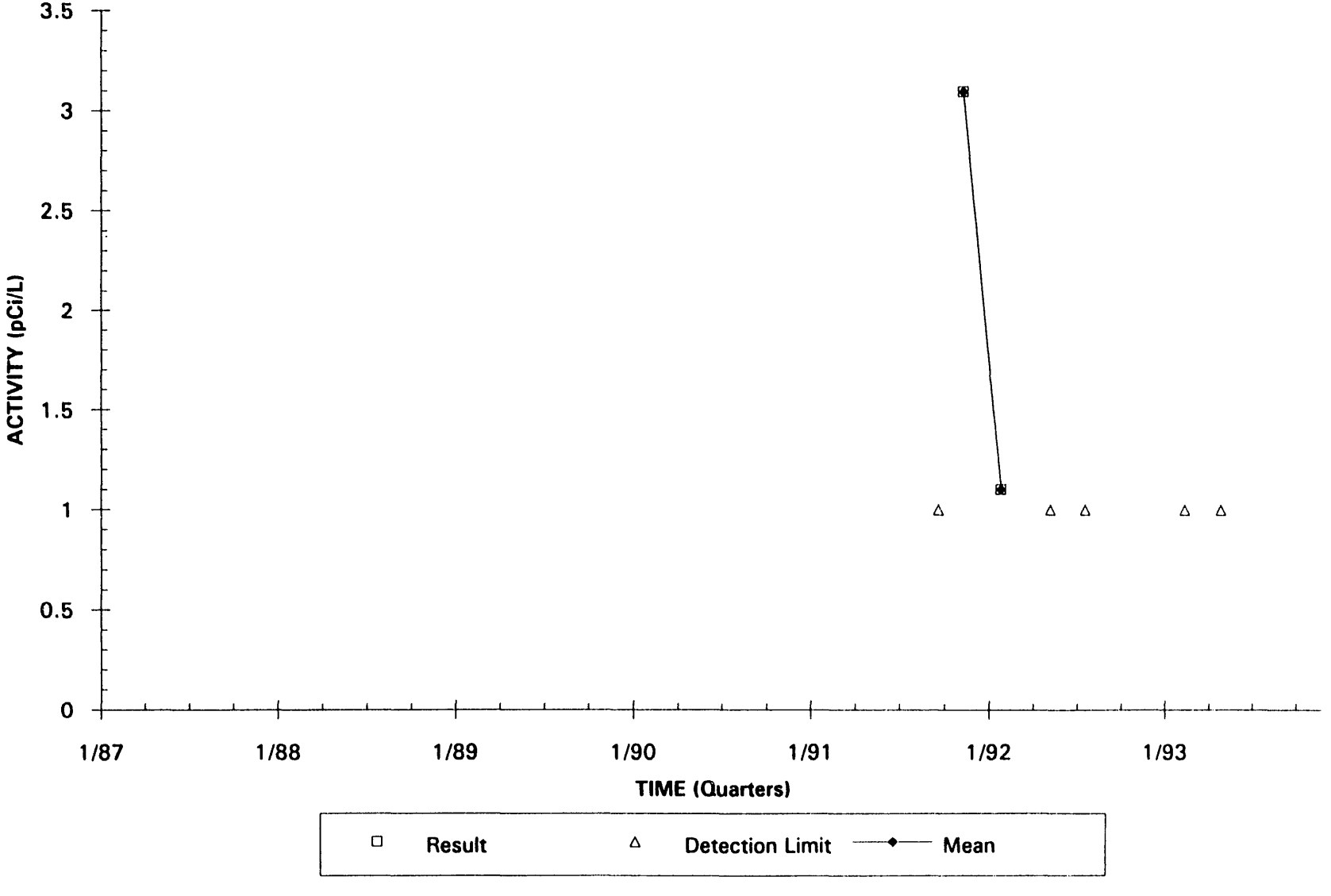

Total Alpha-Emitting Radium Activities
Well AMB 4D
ACTIVITY (pCi/L)
0
1
2
3
4
5
6
7
8
9
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (Quarters)
Result
Detection Limit
Mean

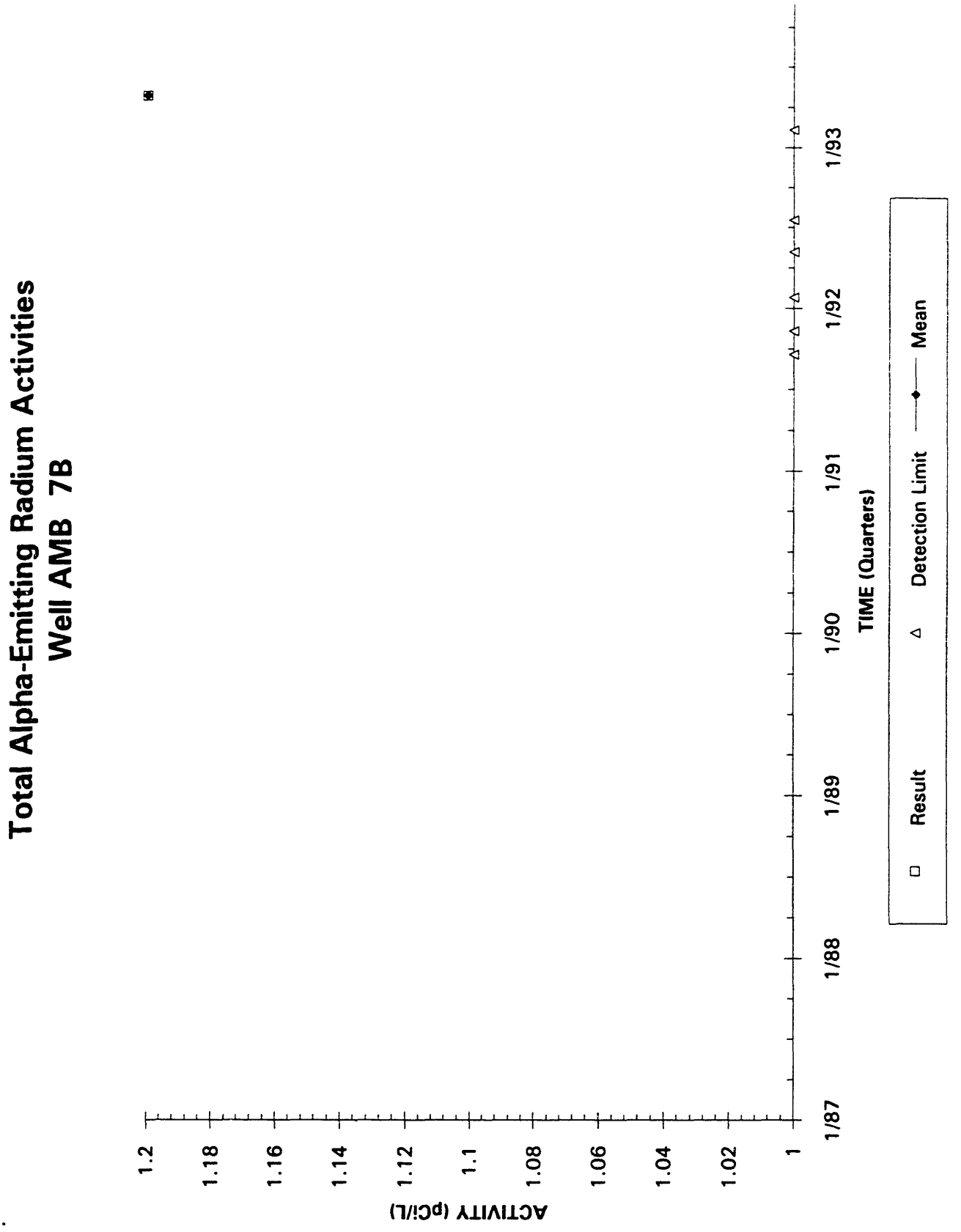

Total Alpha-Emitting Radium Activities
Well AMB 5
ACTIVITY (pCi/L)
0
2
4
6
8
10
12
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (Quarters)
Result
Detection Limit
Mean


Total Alpha-Emitting Radium Activities
Well AMB 6
ACTIVITY (pCi/L)
0
1
2
3
4
5
6
7
8
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (Quarters)
Result
Detection Limit
Mean

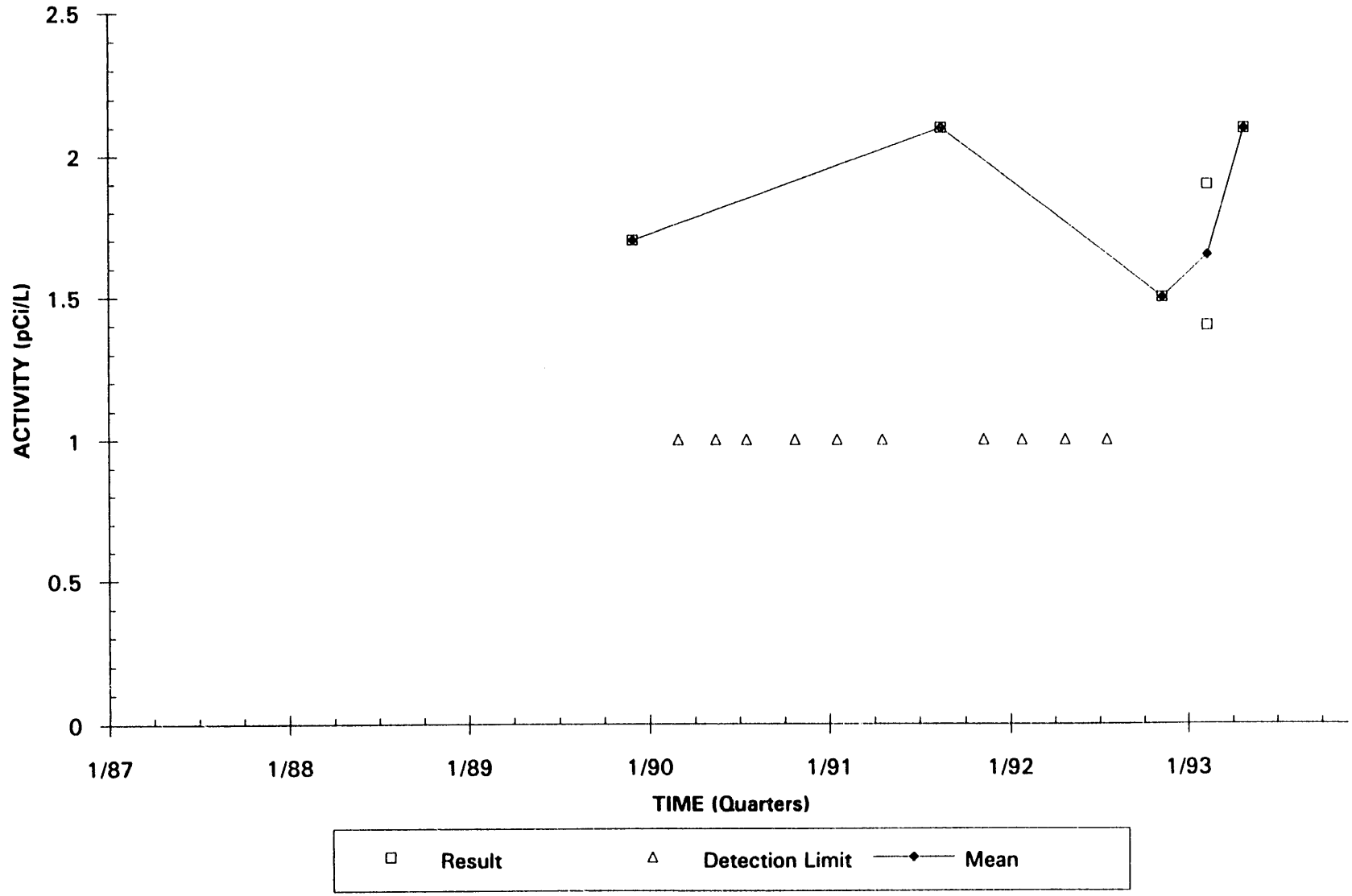

Total Alpha-Emitting Radium Activities
Well AMB 7
ACTIVITY (pCi/L)
3
2.5
2
1.5
1
0.5
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (Quarters)
Result
Detection Limit
Mean

Total Alpha-Emitting Radium Activities
Well AMB 7A

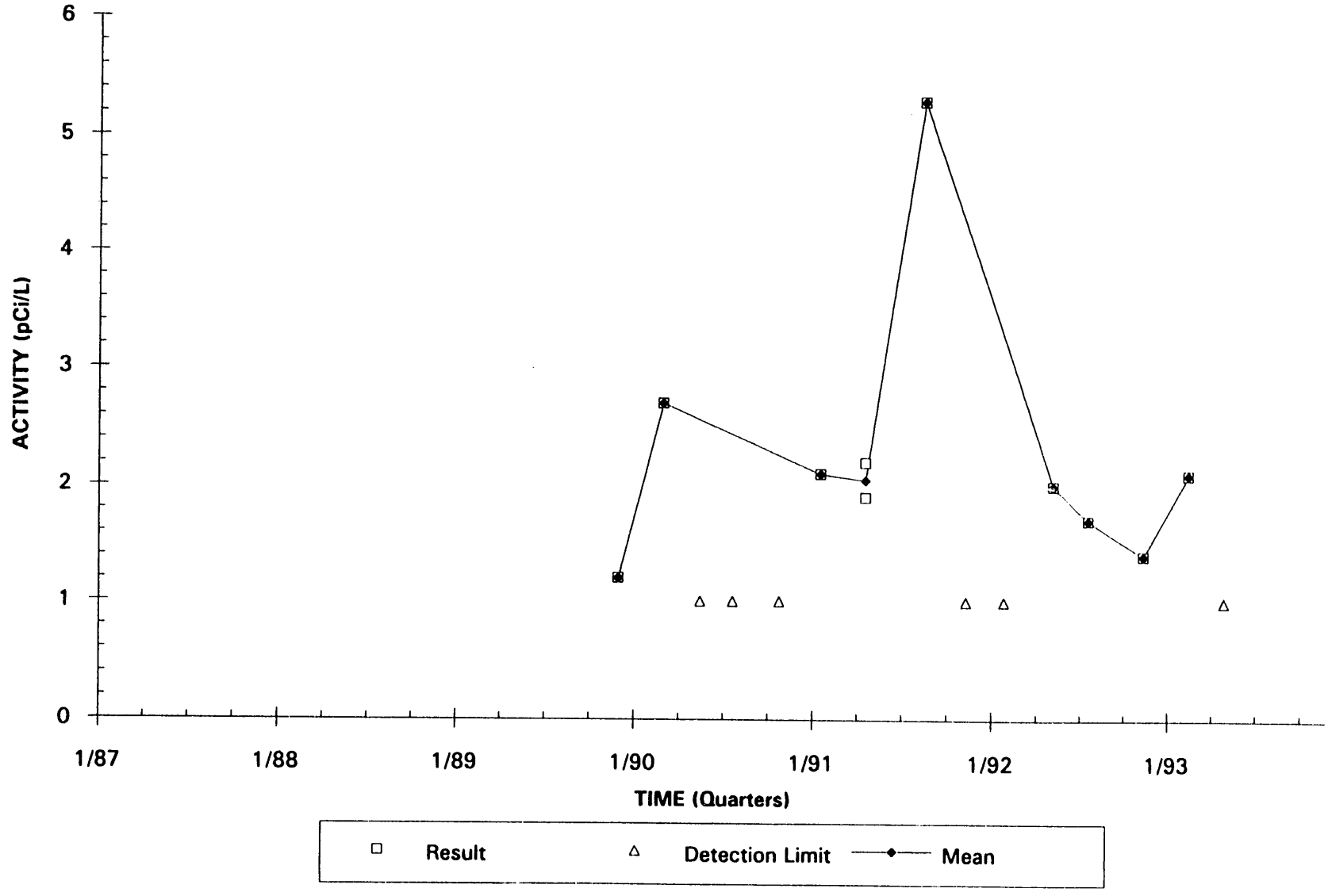



Total Alpha-Emitting Radium Activities
Well AMB 7B
ACTIVITY (pCi/L)
1.2
1.18
1.16
1.14
1.12
1.1
1.08
1.06
1.04
1.02
1
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (Quarters)
Result
Detection Limit
Mean

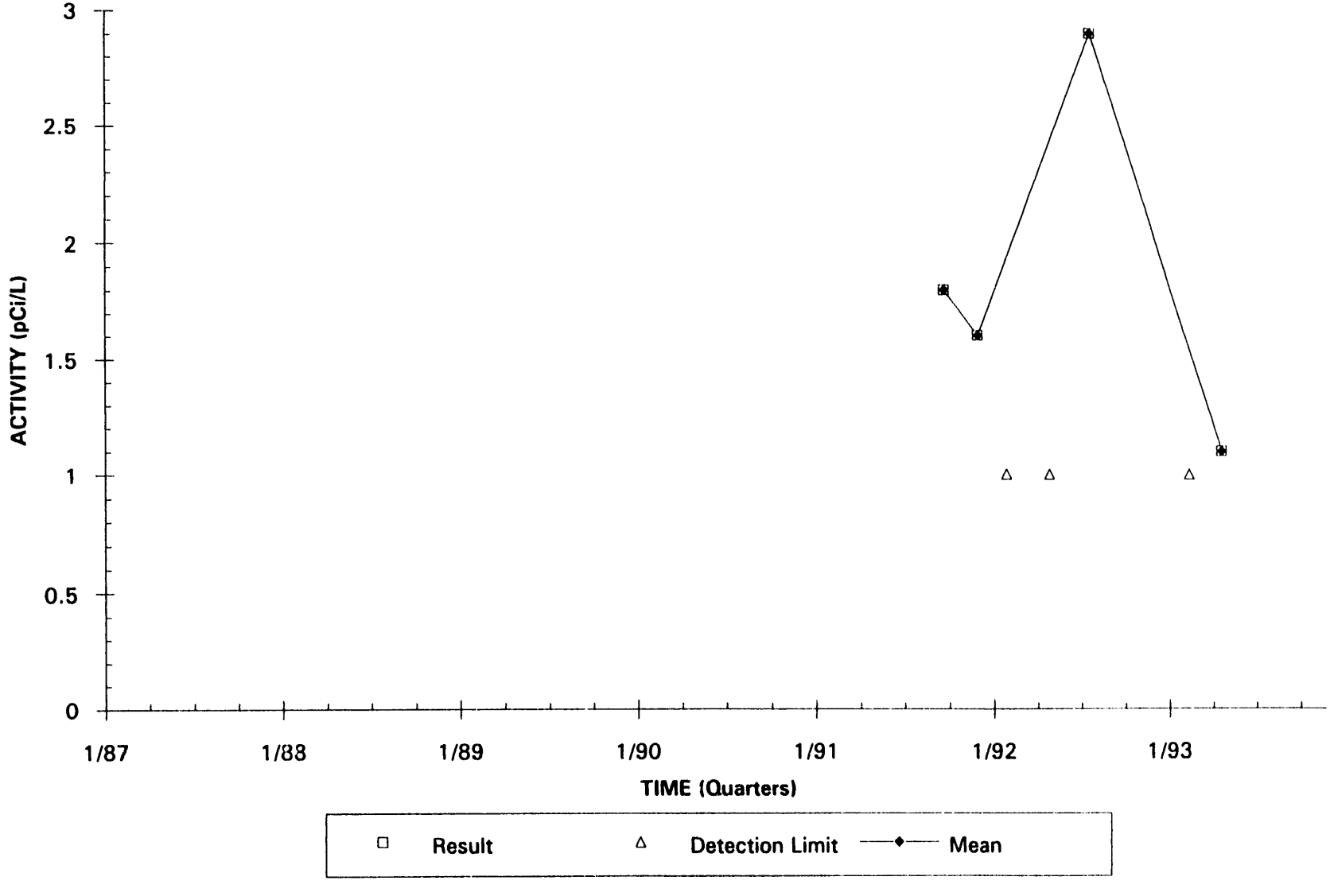
Total Alpha-Emitting Radium Activities
Well AMB 8D

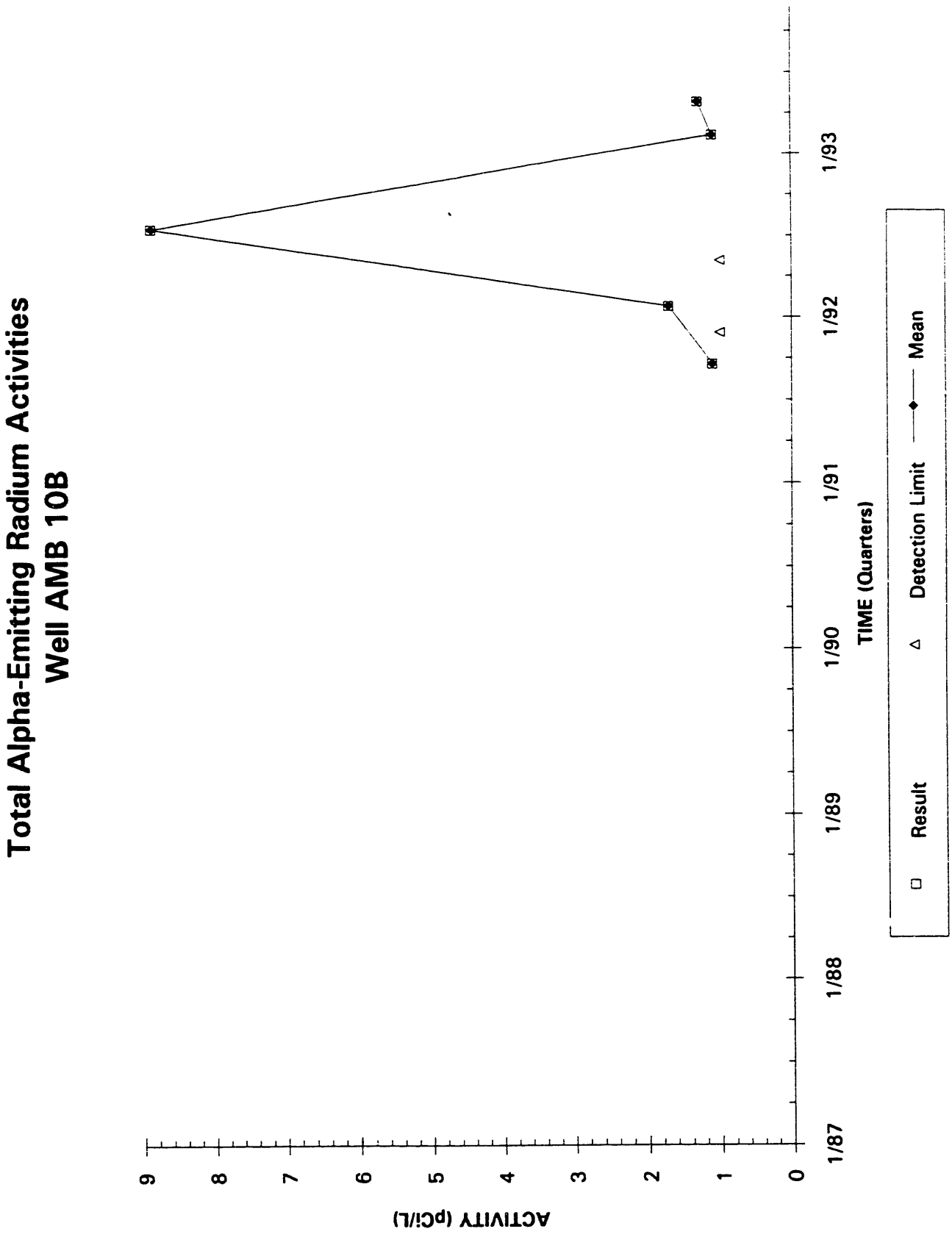


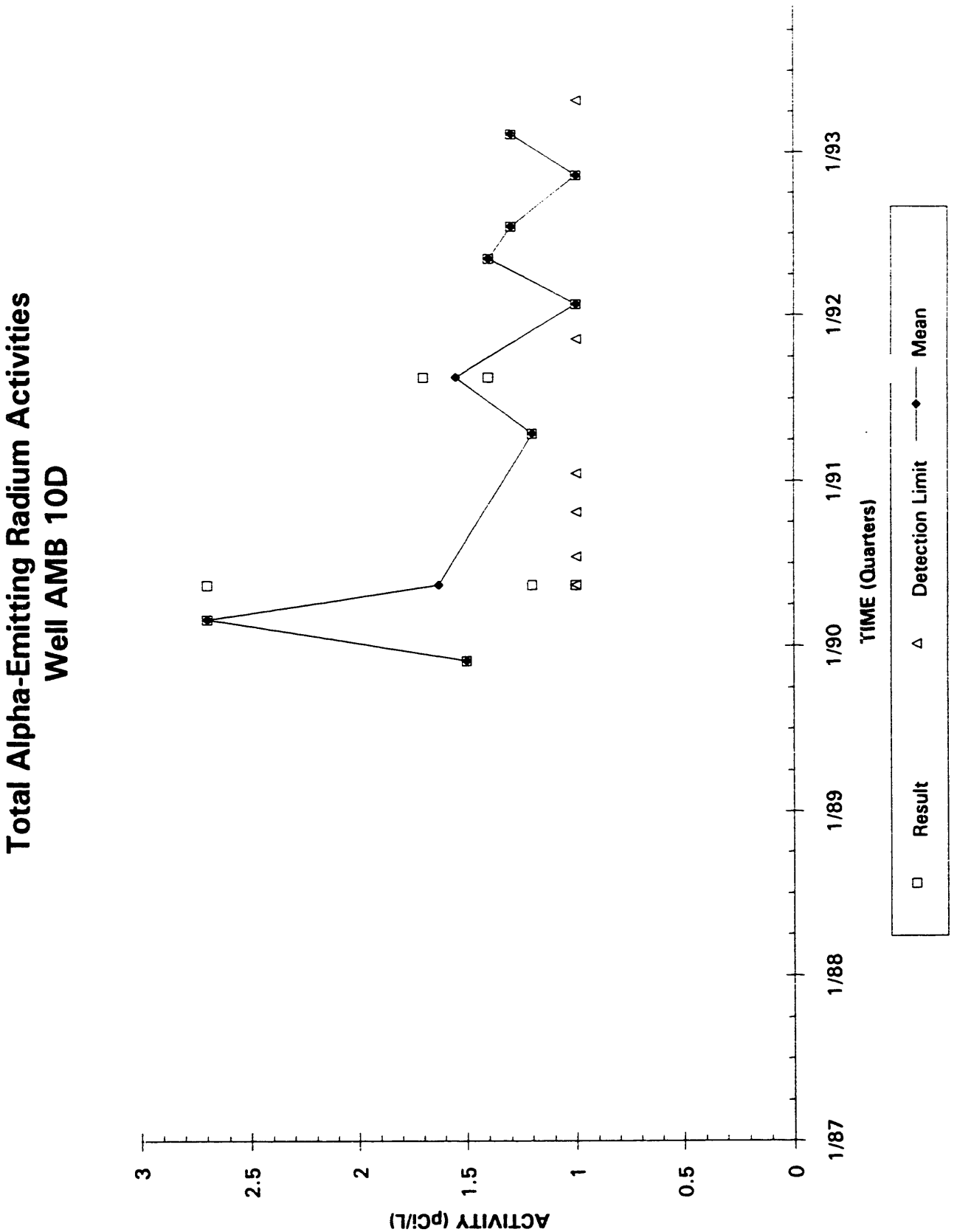
Total Alpha-Emitting Radium Activities
Well AMB 9D



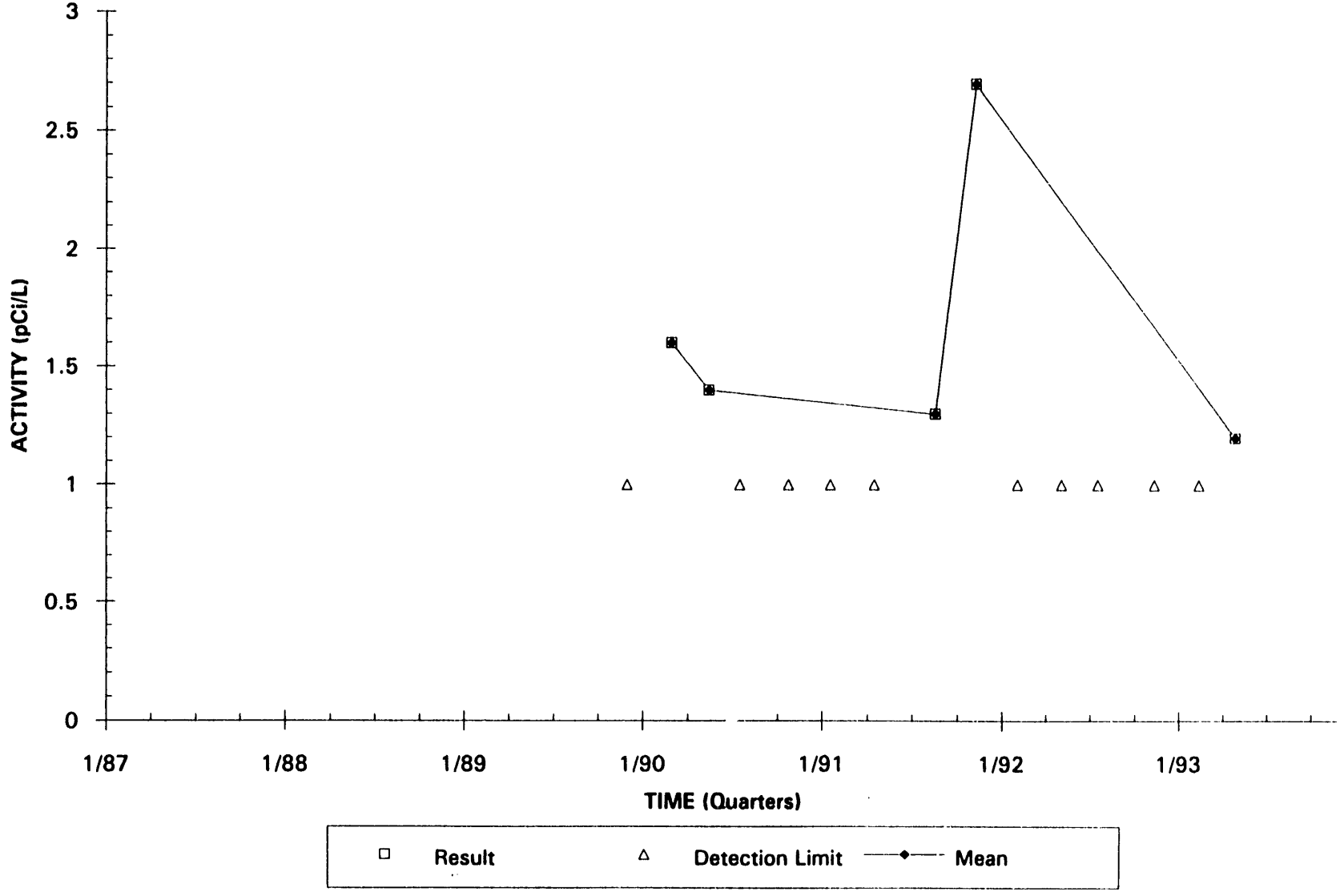
Total Alpha-Emitting Radium Activities
Well AMB 10A

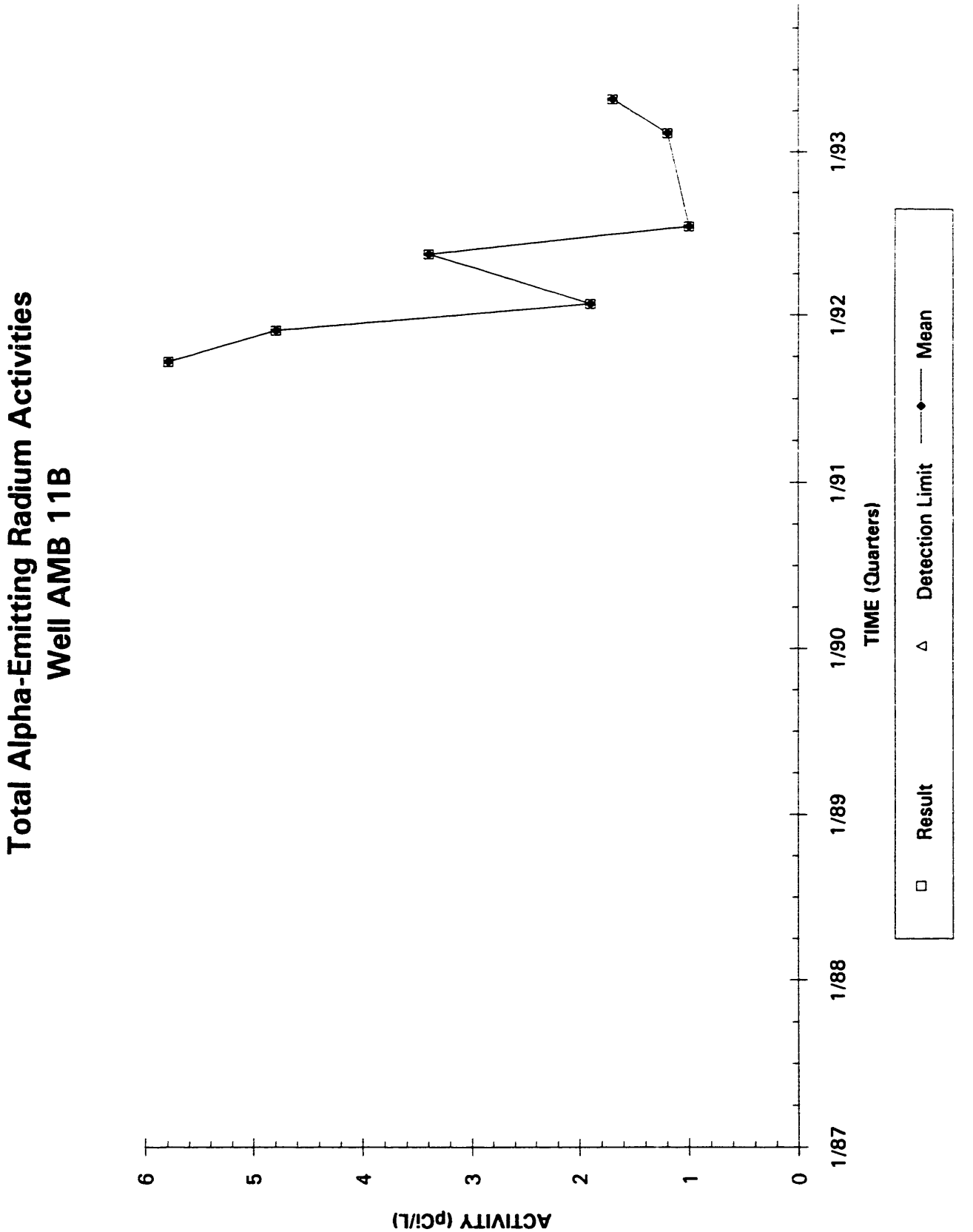



Total Alpha-Emitting Radium Activities
Well AMB 10B
ACTIVITY (pCi/L)
0
1
2
3
4
5
6
7
8
9
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (Quarters)
Result
Detection Limit
Mean

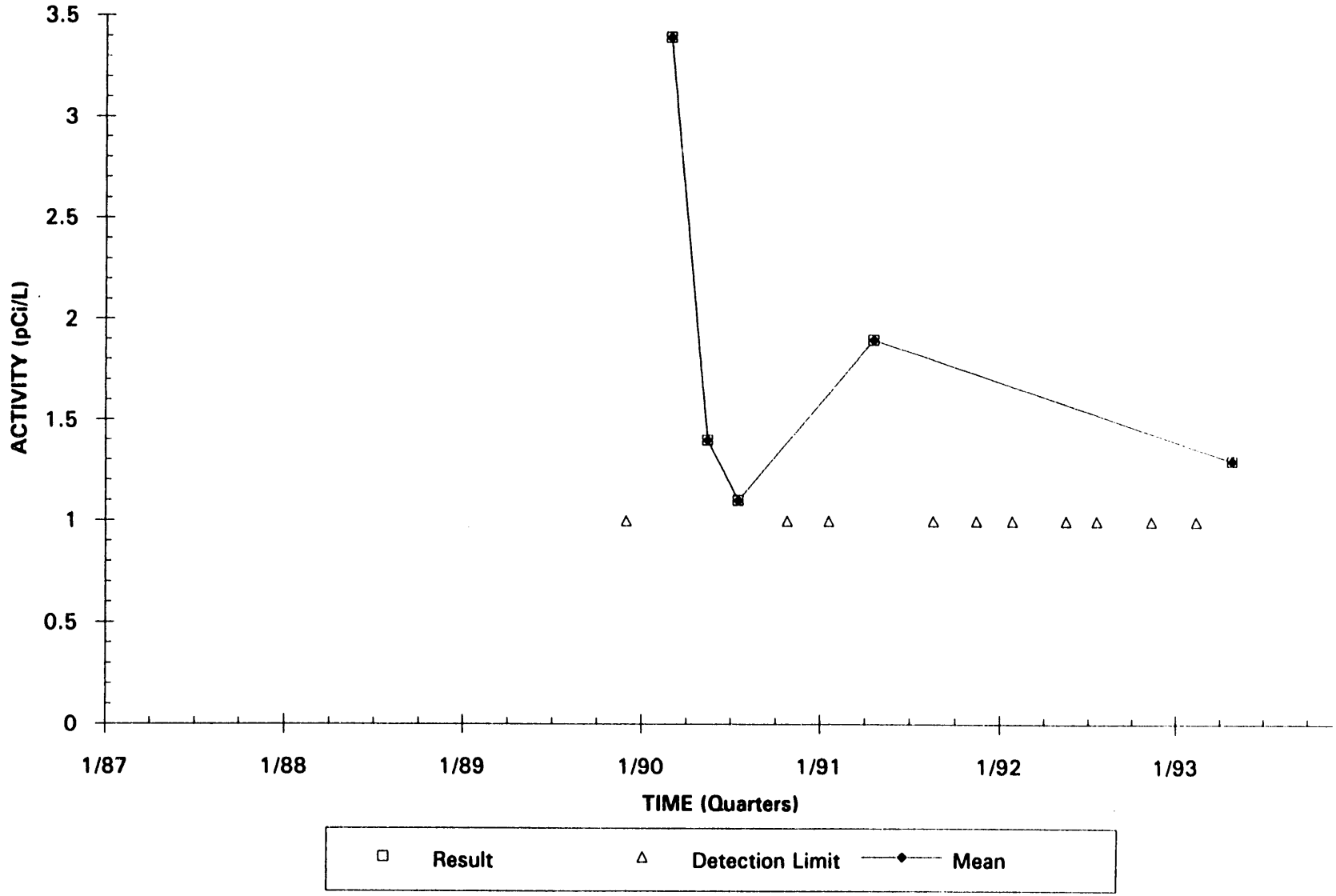

Total Alpha-Emitting Radium Activities
Well AMB 10D
ACTIVITY (pCi/L)
3
2.5
2
1.5
1
0.5
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (Quarters)
Result
Detection Limit
Mean

Total Alpha-Emitting Radium Activities
Well AMB 10DD

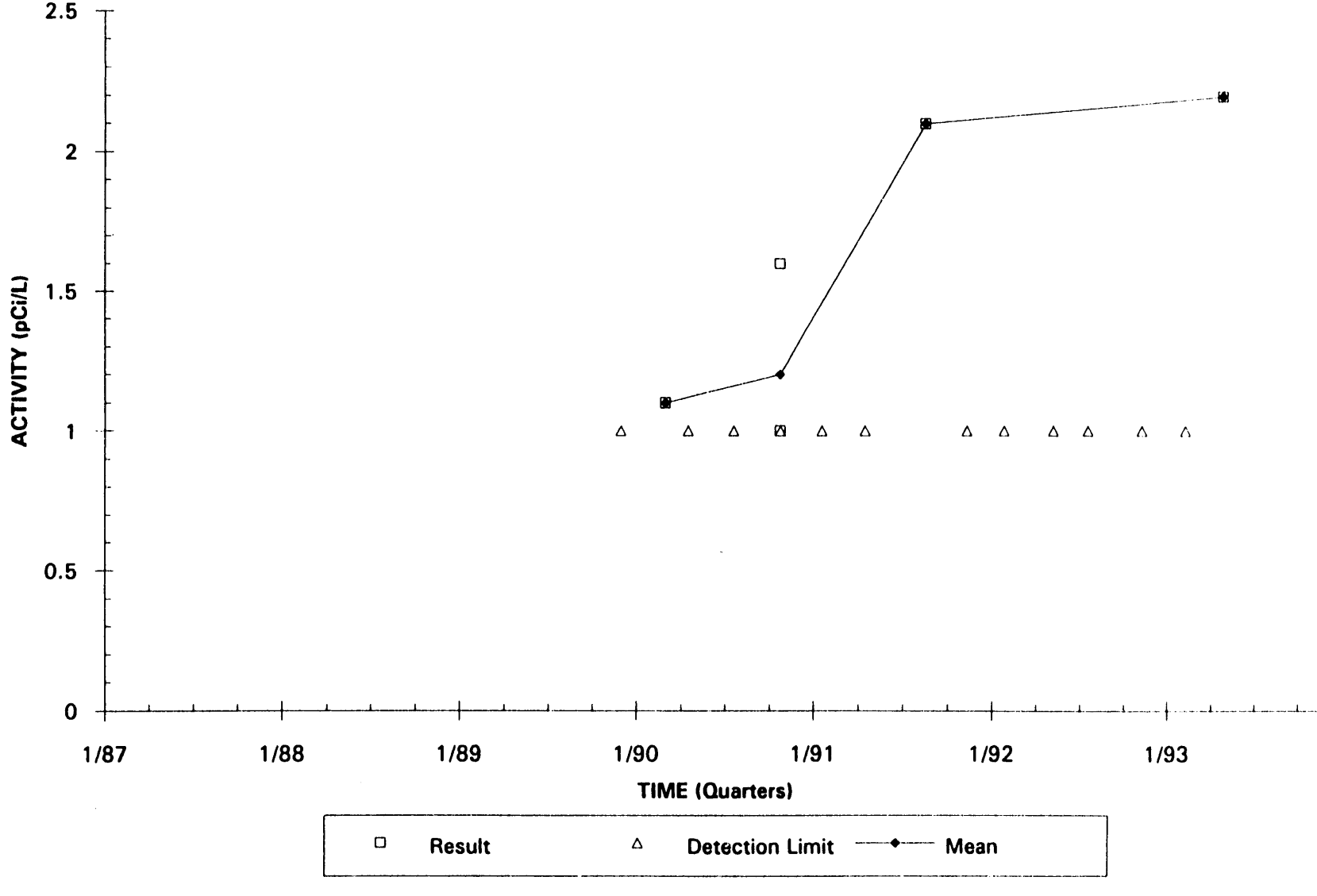


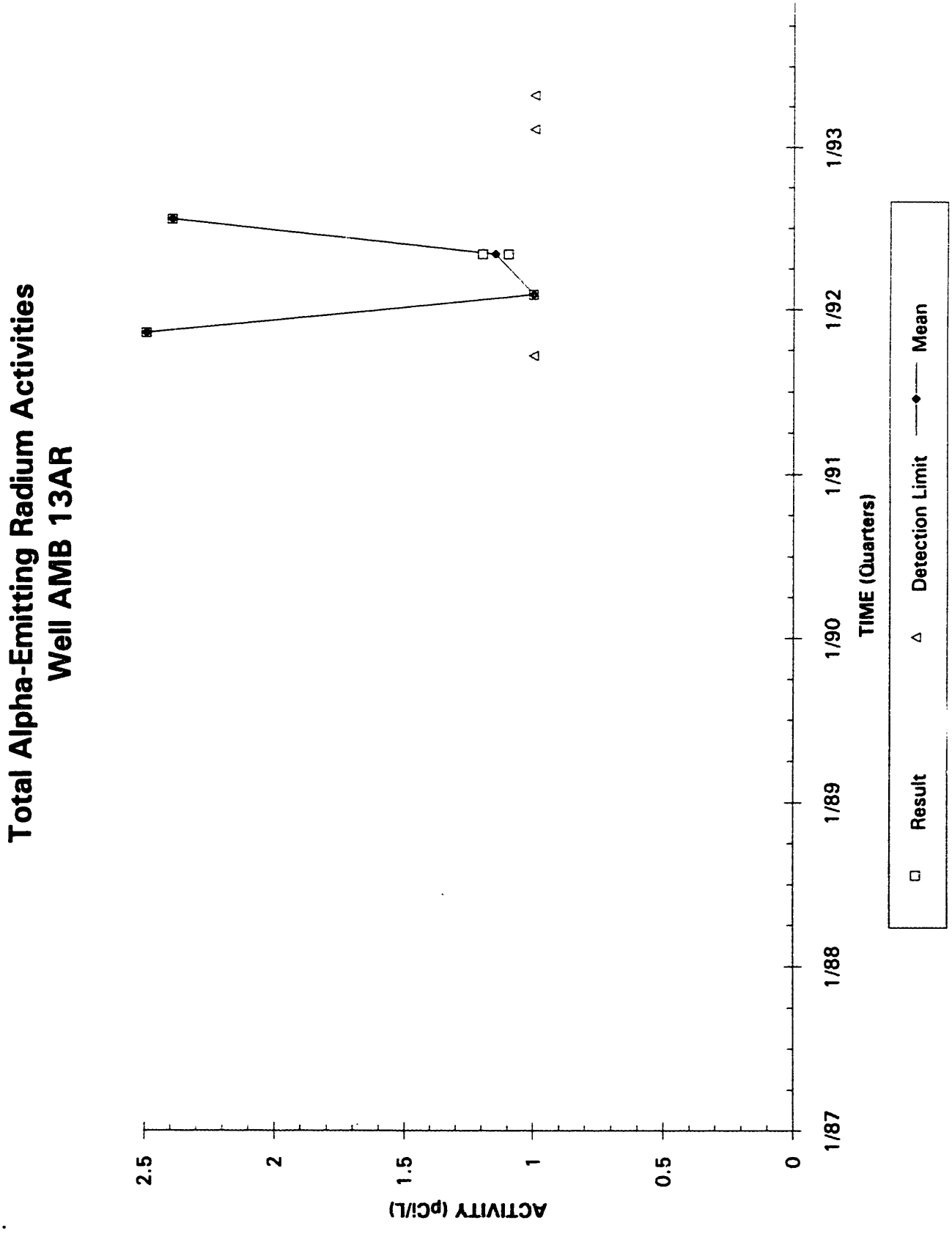

Total Alpha-Emitting Radium Activities
Well AMB 11B
ACTIVITY (pCi/L)
0
1
2
3
4
5
6
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (Quarters)
Result
Detection Limit
Mean

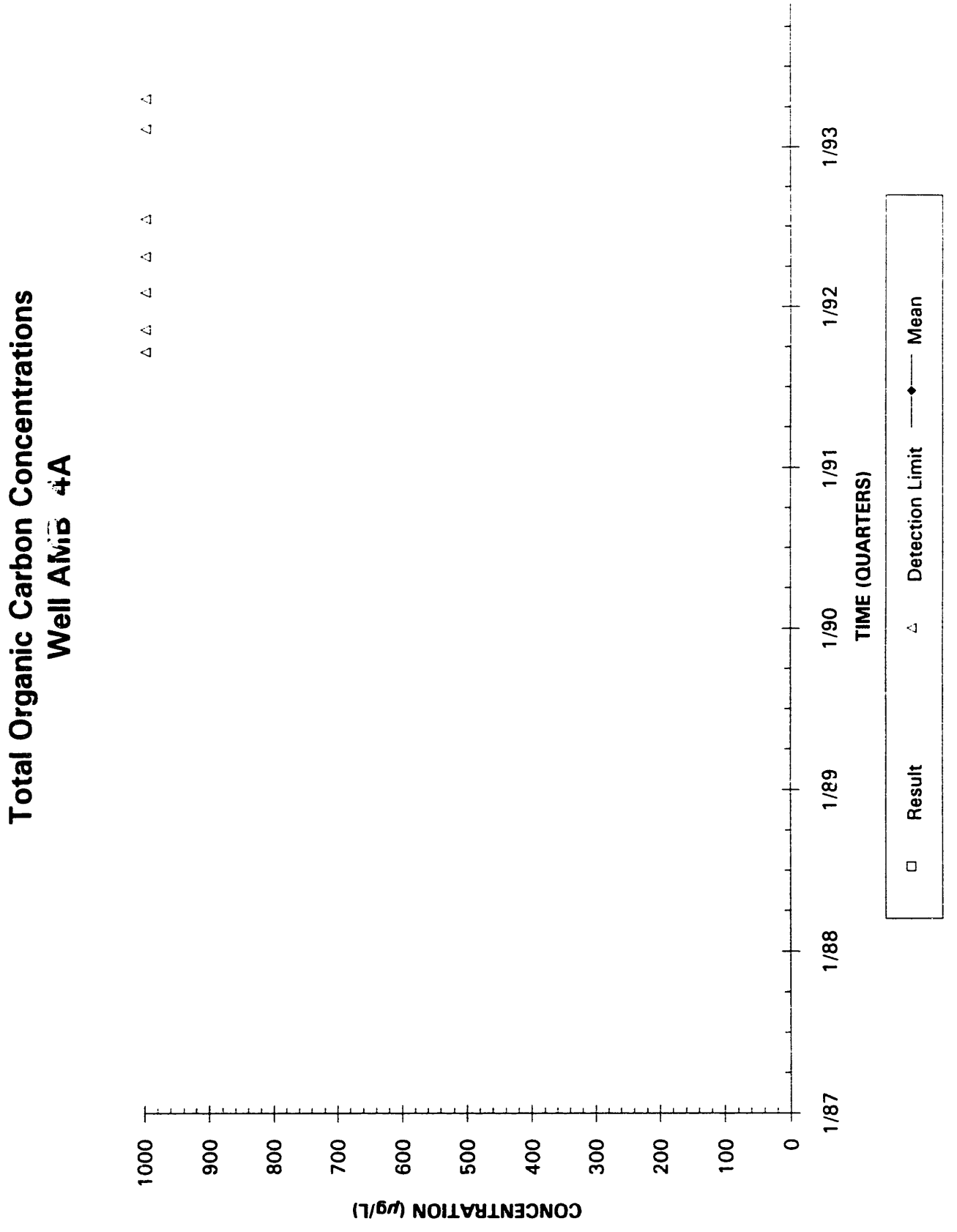
Total Alpha-Emitting Radium Activities
Well AMB 11D



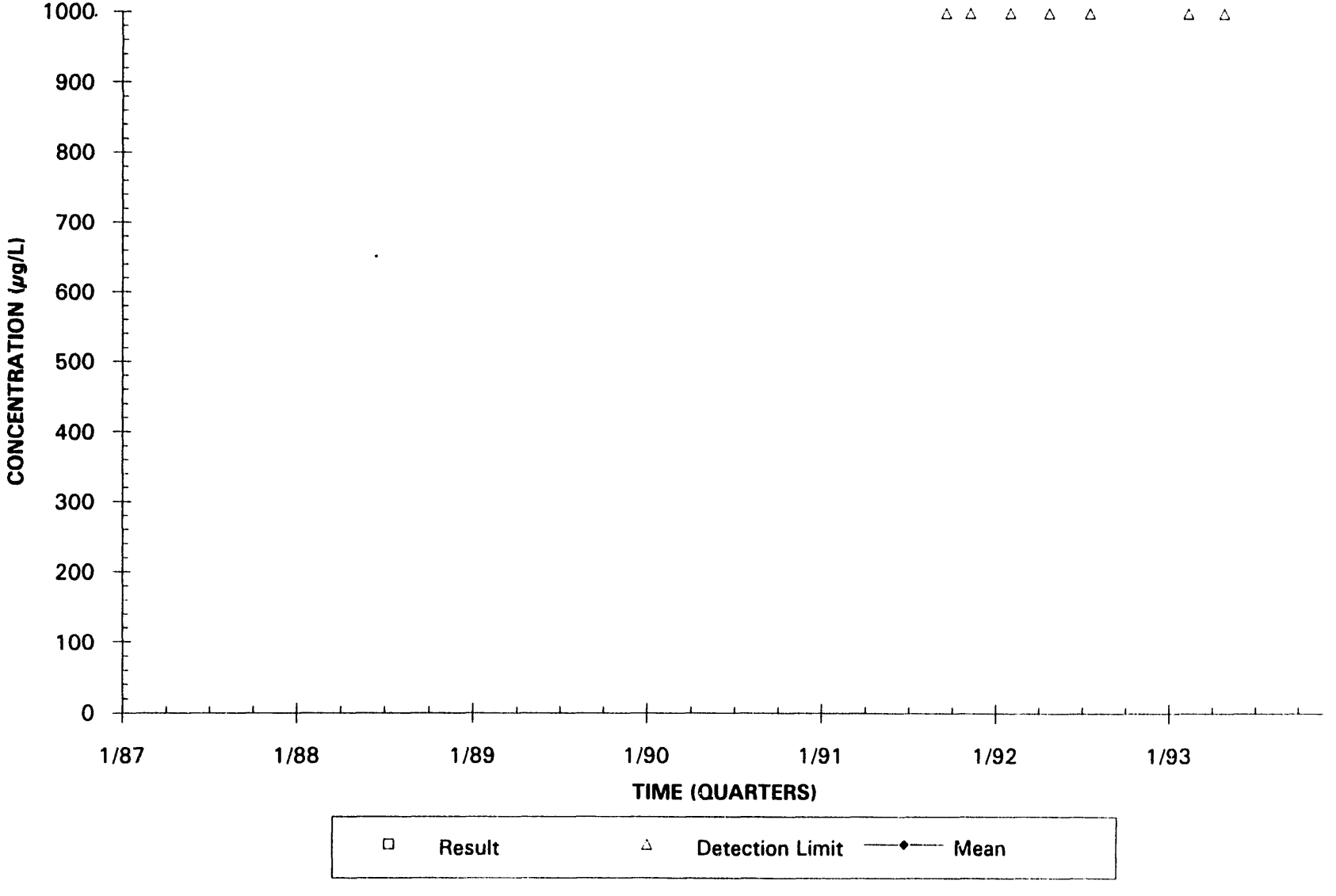
Total Alpha-Emitting Radium Activities
Well AMB 12D

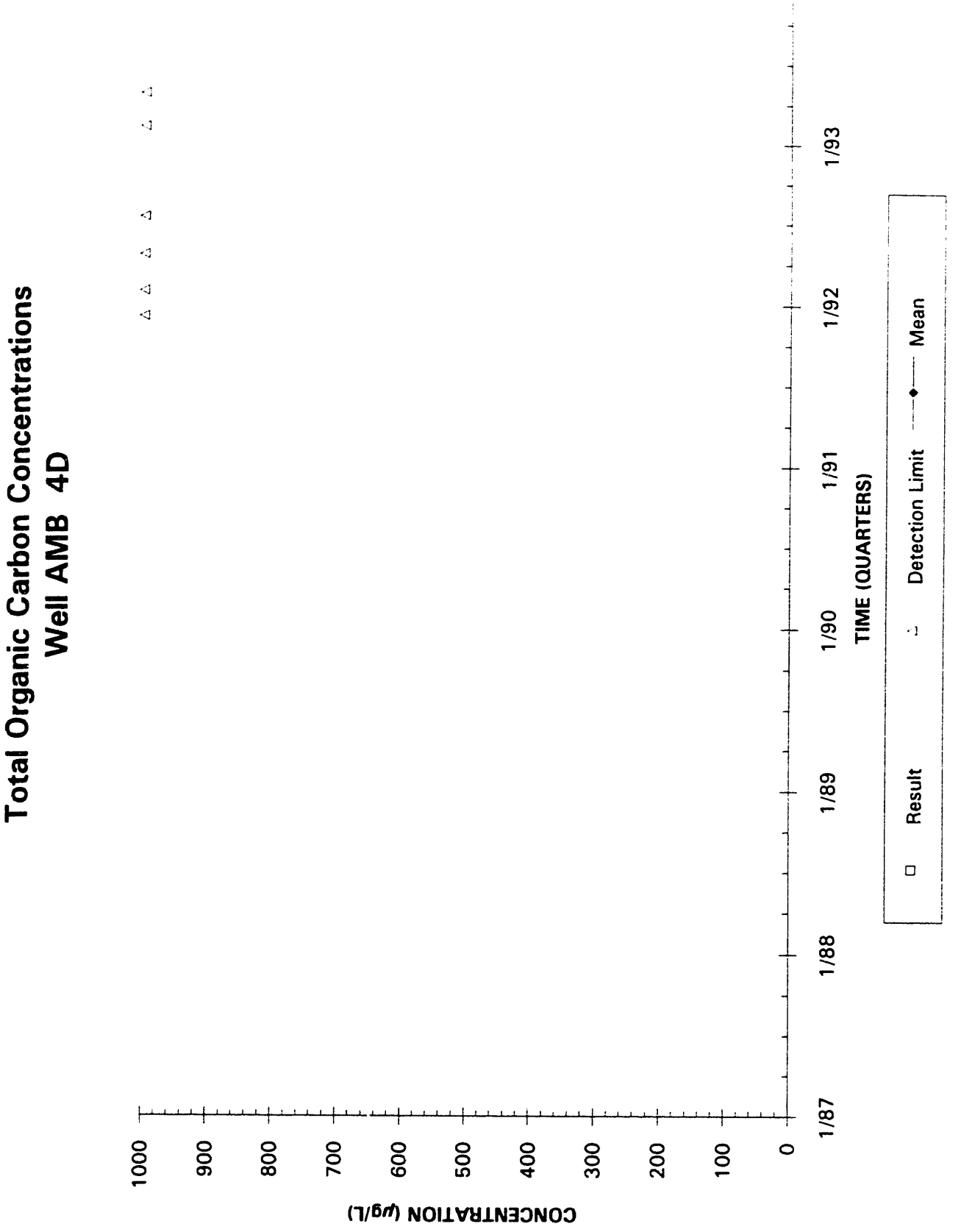


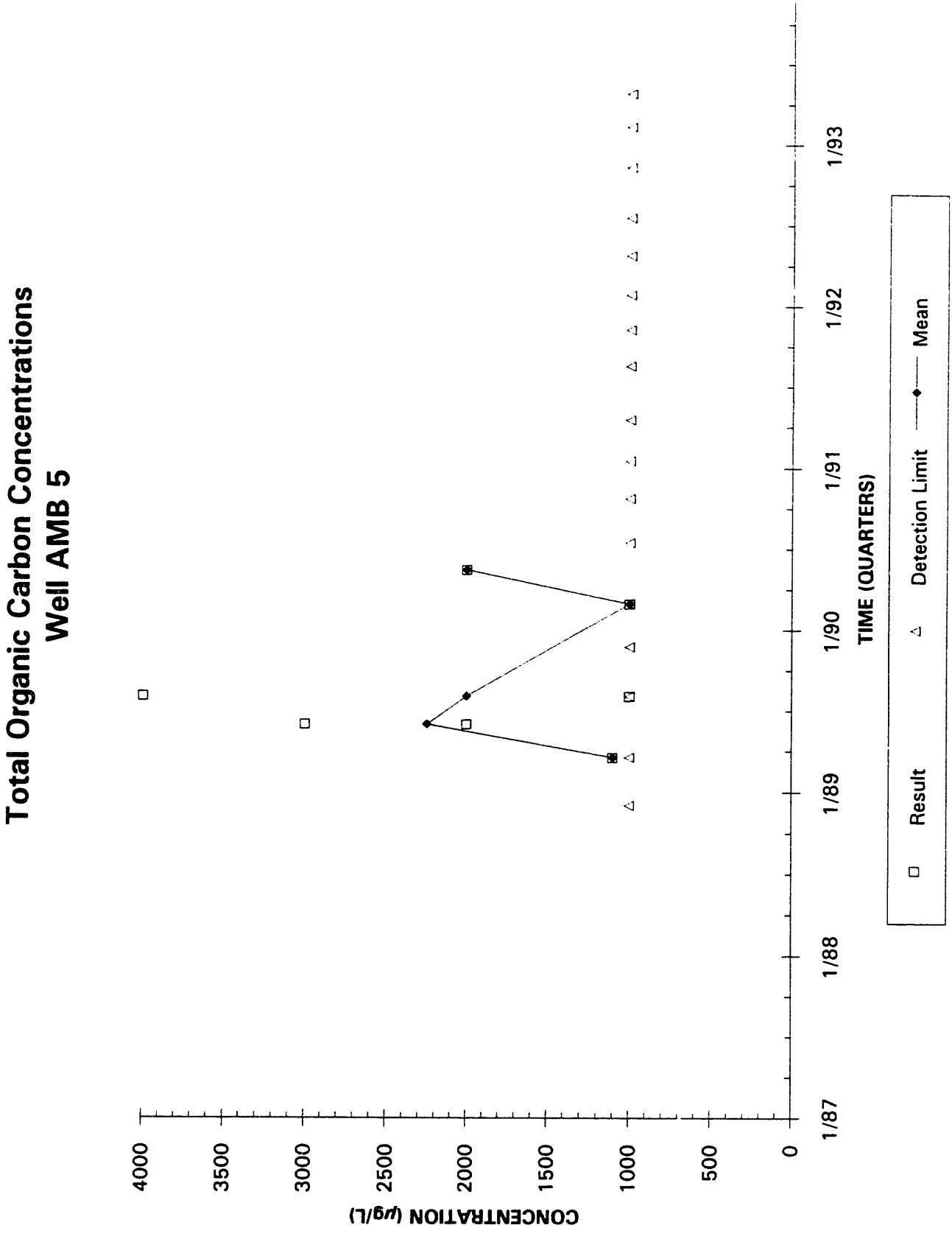

Total Alpha-Emitting Radium Activities
Well AMB 13AR
ACTIVITY (pCi/L)
2.5
2
1.5
1
0.5
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (Quarters)
Result
Detection Limit
Mean

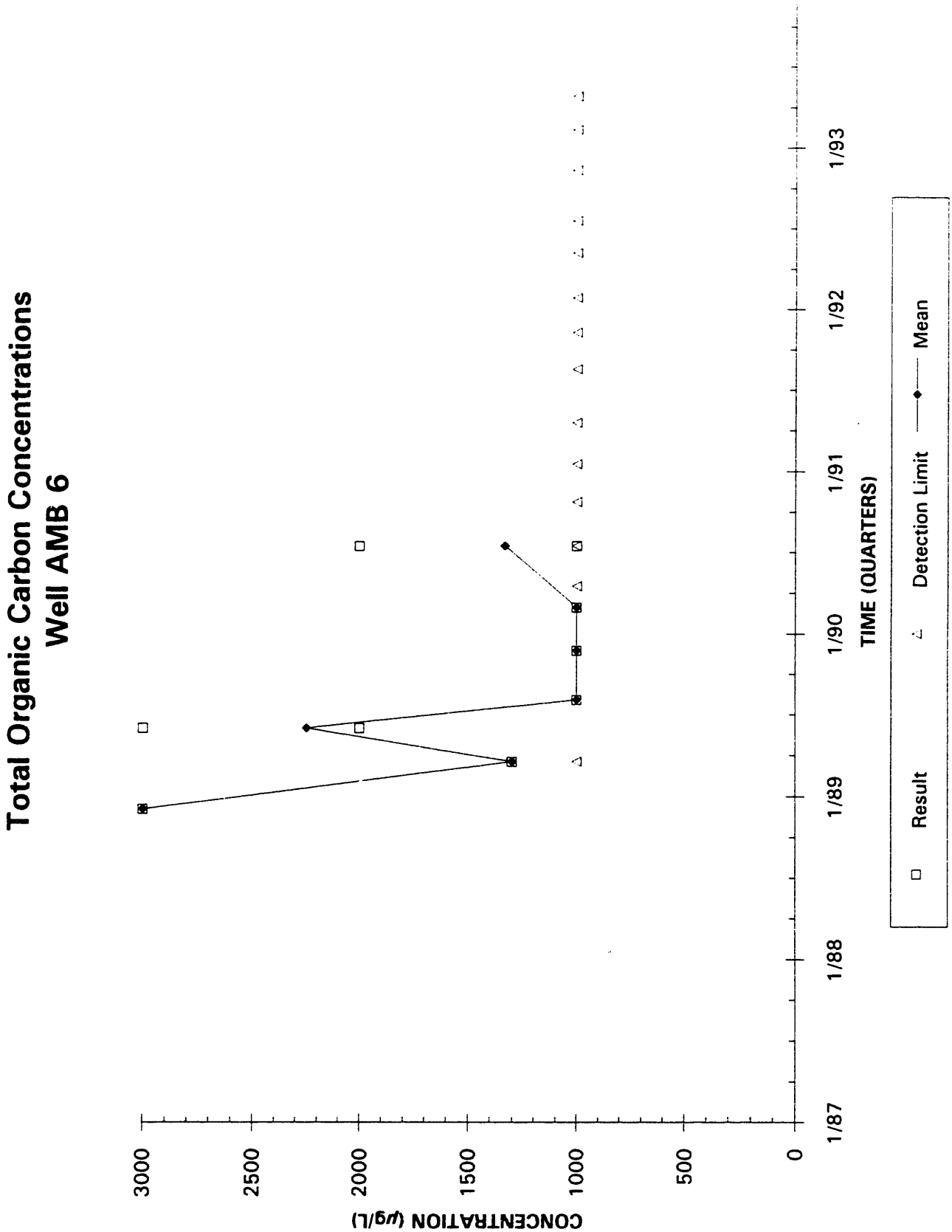

Total Organic Carbon Concentrations
Well AMB 4A
CONCENTRATION (µg/L)
1000
900
800
700
600
500
400
300
200
100
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

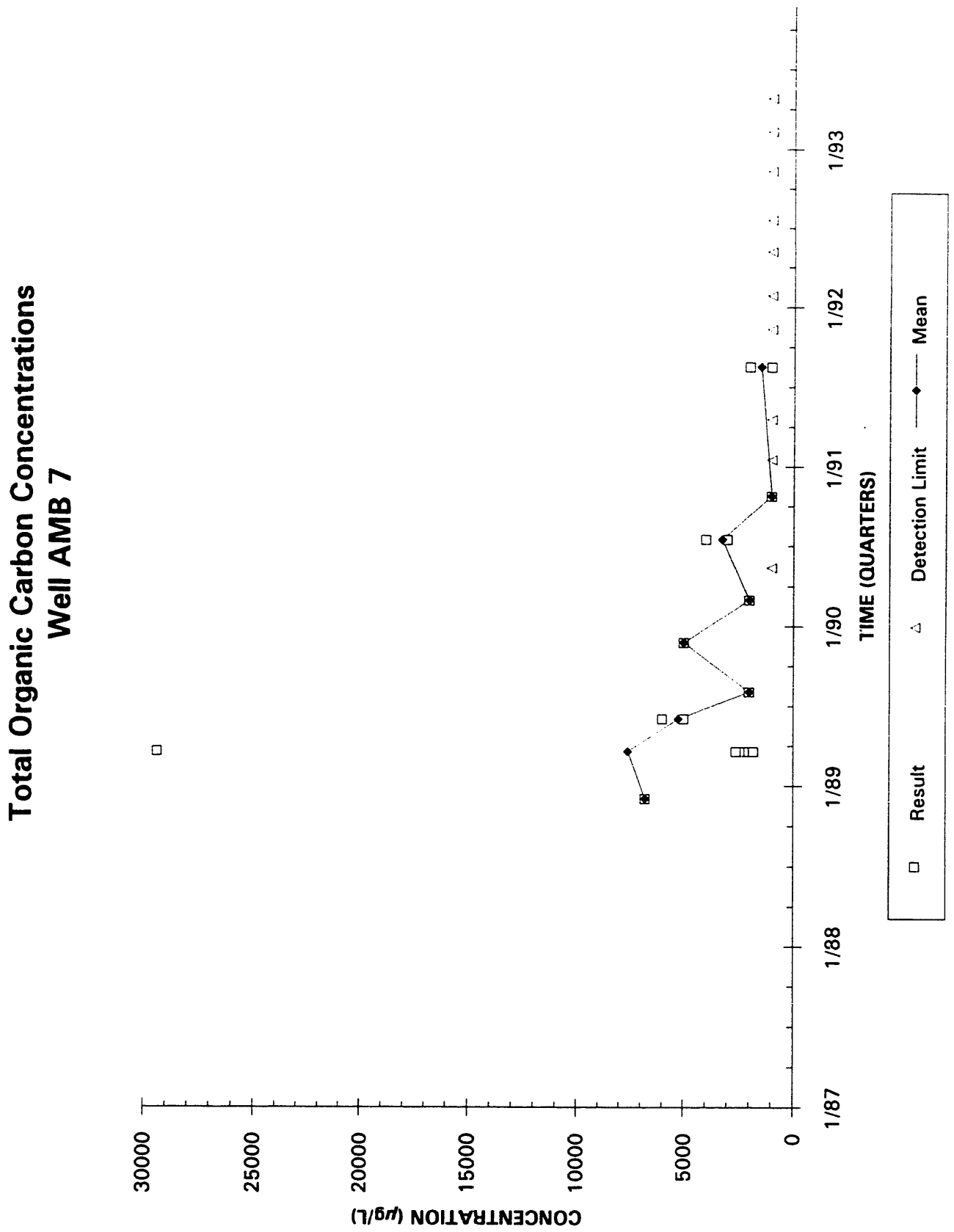
Total Organic Carbon Concentrations
Well AMB 4B



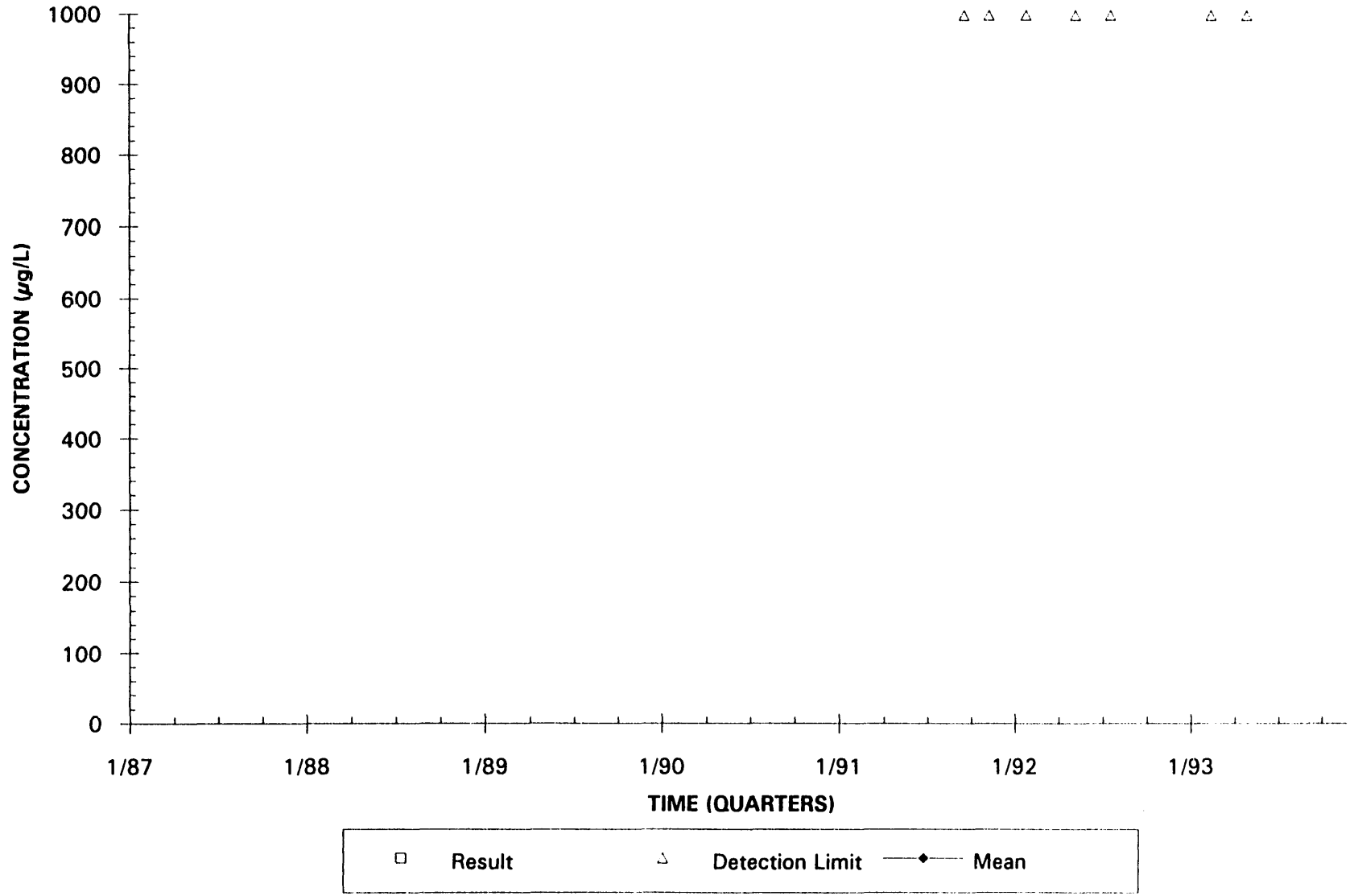

Total Organic Carbon Concentrations
Well AMB 4D
CONCENTRATION (µg/L)
1000
900
800
700
600
500
400
300
200
100
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

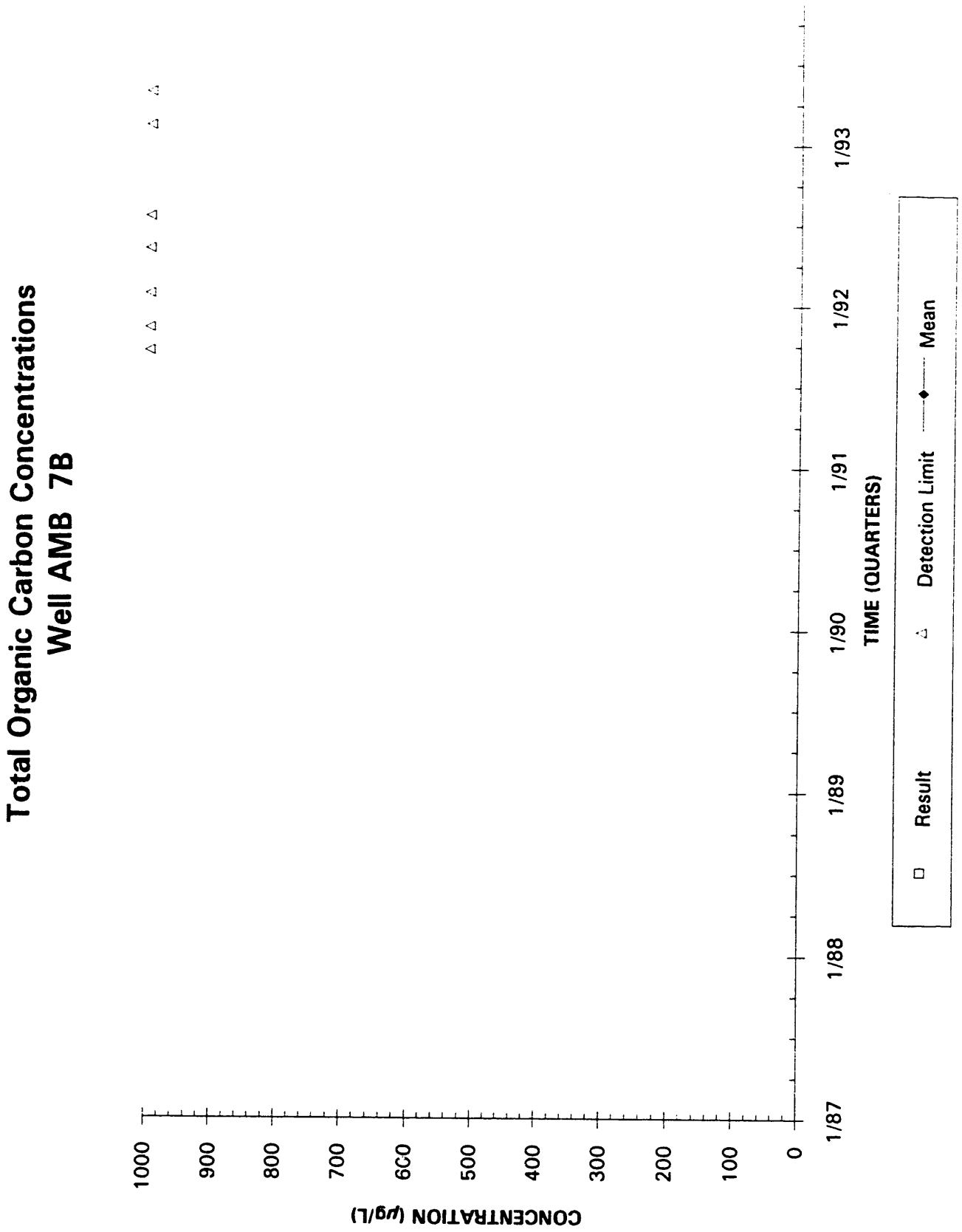

Total Organic Carbon Concentrations
Well AMB 5
CONCENTRATION (µg/L)
4000
3500
3000
2500
2000
1500
1000
500
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

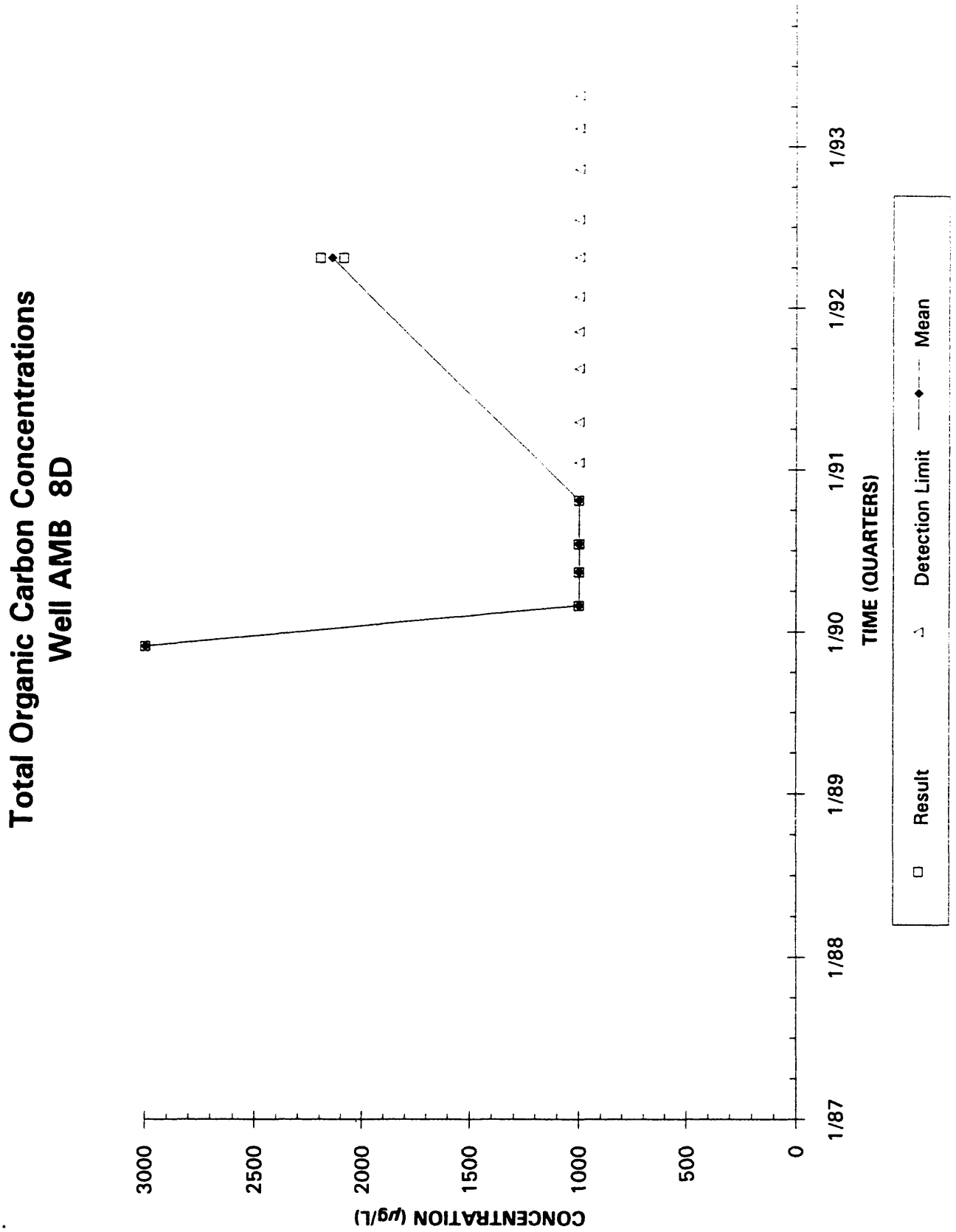

Total Organic Carbon Concentrations
Well AMB 6
CONCENTRATION (µg/L)
3000
2500
2000
1500
1000
500
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

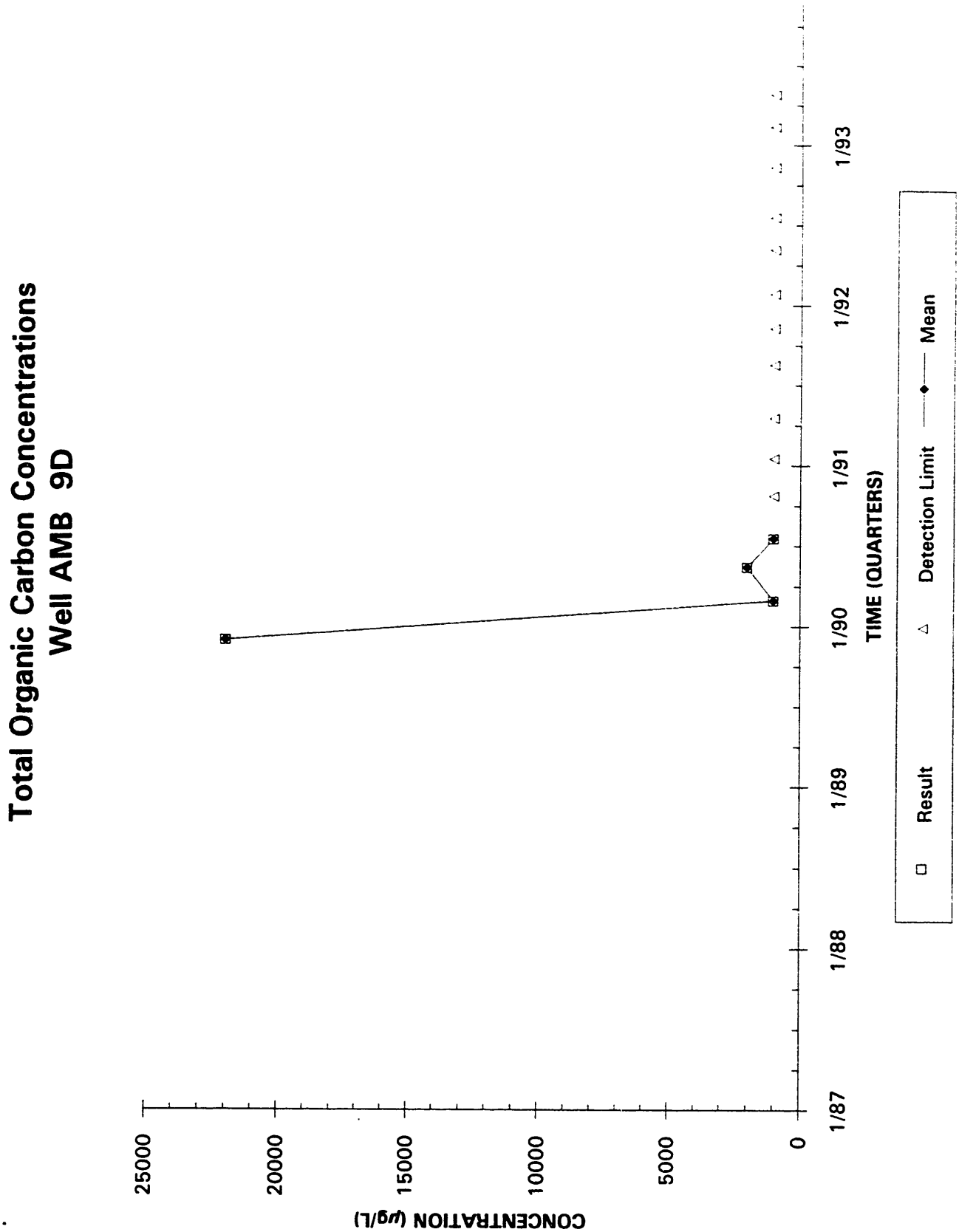

Total Organic Carbon Concentrations
Well AMB 7
CONCENTRATION (µg/L)
30000
25000
20000
15000
10000
5000
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

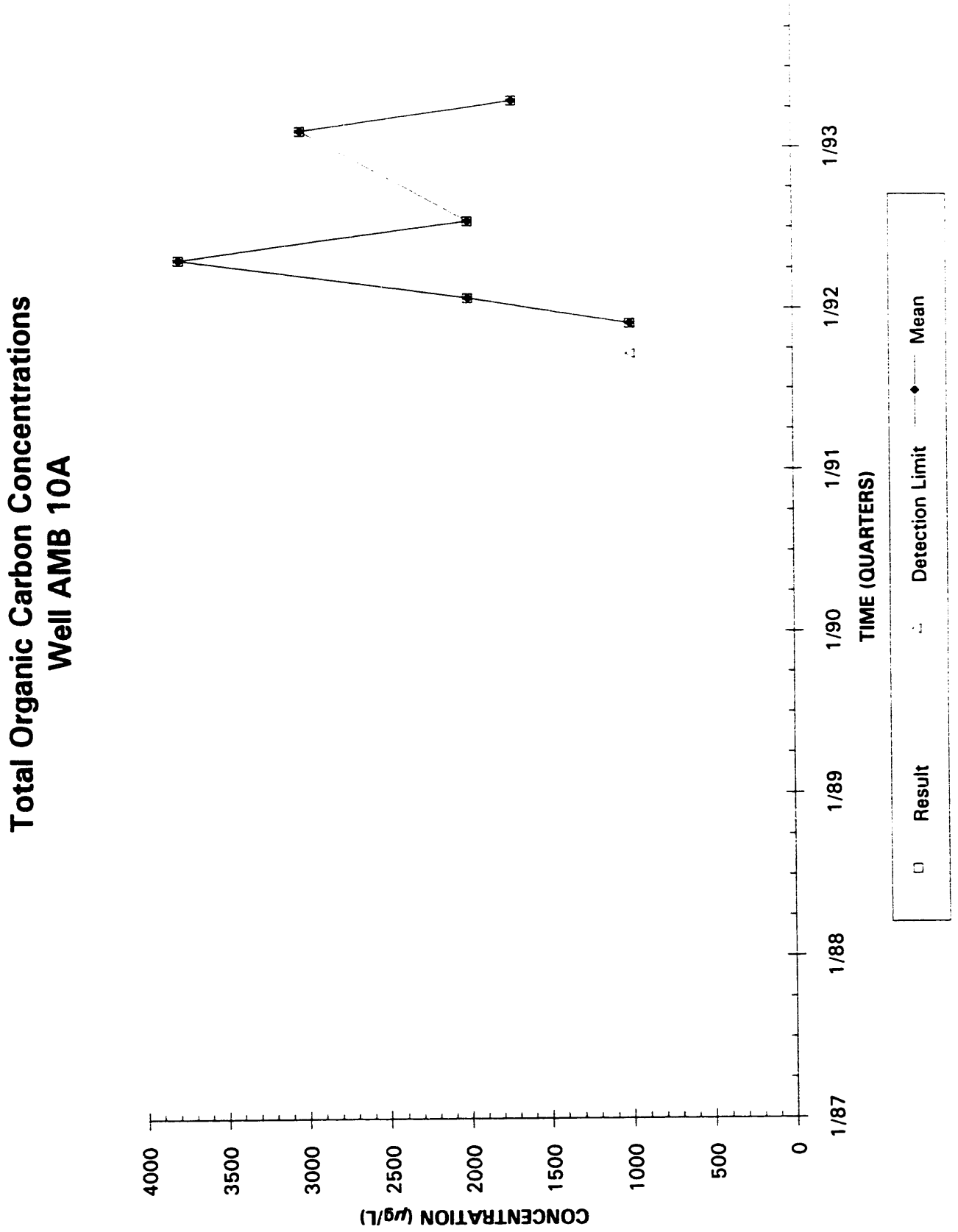
Total Organic Carbon Concentrations
Well AMB 7A

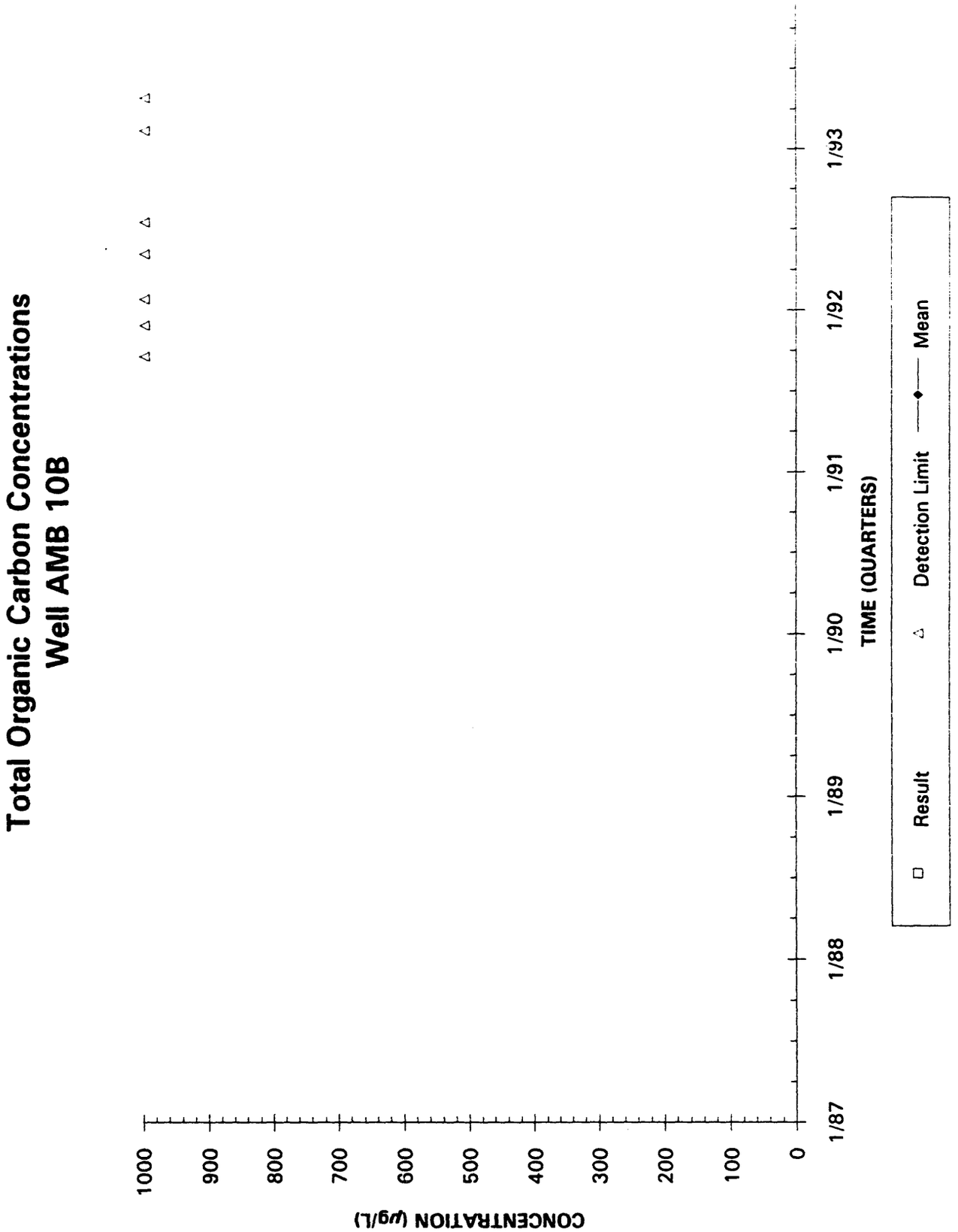


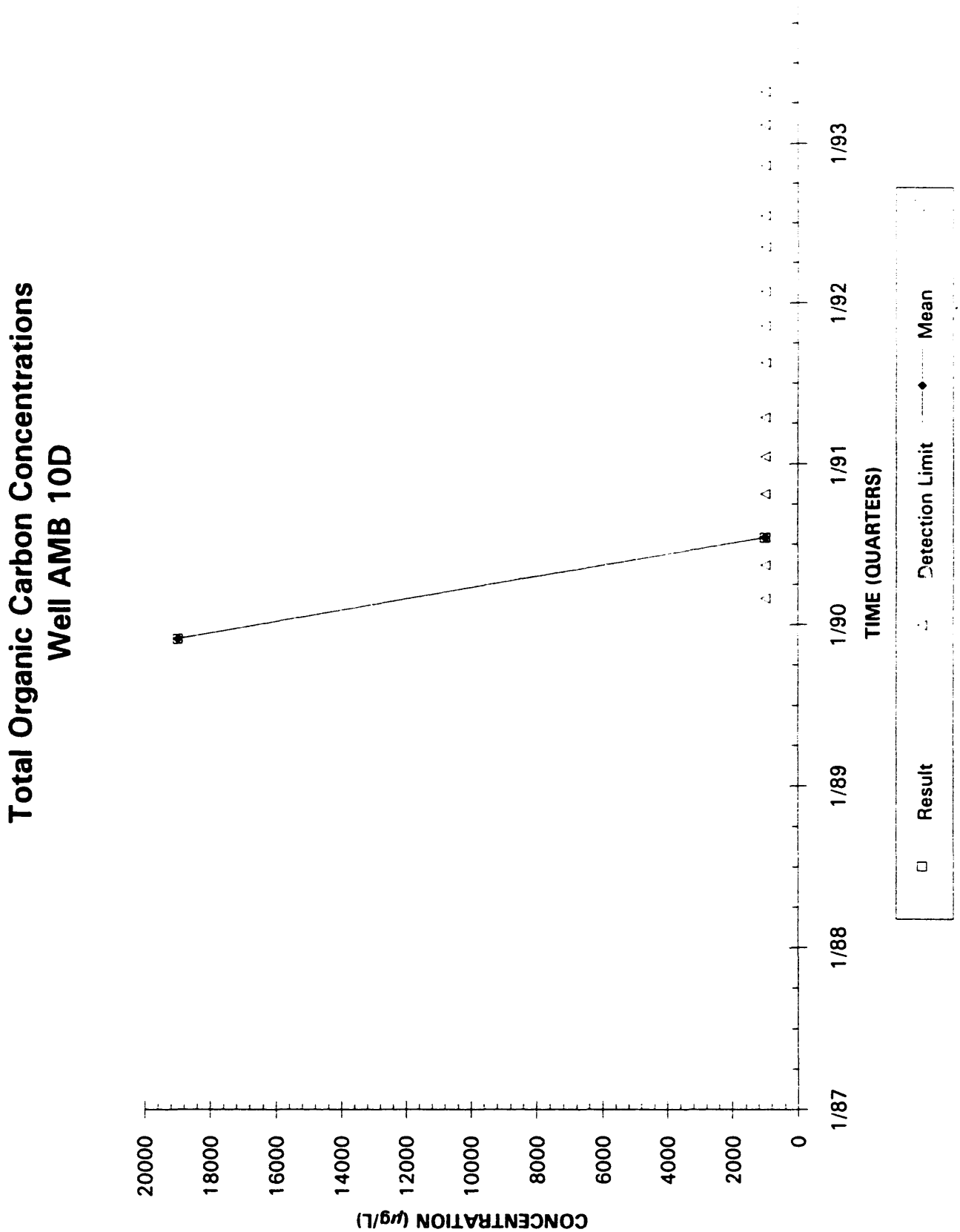

Total Organic Carbon Concentrations
Well AMB 7B
CONCENTRATION (µg/L)
1000
900
800
700
600
500
400
300
200
100
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean


Total Organic Carbon Concentrations
Well AMB 8D
CONCENTRATION (µg/L)
3000
2500
2000
1500
1000
500
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

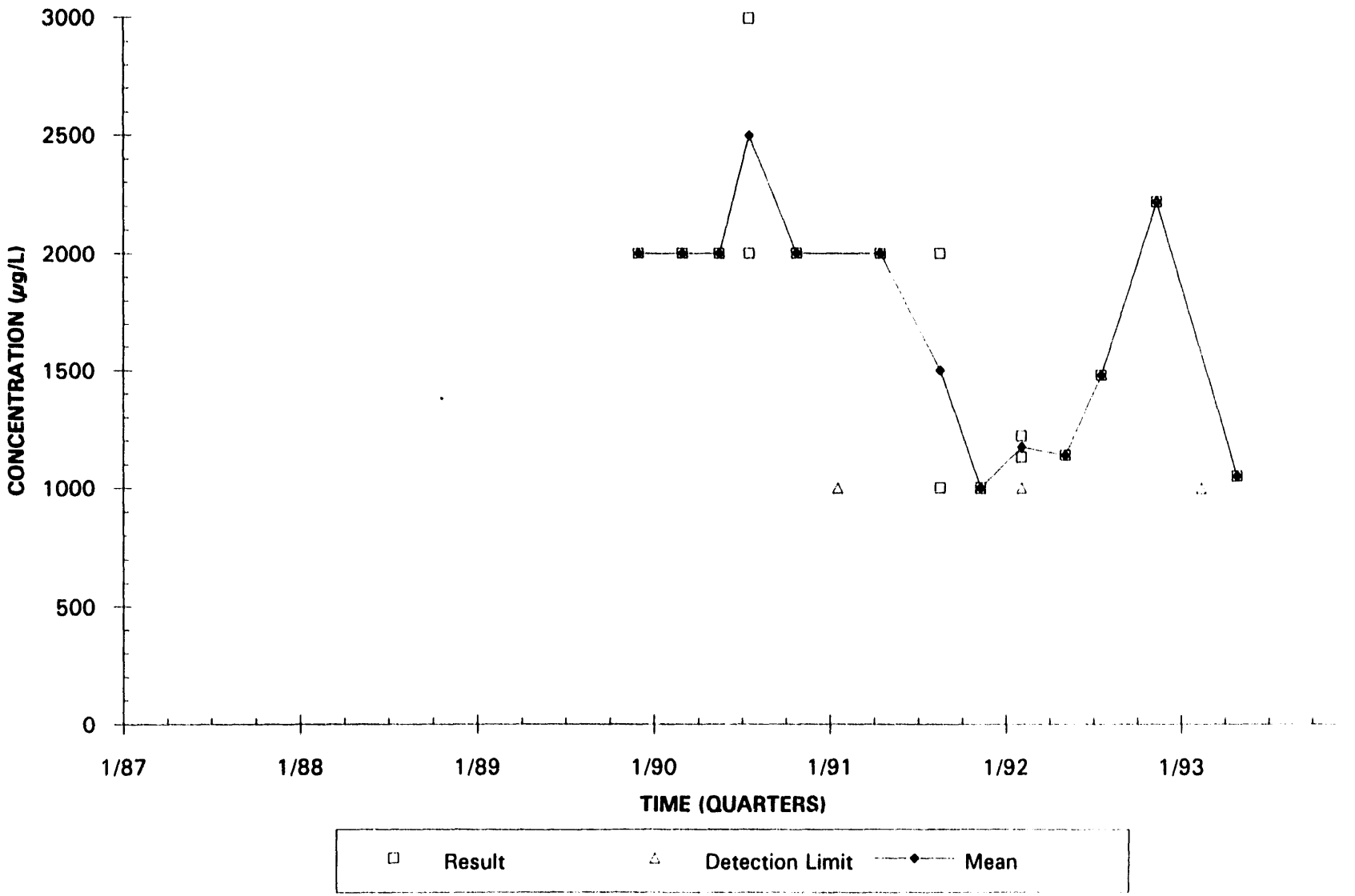

Total Organic Carbon Concentrations
Well AMB 9D
CONCENTRATION (µg/L)
25000
20000
15000
10000
5000
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

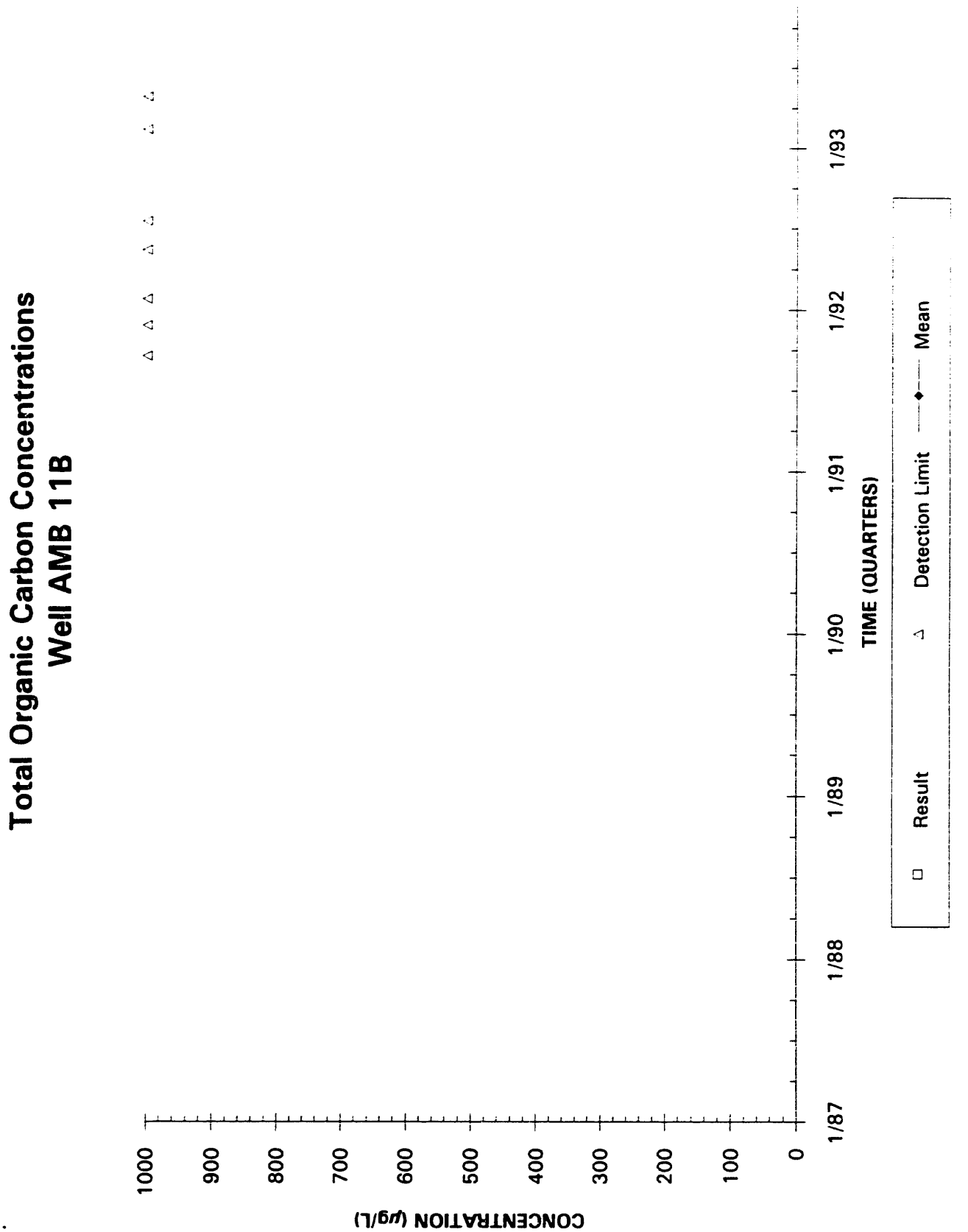

Total Organic Carbon Concentrations
Well AMB 10A
CONCENTRATION (µg/L)
4000
3500
3000
2500
2000
1500
1000
500
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean


Total Organic Carbon Concentrations
Well AMB 10B
CONCENTRATION (µg/L)
1000
900
800
700
600
500
400
300
200
100
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

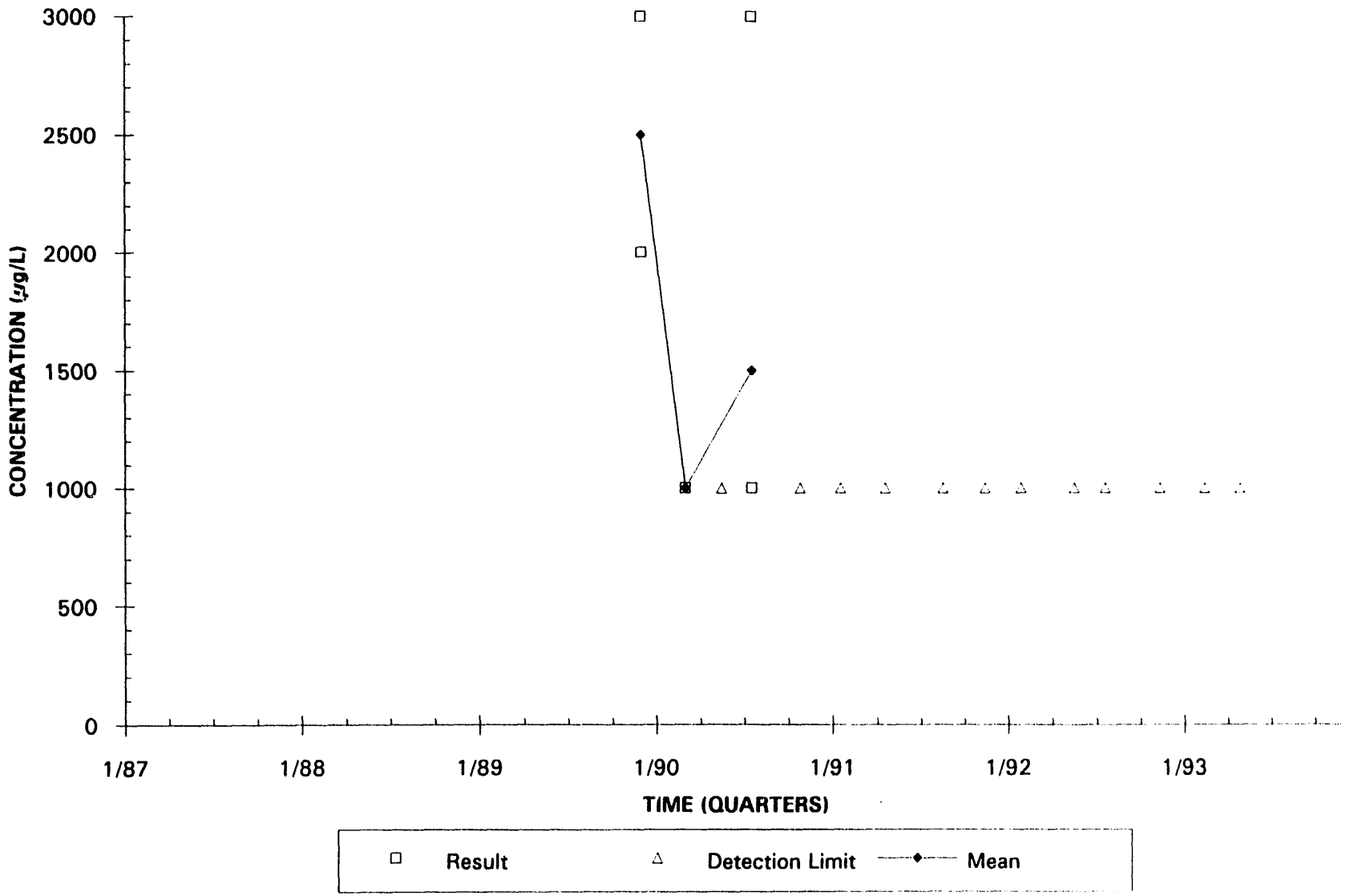

Total Organic Carbon Concentrations
Well AMB 10D
CONCENTRATION (µg/L)
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

Total Organic Carbon Concentrations
Well AMB 10DD

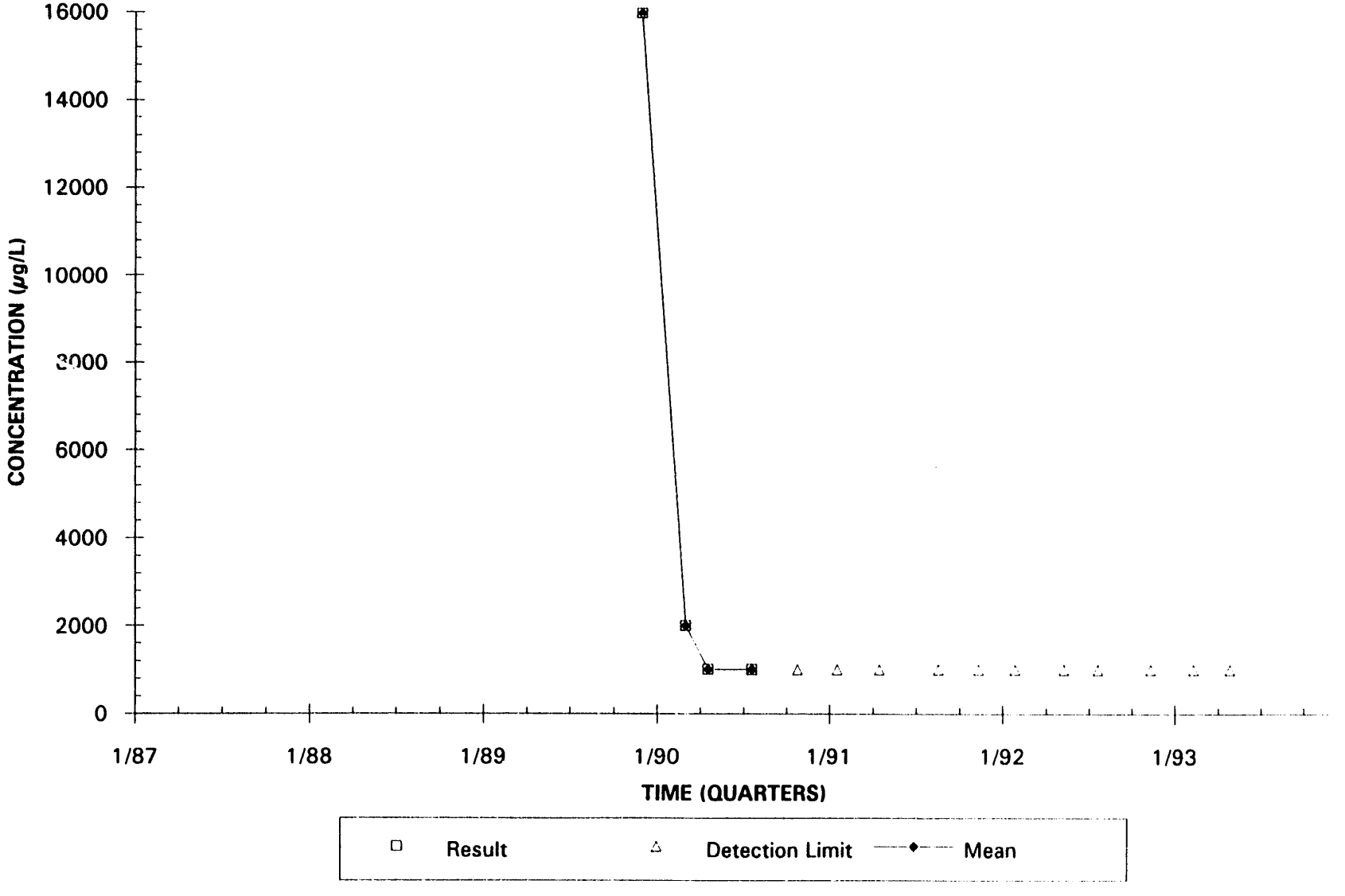



Total Organic Carbon Concentrations
Well AMB 11B
CONCENTRATION (µg/L)
1000
900
800
700
600
500
400
300
200
100
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

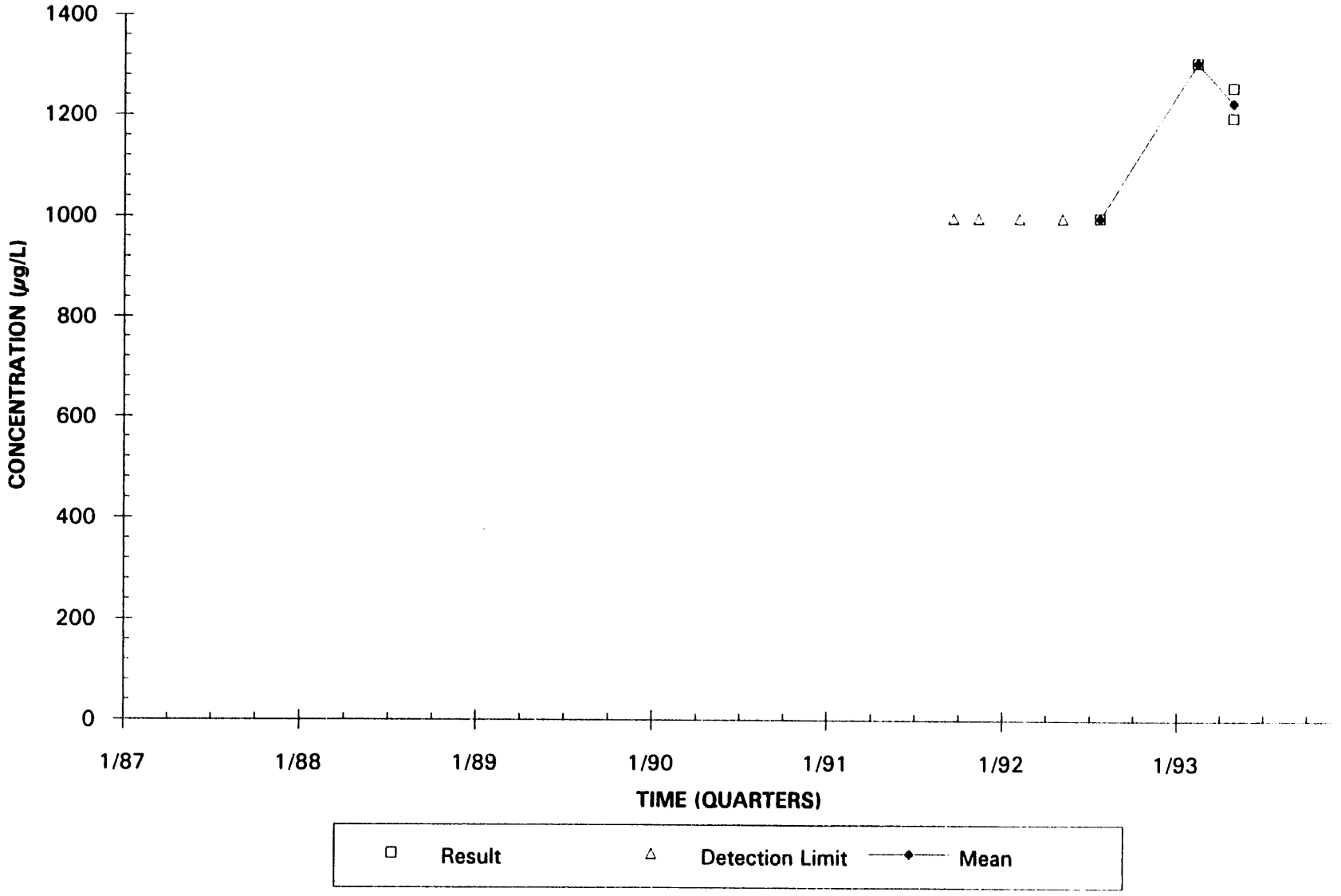
Total Organic Carbon Concentrations
Well AMB 11D

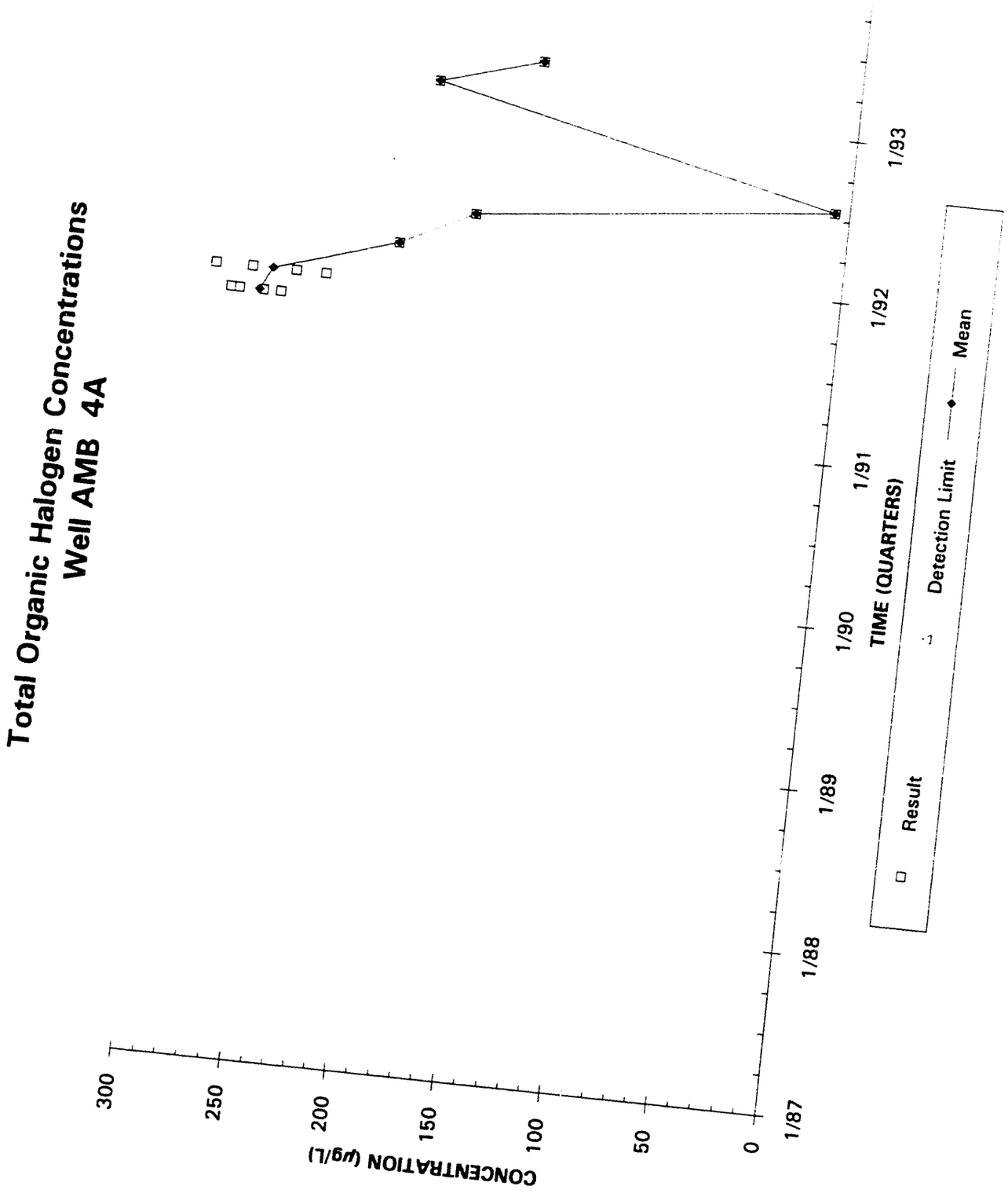


Total Organic Carbon Concentrations
Well AMB 12D

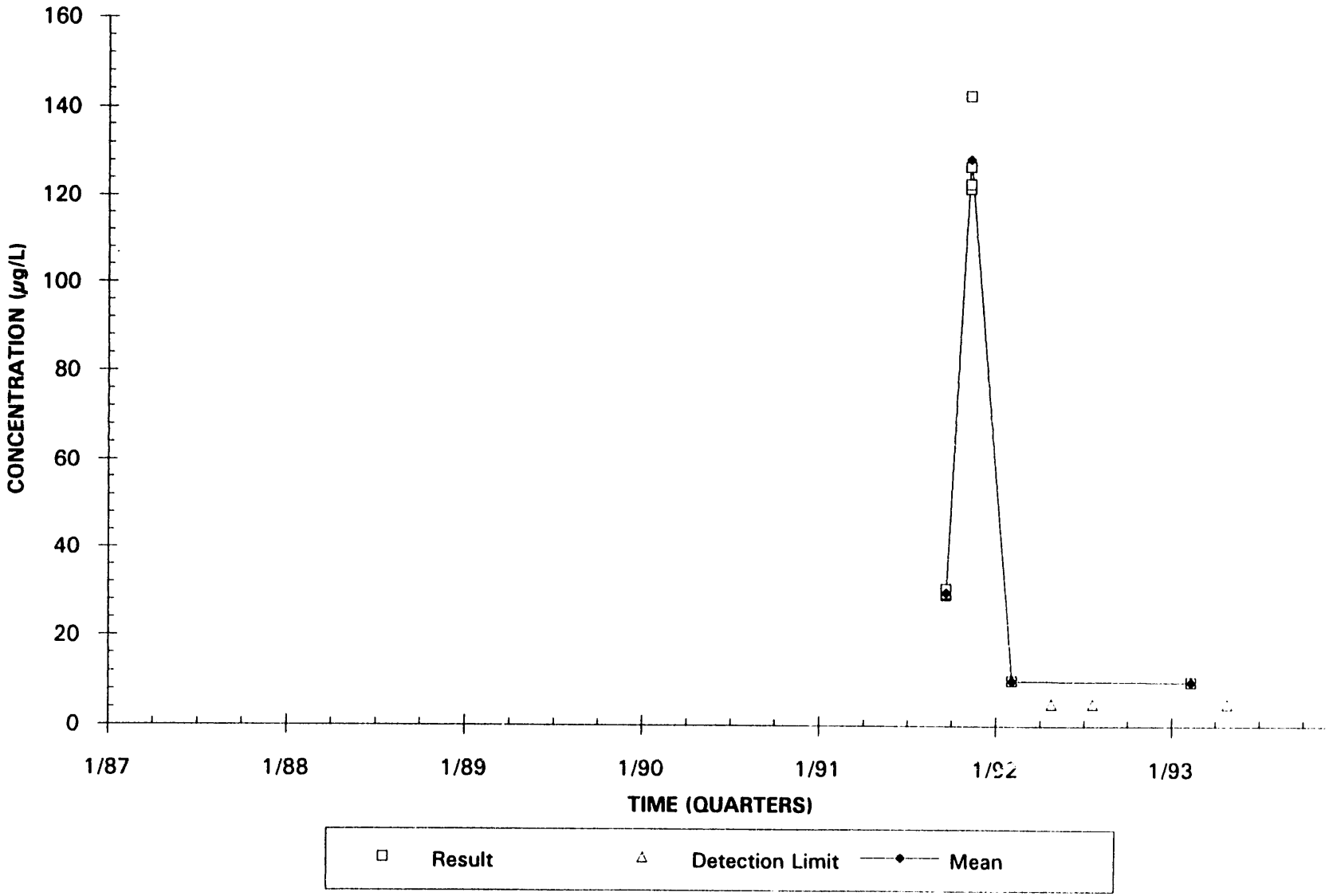


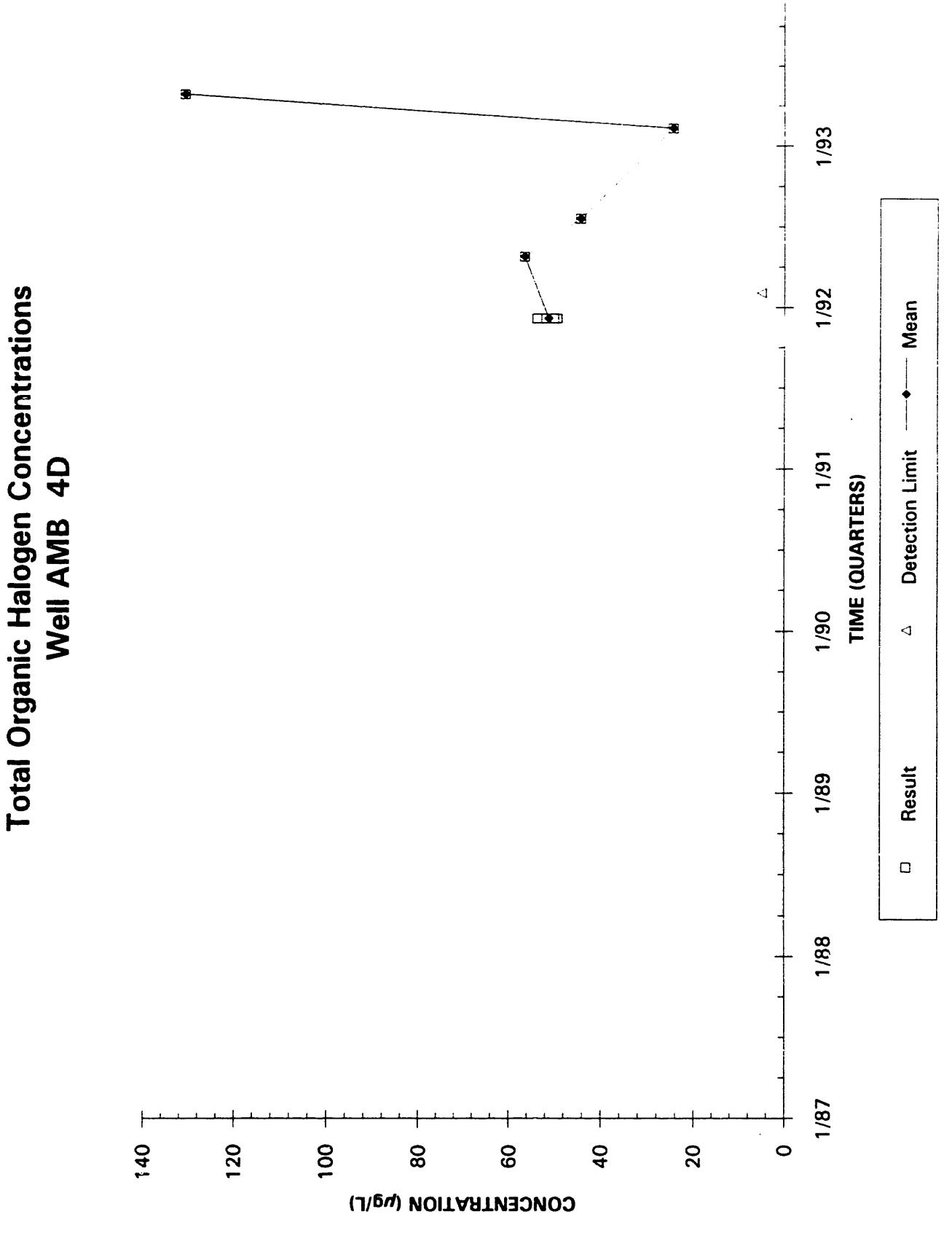
Total Organic Carbon Concentrations
Well AMB 13AR

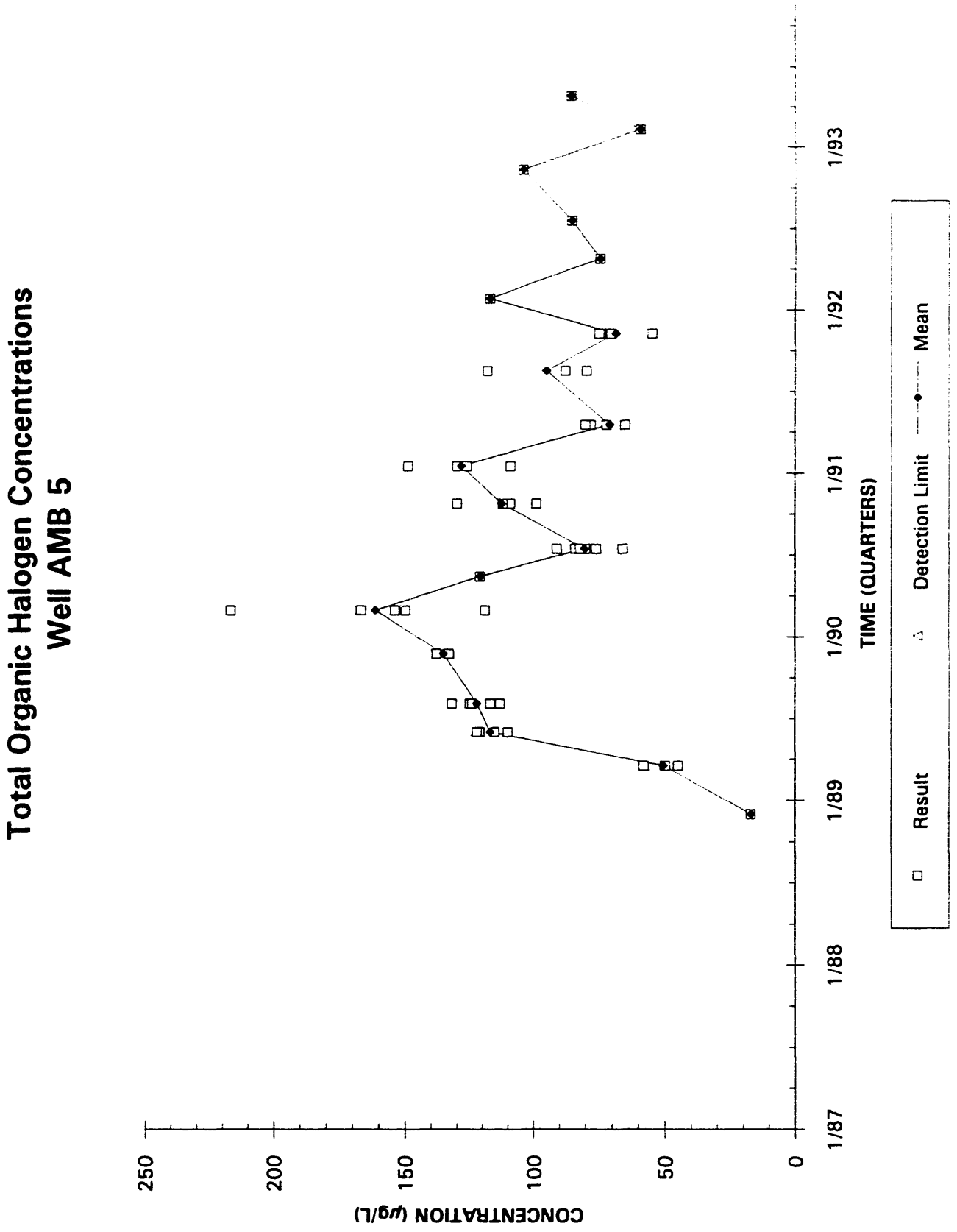



Total Organic Halogen Concentrations
Well AMB 4A
CONCENTRATION (µg/L)
300
250
200
150
100
50
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

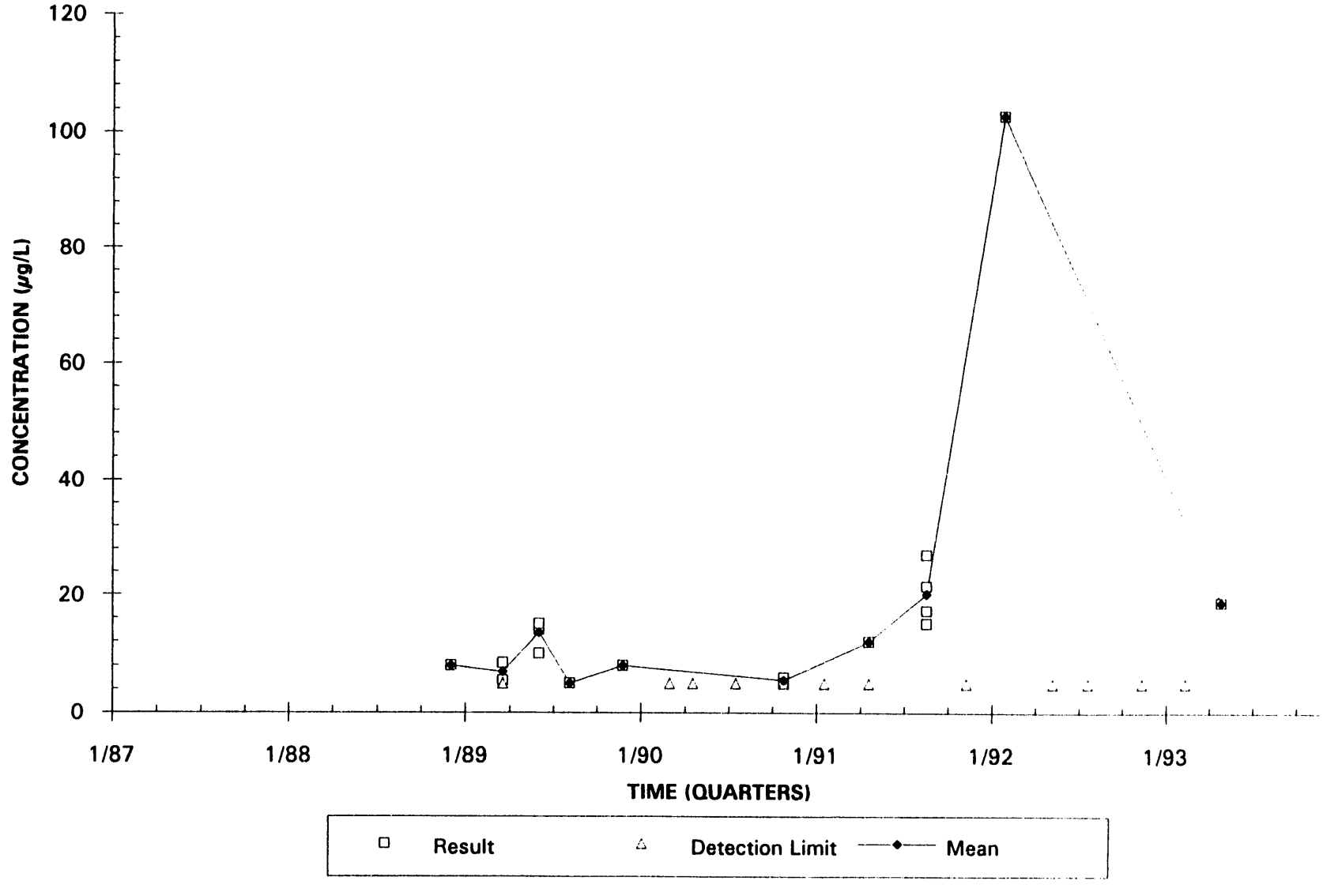
Total Organic Halogen Concentrations
Well AMB 4B

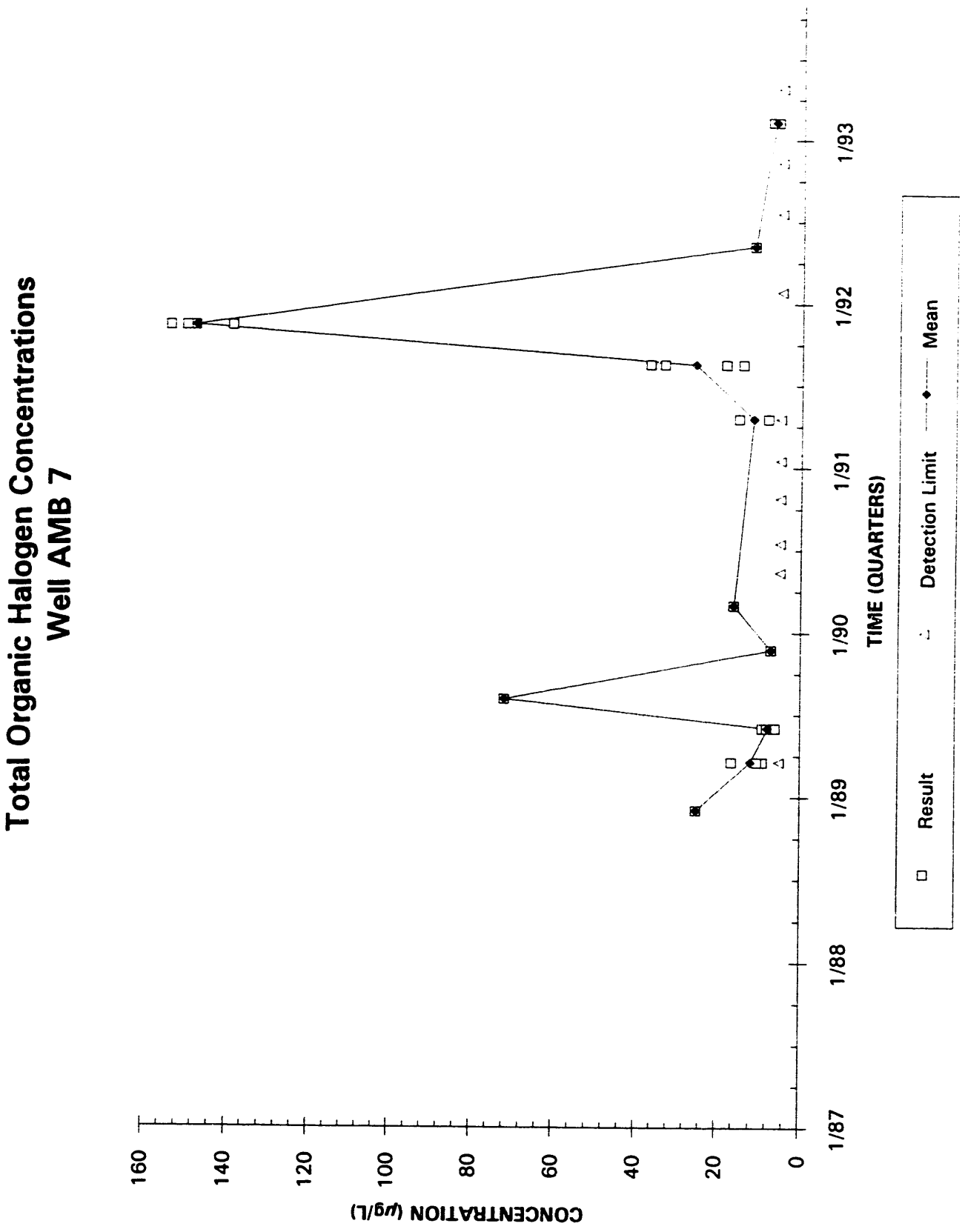


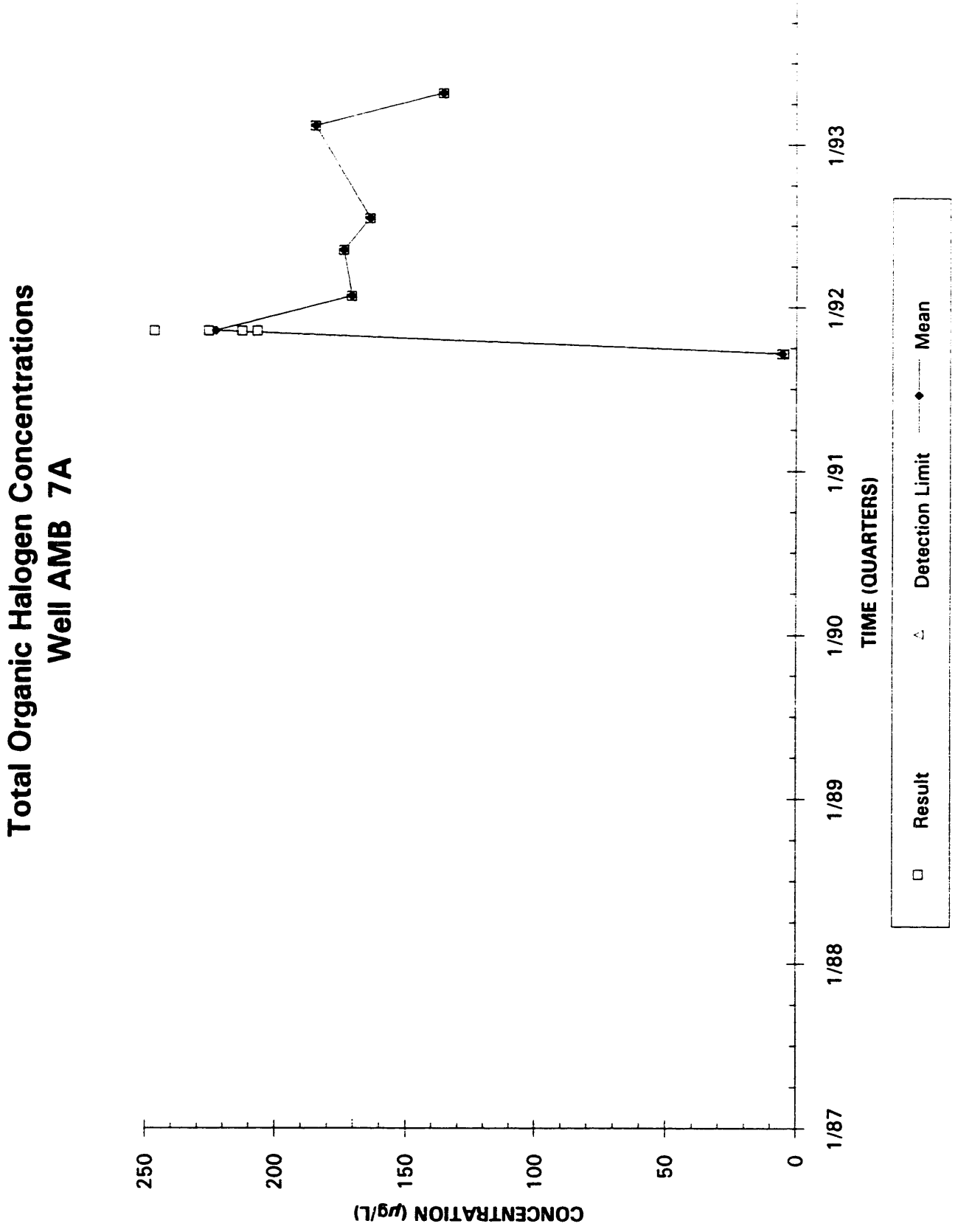

Total Organic Halogen Concentrations
Well AMB 4D
CONCENTRATION (µg/L)
140
120
100
80
60
40
20
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

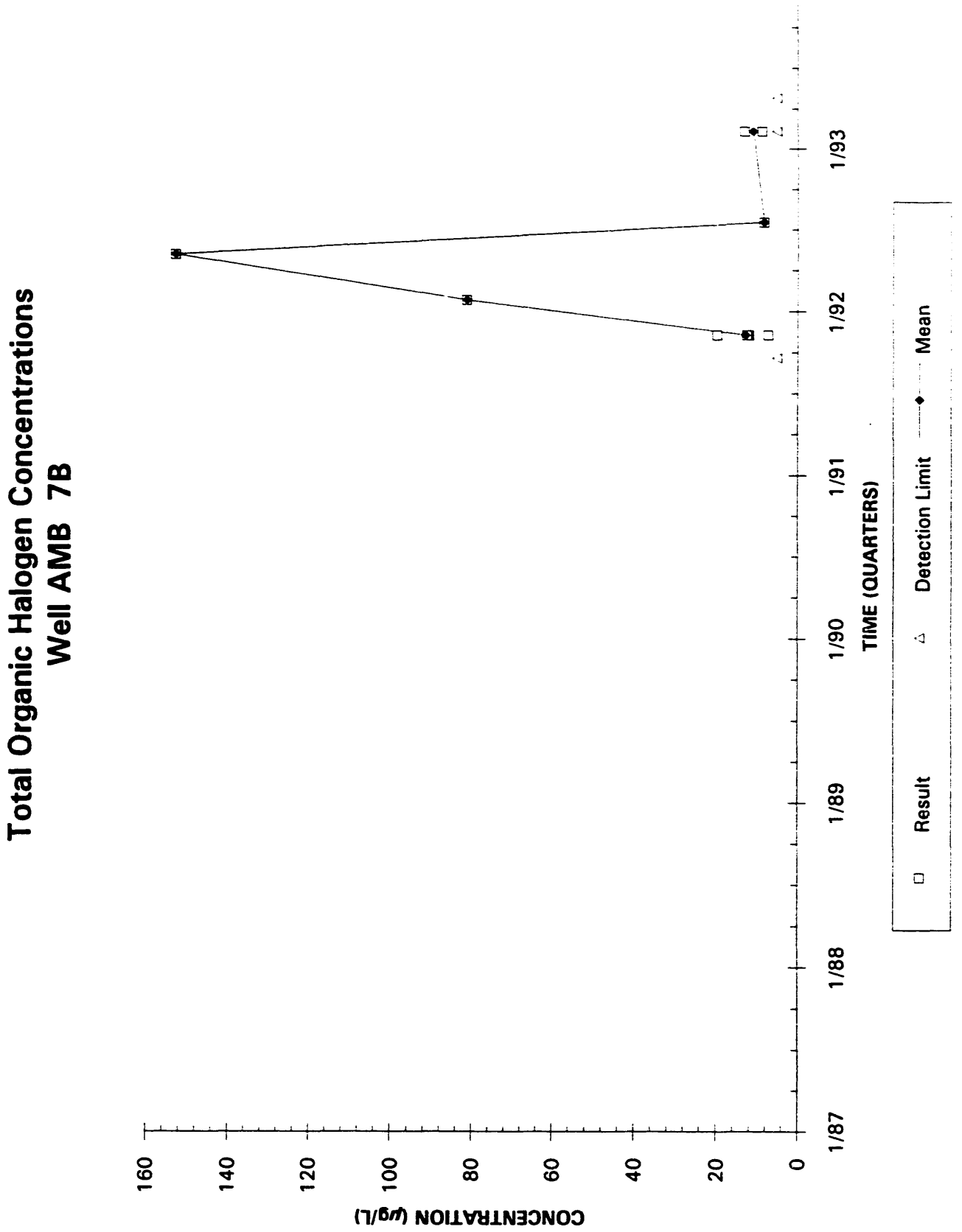

Total Organic Halogen Concentrations
Well AMB 5
CONCENTRATION (µg/L)
250
200
150
100
50
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

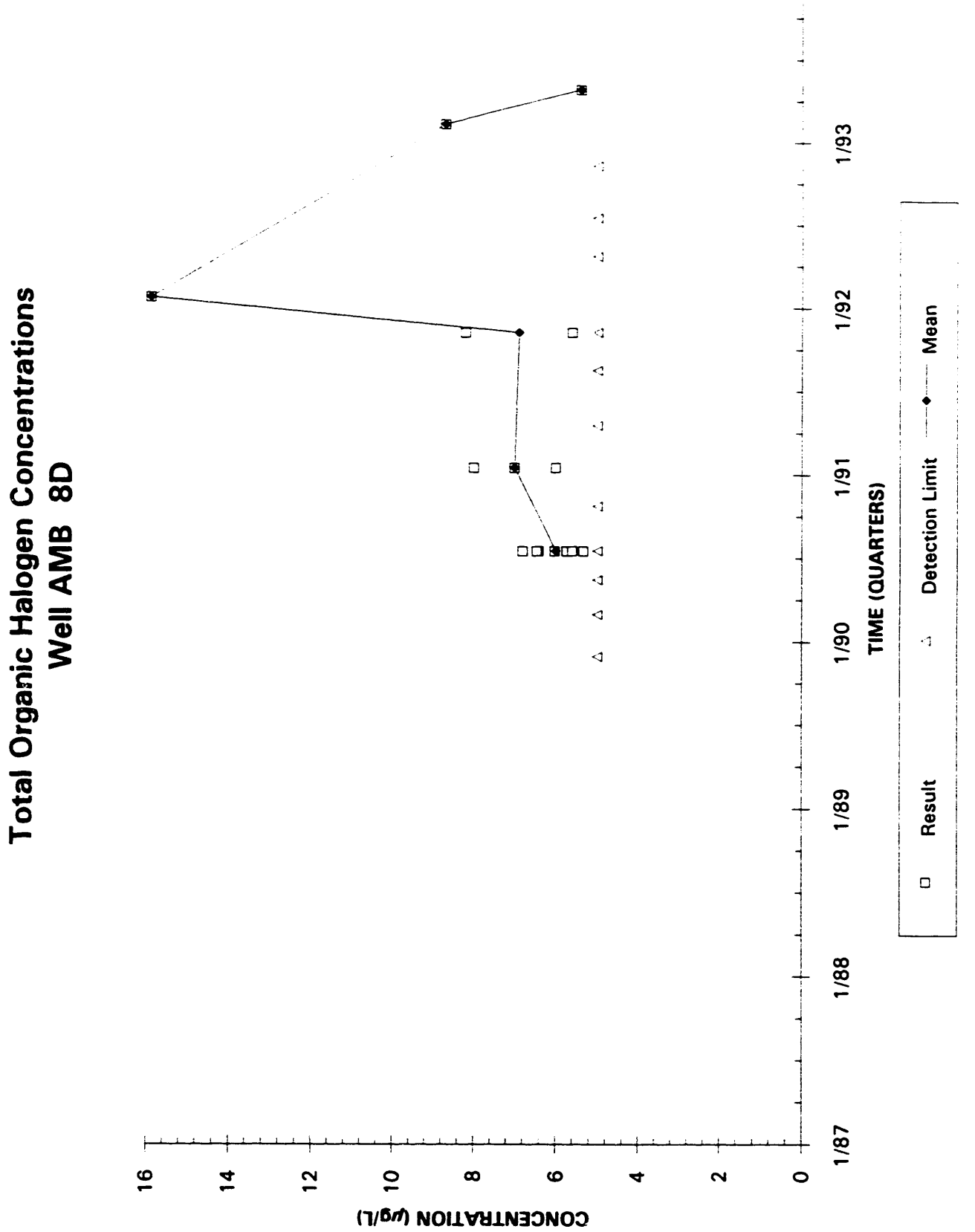
Total Organic Halogen Concentrations
Well AMB 6

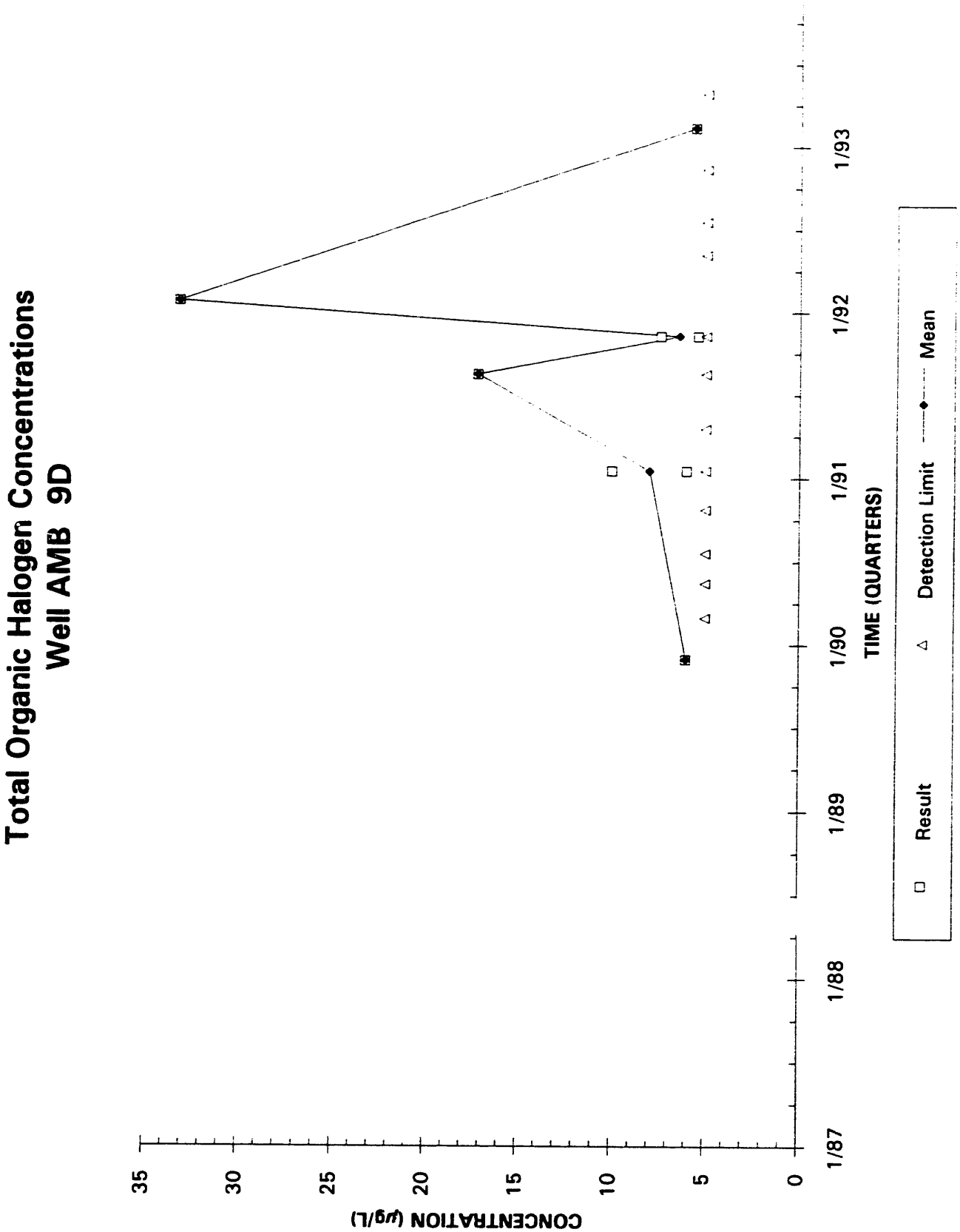



Total Organic Halogen Concentrations
Well AMB 7
CONCENTRATION (µg/L)
0
20
40
60
80
100
120
140
160
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

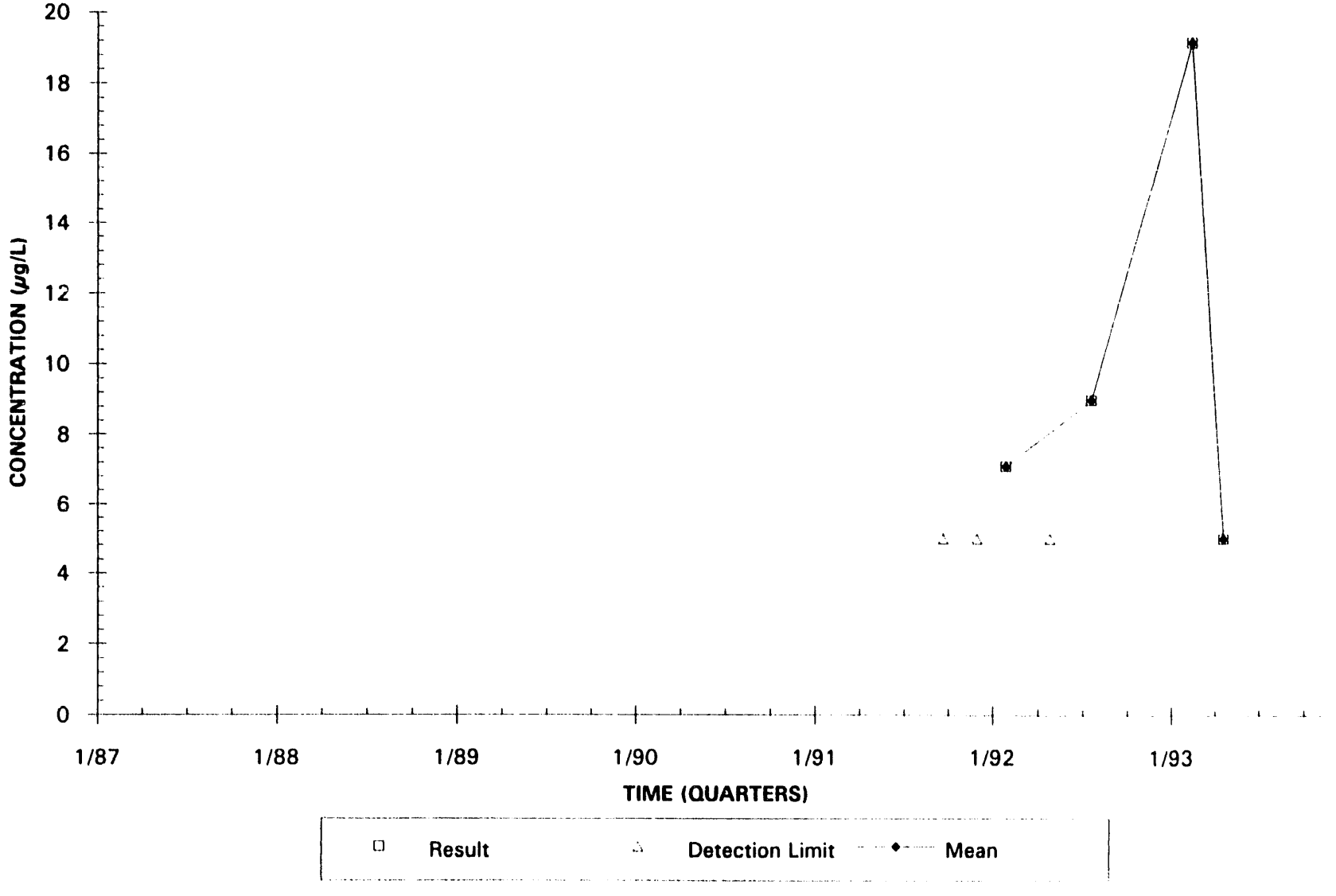

Total Organic Halogen Concentrations
Well AMB 7A
CONCENTRATION (µg/L)
250
200
150
100
50
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

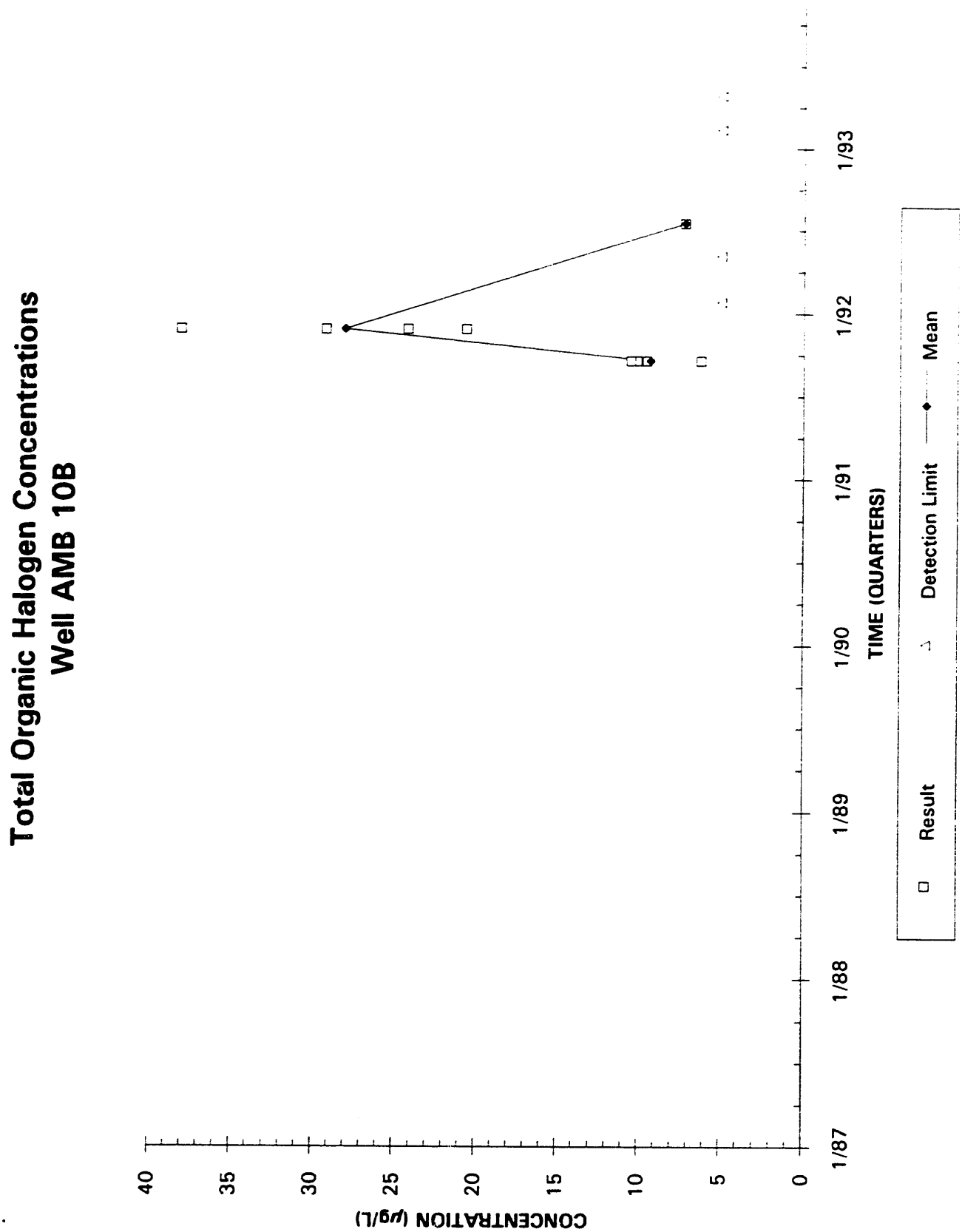

Total Organic Halogen Concentrations
Well AMB 7B
CONCENTRATION (µg/L)
160
140
120
100
80
60
40
20
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean


Total Organic Halogen Concentrations
Well AMB 8D
CONCENTRATION (µg/L)
0
2
4
6
8
10
12
14
16
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

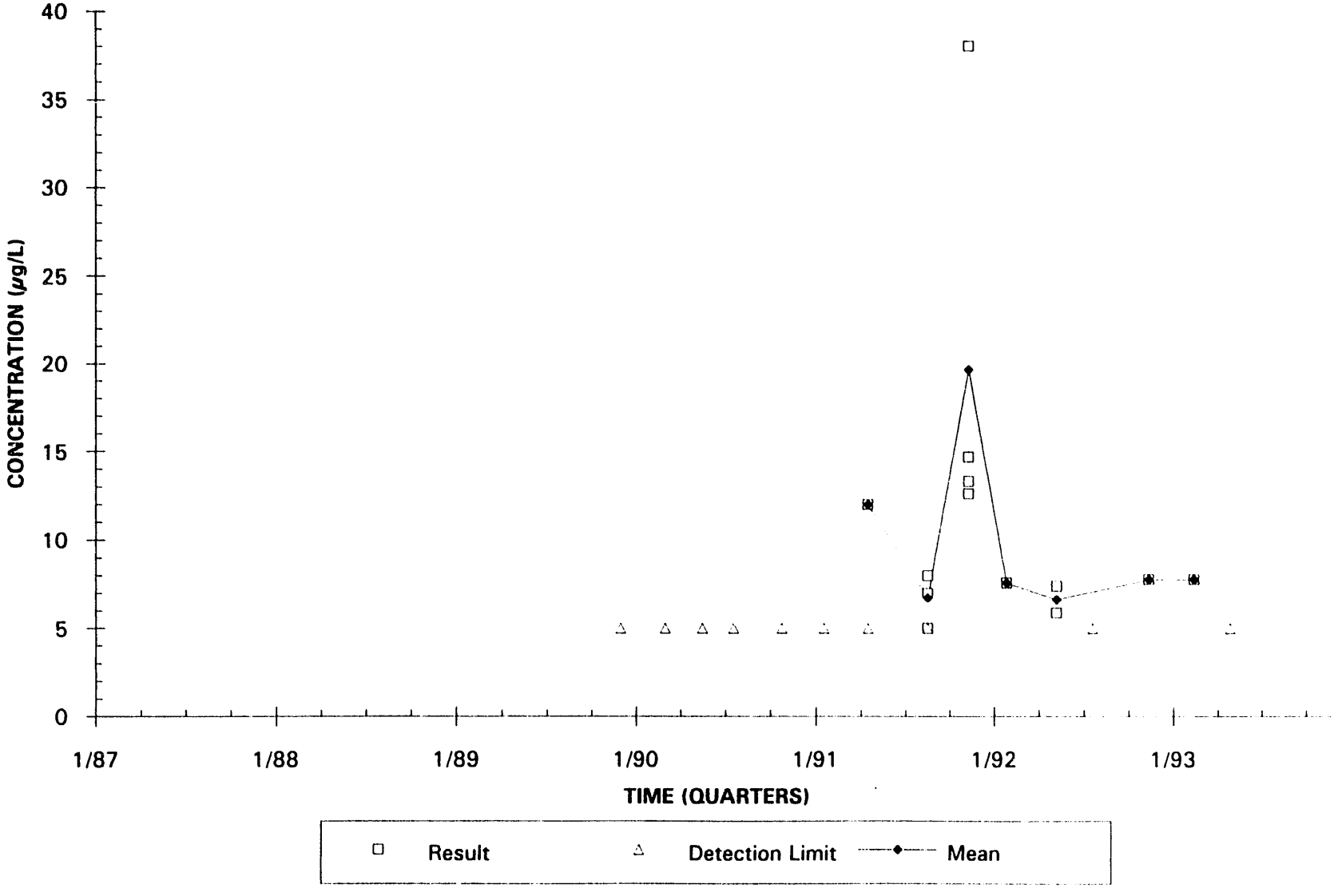

Total Organic Halogen Concentrations
Well AMB 9D
CONCENTRATION (µg/L)
35
30
25
20
15
10
5
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

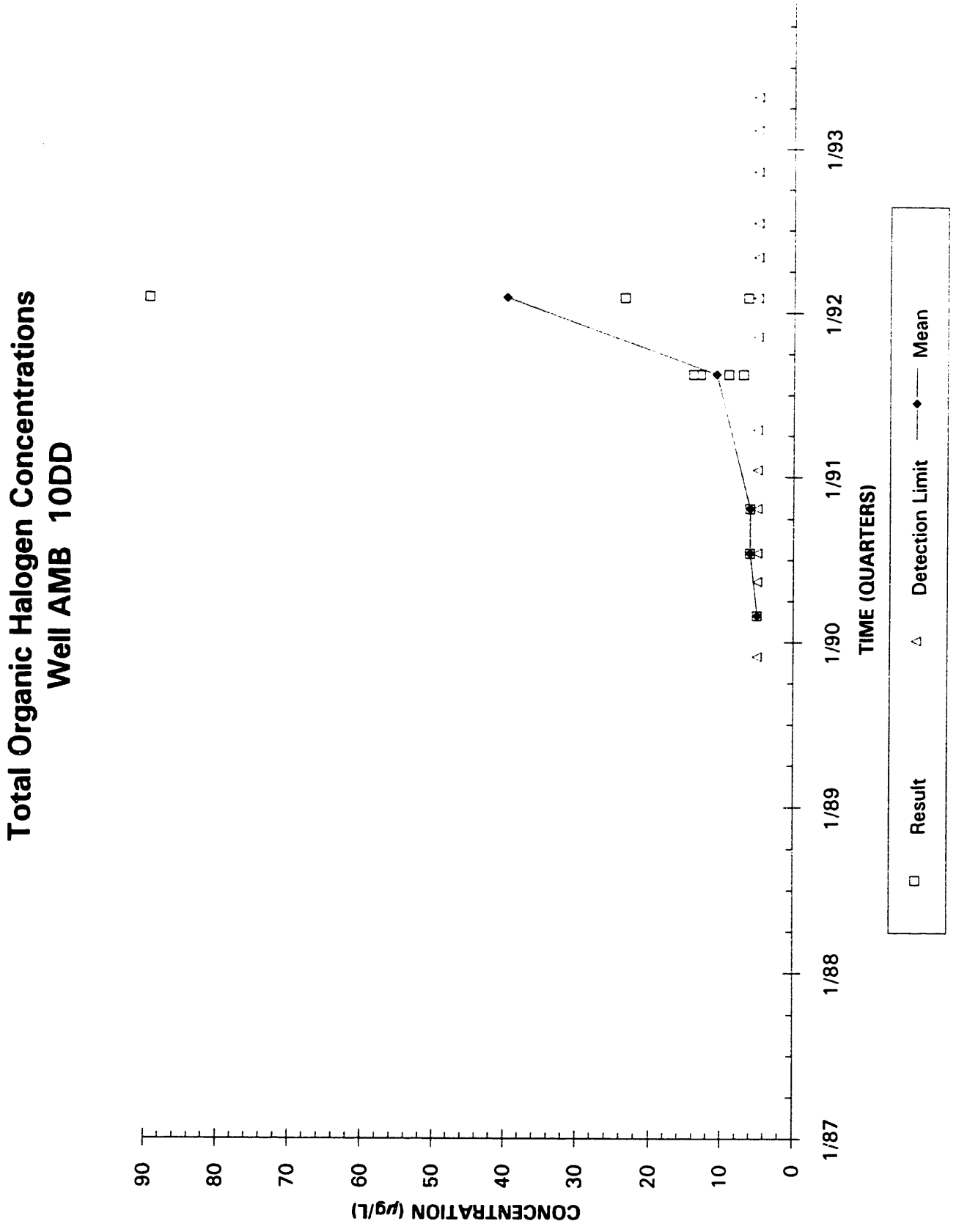
Total Organic Halogen Concentrations
Well AMB 10A

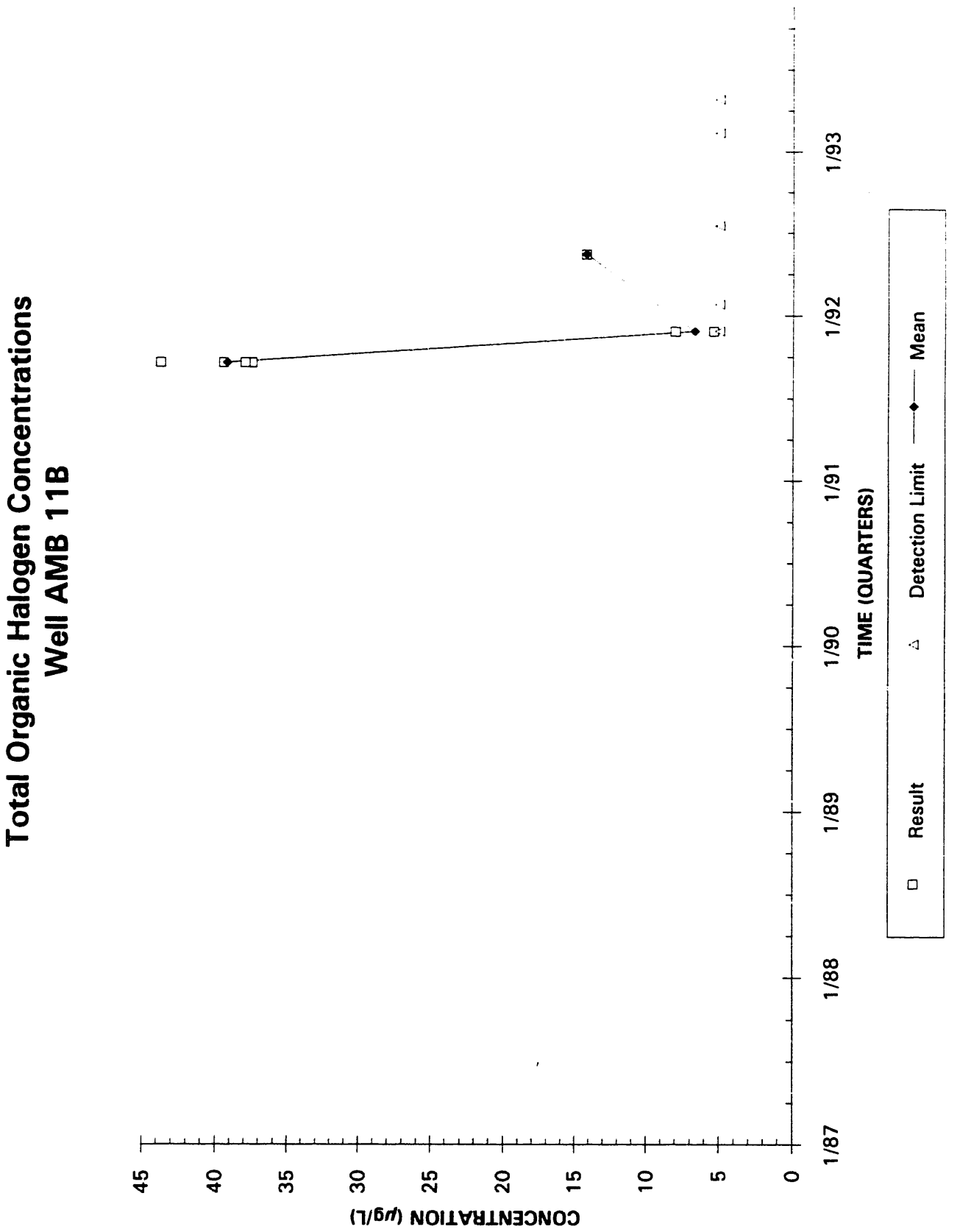


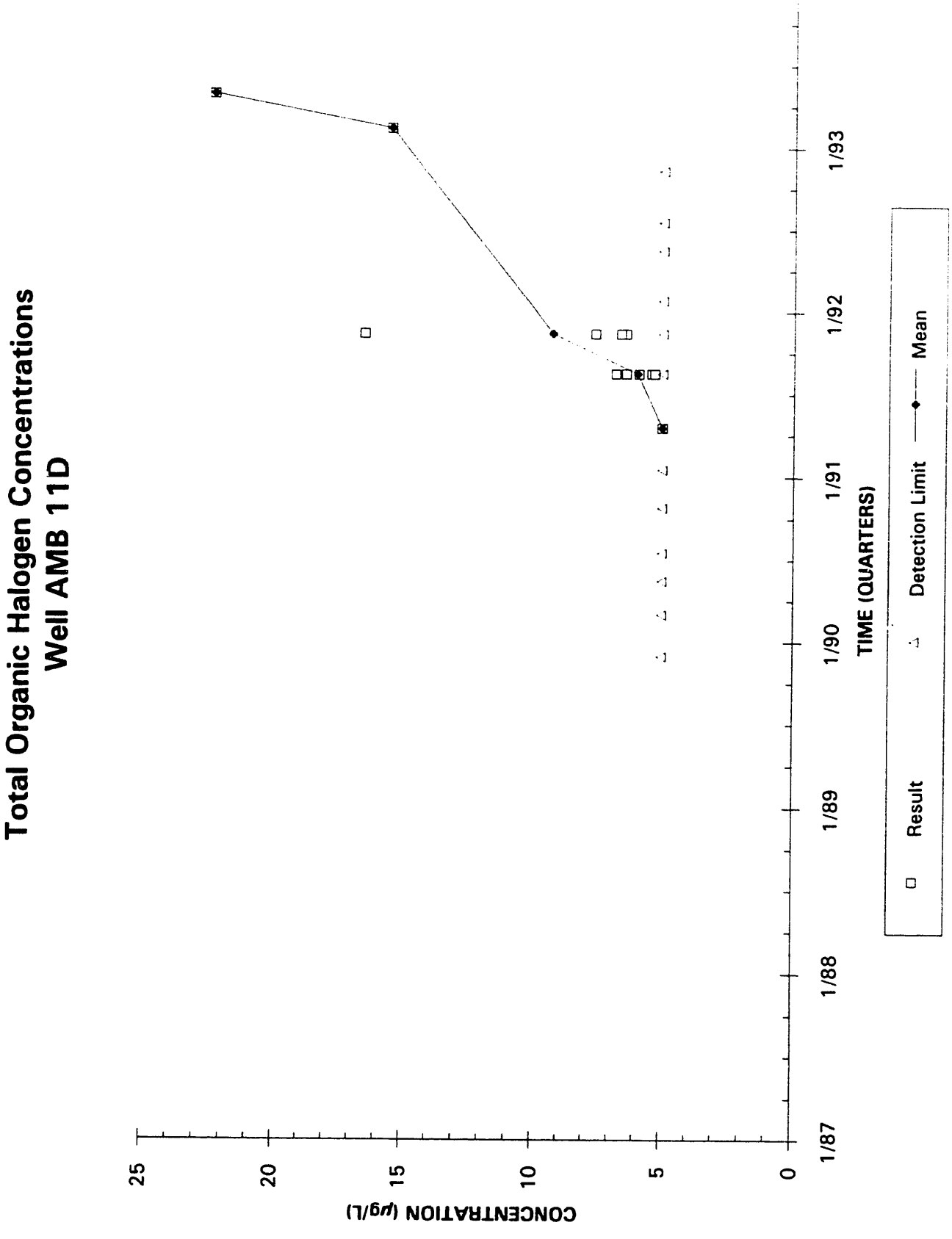

Total Organic Halogen Concentrations
Well AMB 10B
CONCENTRATION (µg/L)
0
5
10
15
20
25
30
35
40
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

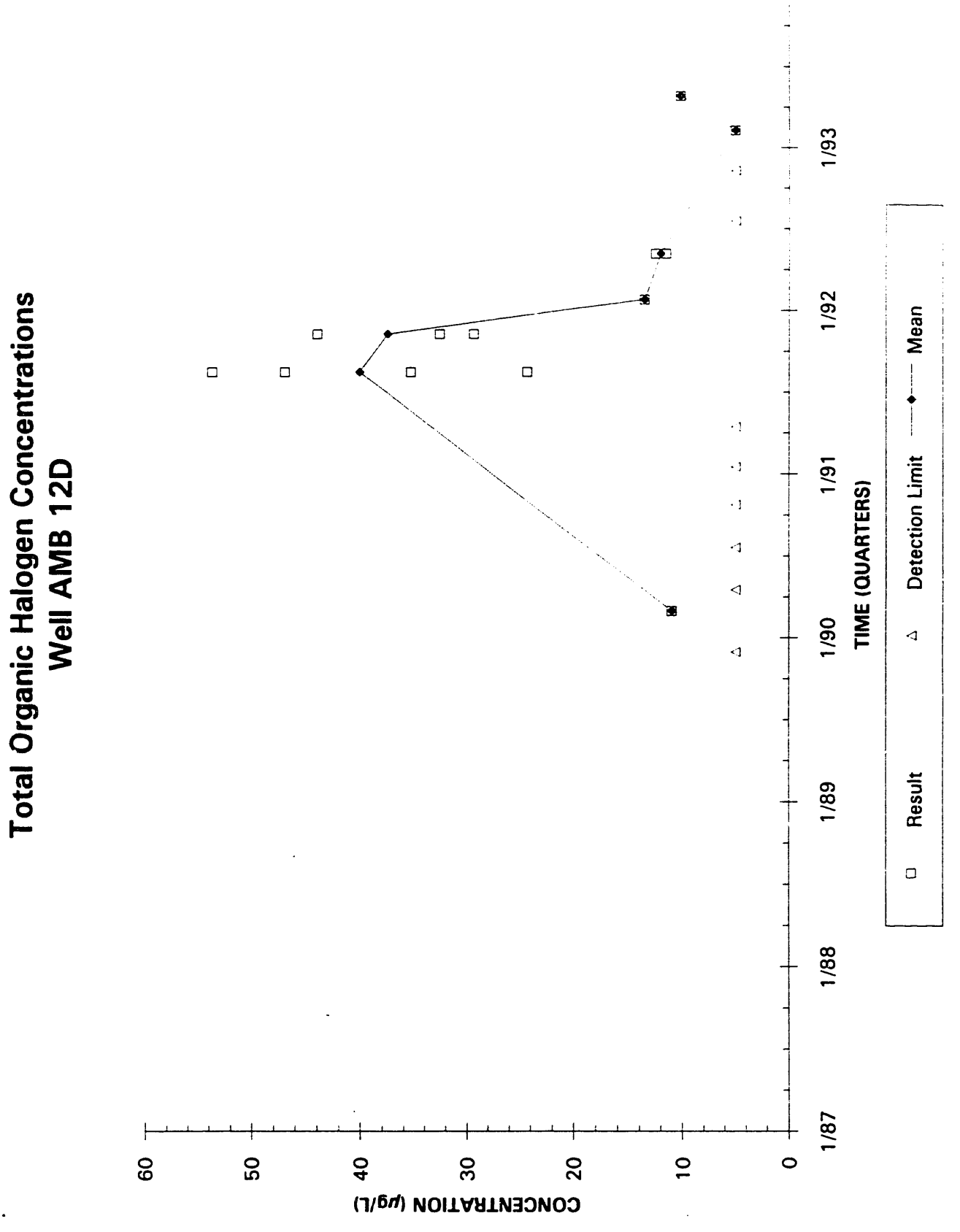
Total Organic Halogen Concentrations
Well AMB 10D



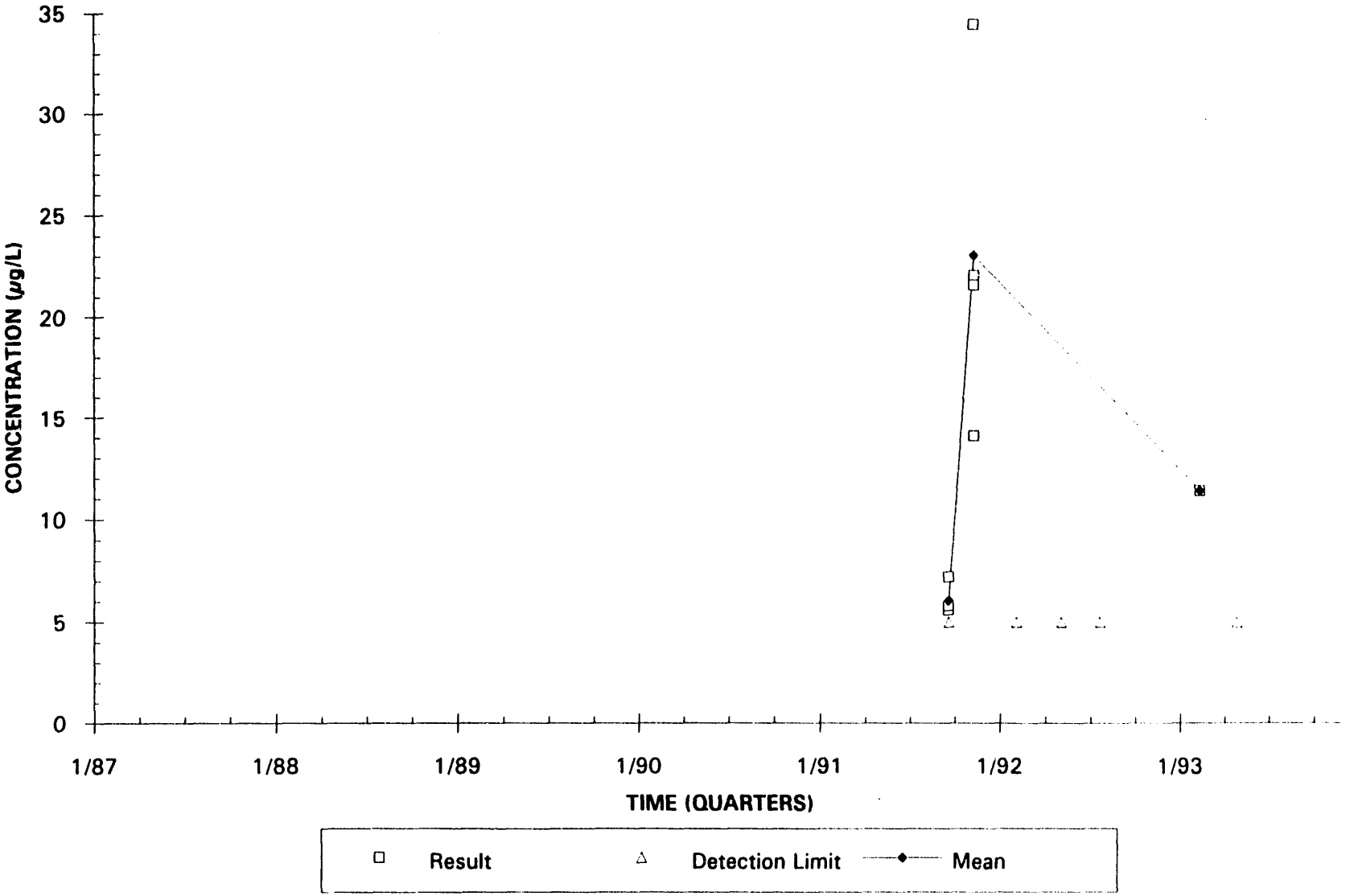

Total Organic Halogen Concentrations
Well AMB 10DD
CONCENTRATION (µg/L)
0
10
20
30
40
50
60
70
80
90
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

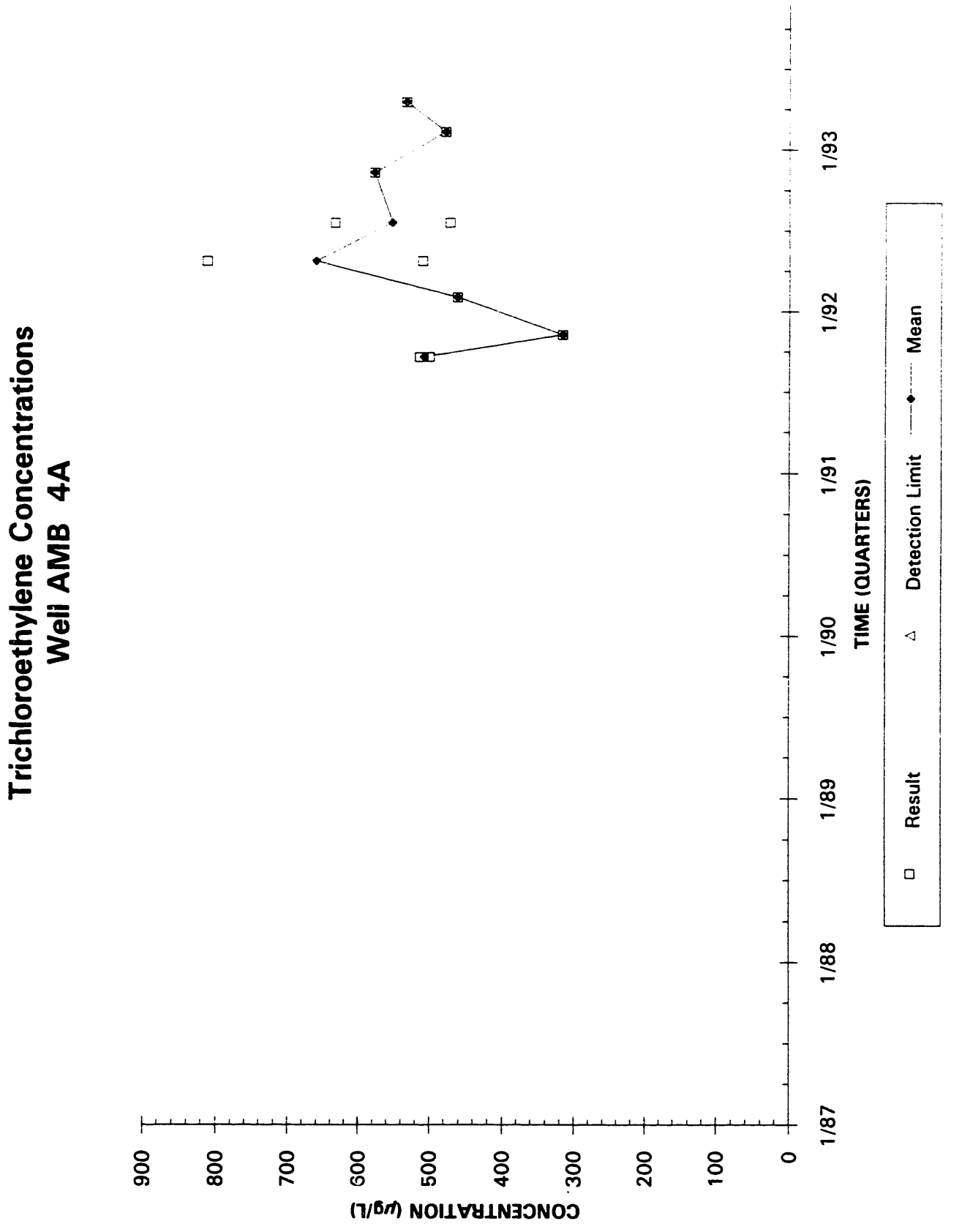

Total Organic Halogen Concentrations
Well AMB 11B
CONCENTRATION (µg/L)
45
40
35
30
25
20
15
10
5
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

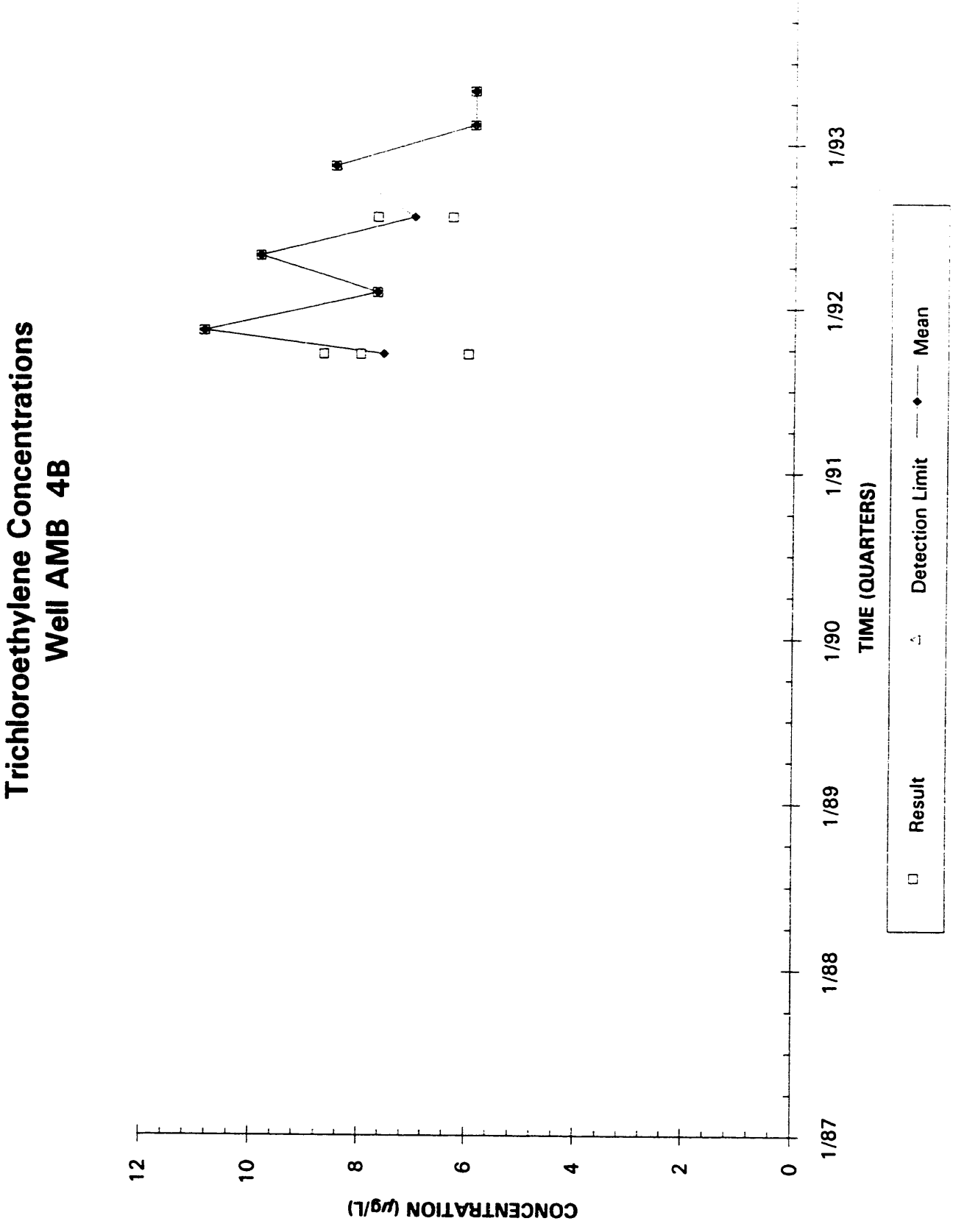

Total Organic Halogen Concentrations
Well AMB 11D
CONCENTRATION (µg/L)
25
20
15
10
5
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

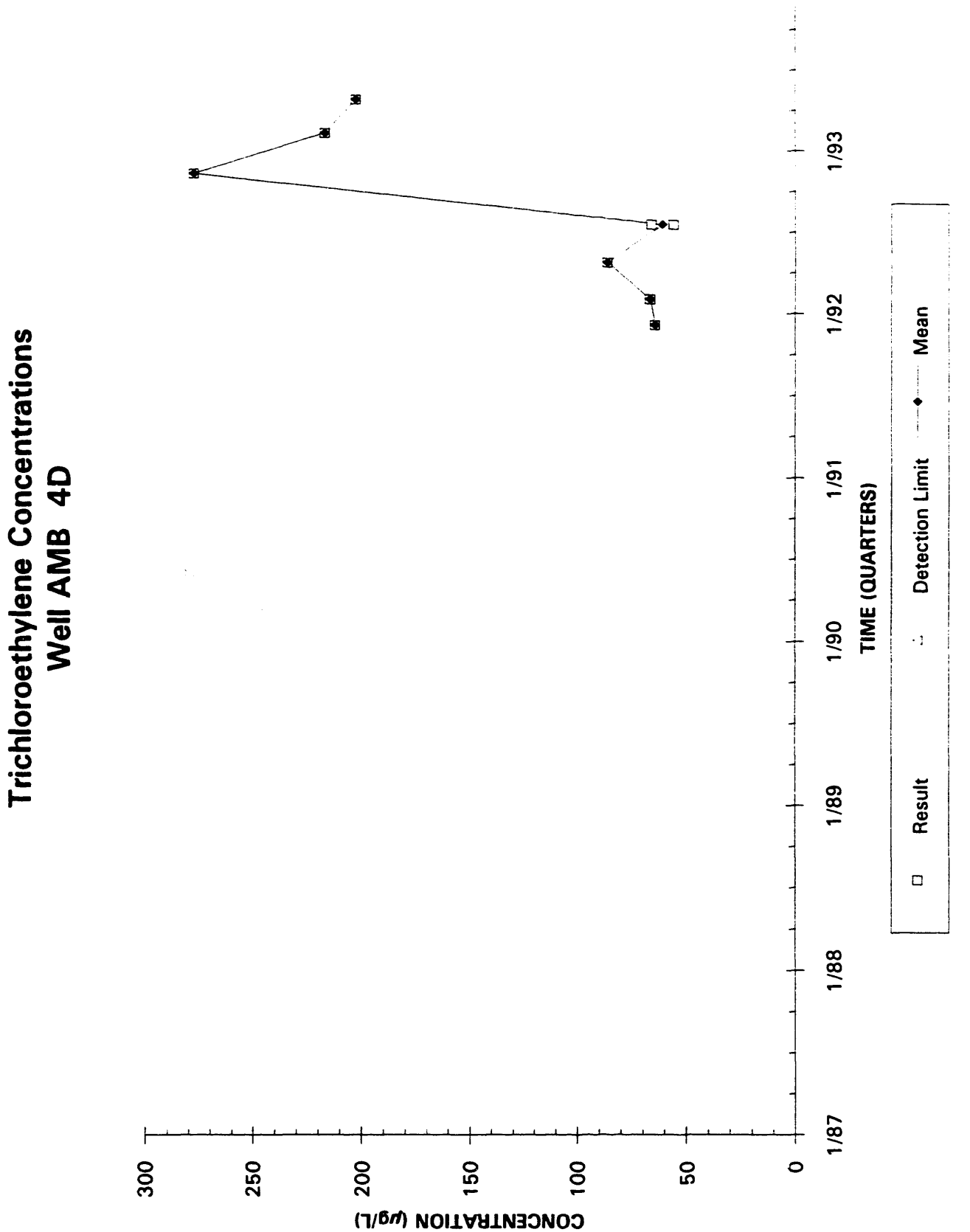

Total Organic Halogen Concentrations
Well AMB 12D
CONCENTRATION (µg/L)
0
10
20
30
40
50
60
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

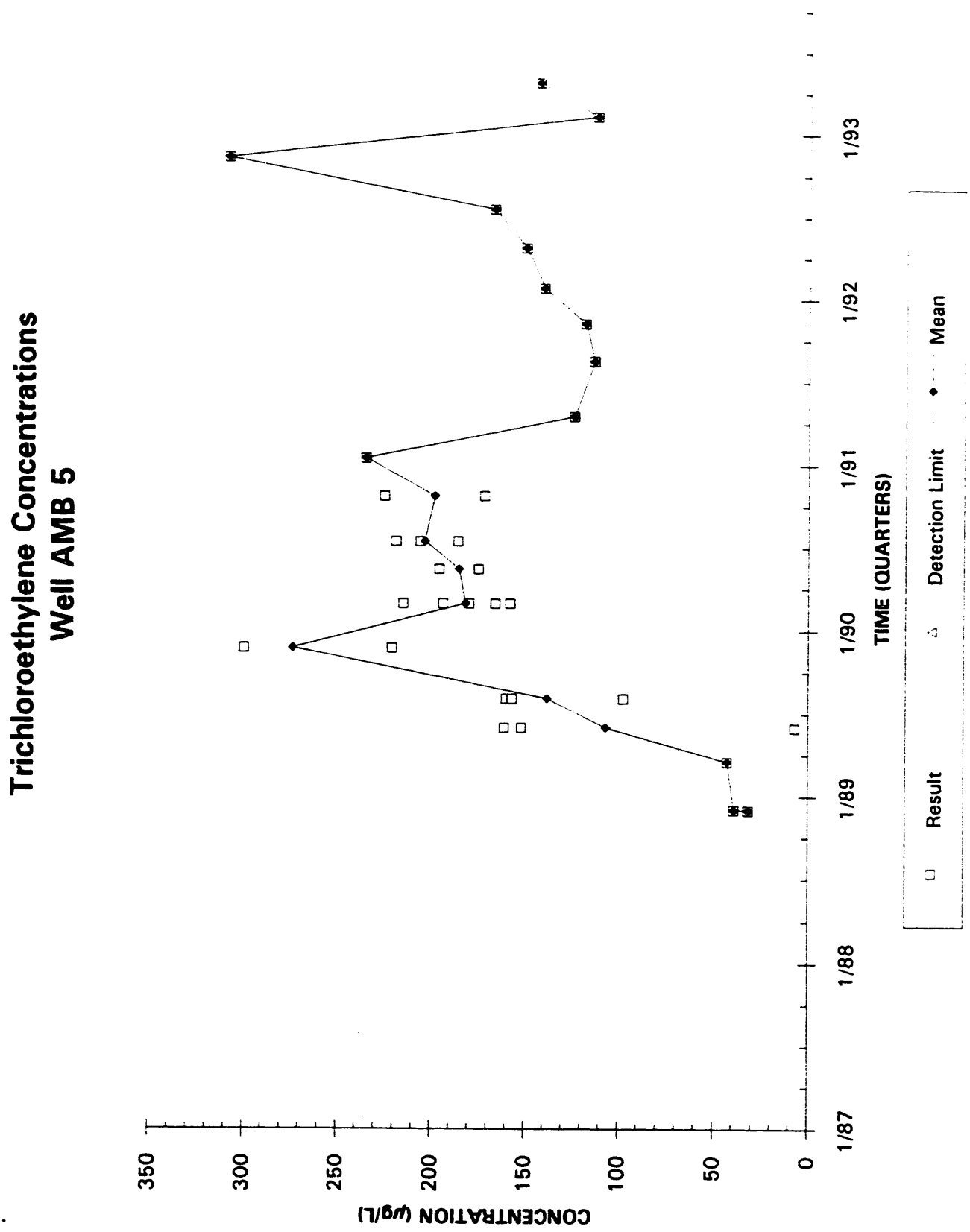
Total Organic Halogen Concentrations
Well AMB 13AR

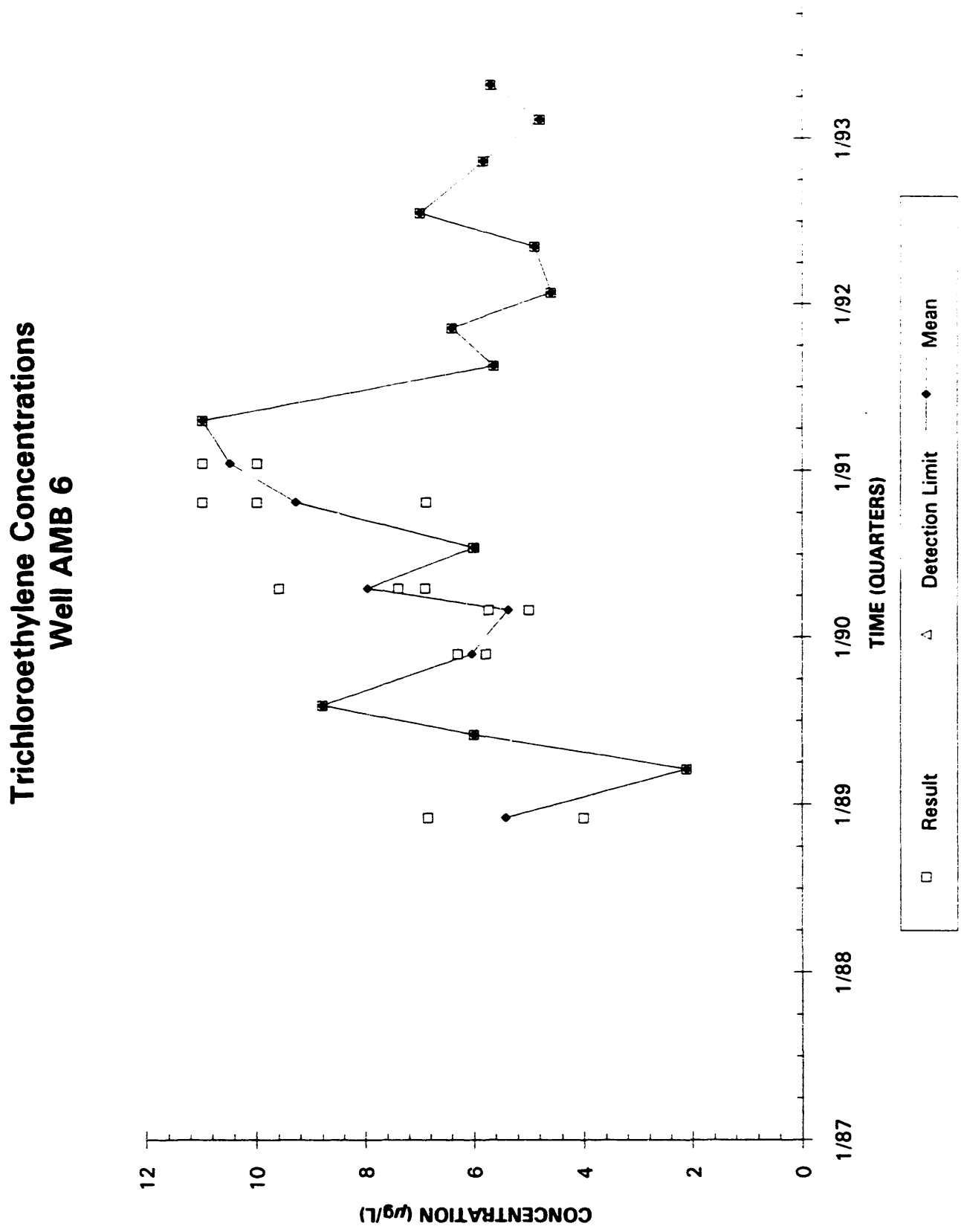


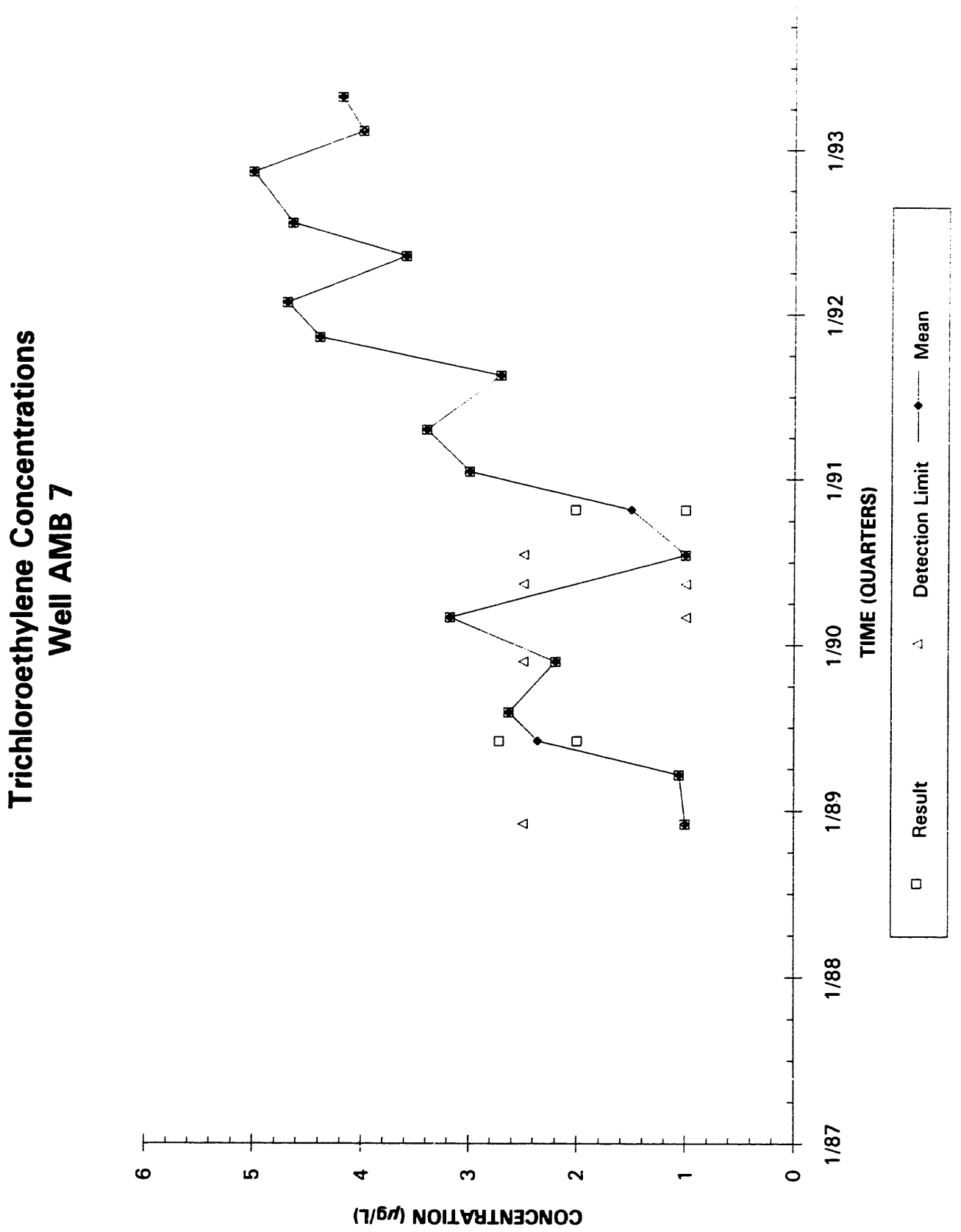

Trichloroethylene Concentrations
Well AMB 4A
CONCENTRATION (µg/L)
900
800
700
600
500
400
300
200
100
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

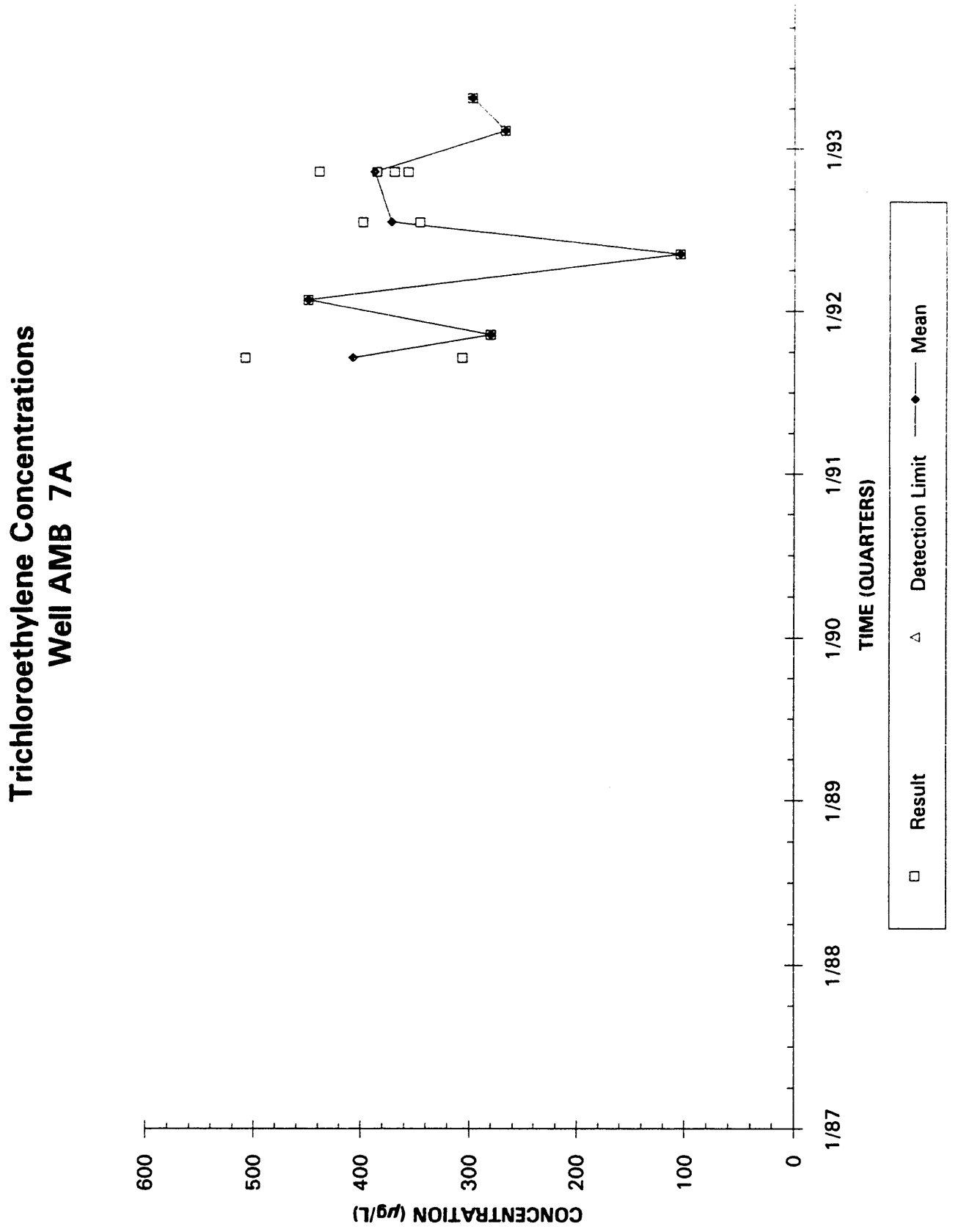

Trichloroethylene Concentrations
Well AMB 4B
CONCENTRATION (µg/L)
0
2
4
6
8
10
12
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

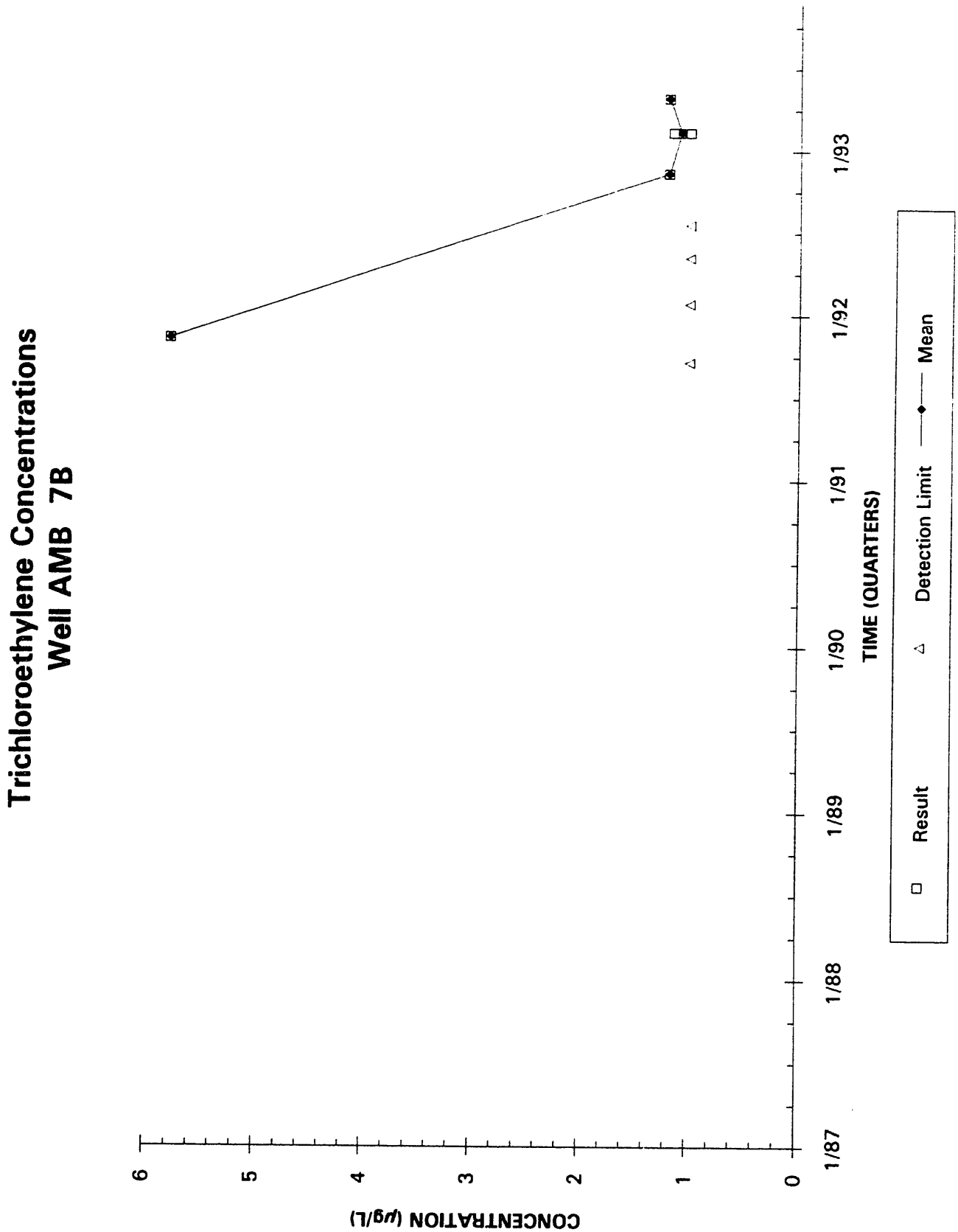

Trichloroethylene Concentrations
Well AMB 4D
CONCENTRATION (µg/L)
300
250
200
150
100
50
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

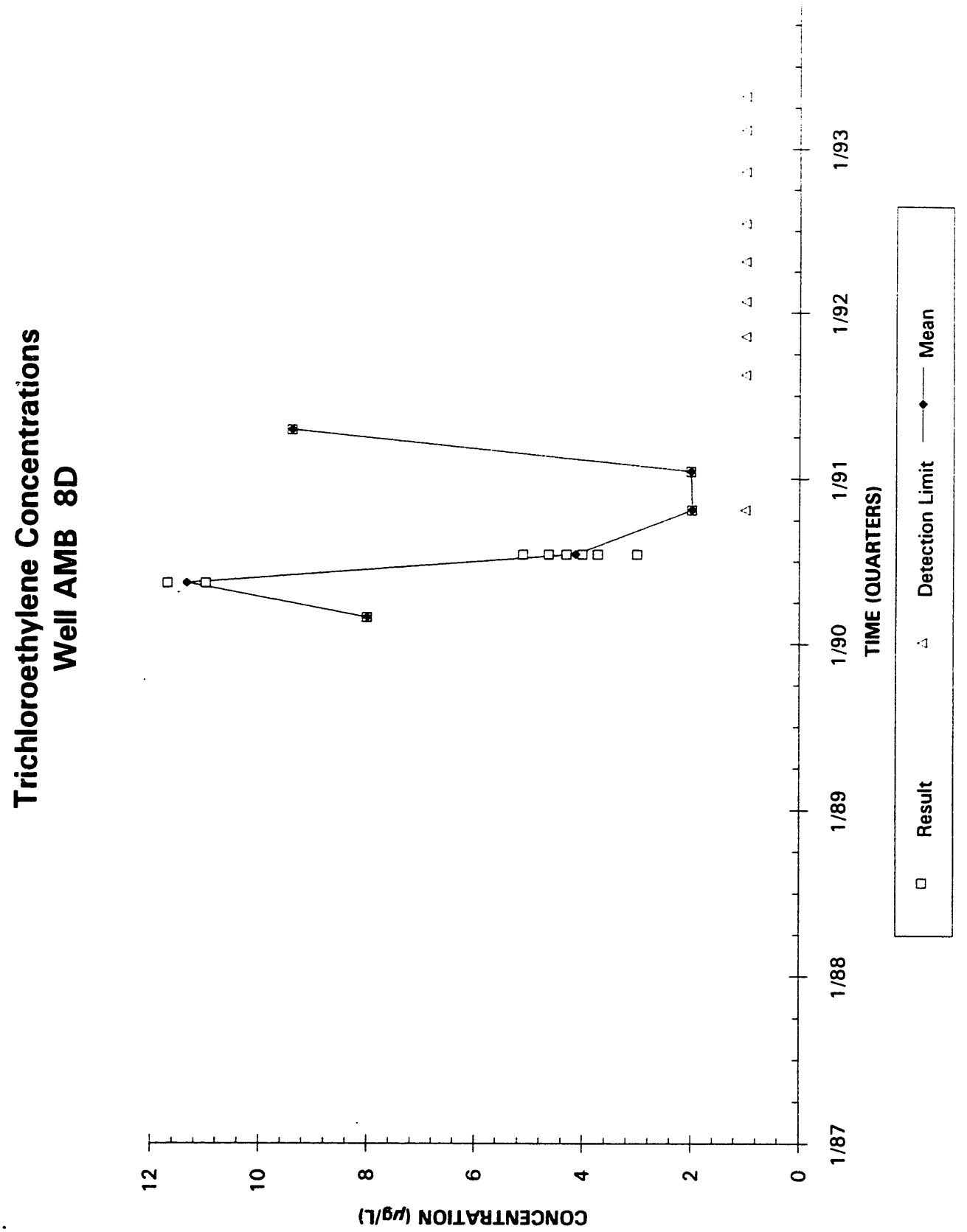

Trichloroethylene Concentrations
Well AMB 5
CONCENTRATION (µg/L)
350
300
250
200
150
100
50
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

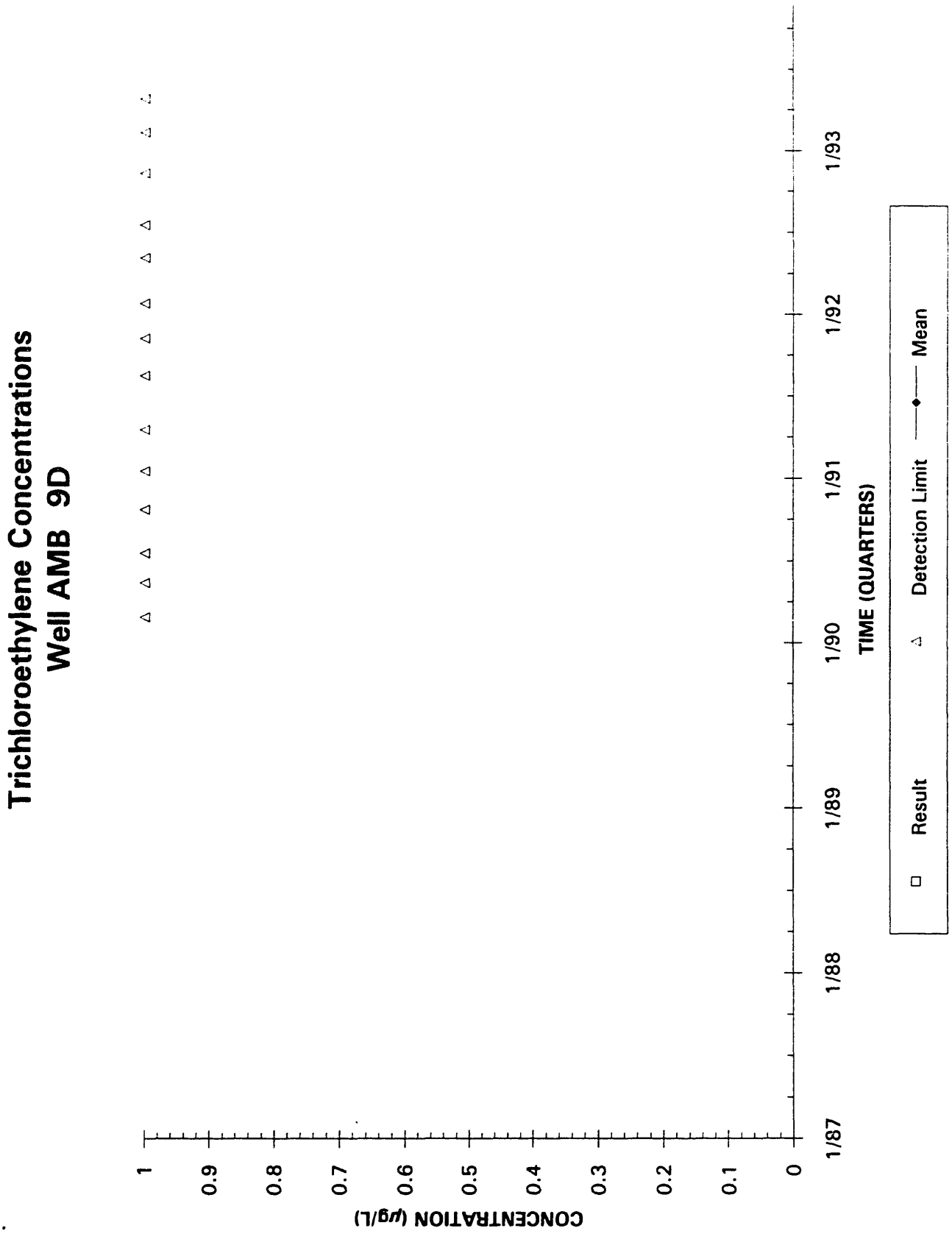

Trichloroethylene Concentrations
Well AMB 6
CONCENTRATION (µg/L)
0
2
4
6
8
10
12
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean


Trichloroethylene Concentrations
Well AMB 7
CONCENTRATION (µg/L)
0
1
2
3
4
5
6
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

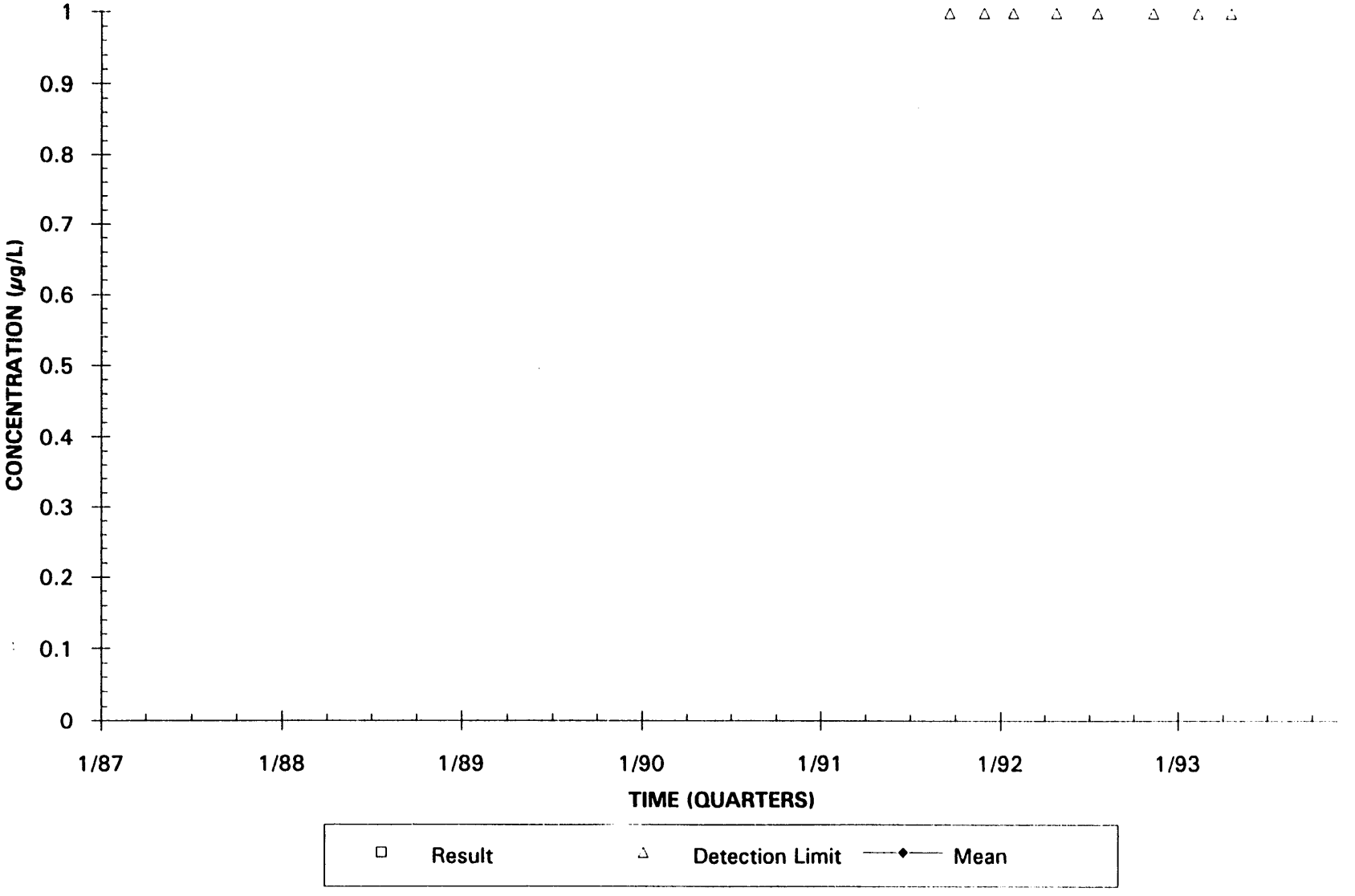

Trichloroethylene Concentrations
Well AMB 7A
CONCENTRATION (µg/L)
600
500
400
300
200
100
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean


Trichloroethylene Concentrations
Well AMB 7B
CONCENTRATION (µg/L)
0
1
2
3
4
5
6
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

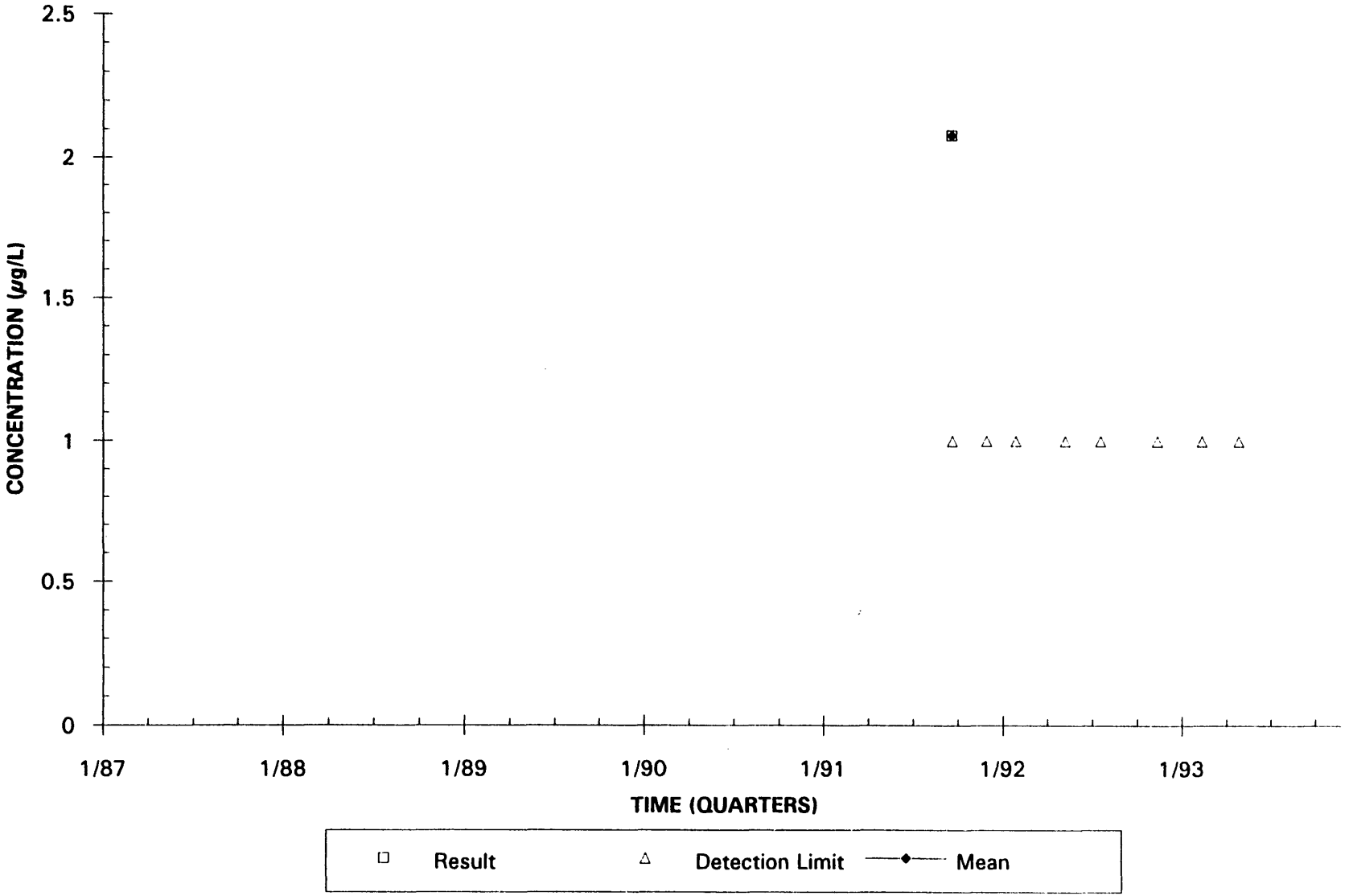

Trichloroethylene Concentrations
Well AMB 8D
CONCENTRATION (µg/L)
0
2
4
6
8
10
12
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean


Trichloroethylene Concentrations
Well AMB 9D
CONCENTRATION (µg/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

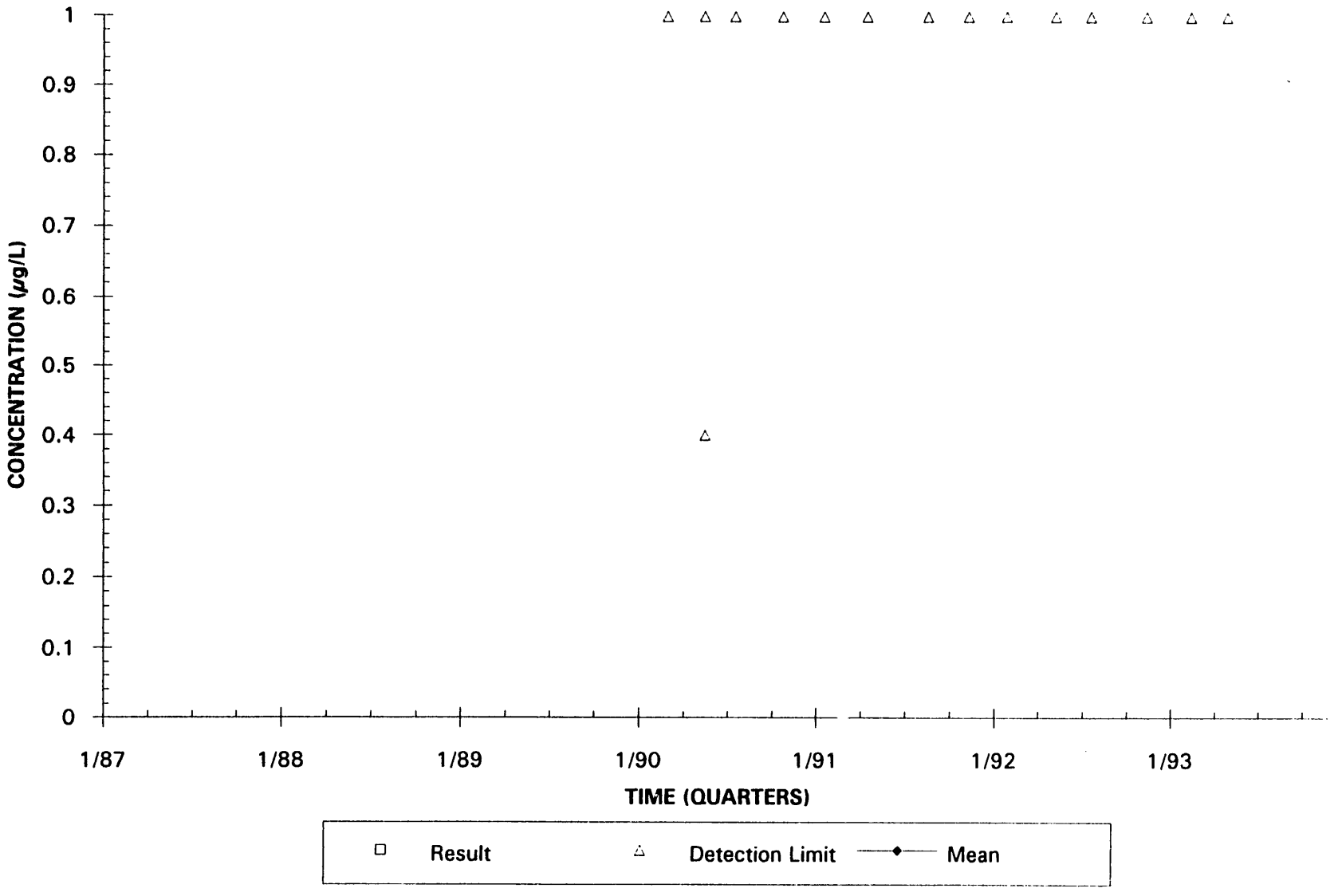
Trichloroethylene Concentrations
Well AMB 10A



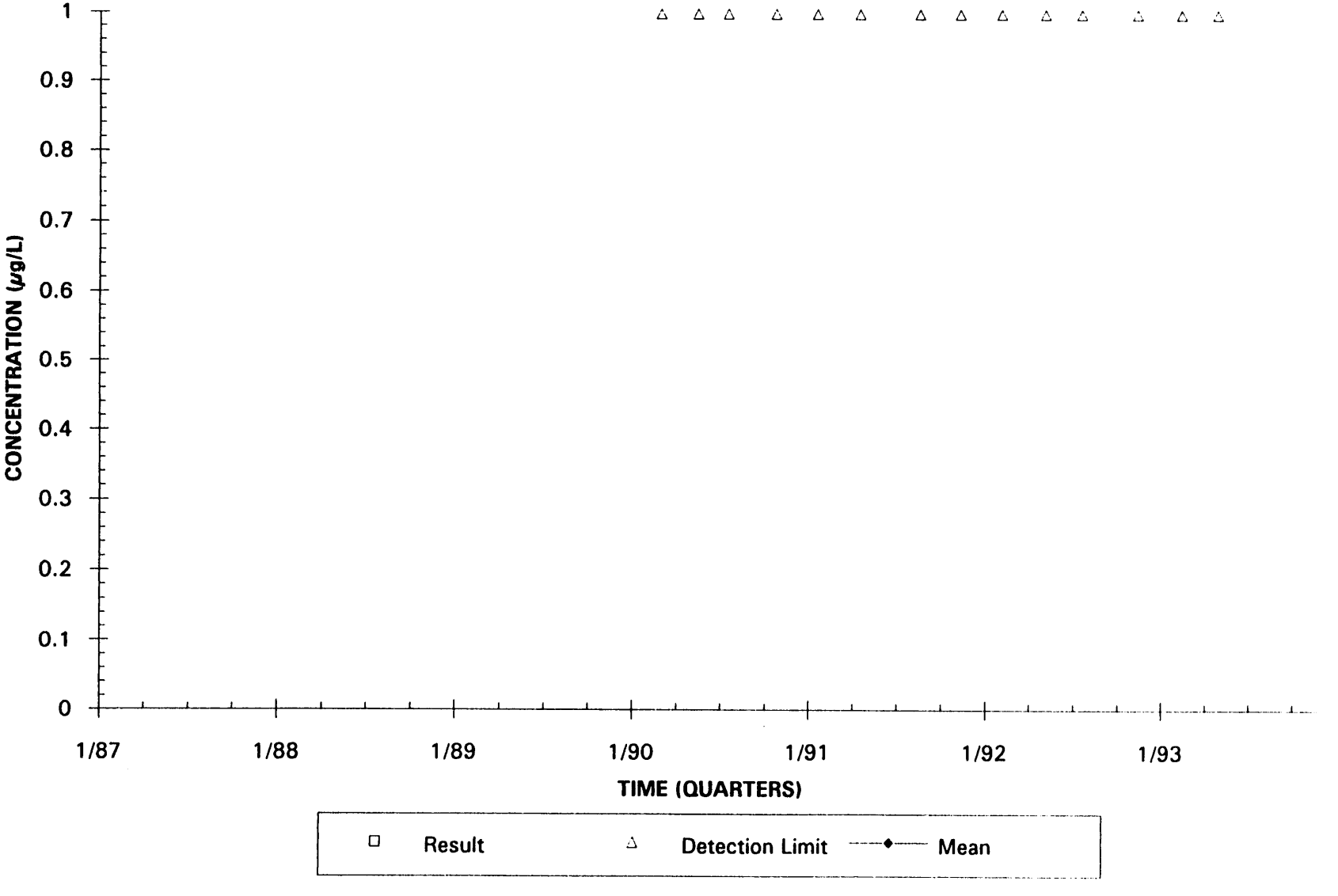
Trichloroethylene Concentrations
Well AMB 10B



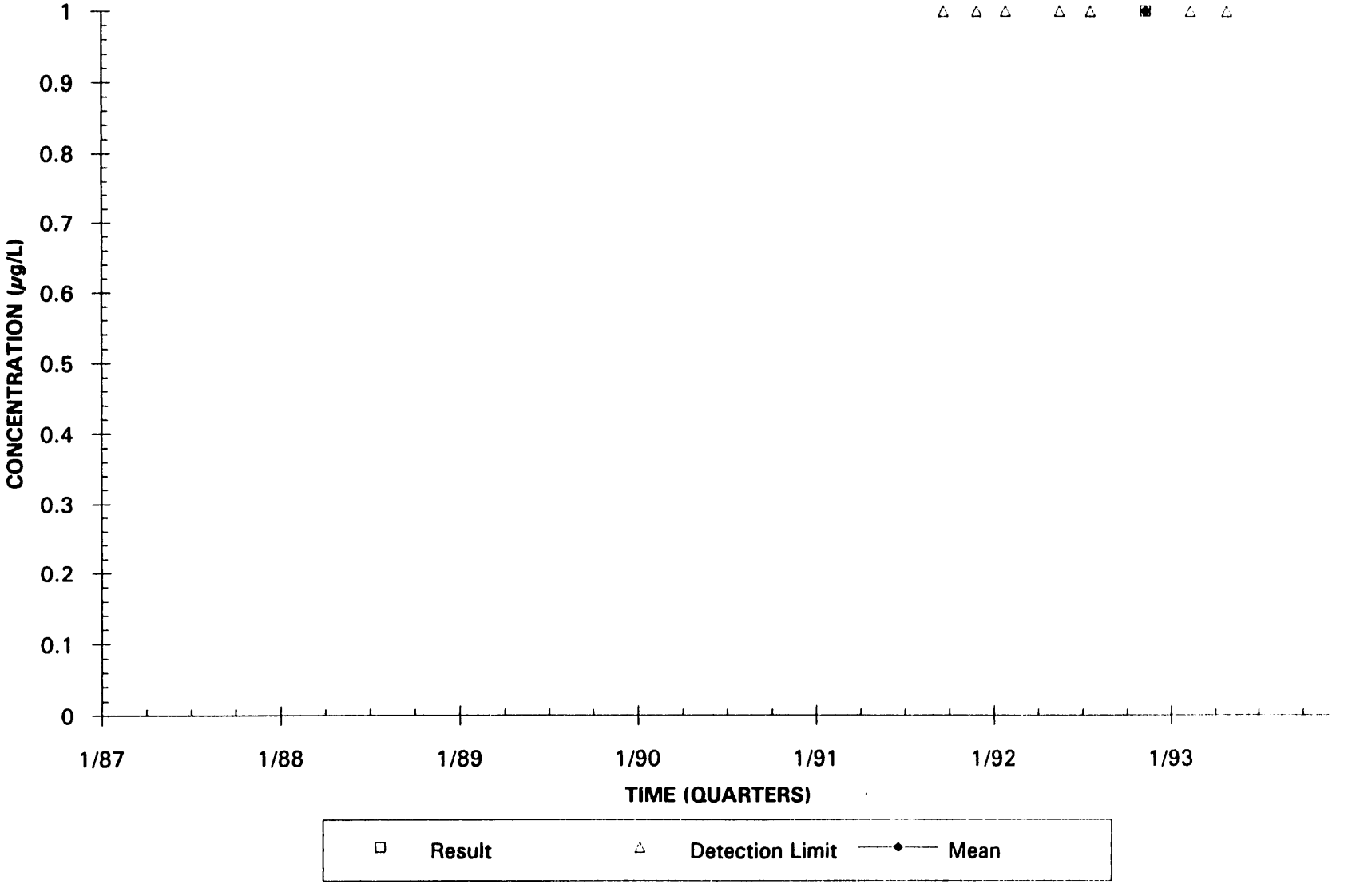
Trichloroethylene Concentrations
Well AMB 10D



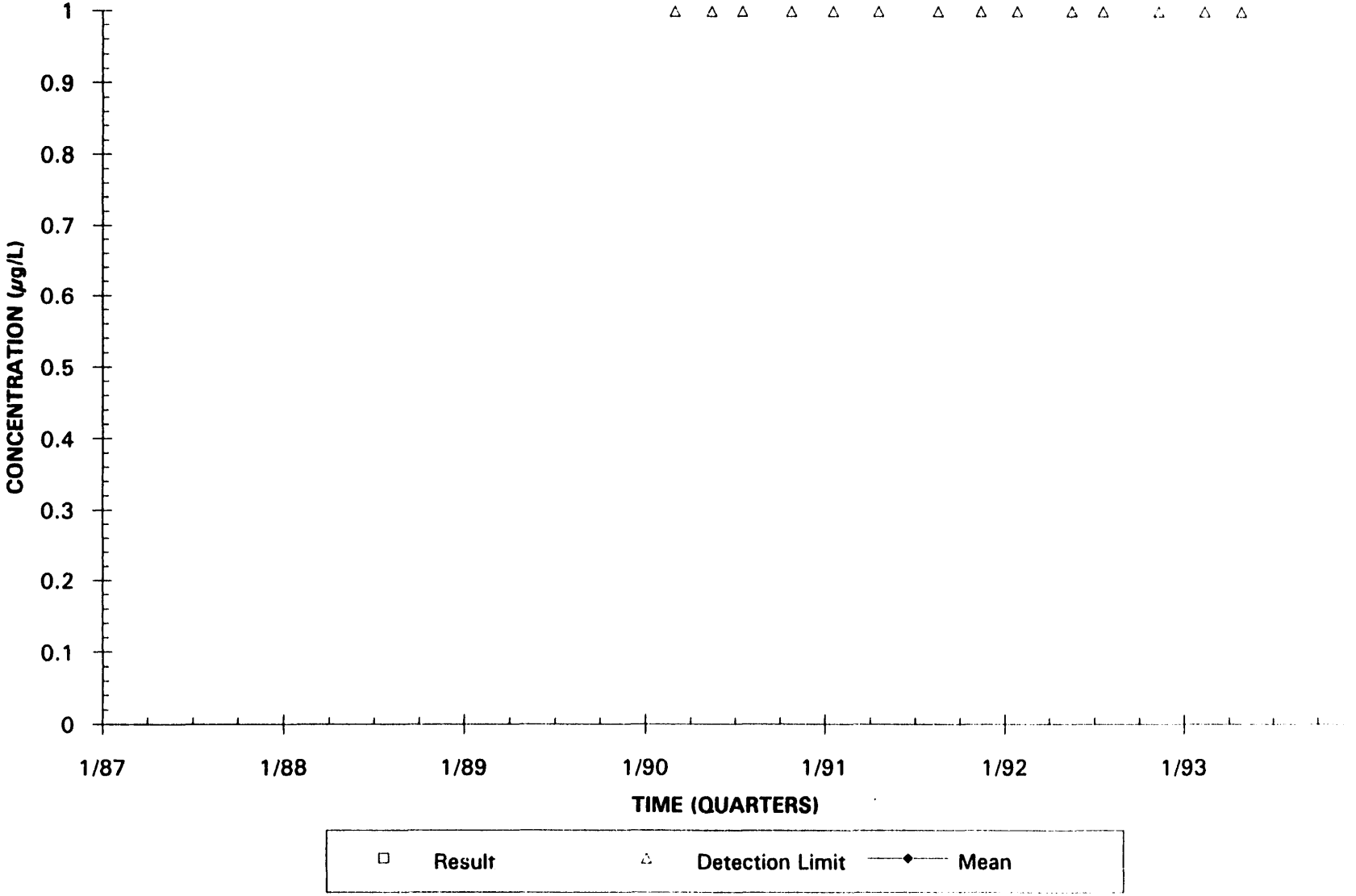
Trichloroethylene Concentrations
Well AMB 10DD

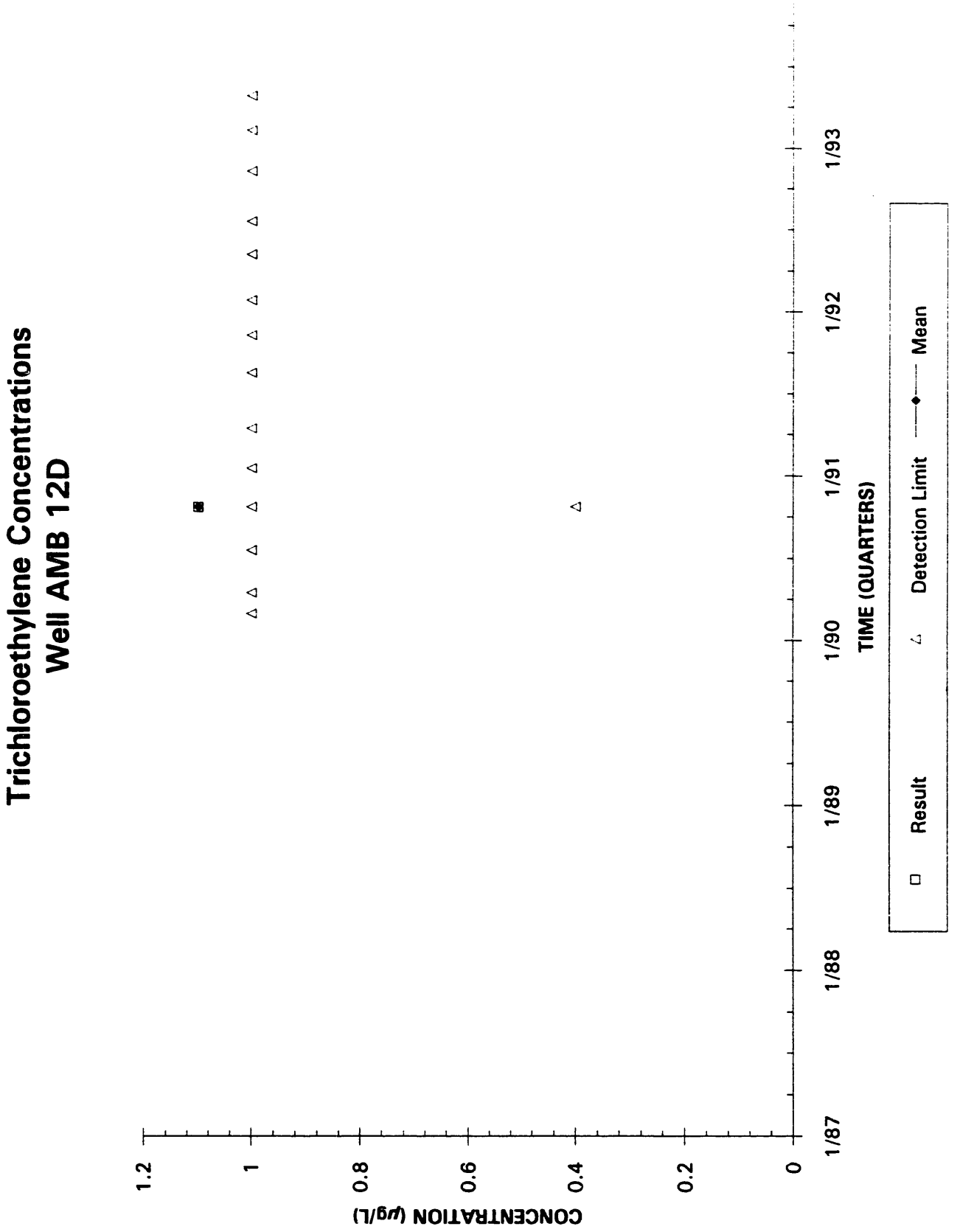


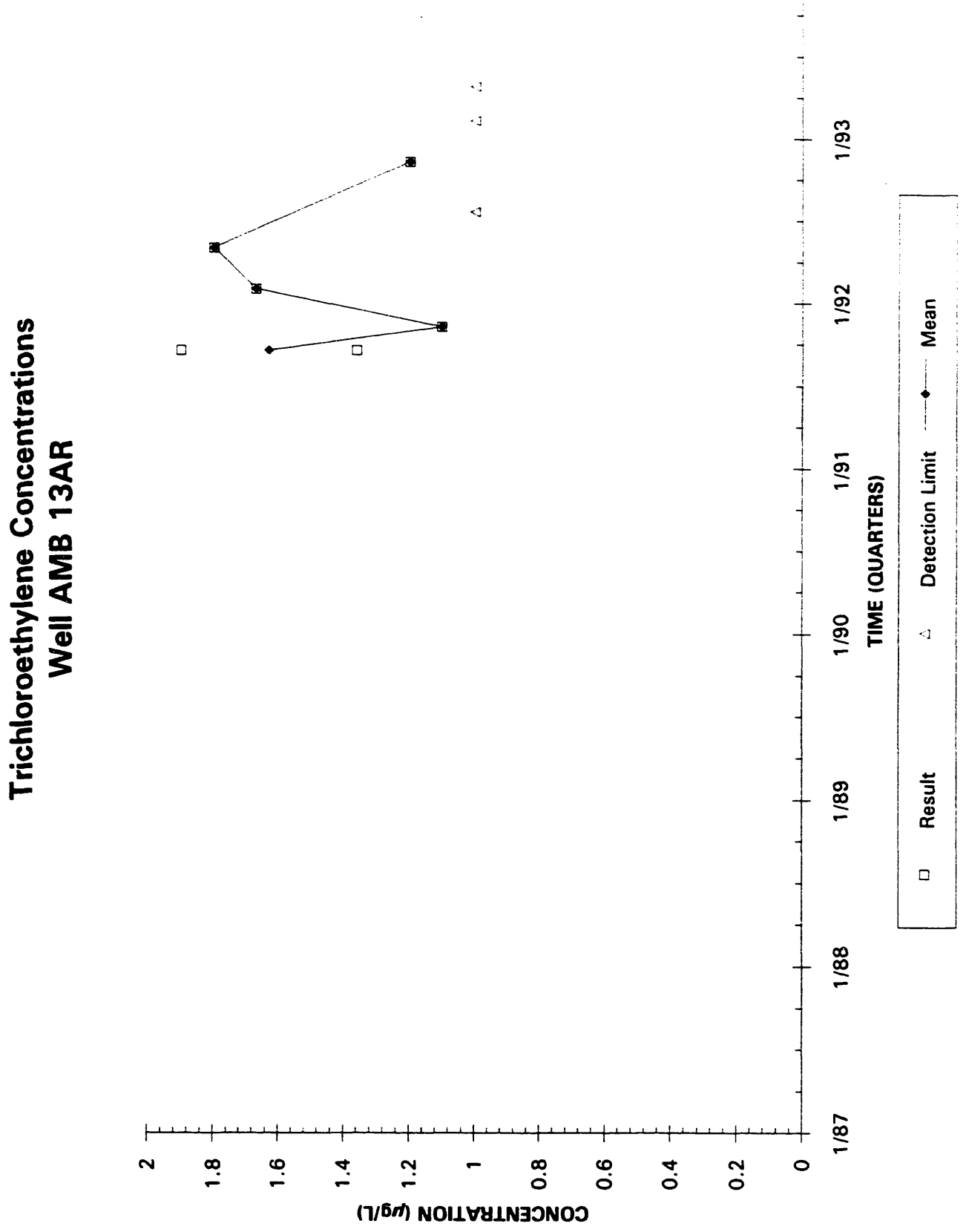
Trichloroethylene Concentrations
Well AMB 11B



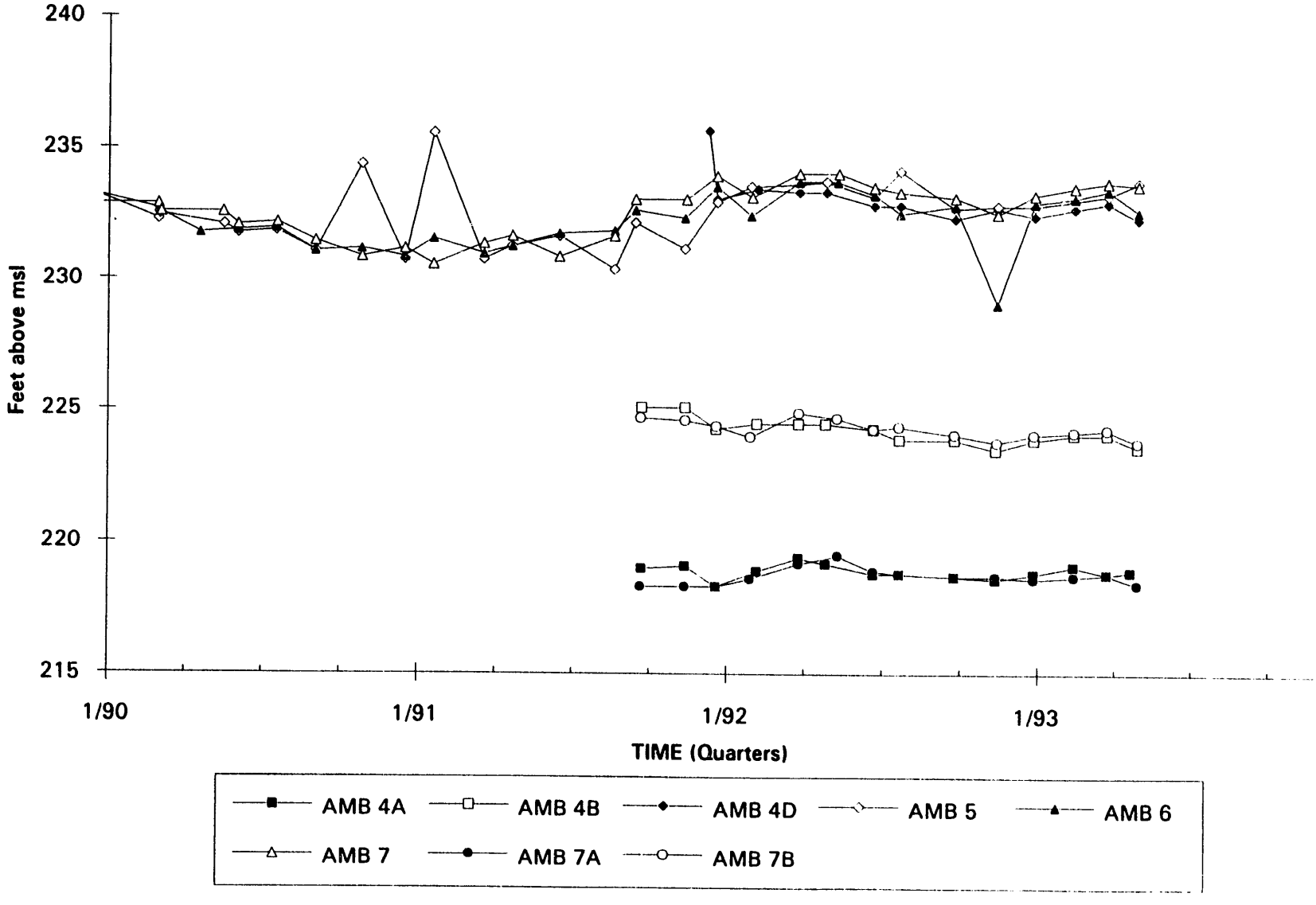
Trichloroethylene Concentrations
Well AMB 11D



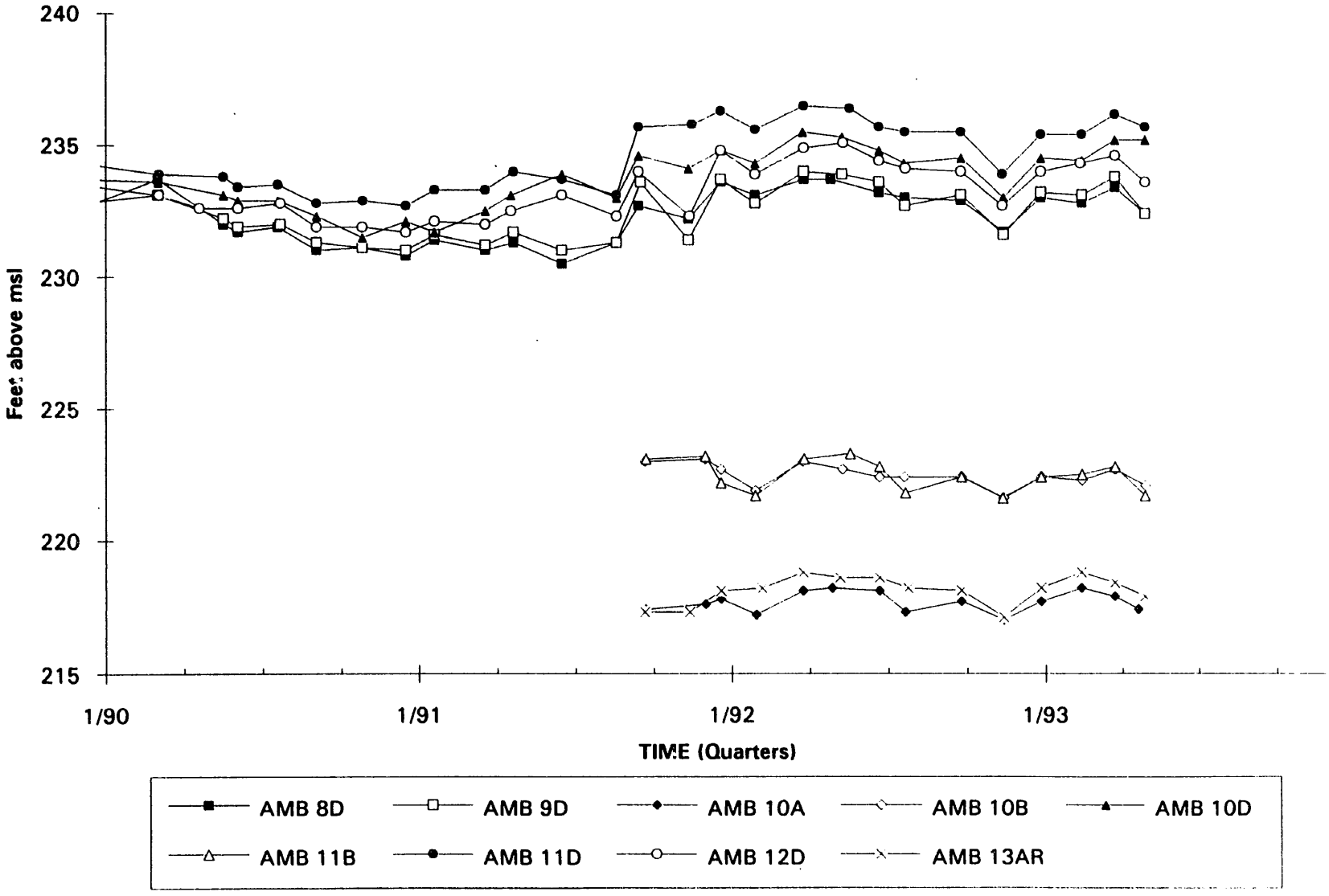

Trichloroethylene Concentrations
Well AMB 12D
CONCENTRATION (µg/L)
1.2
1
0.8
0.6
0.4
0.2
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean


Trichloroethylene Concentrations
Well AMB 13AR
CONCENTRATION (µg/L)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1/87
1/88
1/89
1/90
1/91
1/92
1/93
TIME (QUARTERS)
Result
Detection Limit
Mean

Appendix G – Hydrographs


Hydrograph for Wells AMB 4A Through AMB 7B
240
235
230
225
220
215
Feet above msl
1/90
1/91
1/92
1/93
TIME (Quarters)
AMB 4A
AMB 4B
AMB 4D
AMB 5
AMB 6
AMB 7
AMB 7A
AMB 7B

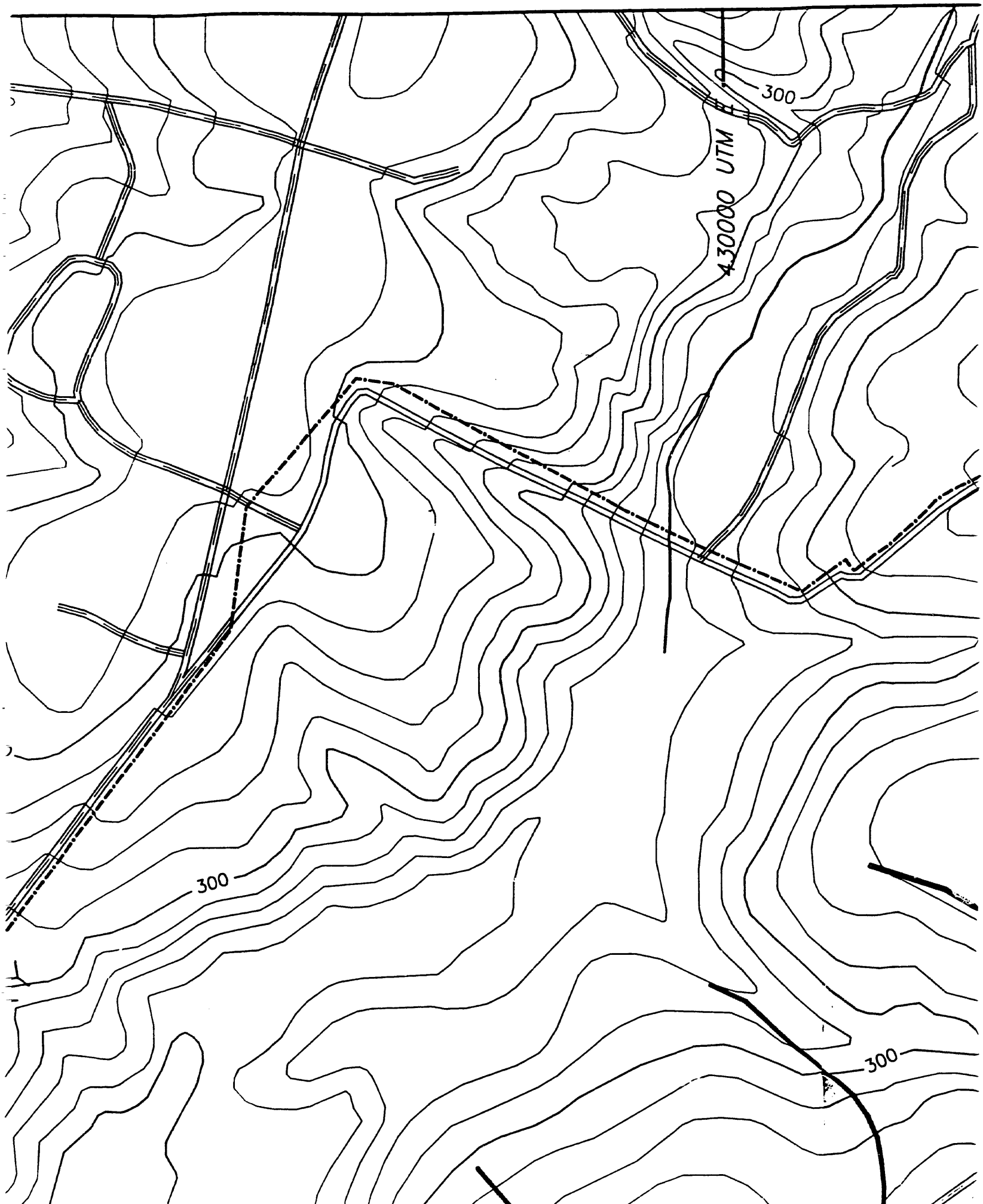
Hydrograph for Wells AMB 8D Through AMB 13AR

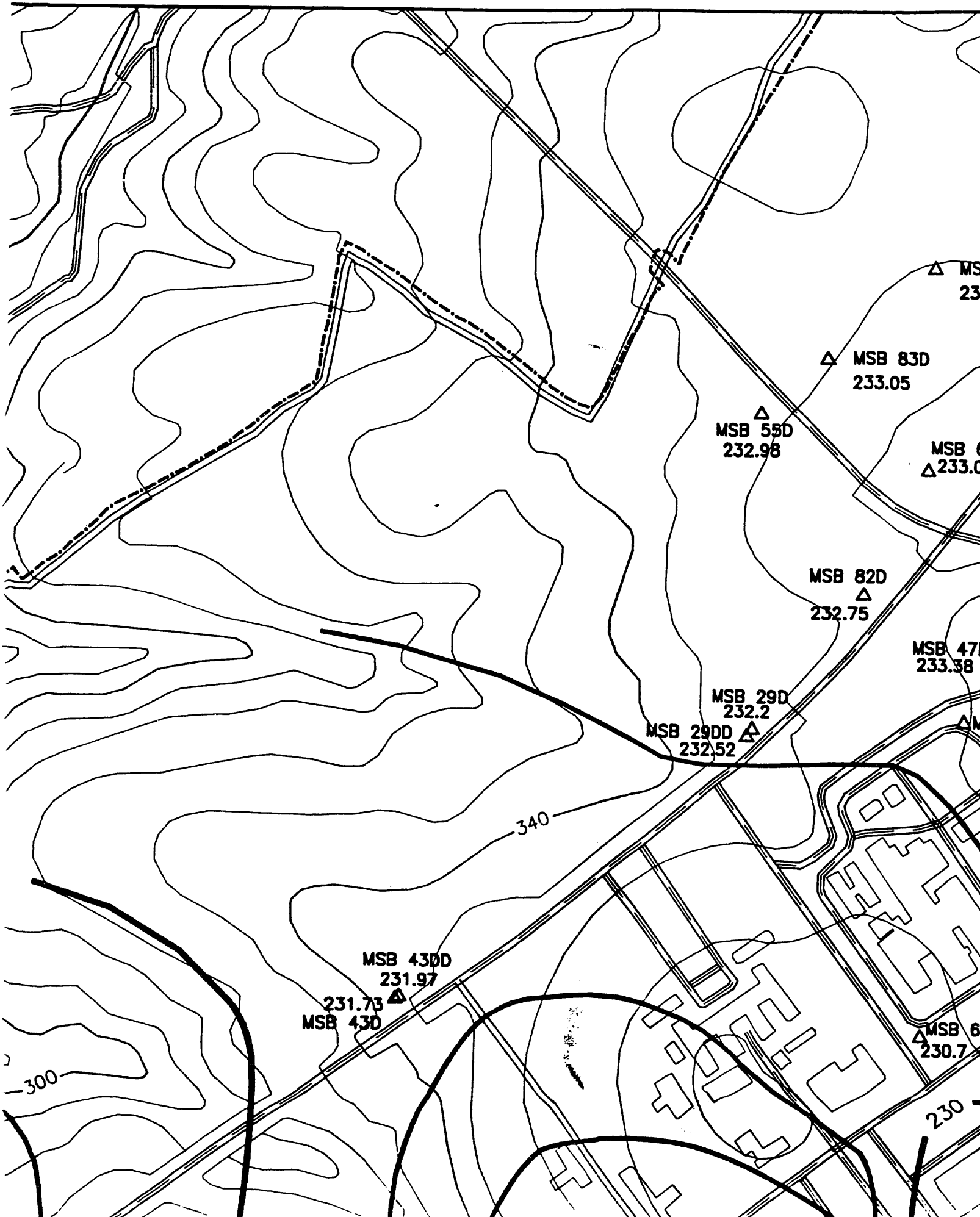


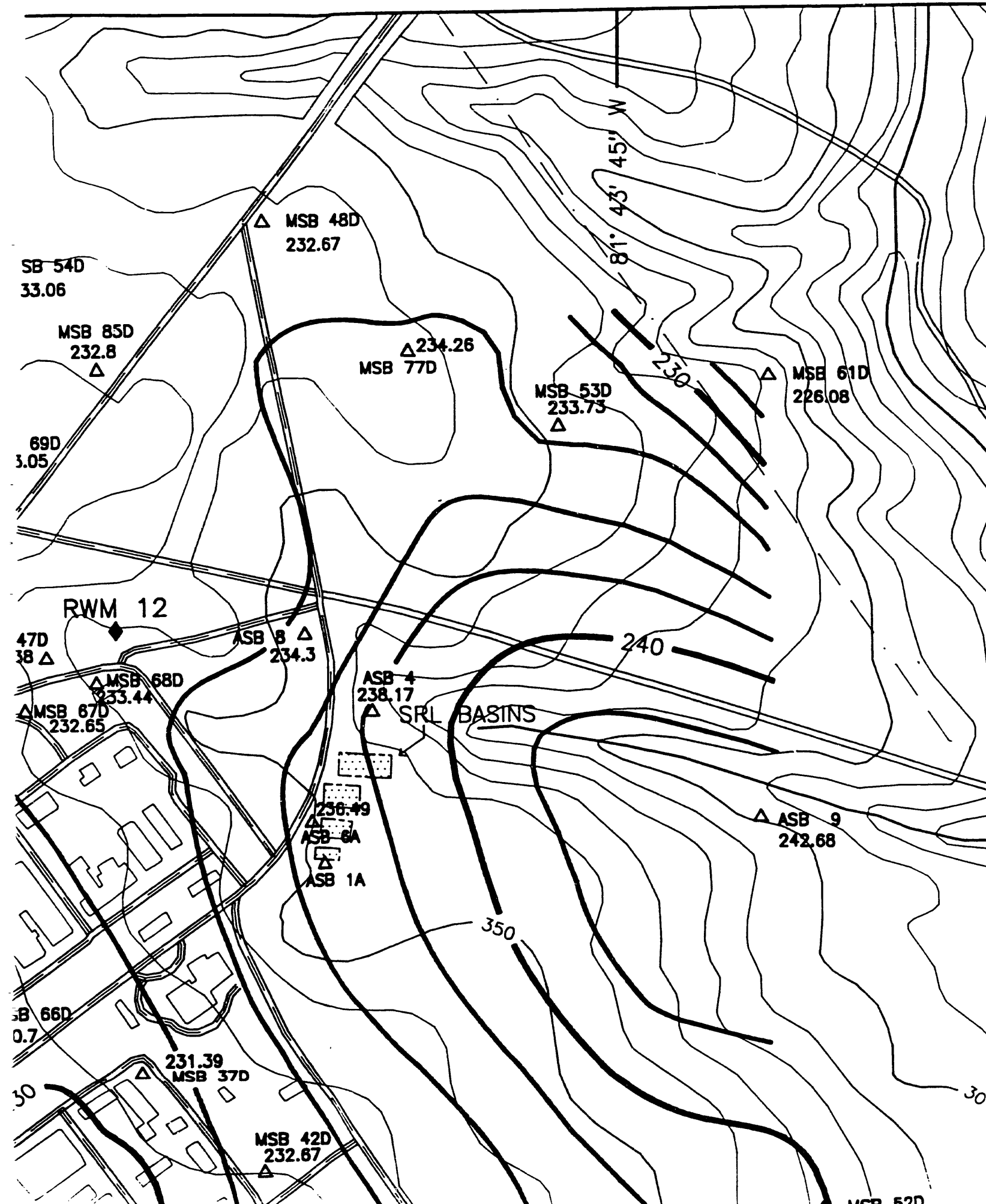
AMB 10DD is not plotted because its values (above 350 ft msl) distort the scale of the chart.

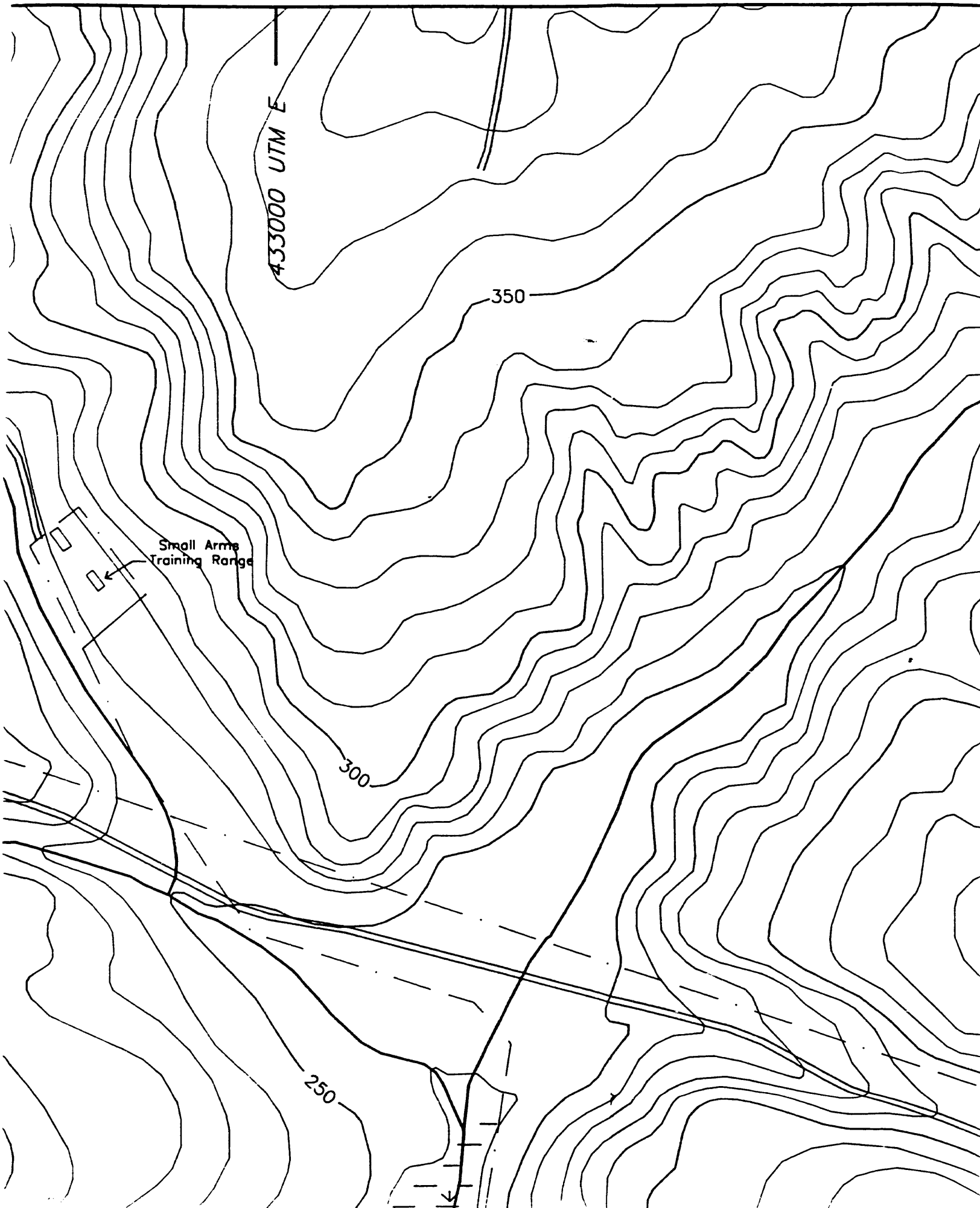
Appendix H – Water-Elevation Contour Maps

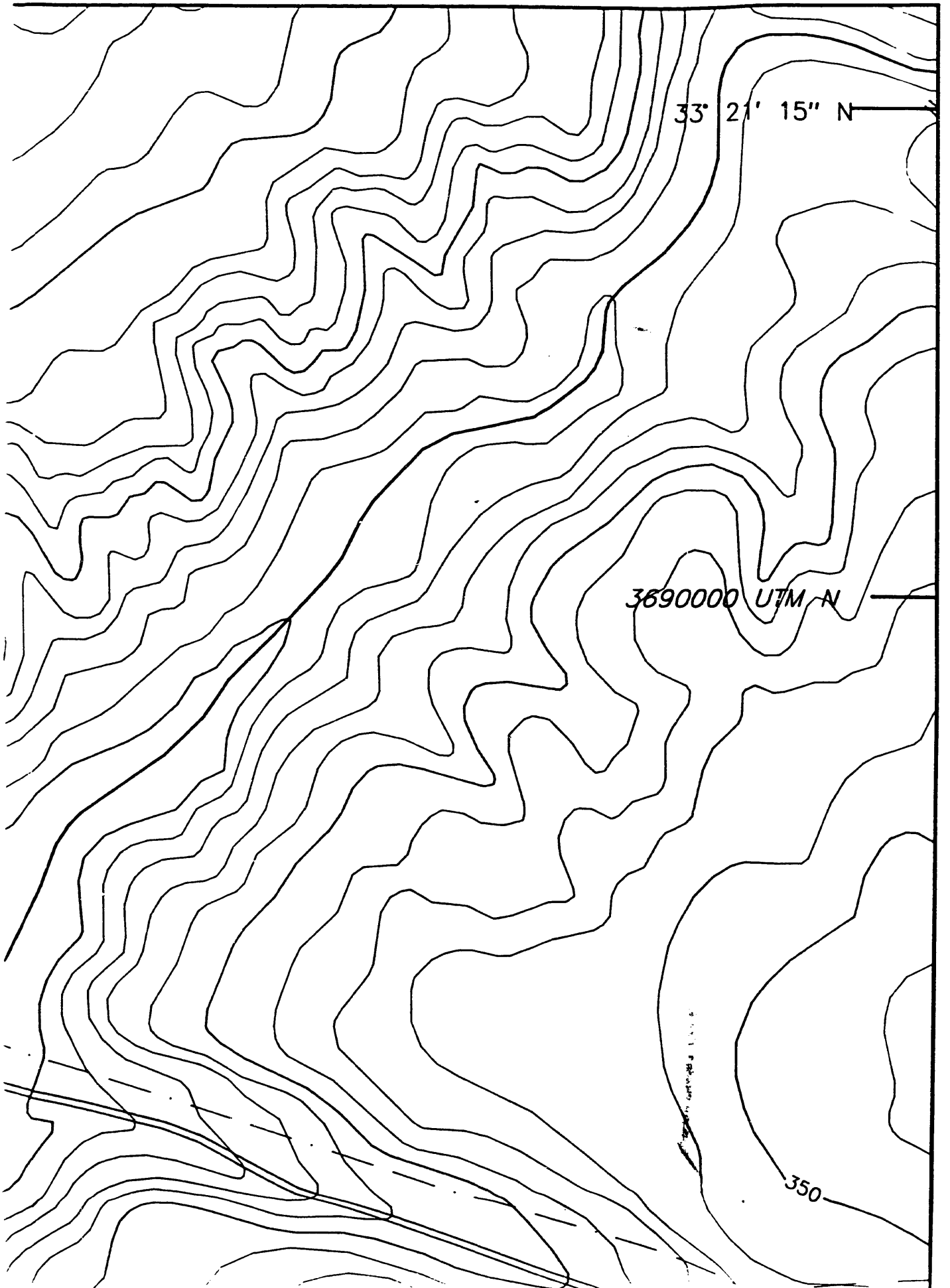
3690000 UTM N
33° 21' 15" N
81° 46' 15" W
300
350
350
S BOUNDARY

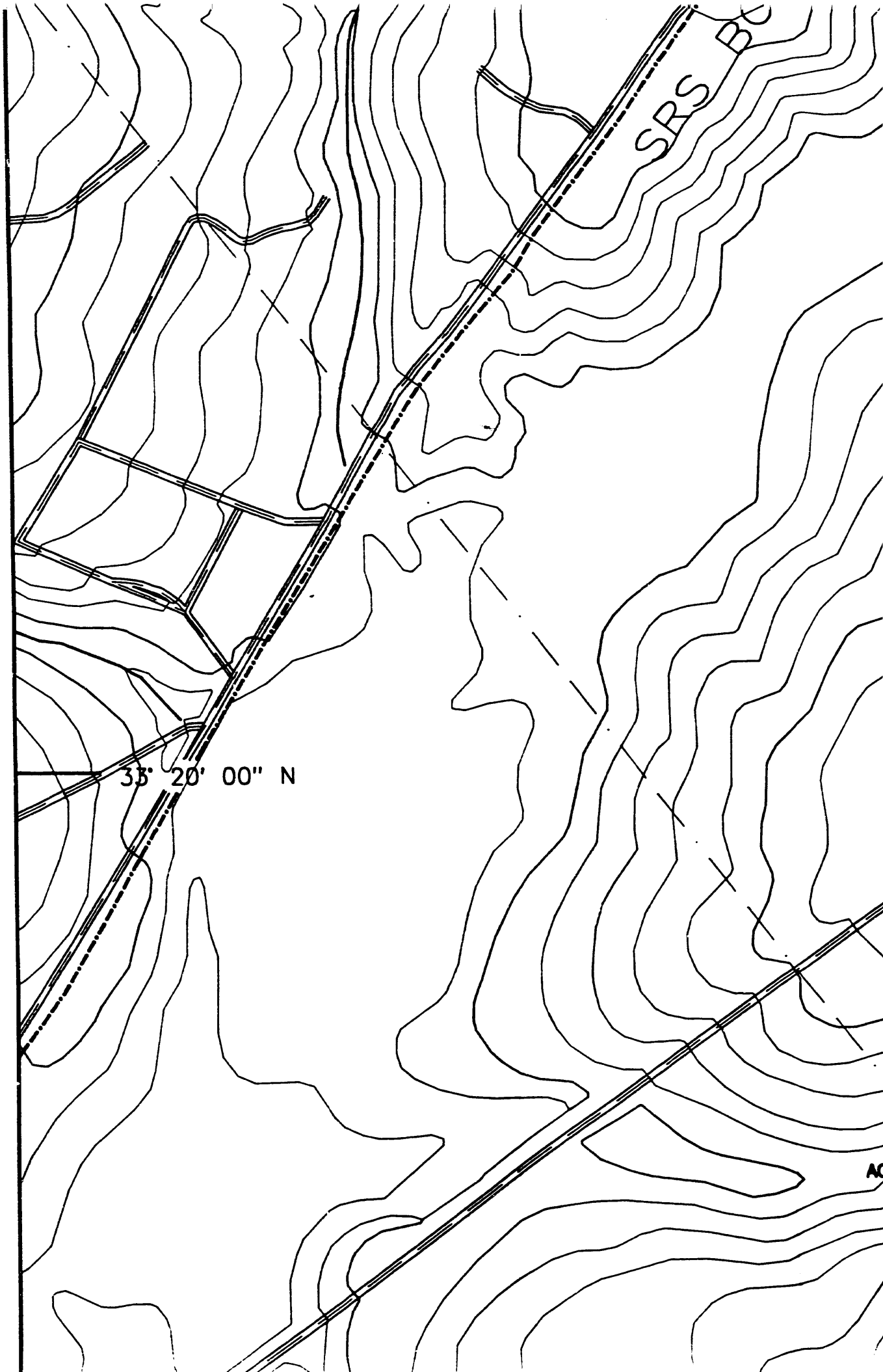

300
430000 UTM E
300
300

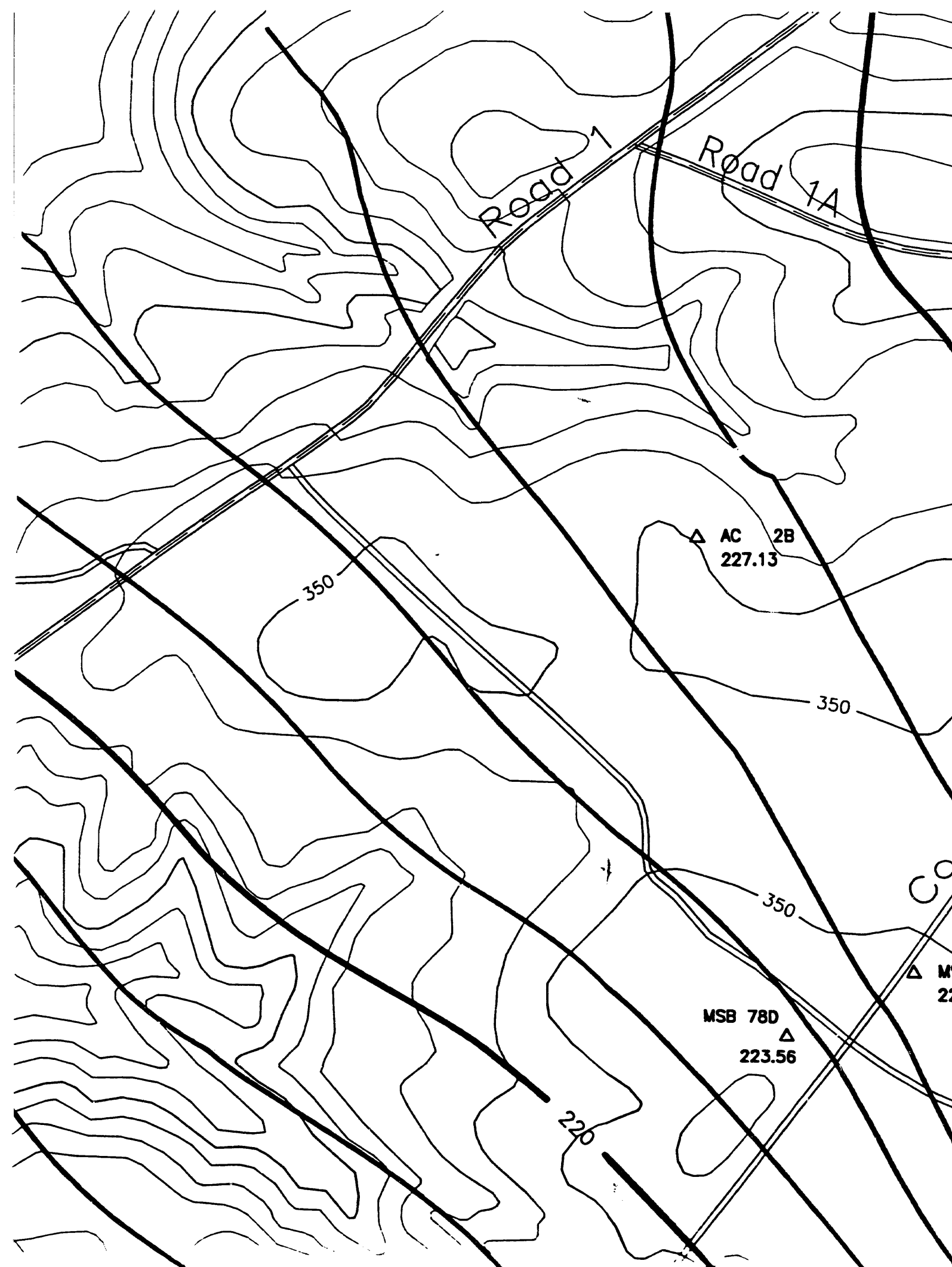

MSB 83D
233.05
MSB 55D
232.98
MSB 82D
232.75
MSB 29D
232.2
MSB 29DD
232.52
340
MSB 43DD
231.97
231.73
MSB 43D
300
230.7
230

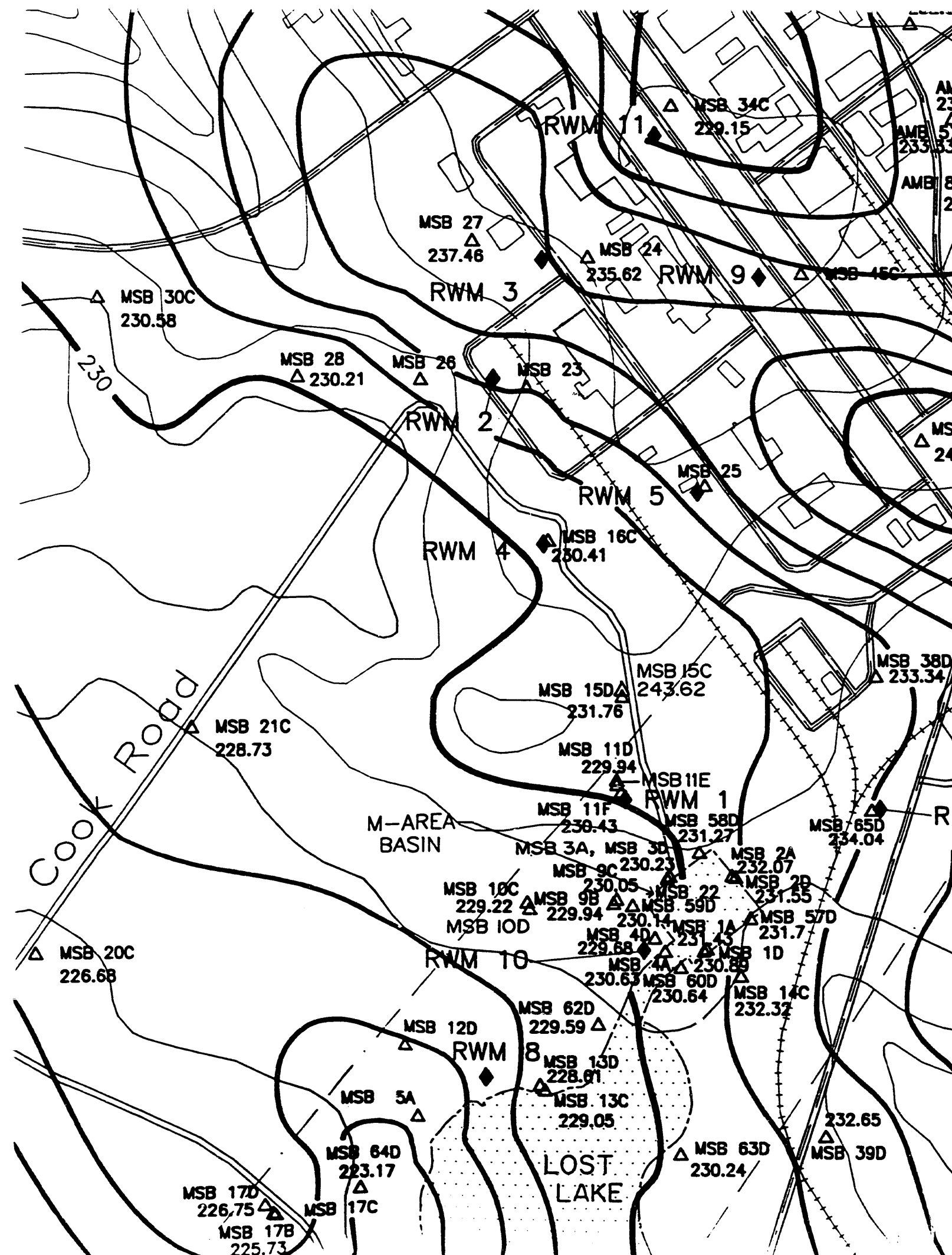

81° 43' 45" W
MSB 48D
232.67
SB 54D
33.06
MSB 85D
232.8
234.26
MSB 77D
230
MSB 53D
233.73
MSB 61D
226.08
69D
3.05
RWM 12
47D
38
ASB 8
234.3
240
MSB 68D
233.44
MSB 67D
232.65
ASB 4
238.17
SRL BASINS
236.49
ASB 6A
ASB 1A
ASB 9
242.68
350
B 66D
0.7
231.39
MSB 37D
30
MSB 42D
232.67
30


433000 UTM E
350
300
250
Small Arms
Training Range

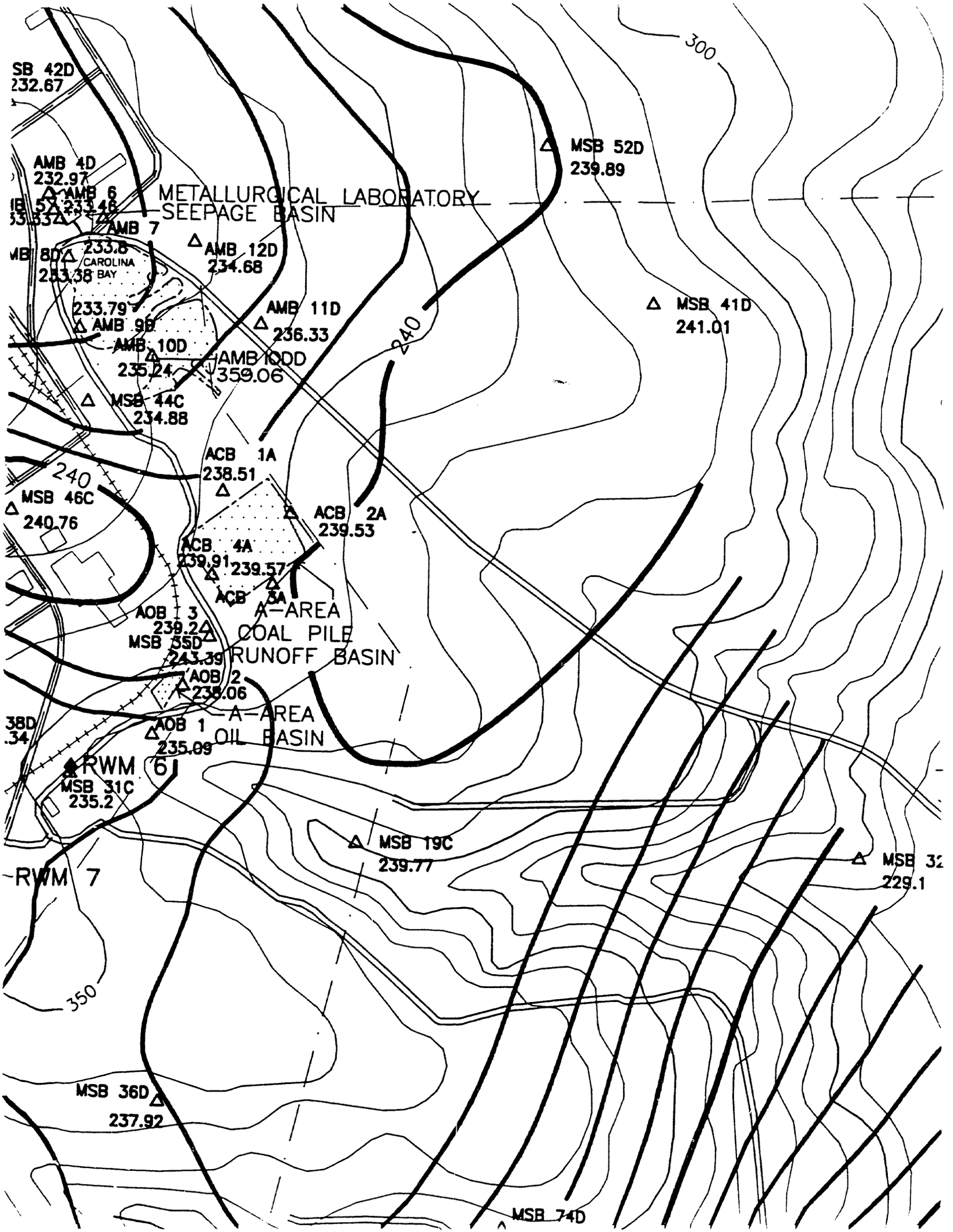

33° 21' 15" N
3690000 UTM N
350

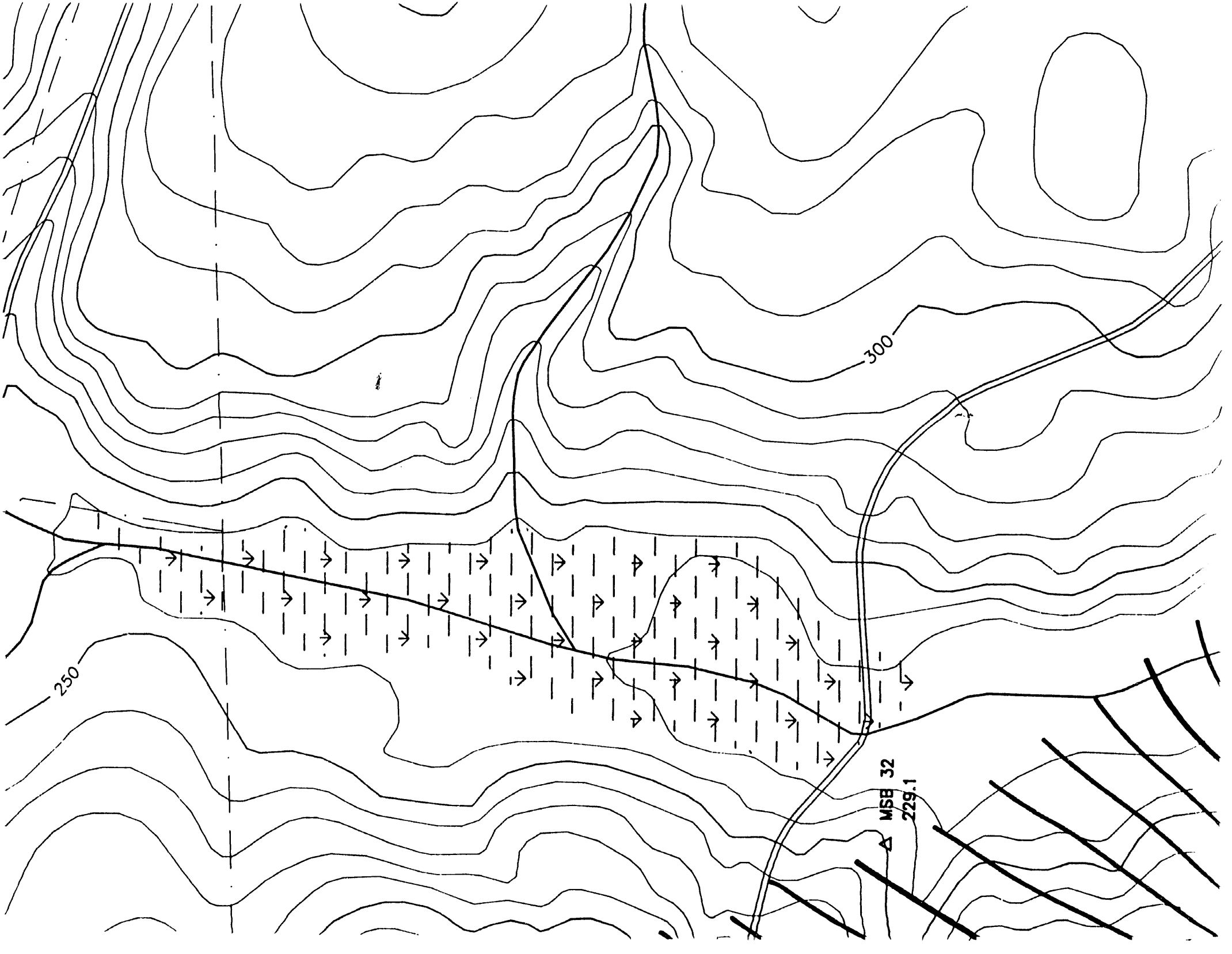

SRS BC
33° 20' 00" N

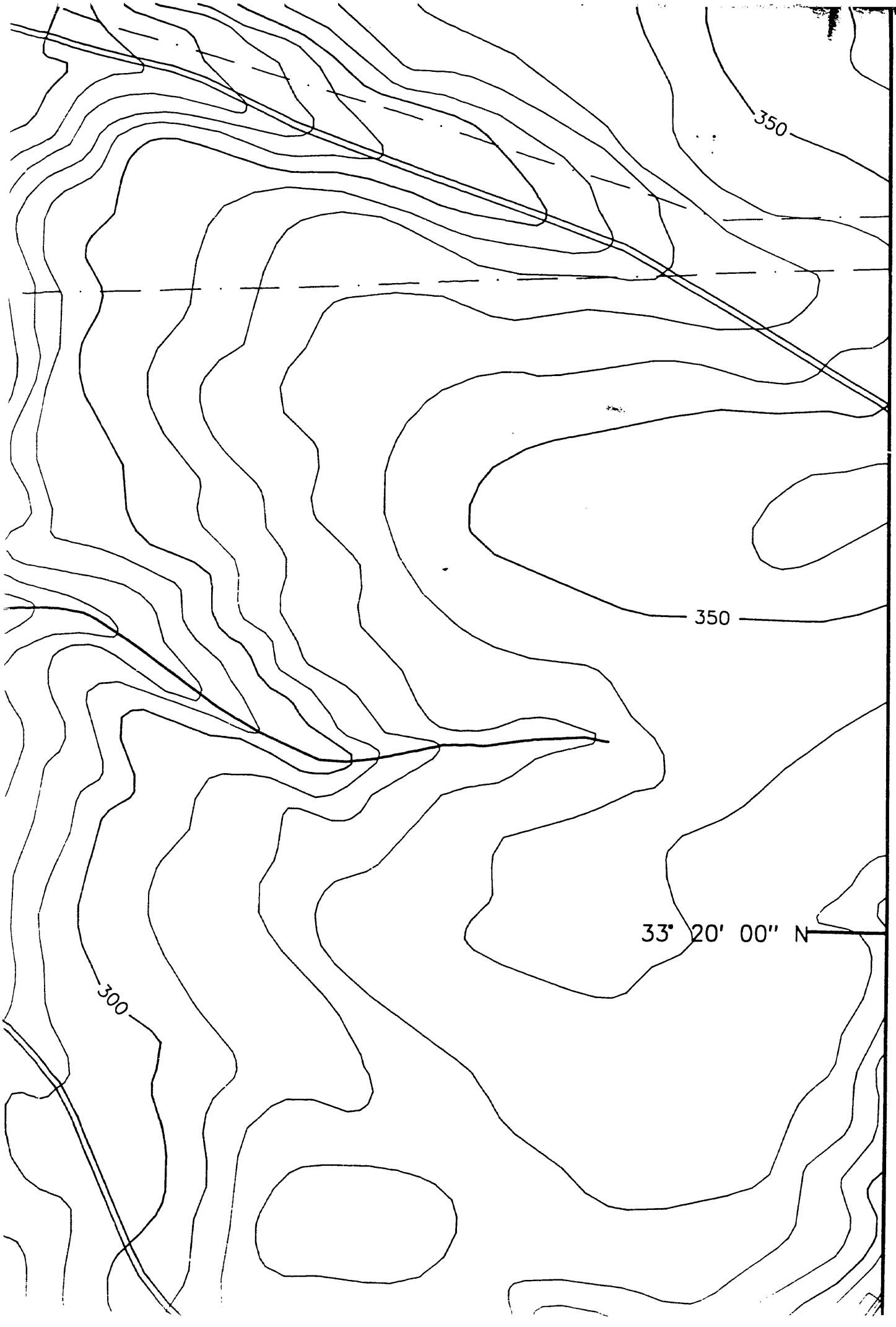

Road 1
Road 1A
AC 2B
227.13
350
350
350
MSB 78D
223.56
220

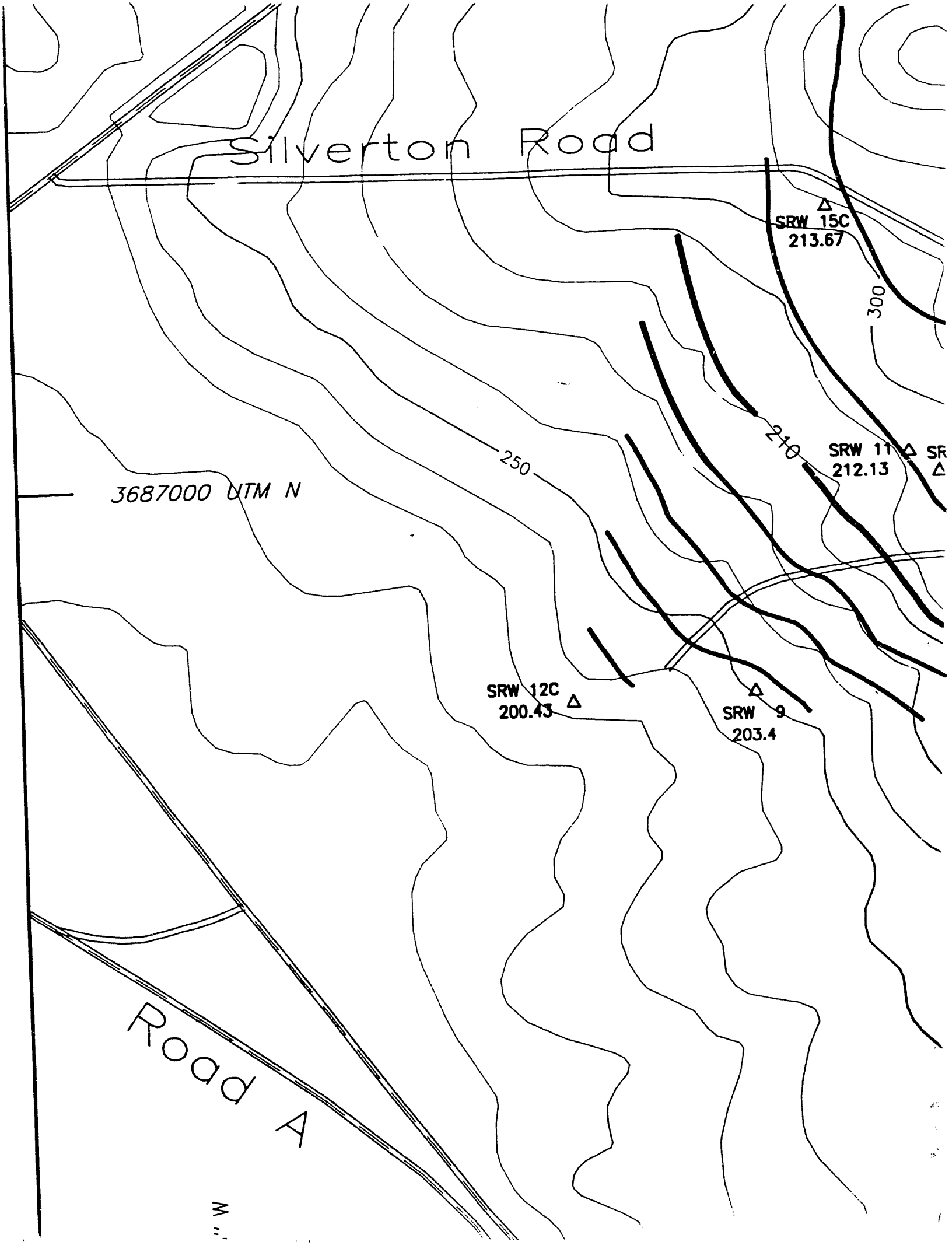

RWM 11
MSB 34C
229.15
MSB 27
237.46
MSB 24
235.62
RWM 9
MSB 45C
RWM 3
MSB 30C
230.58
230
MSB 28
230.21
MSB 26
MSB 23
RWM 2
MSB 25
RWM 5
RWM 4
MSB 16C
230.41
MSB 38D
233.34
MSB 15C
243.62
MSB 15D
231.76
MSB 21C
228.73
COOK Road
MSB 11D
229.94
MSB 11E
RWM 1
MSB 11F
230.43
M-AREA
BASIN
MSB 58D
231.27
MSB 65D
234.04
MSB 3A, MSB 3D
230.23
MSB 2A
232.07
MSB 9C
230.05
MSB 2D
231.55
MSB 10C
229.22
MSB 9B
229.94
MSB 22
MSB 59D
230.14
MSB 57D
231.7
MSB 10D
MSB 1A
MSB 4D
229.68
231.43
MSB 1D
MSB 20C
226.68
RWM 10
MSB 4A
230.89
230.63
MSB 60D
230.64
MSB 14C
232.32
MSB 62D
229.59
MSB 12D
RWM 8
MSB 13D
228.81
MSB 5A
MSB 13C
229.05
232.65
MSB 64D
223.17
MSB 63D
230.24
MSB 39D
LOST
LAKE
MSB 17D
226.75
MSB 17C
MSB 17B
225.73

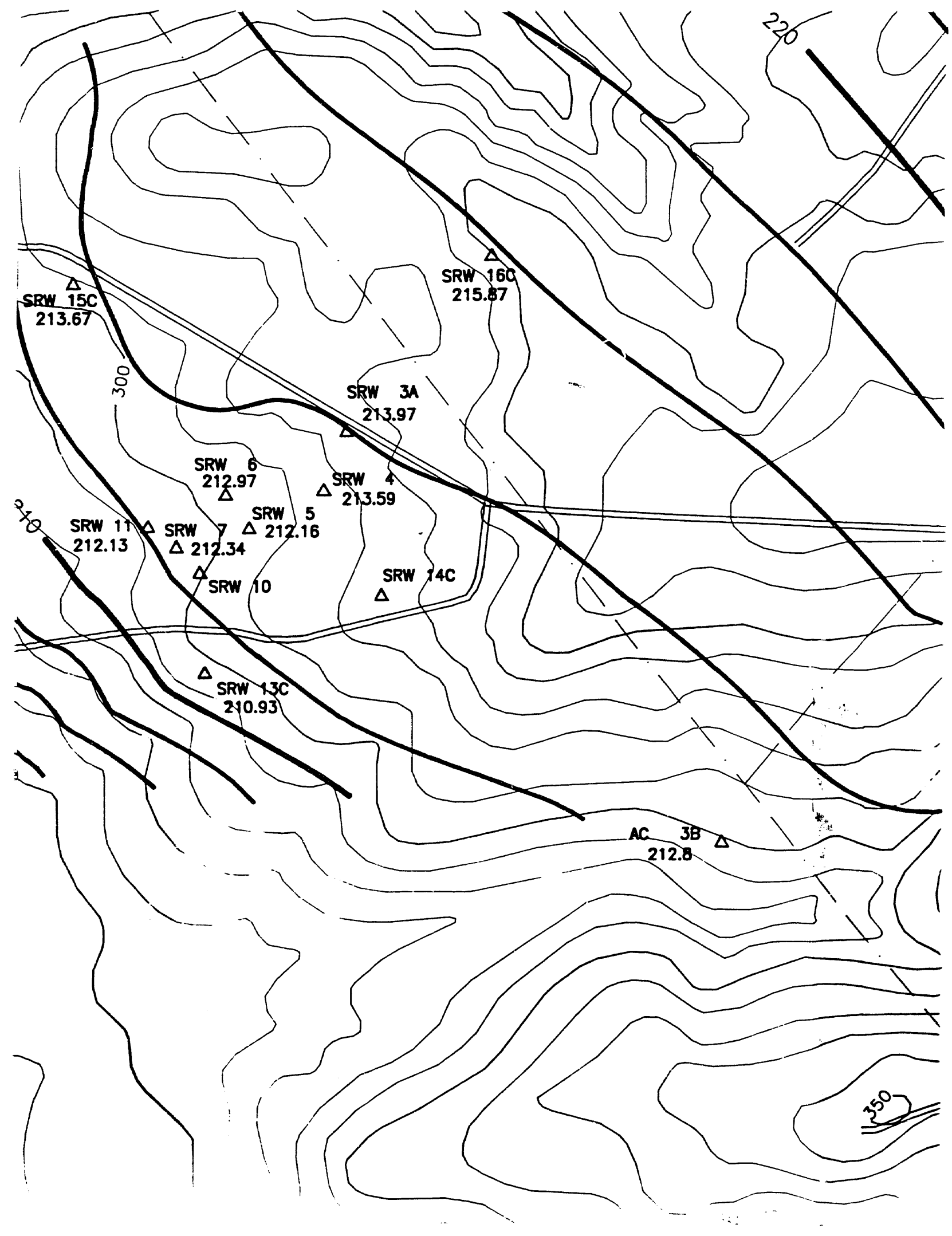

OF
1.0
2.5
2.2
1.1
2.0
1.8
1.25
1.4
1.6

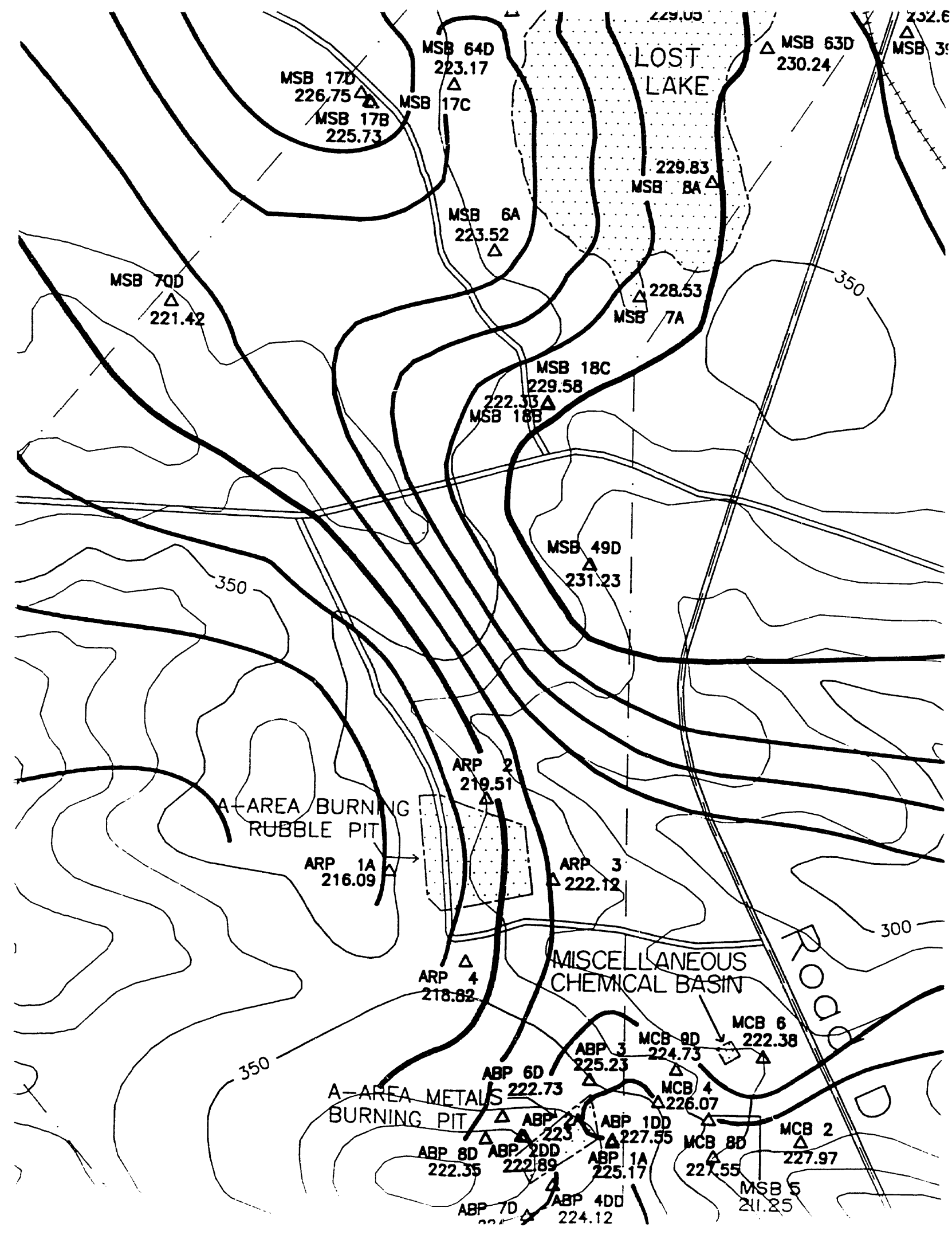

SB 42D
232.67
AMB 4D
232.97
AMB 6
233.46
AMB 7
233.8
AMB 8D
233.38
CAROLINA BAY
AMB 12D
234.68
233.79
AMB 9B
AMB 11D
236.33
AMB 10D
235.24
AMB 10DD
359.06
MSB 44C
234.88
METALLURGICAL LABORATORY
SEEPAGE BASIN
MSB 52D
239.89
MSB 41D
241.01
300
240
240
ACB 1A
238.51
MSB 46C
240.76
ACB 2A
239.53
ACB 4A
239.91
239.57
ACB 3A
A-AREA
COAL PILE
RUNOFF BASIN
AOB 3
239.2
MSB 55D
243.39
AOB 2
238.06
A-AREA
OIL BASIN
AOB 1
235.09
RWM 6
MSB 31C
235.2
RWM 7
MSB 19C
239.77
MSB 32
229.1
350
MSB 36D
237.92
MSB 74D

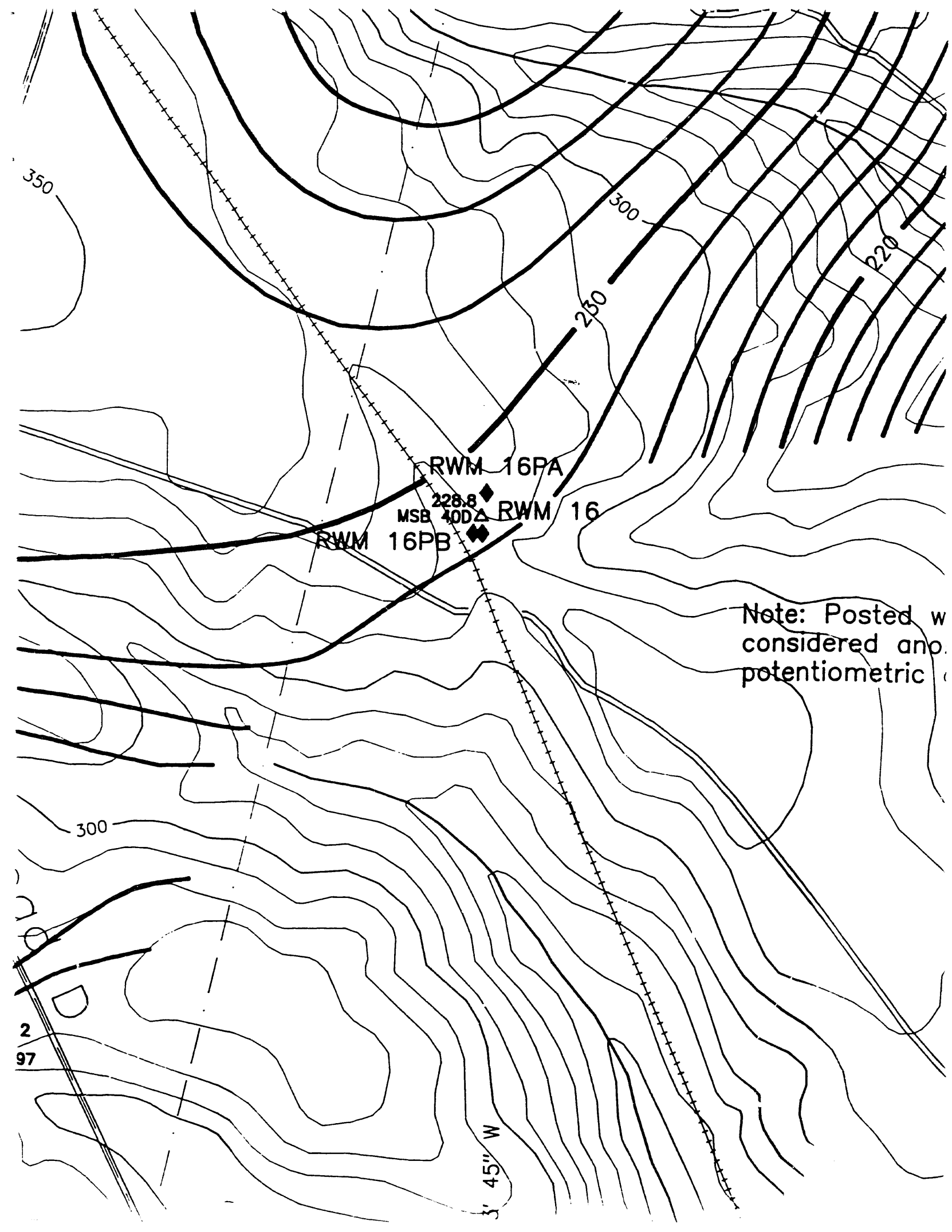

300
250
MSB 32
229.1

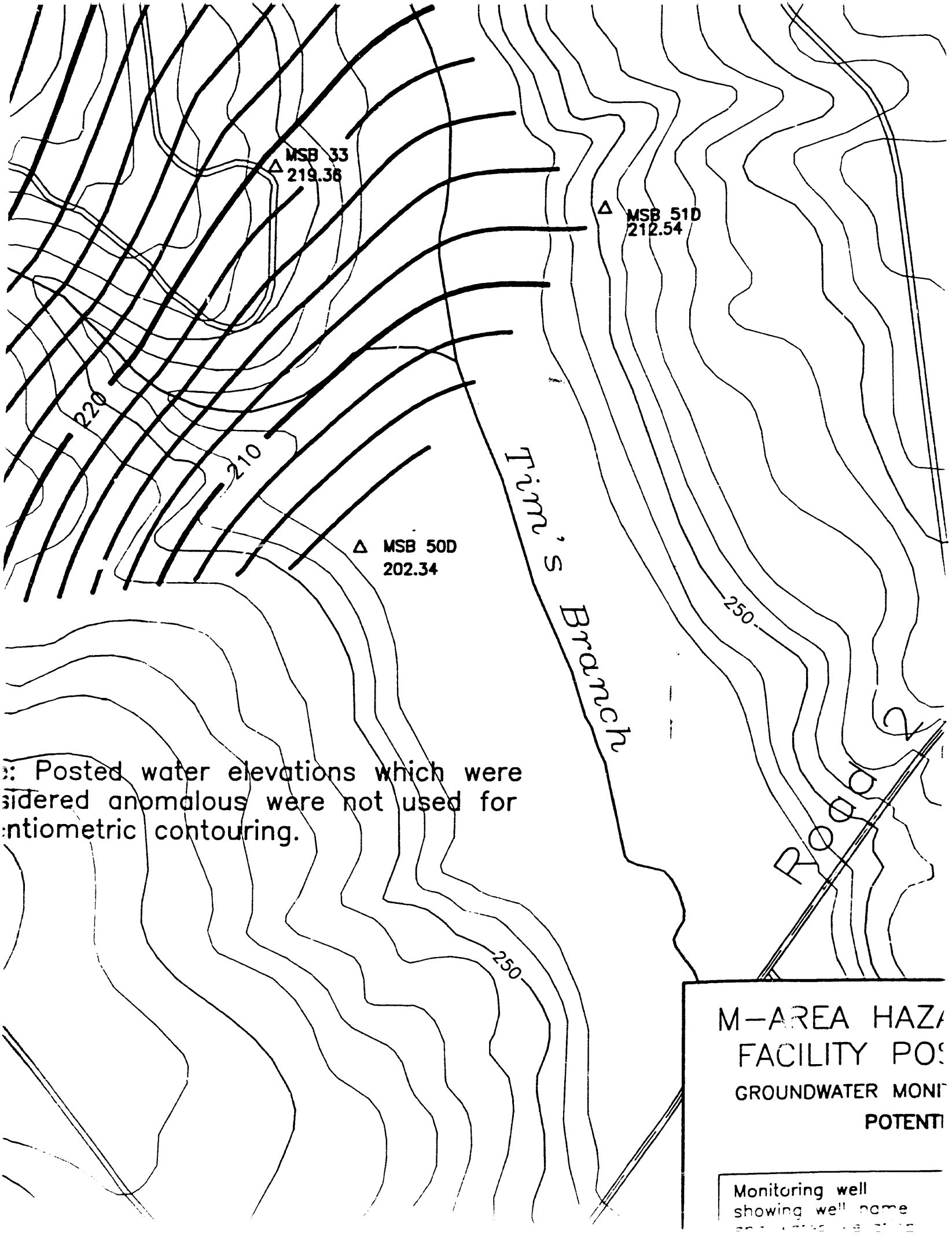

350
350
33° 20' 00" N
300


Silverton Road
SRW 15C
213.67
300
250
210
SRW 11
212.13
3687000 UTM N
SRW 12C
200.43
SRW 9
203.4
Road A

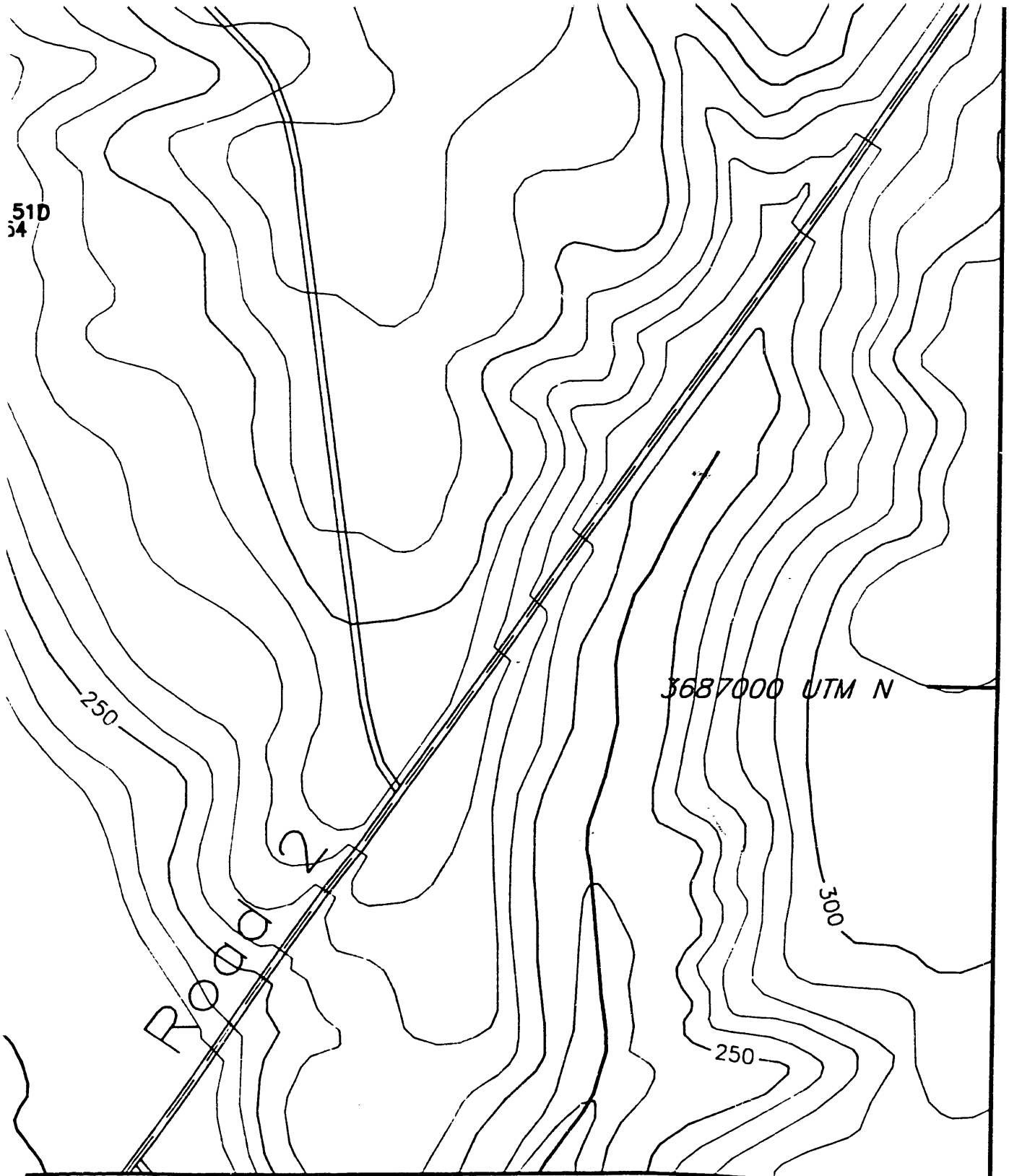

220
SRW 16C
215.87
SRW 15C
213.67
300
SRW 3A
213.97
SRW 6
212.97
SRW 4
213.59
SRW 5
212.16
SRW 11
212.13
SRW 7
212.34
SRW 10
SRW 14C
SRW 13C
210.93
AC 3B
212.8
350


MSB 64D
223.17
MSB 17D
226.75
MSB 17C
MSB 17B
225.73
LOST
LAKE
MSB 63D
230.24
229.83
MSB 8A
MSB 6A
223.52
MSB 70D
221.42
228.53
MSB 7A
350
MSB 18C
229.58
222.33
MSB 18B
MSB 49D
231.23
350
ARP 2
219.51
A-AREA BURNING
RUBBLE PIT
ARP 1A
216.09
ARP 3
222.12
300
ARP 4
218.82
MISCELLANEOUS
CHEMICAL BASIN
Road D
MCB 6
222.38
MCB 9D
224.73
ABP 3
225.23
ABP 6D
222.73
MCB 4
226.07
A-AREA METALS
BURNING PIT
ABP 2A
223
ABP 1DD
227.55
MCB 2
227.97
MCB 8D
227.55
ABP 8D
222.35
ABP 2DD
222.89
ABP 1A
225.17
MSB 5
211.85
ABP 7D
ABP 4DD
224.12
350


350
300
230
220
RWM 16PA
228.8
MSB 40D
RWM 16
RWM 16PB
Note: Posted w
considered ano
potentiometric
300
2
97
3' 45" W



: Posted water elevations which were
sidered anomalous were not used for
ntiometric contouring.



M-AREA HAZARDOUS WASTE MANAGEMENT FACILITY POST-CLOSURE CARE PERMIT

GROUNDWATER MONITORING AND CORRECTIVE ACTION PROGRAM

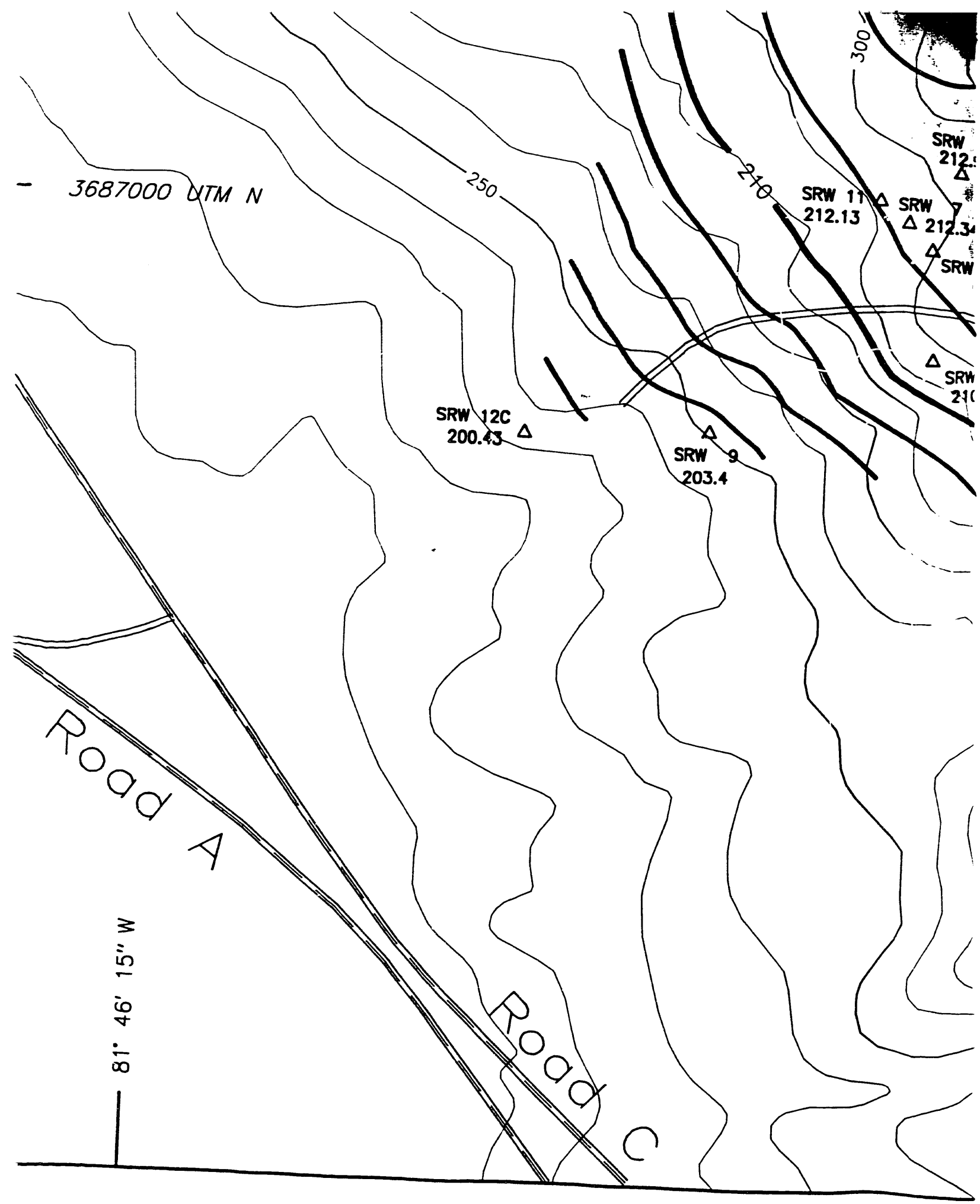
POTENTIOMETRIC SURFACE MAP (2Q93)

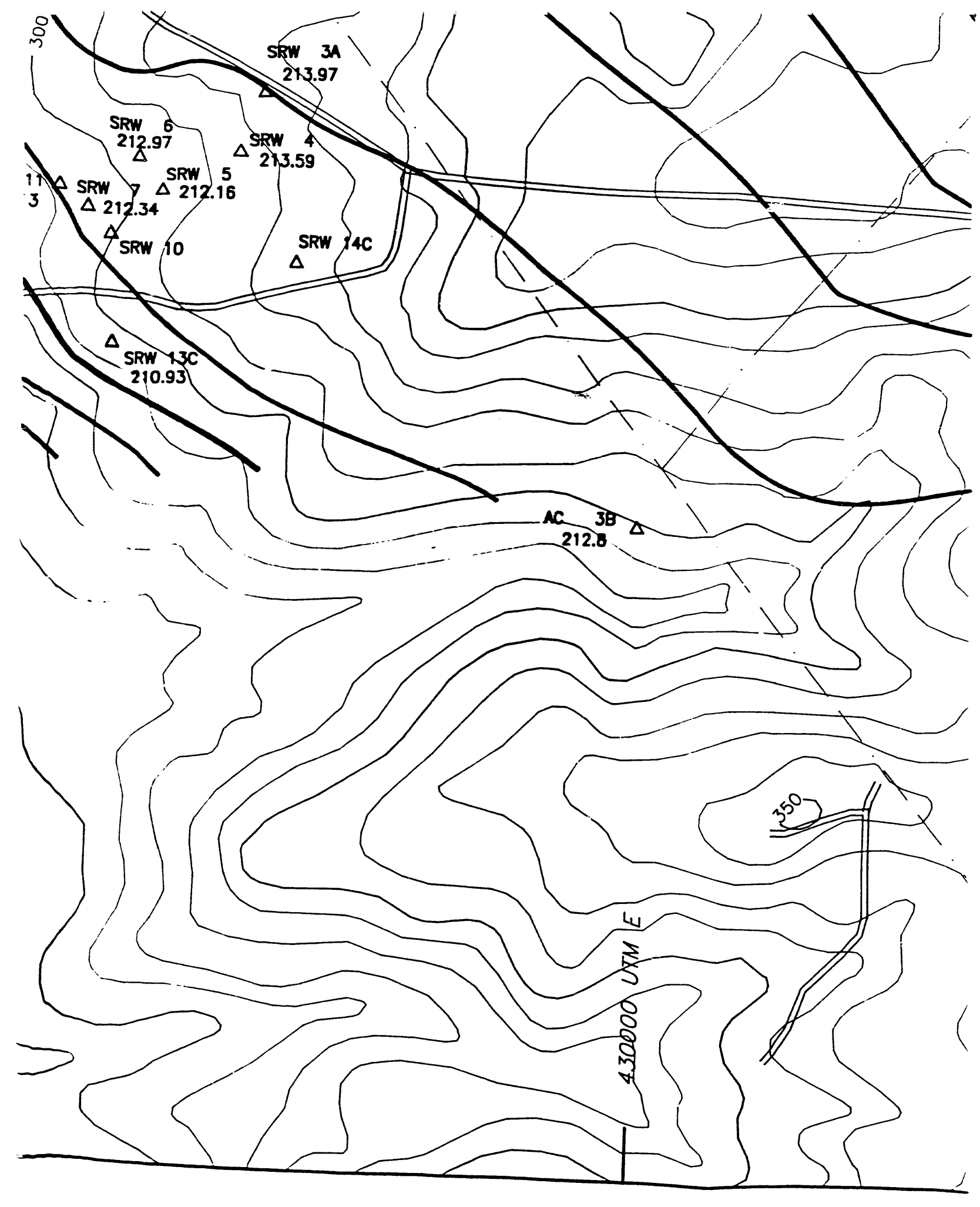
WATER TABLE UNIT

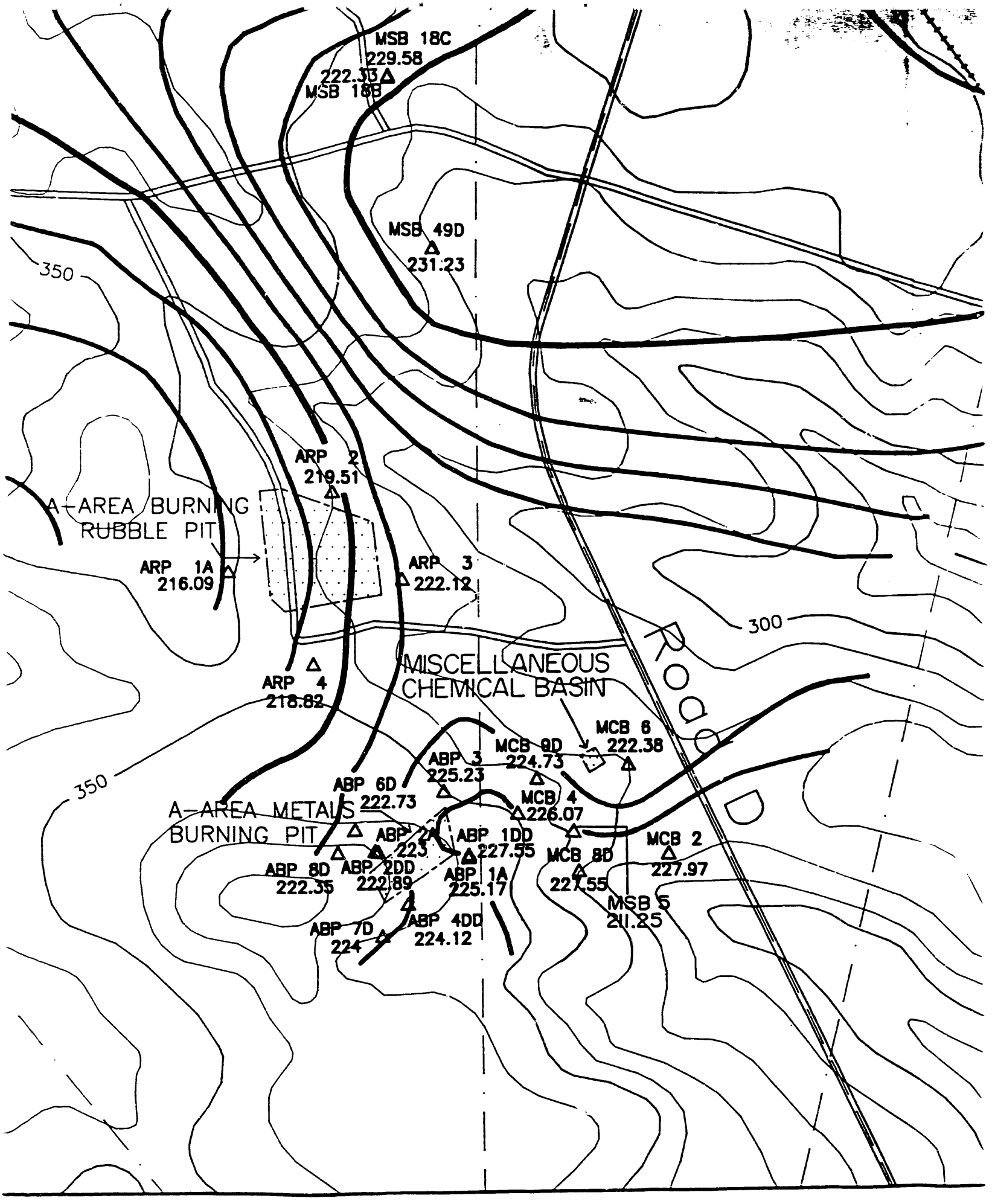
Monitoring well showing well name and water elevation in feet msl

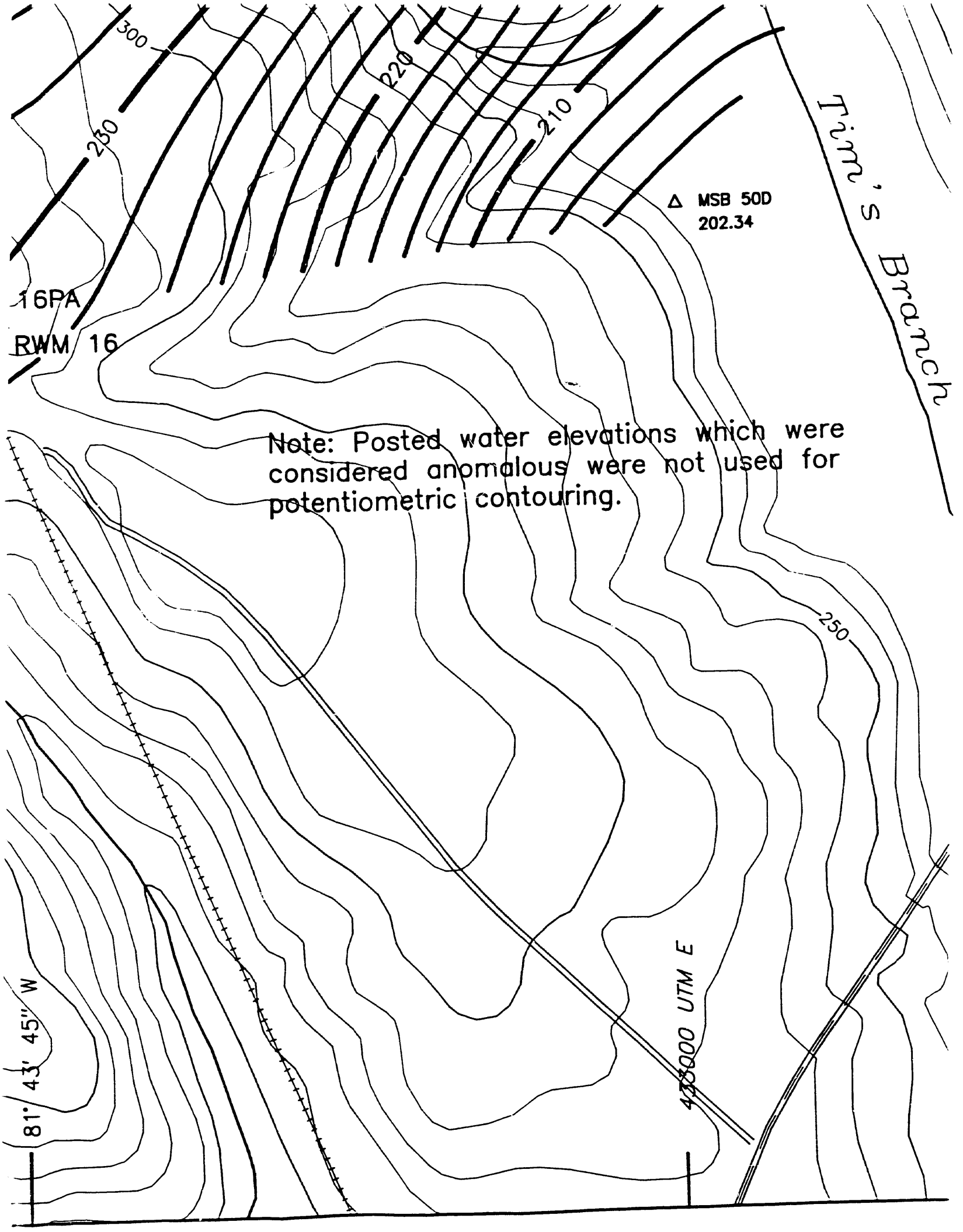
MSB 85D
△
230.42

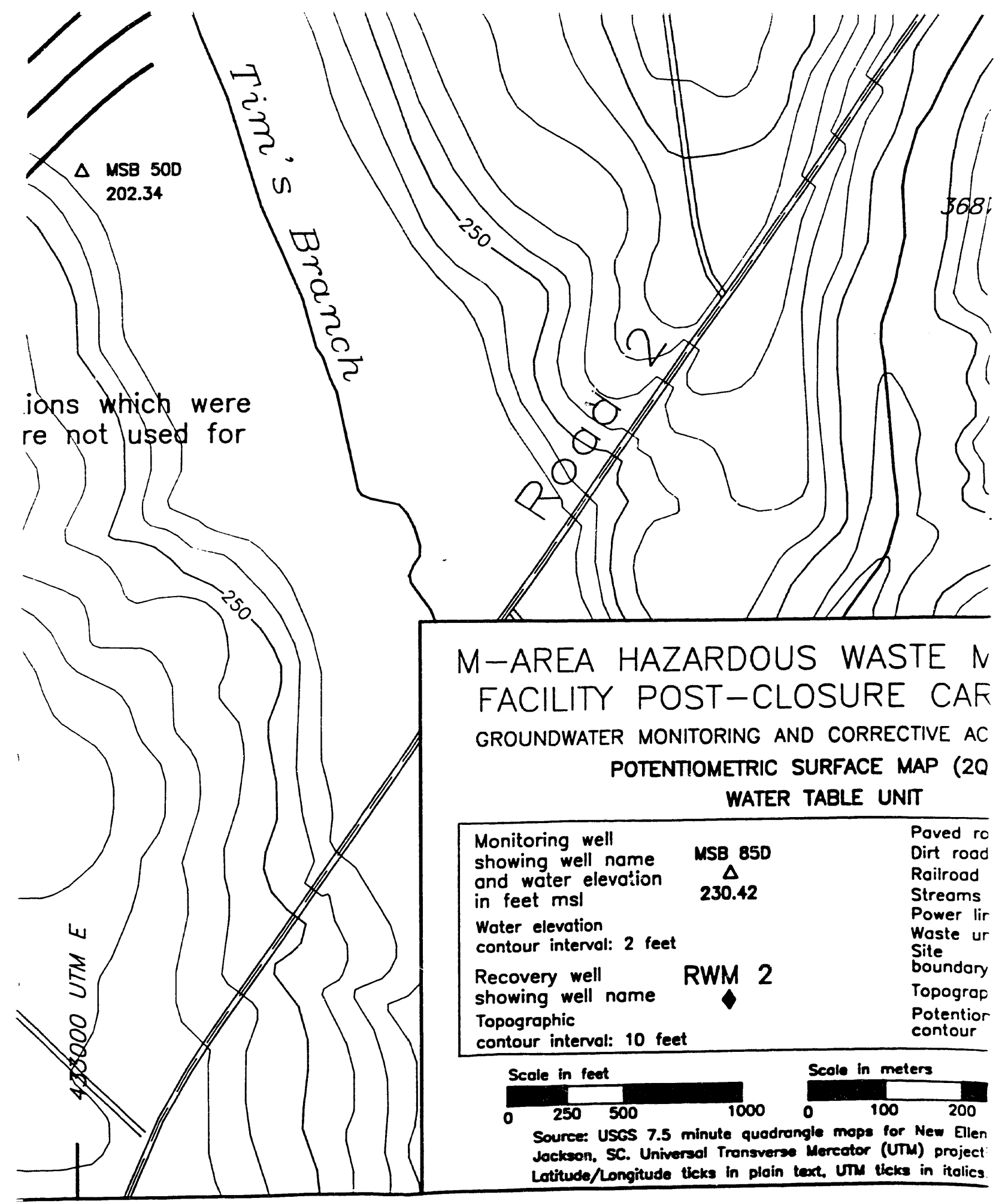
Paved road
Dirt road
Railroad
Streams
Power line

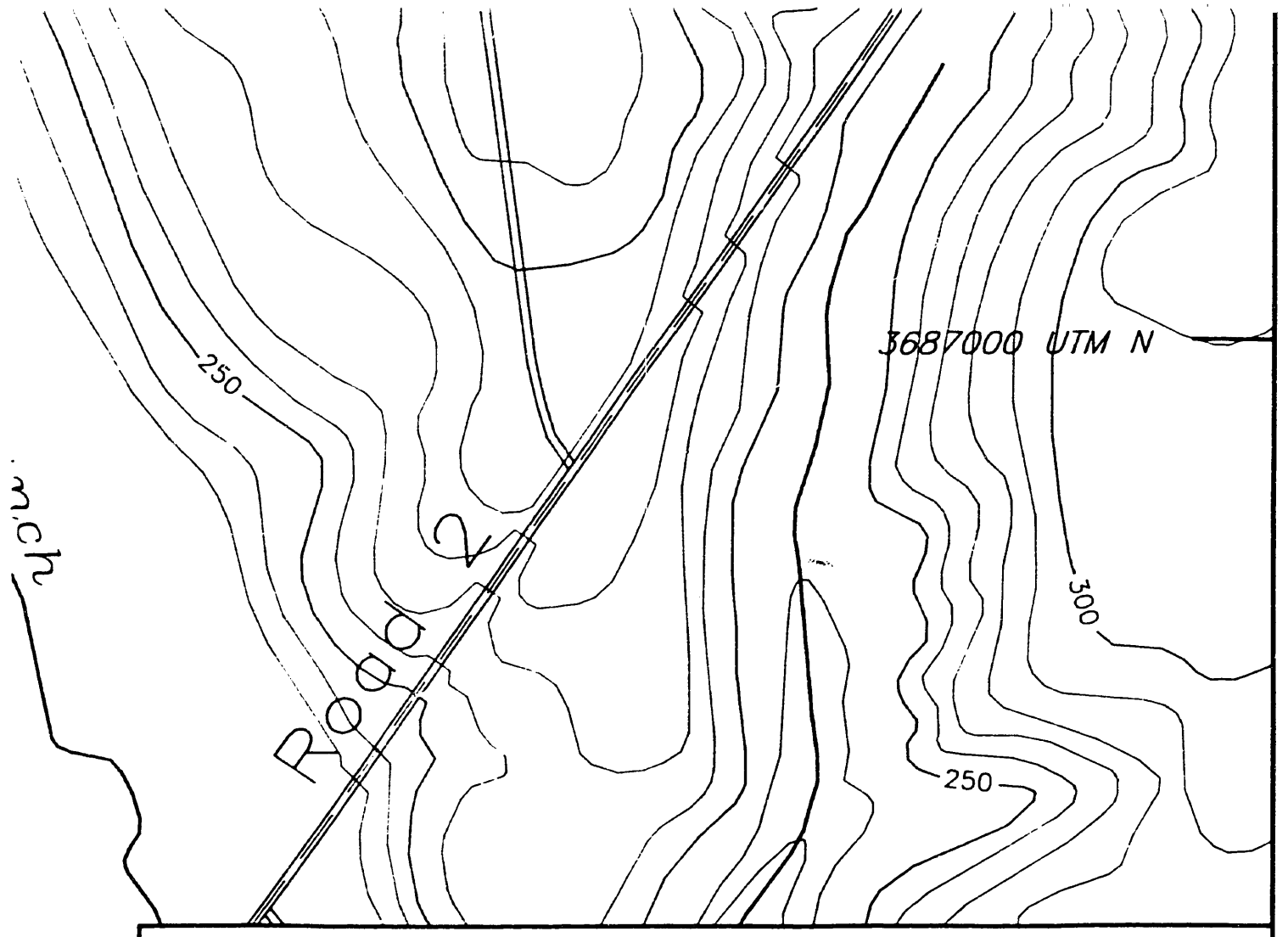

3687000 UTM N
250
210
300
SRW 11
212.13
SRW
SRW 12C
200.43
SRW 9
203.4
Road A
Road C
81° 46' 15" W


300
SRW 3A
213.97
SRW 6
212.97
SRW 4
213.59
SRW 5
212.16
SRW 7
212.34
SRW 10
SRW 14C
SRW 13C
210.93
AC 3B
212.8
350
430000 UTM E


MSB 18C
229.58
222.33
MSB 18B
MSB 49D
231.23
350
ARP 2
219.51
A-AREA BURNING
RUBBLE PIT
ARP 1A
216.09
ARP 3
222.12
300
ARP 4
218.82
MISCELLANEOUS
CHEMICAL BASIN
Road D
MCB 6
222.38
MCB 9D
224.73
ABP 3
225.23
350
ABP 6D
222.73
MCB 4
226.07
A-AREA METALS
BURNING PIT
ABP 2A
223
ABP 1DD
227.55
MCB 8D
227.55
MCB 2
227.97
ABP 8D
222.35
ABP 2DD
222.89
ABP 1A
225.17
MSB 5
211.25
ABP 7D
224
ABP 4DD
224.12


300
230
220
210
Tim's Branch
△ MSB 50D
202.34
16PA
RWM 16
Note: Posted water elevations which were considered anomalous were not used for potentiometric contouring.
250
438000 UTM E
81° 43' 45" W


Tim's Branch
MSB 50D
202.34
250
250
ROAD
ions which were
re not used for
430000 UTM E
M-AREA HAZARDOUS WASTE M
FACILITY POST-CLOSURE CAR
GROUNDWATER MONITORING AND CORRECTIVE AC
POTENTIOMETRIC SURFACE MAP (2Q
WATER TABLE UNIT
Monitoring well showing well name and water elevation in feet msl
MSB 85D
230.42
Water elevation contour interval: 2 feet
Recovery well showing well name
RWM 2
Topographic contour interval: 10 feet
Paved ro
Dirt road
Railroad
Streams
Power lir
Waste ur
Site boundary
Topograp
Potentior contour
Scale in feet
0 250 500 1000
Scale in meters
0 100 200
Source: USGS 7.5 minute quadrangle maps for New Ellen
Jackson, SC. Universal Transverse Mercator (UTM) project
Latitude/Longitude ticks in plain text, UTM ticks in italics



M-AREA HAZARDOUS WASTE MANAGEMENT FACILITY POST-CLOSURE CARE PERMIT

GROUNDWATER MONITORING AND CORRECTIVE ACTION PROGRAM

POTENTIOMETRIC SURFACE MAP (2Q93)

WATER TABLE UNIT

Monitoring well showing well name and water elevation in feet msl — MSB 85D △ 230.42

Water elevation contour interval: 2 feet

Recovery well showing well name — RWM 2 ♦

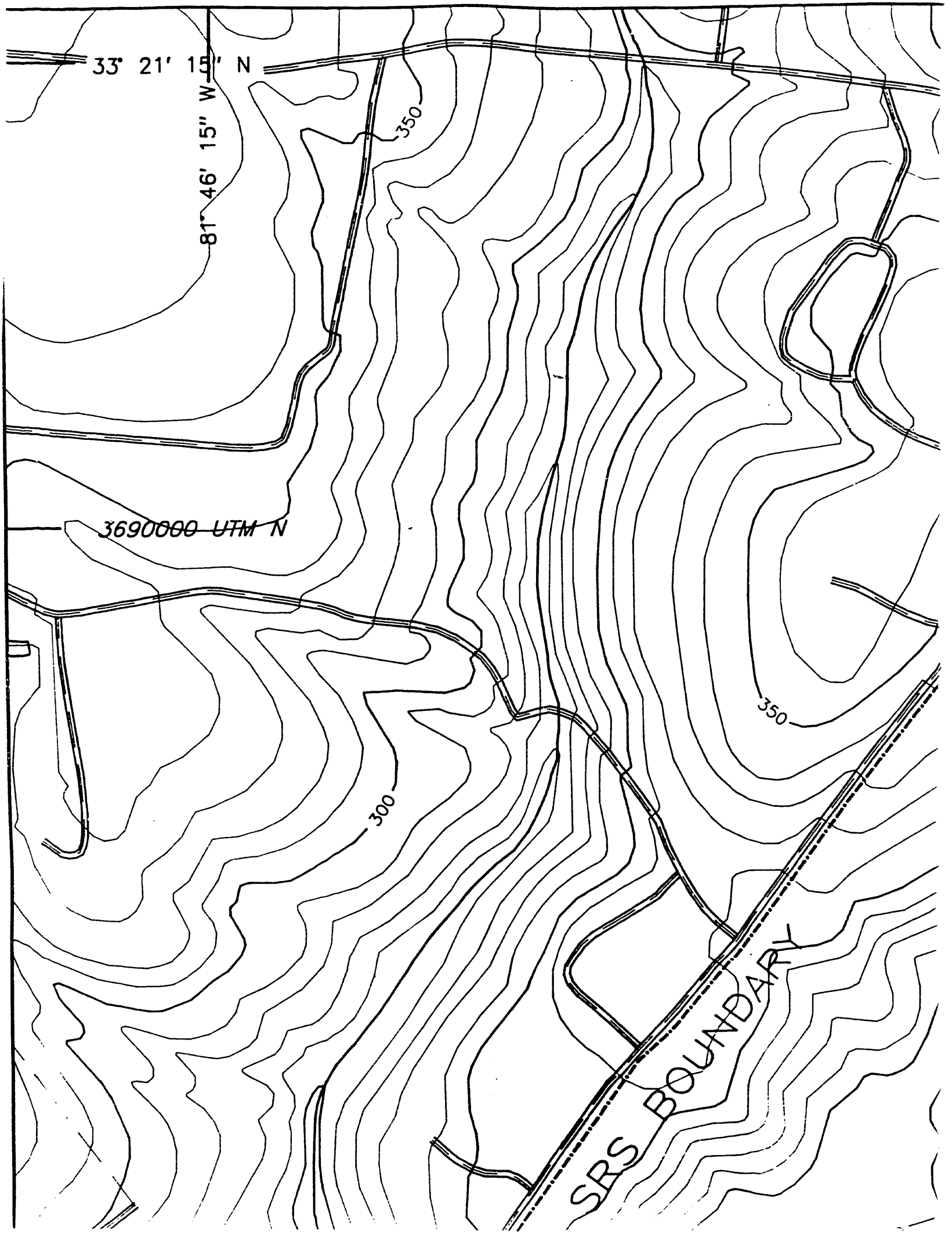
Topographic contour interval: 10 feet

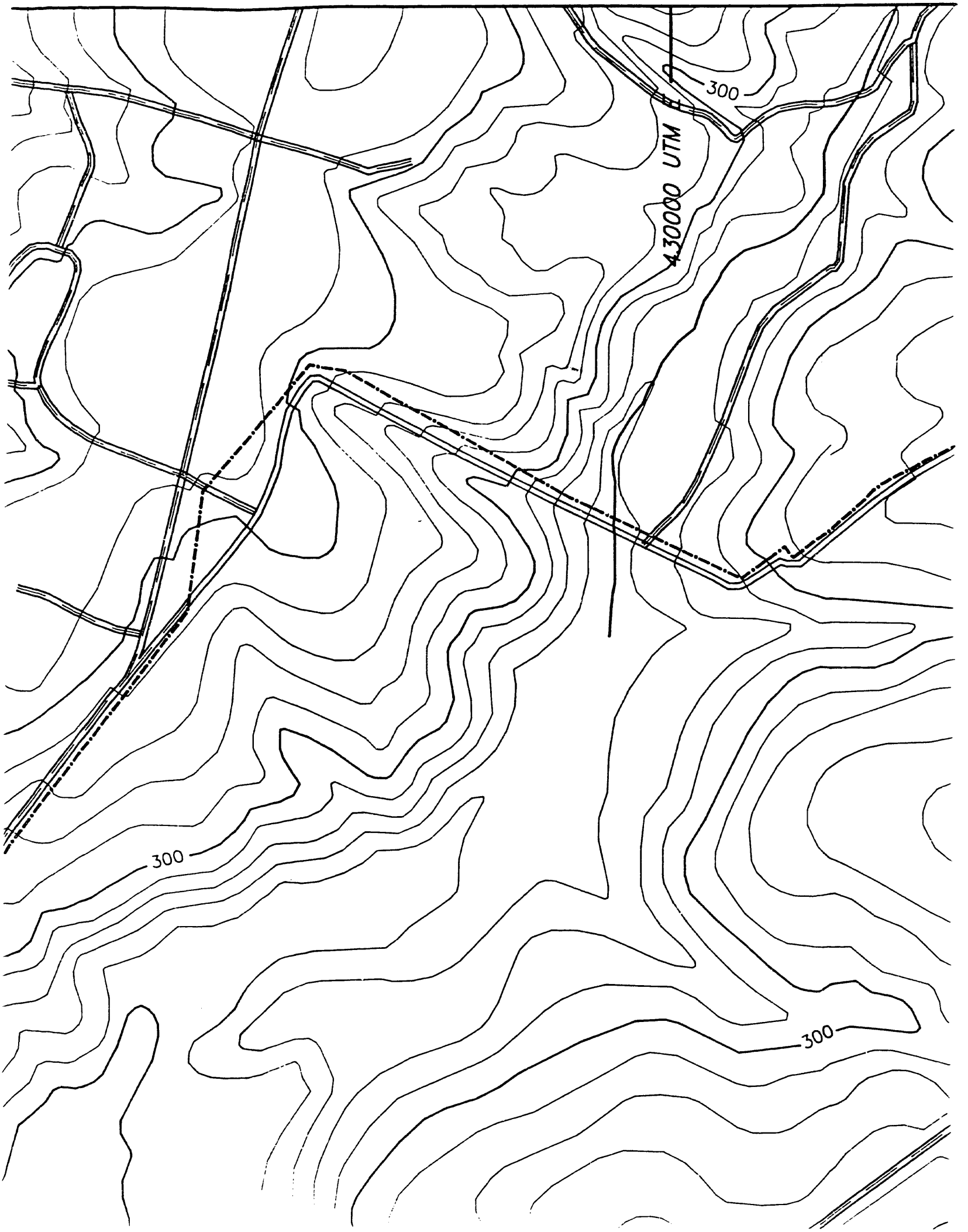
Paved road
Dirt road
Railroad
Streams
Power line
Waste unit
Site boundary
Topography — 250
Potentiometric contour — 210

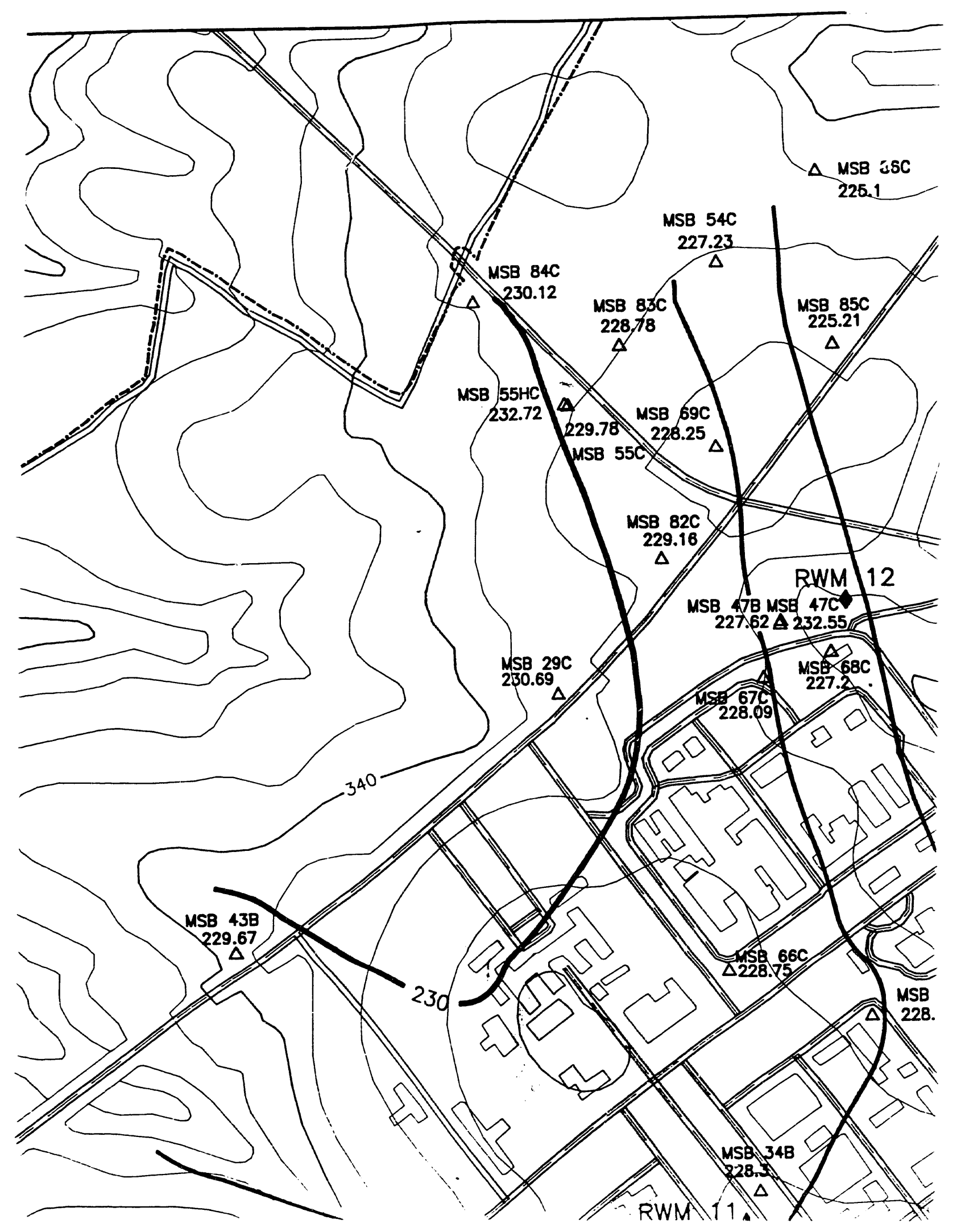
Scale in feet: 0 250 500 1000

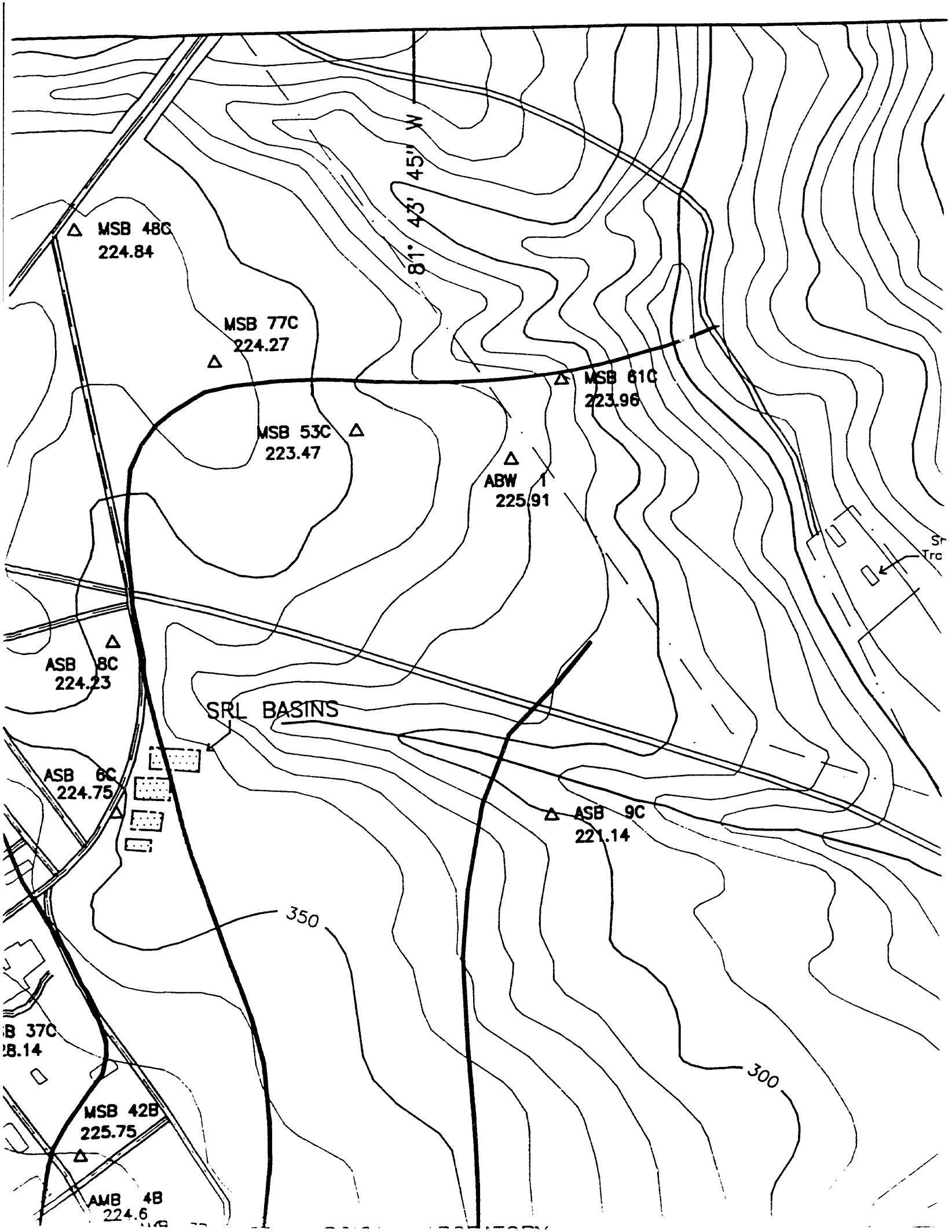
Scale in meters: 0 100 200 1000

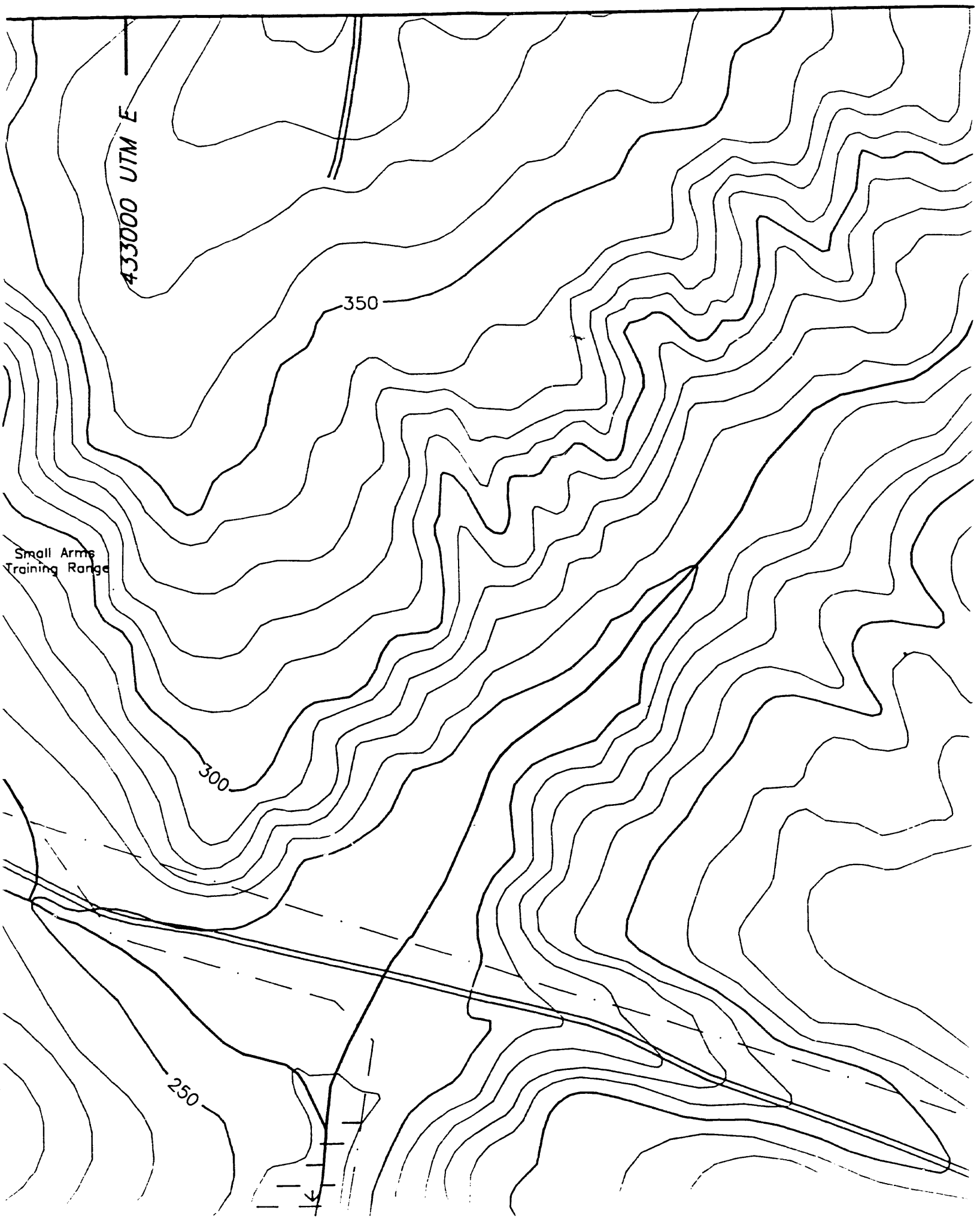
Source: USGS 7.5 minute quadrangle maps for New Ellenton SW and Jackson, SC. Universal Transverse Mercator (UTM) projection, Zone 17. Latitude/Longitude ticks in plain text, UTM ticks in italics.

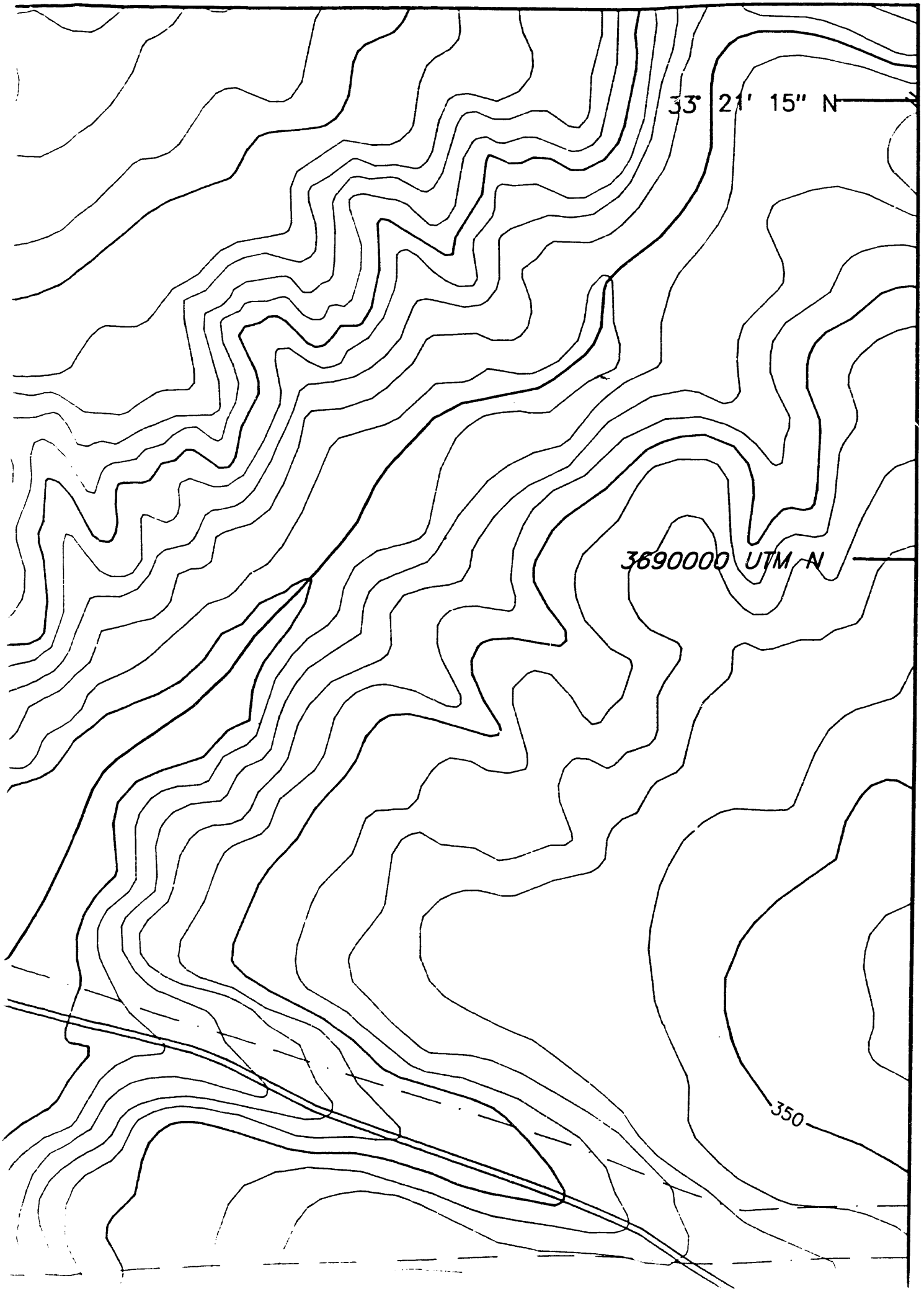

33° 21' 15" N
81° 46' 15" W
350
3690000 UTM N
350
300
SRS BOUNDARY

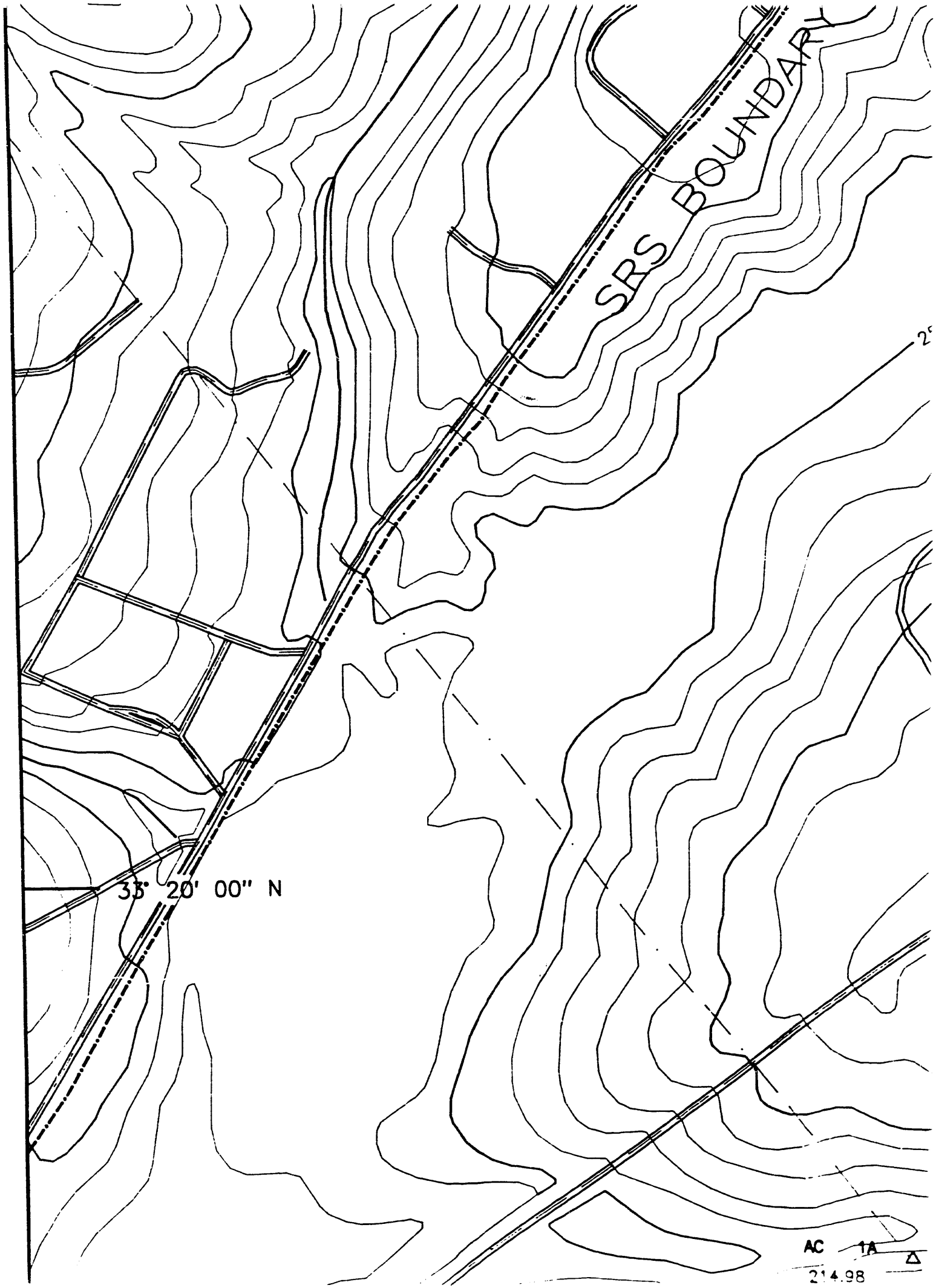

300
4300000 UTM
300
300

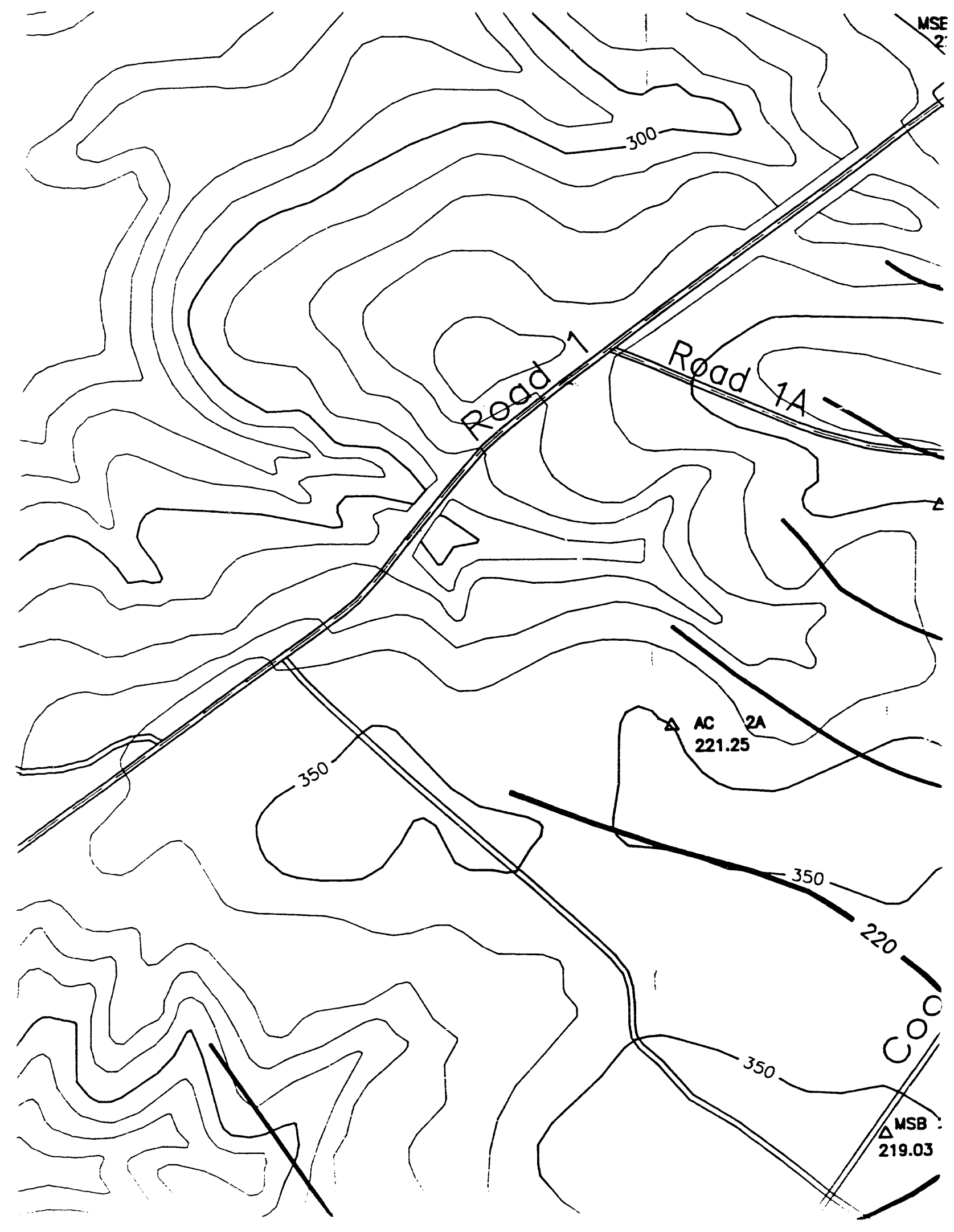

MSB 36C
225.1
MSB 54C
227.23
MSB 84C
230.12
MSB 83C
228.78
MSB 85C
225.21
MSB 55HC
232.72
229.78
MSB 69C
228.25
MSB 55C
MSB 82C
229.16
RWM 12
MSB 47B MSB 47C
227.62 232.55
MSB 29C
230.69
MSB 68C
227.2
MSB 67C
228.09
340
MSB 43B
229.67
230
MSB 66C
228.75
MSB
228.
MSB 34B
228.3
RWM 11

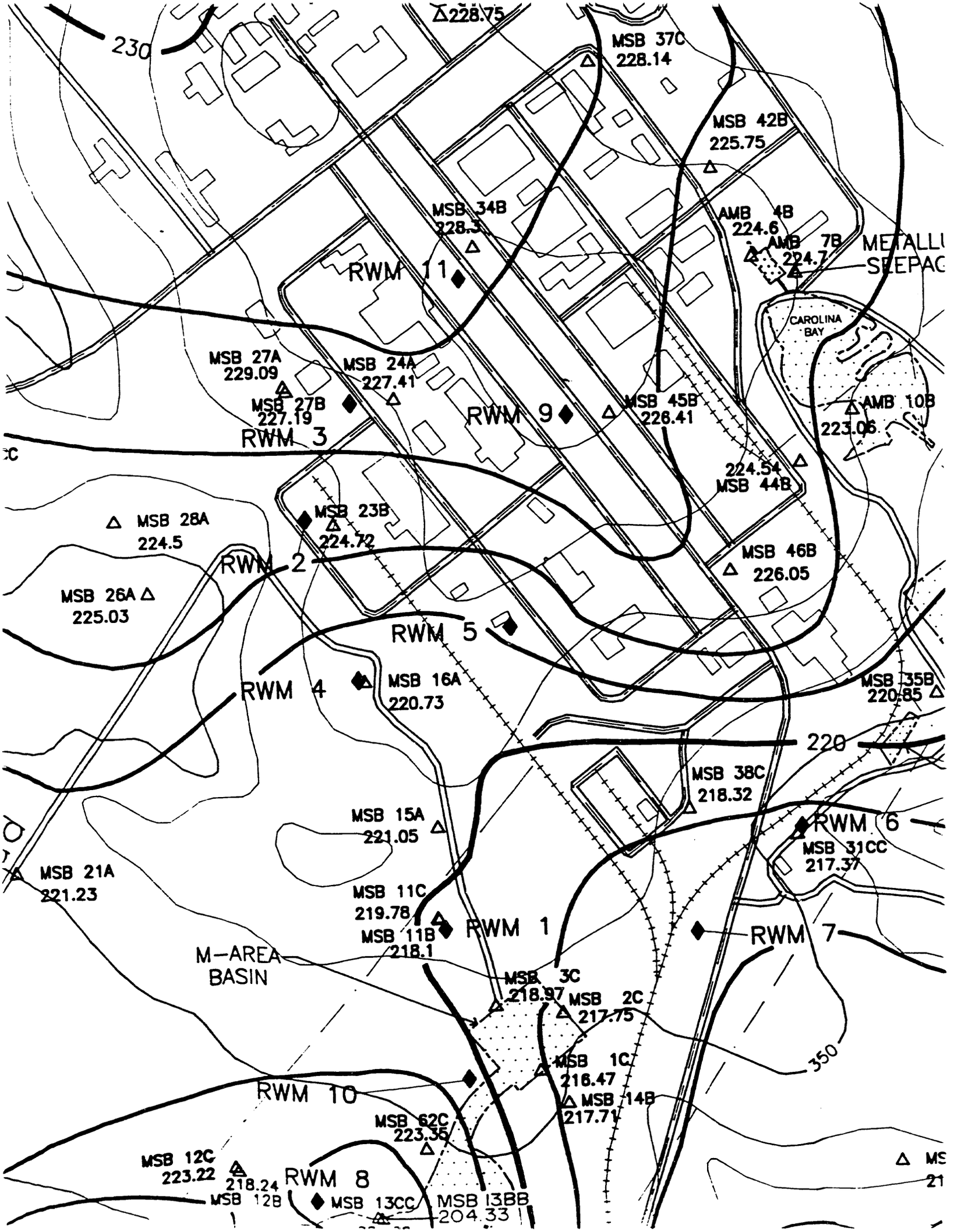

81° 43' 45" W
MSB 48C
224.84
MSB 77C
224.27
MSB 61C
223.96
MSB 53C
223.47
ABW 1
225.91
ASB 8C
224.23
SRL BASINS
ASB 6C
224.75
ASB 9C
221.14
350
300
MSB 42B
225.75
AMB 4B
224.6

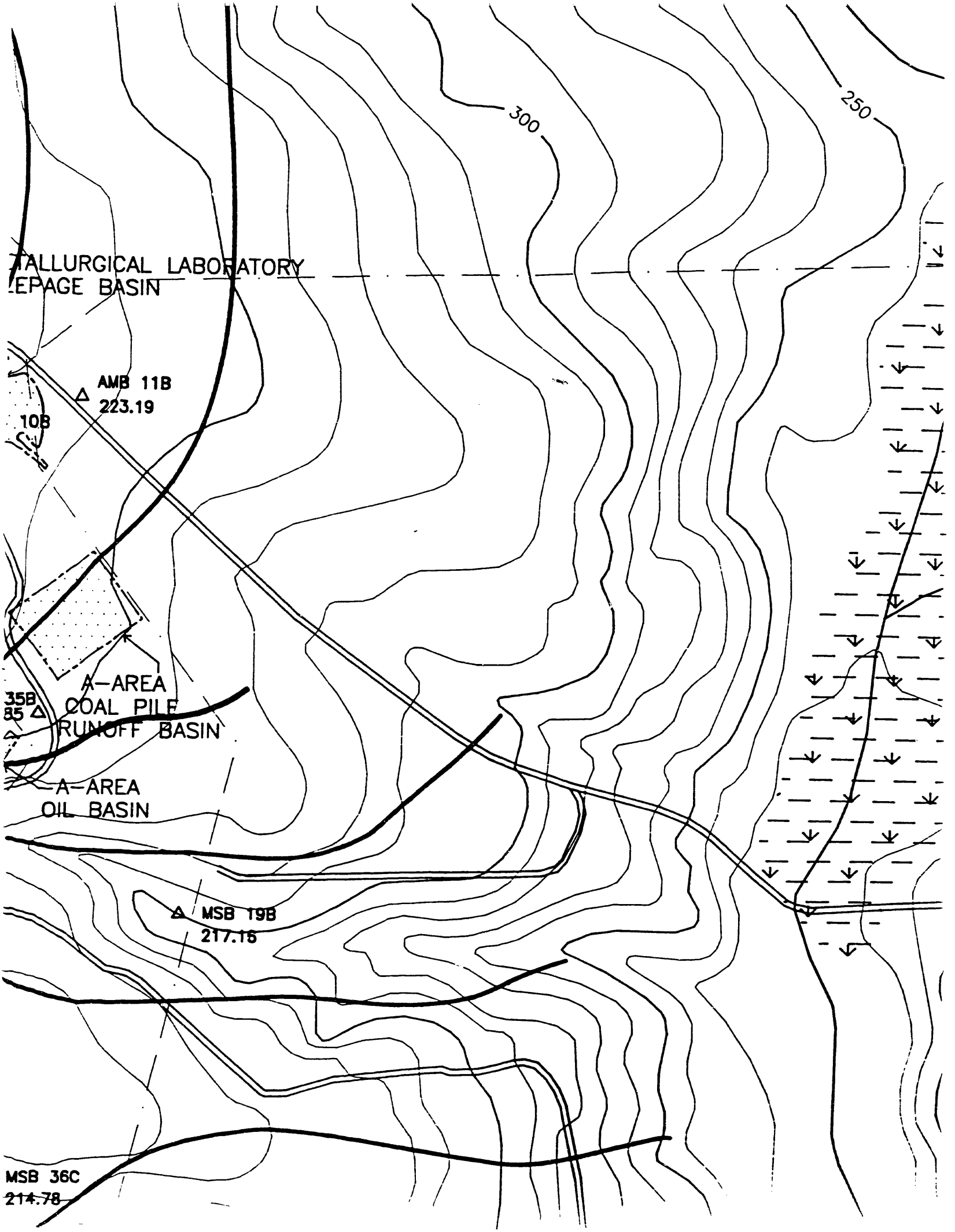

433000 UTM E
350
300
250
Small Arms
Training Range

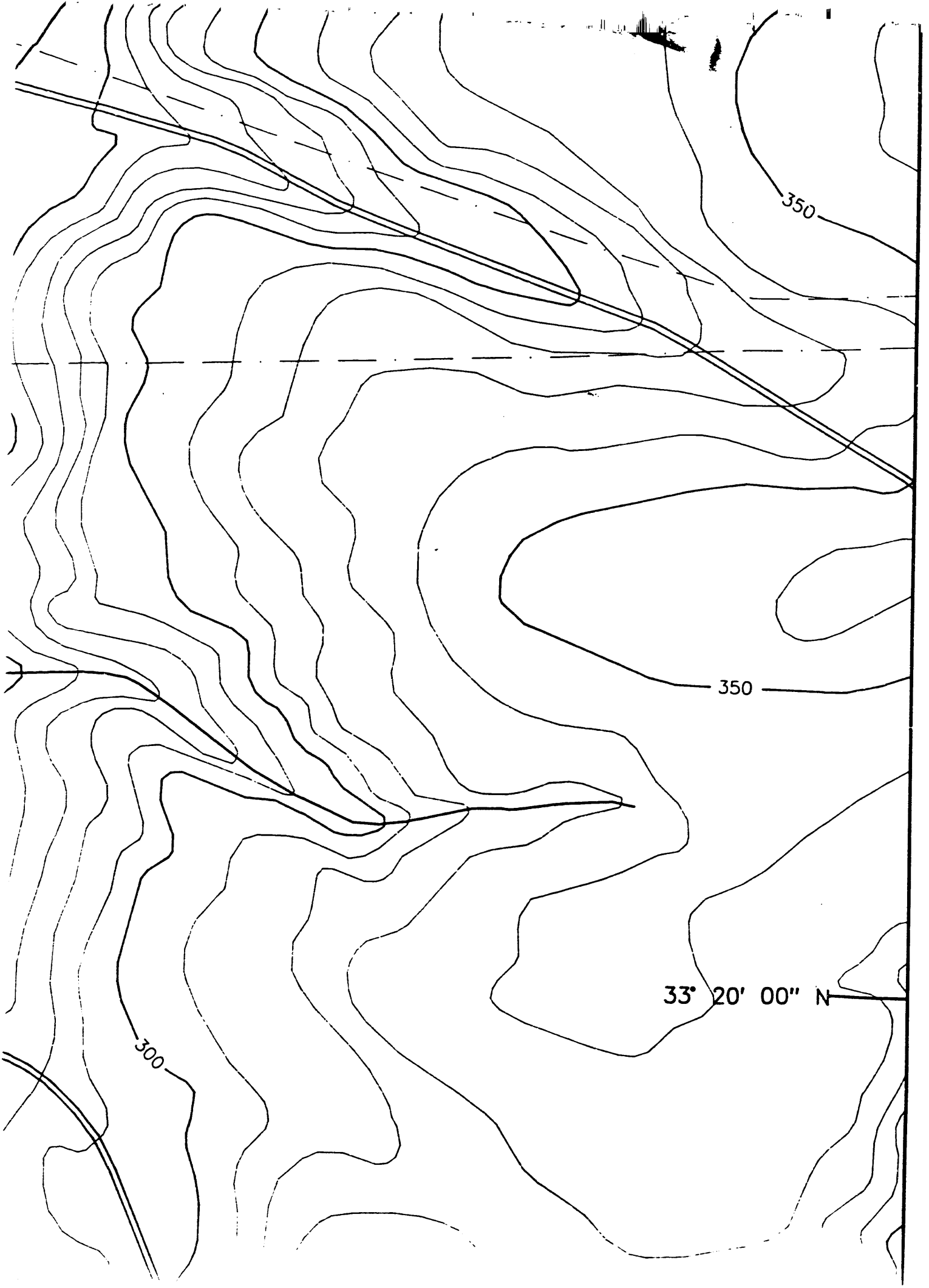

33° 21' 15" N
3690000 UTM N
350

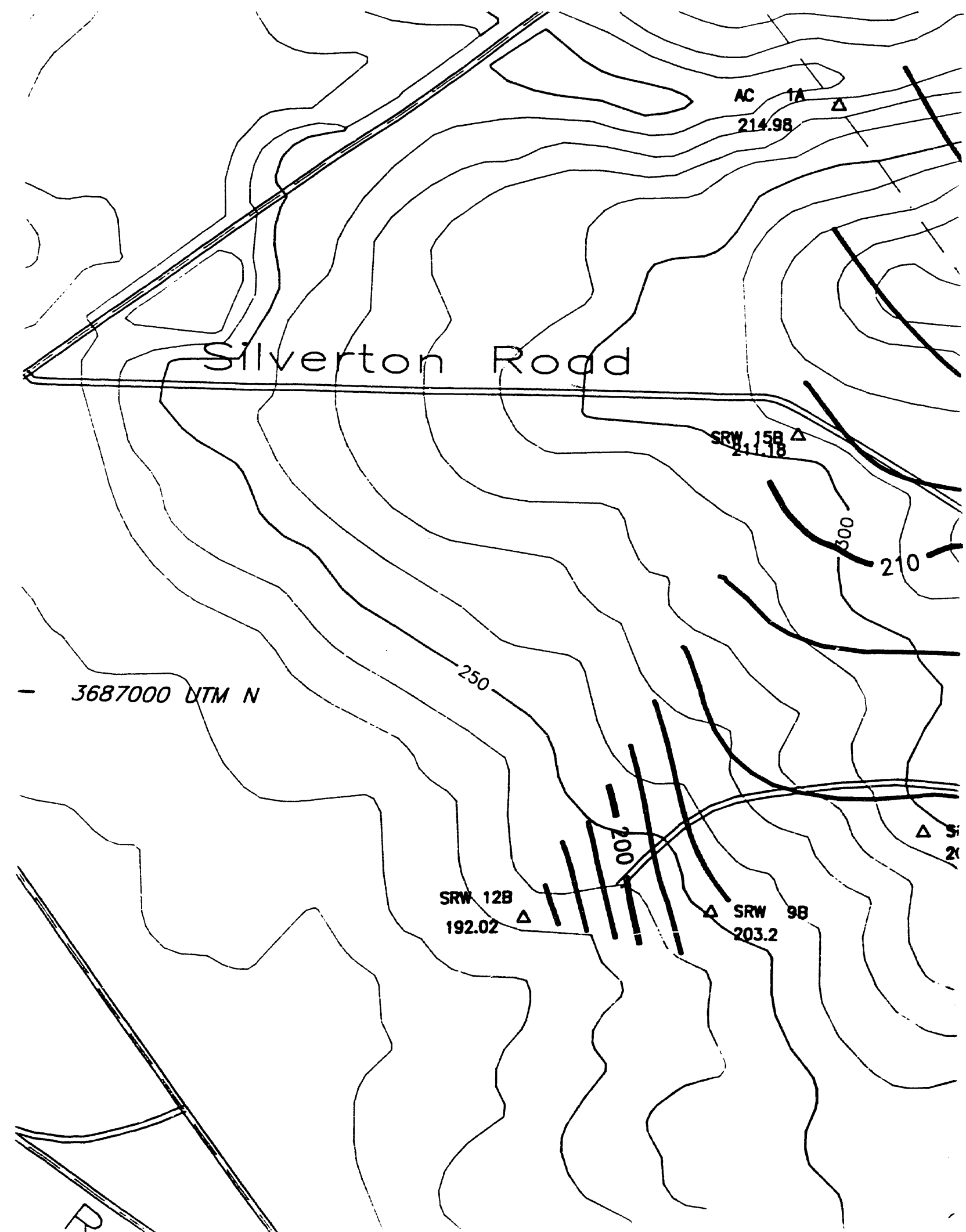

SRS BOUNDARY
33° 20' 00" N
AC 1A
214.98

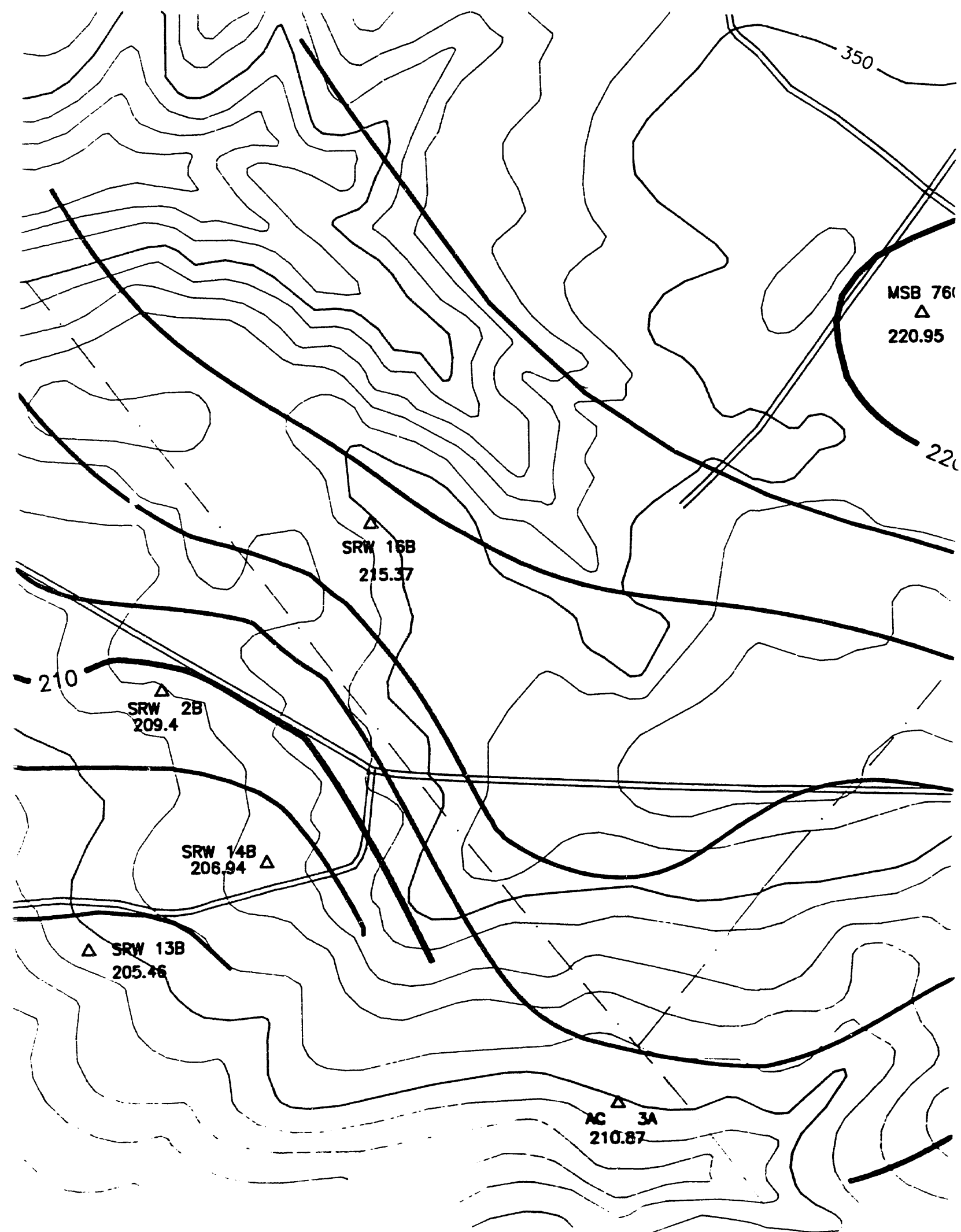

MSE
300
Road 1
Road 1A
AC 2A
221.25
350
350
220
350
MSB
219.03

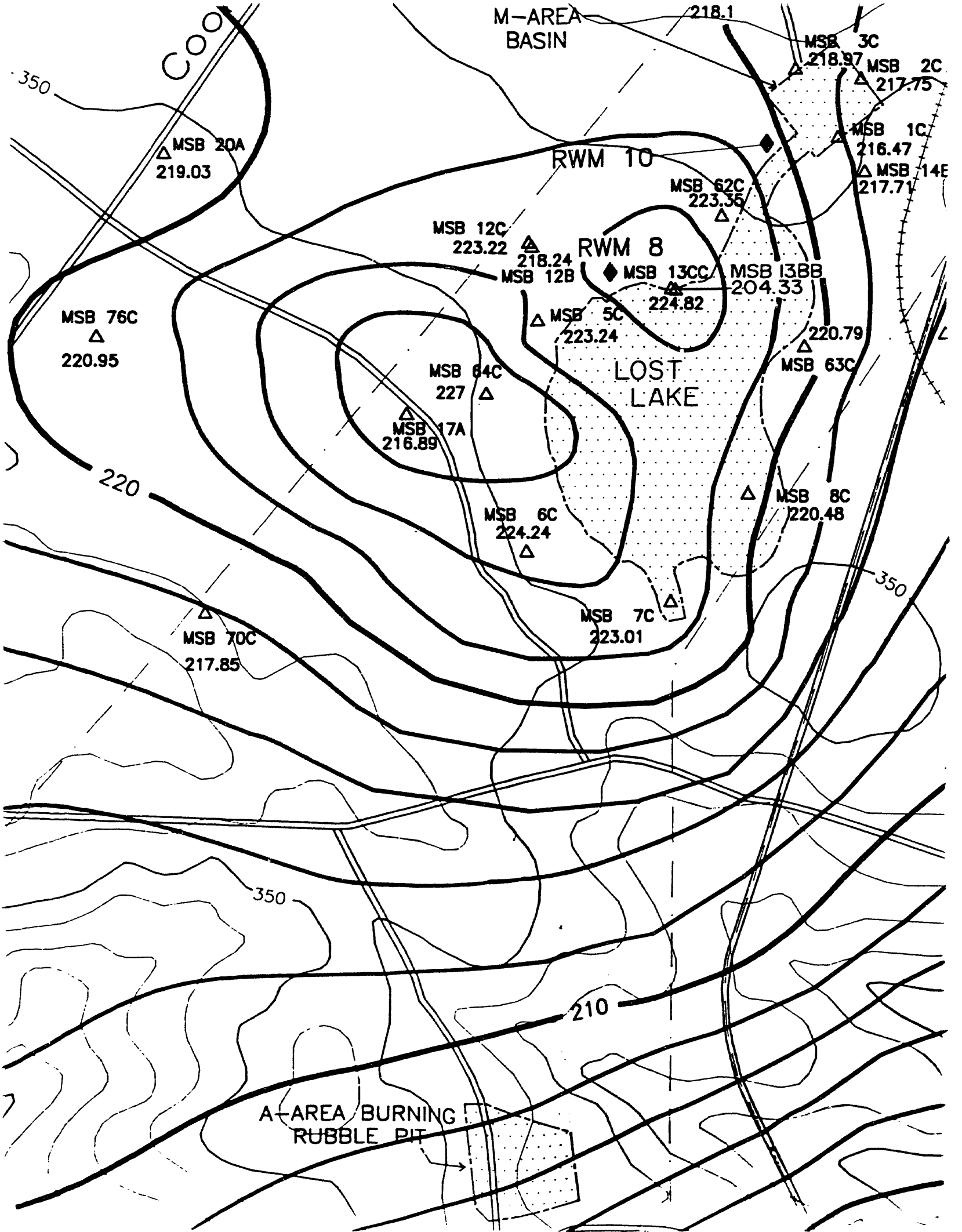

230
228.75
MSB 37C
228.14
MSB 42B
225.75
MSB 34B
228.3
AMB 4B
224.6
AMB 7B
224.7
METALLU
SLEEPAC
RWM 11
CAROLINA
BAY
MSB 27A
229.09
MSB 24A
227.41
MSB 27B
227.19
RWM 3
RWM 9
MSB 45B
226.41
AMB 10B
223.06
224.54
MSB 44B
MSB 28A
224.5
MSB 23B
224.72
RWM 2
MSB 46B
226.05
MSB 26A
225.03
RWM 5
RWM 4
MSB 16A
220.73
MSB 35B
220.85
220
MSB 38C
218.32
MSB 15A
221.05
RWM 6
MSB 31CC
217.37
MSB 21A
221.23
MSB 11C
219.78
MSB 11B
218.1
RWM 1
RWM 7
M-AREA
BASIN
MSB 3C
218.97
MSB 2C
217.75
MSB 1C
216.47
MSB 14B
217.71
350
RWM 10
MSB 62C
223.35
MSB 12C
223.22
218.24
RWM 8
MSB 12B
MSB 13CC
MSB 13BB
204.33

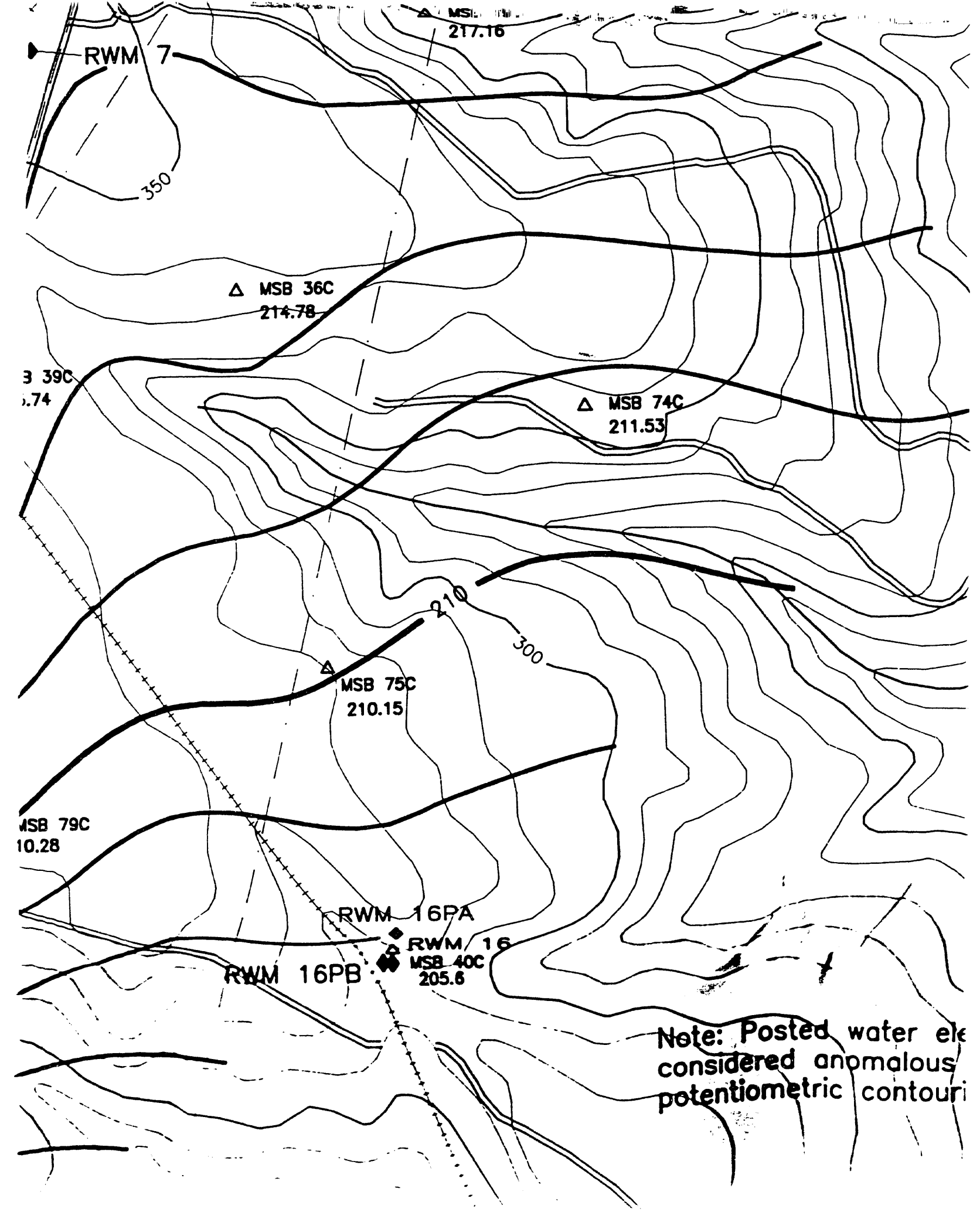

300
250
TALLURGICAL LABORATORY
EPAGE BASIN
AMB 11B
223.19
10B
A-AREA
COAL PILE
RUNOFF BASIN
35B
85
A-AREA
OIL BASIN
MSB 19B
217.15
MSB 36C
214.78

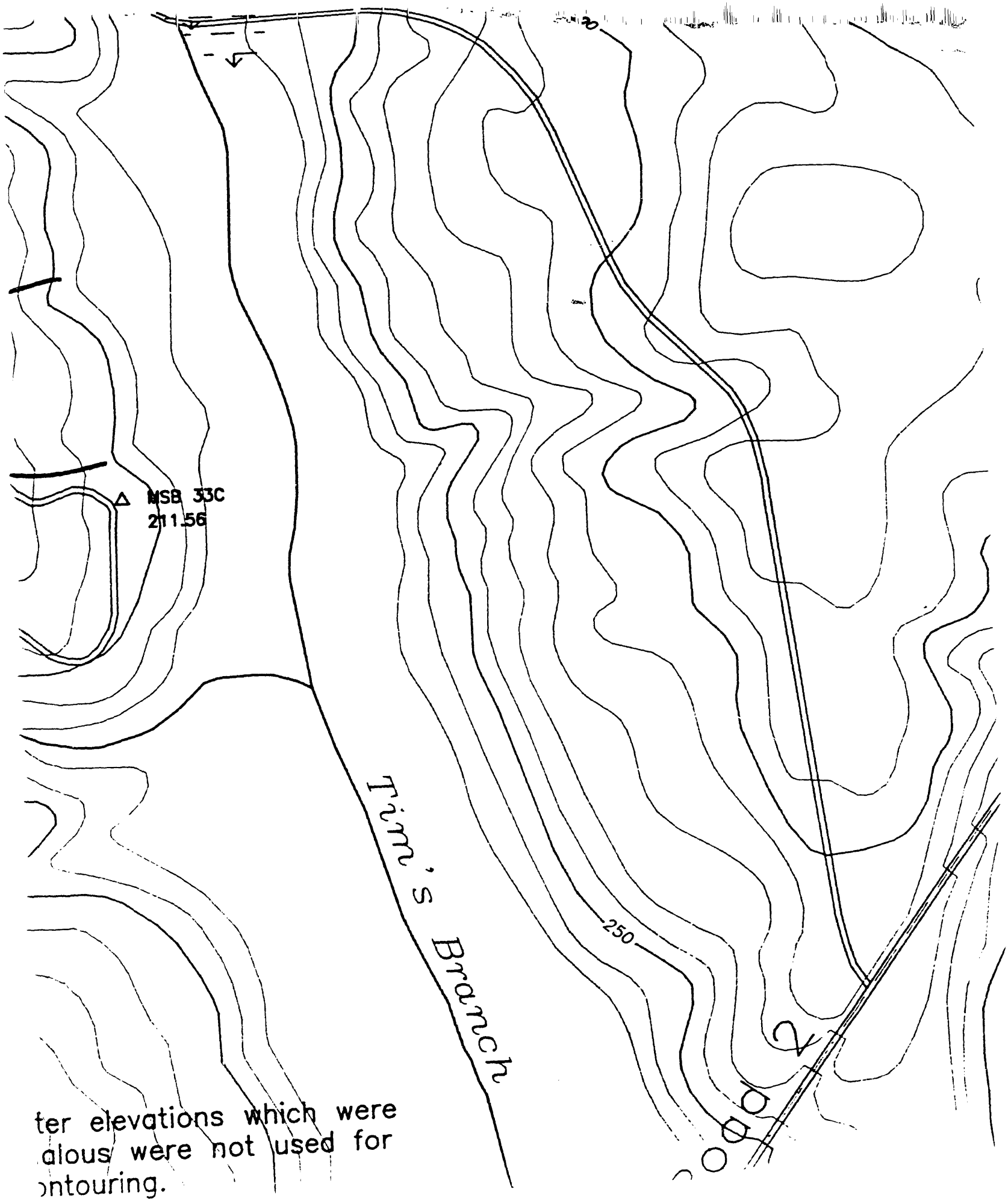

350
350
33° 20' 00" N
300


AC 1A
214.98
Silverton Road
SRW 15B
211.18
300
210
250
3687000 UTM N
200
SRW 12B
192.02
SRW 9B
203.2

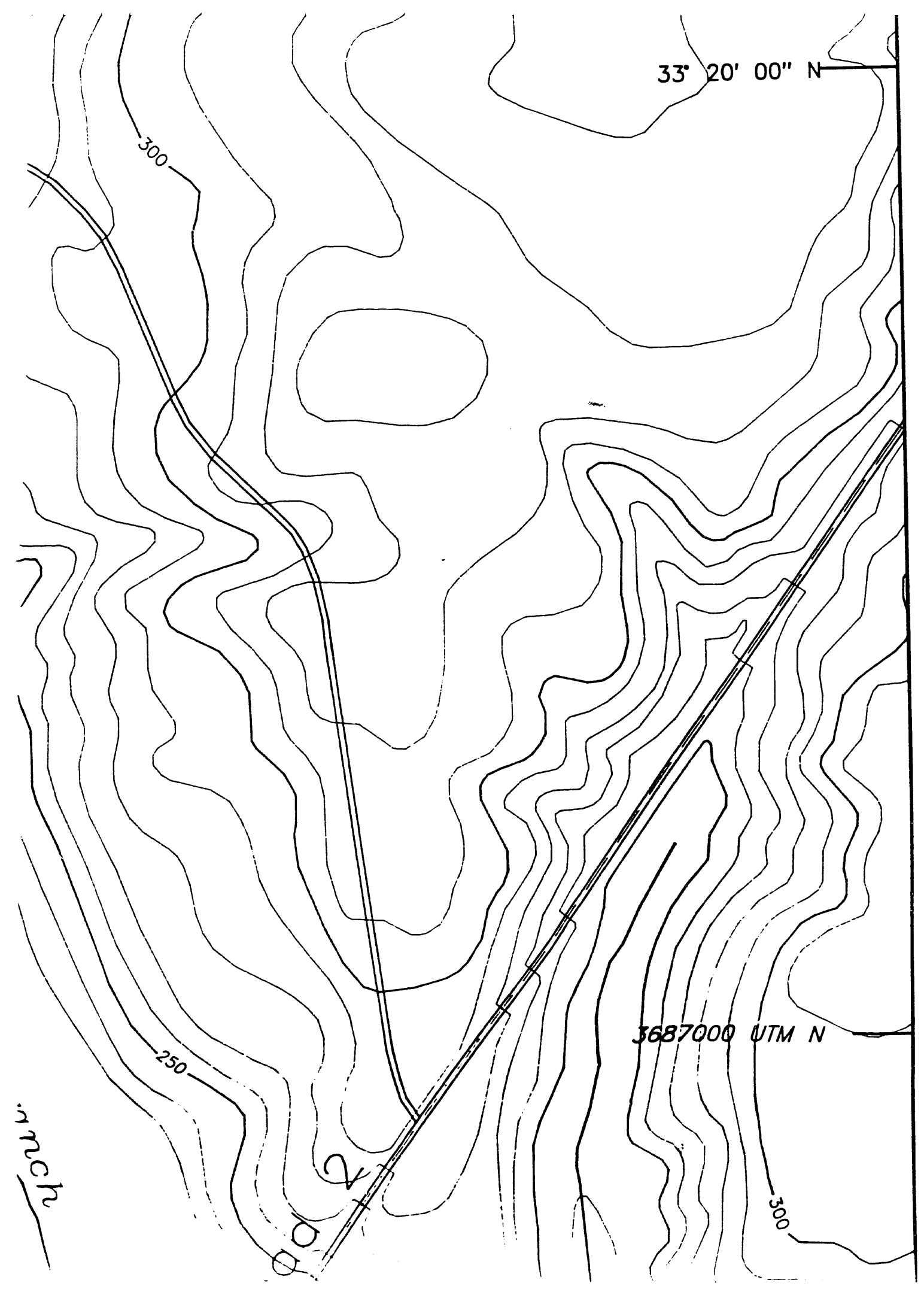

350
MSB 76(
220.95
22(
SRW 16B
215.37
210
SRW 2B
209.4
SRW 14B
206.94
SRW 13B
205.46
AC 3A
210.87

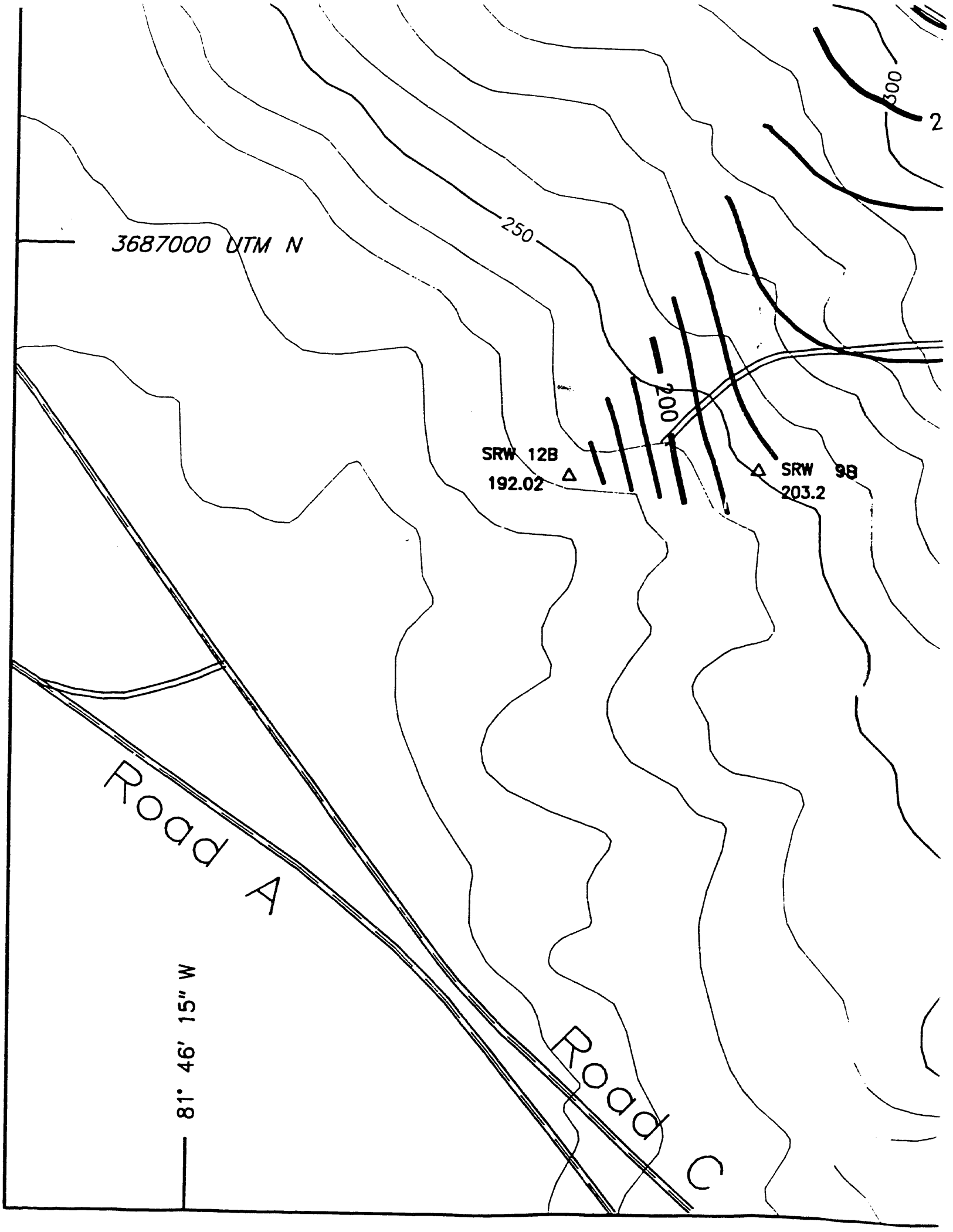

M-AREA
BASIN
218.1
MSB 3C
218.97
MSB 2C
217.75
MSB 1C
216.47
MSB 14B
217.71
350
MSB 20A
219.03
RWM 10
MSB 62C
223.35
MSB 12C
223.22
218.24
MSB 12B
RWM 8
MSB 13CC
MSB 13BB
204.33
224.82
MSB 5C
223.24
MSB 76C
220.95
220.79
MSB 63C
MSB 64C
227
LOST
LAKE
MSB 17A
216.89
220
MSB 8C
220.48
MSB 6C
224.24
350
MSB 7C
223.01
MSB 70C
217.85
350
210
A-AREA BURNING
RUBBLE PIT

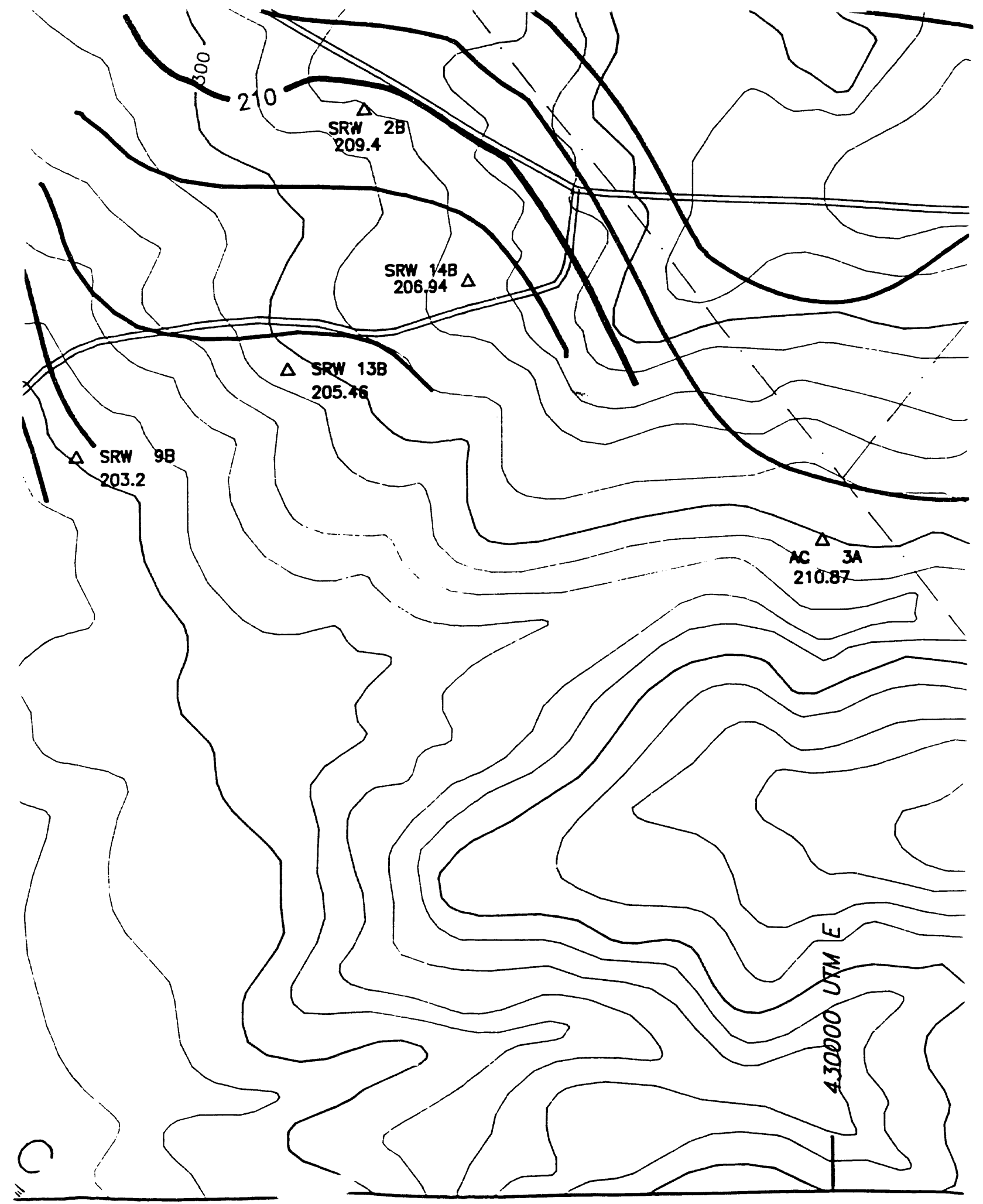

RWM 7
MSB
217.16
350
MSB 36C
214.78
3 39C
.74
MSB 74C
211.53
210
300
MSB 75C
210.15
MSB 79C
10.28
RWM 16PA
RWM 16
MSB 40C
205.6
RWM 16PB
Note: Posted water ele
considered anomalous
potentiometric contouri

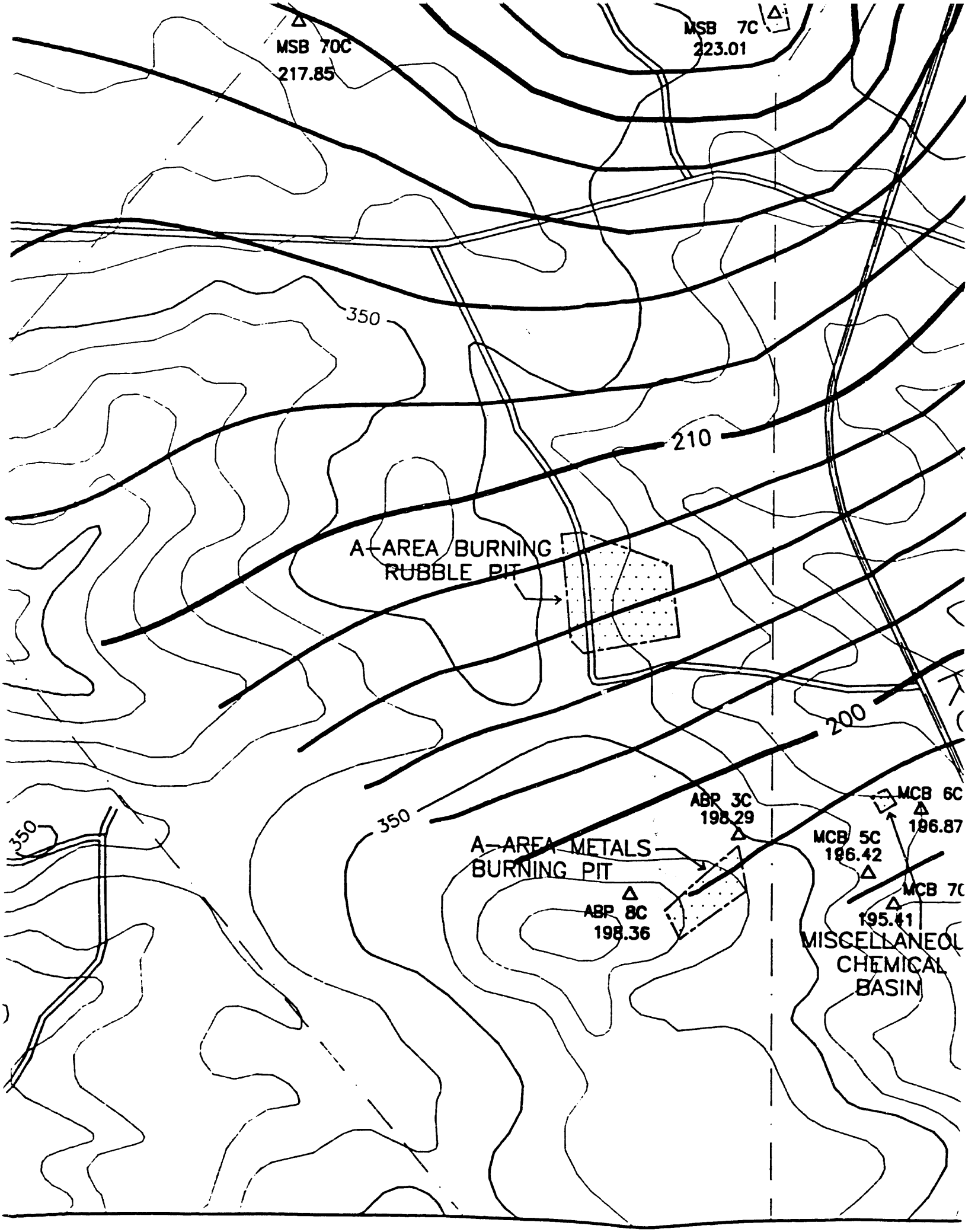


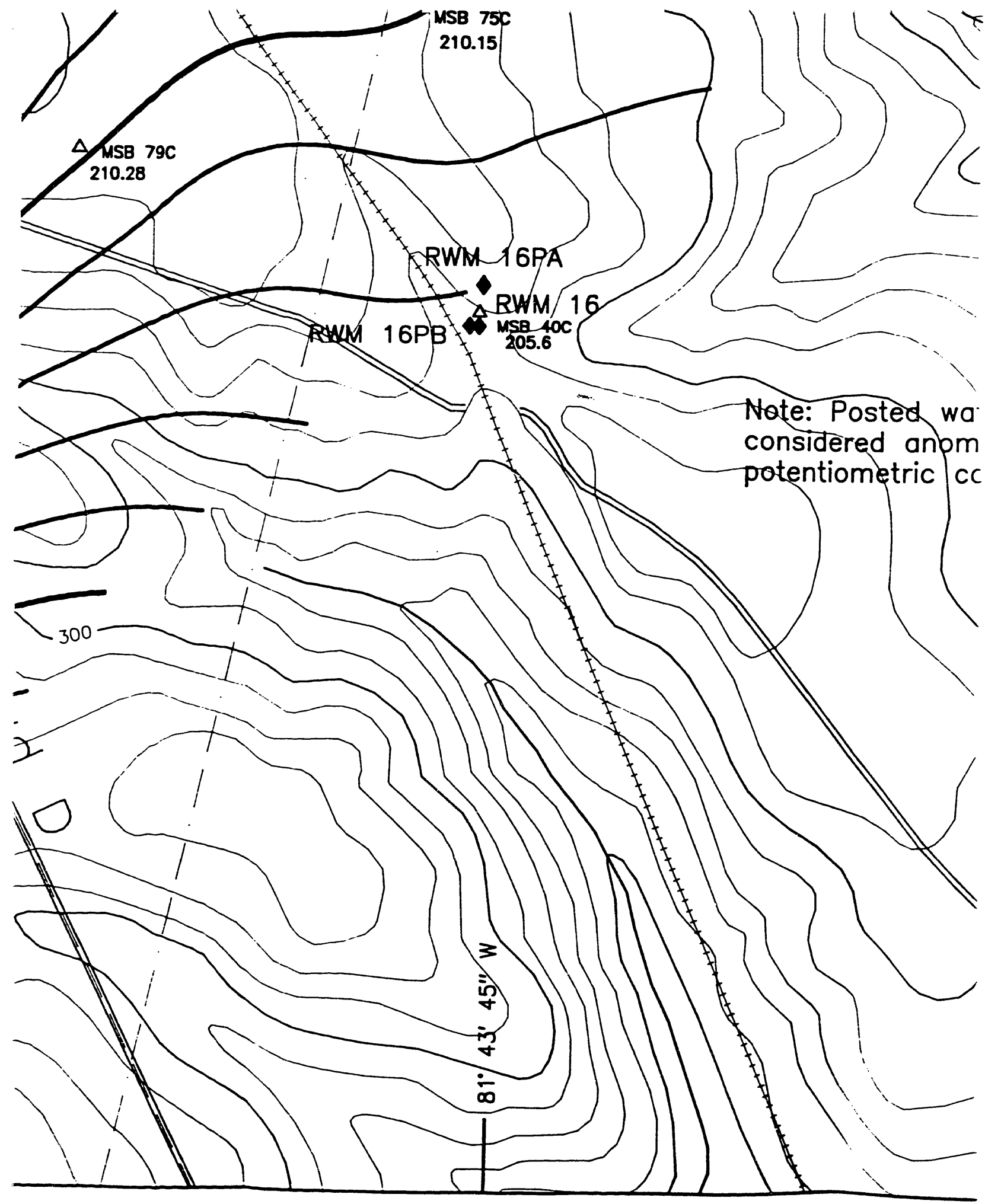
ter elevations which were
alous were not used for
ontouring.

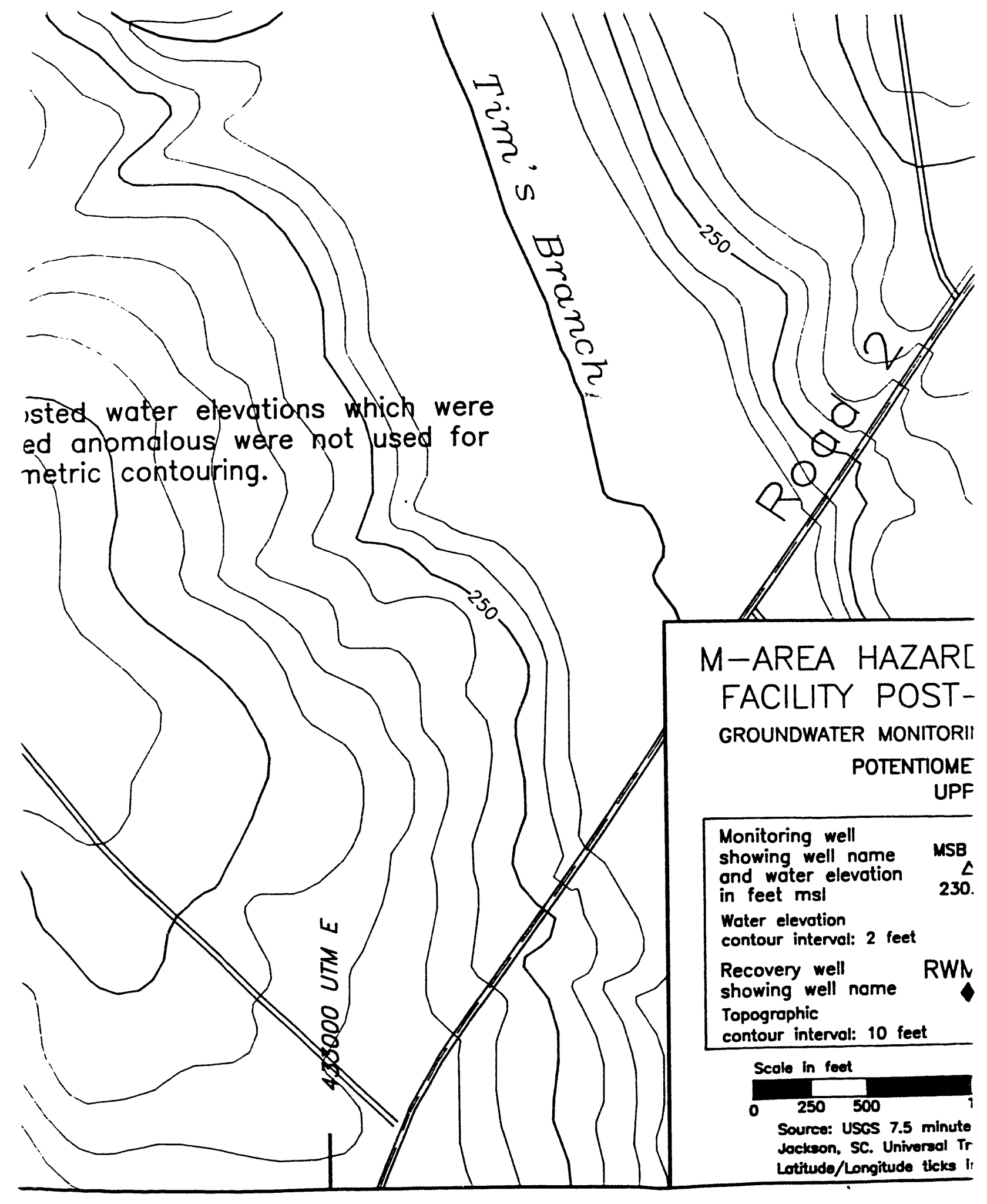

33° 20' 00" N
300
250
3687000 UTM N
300
inch

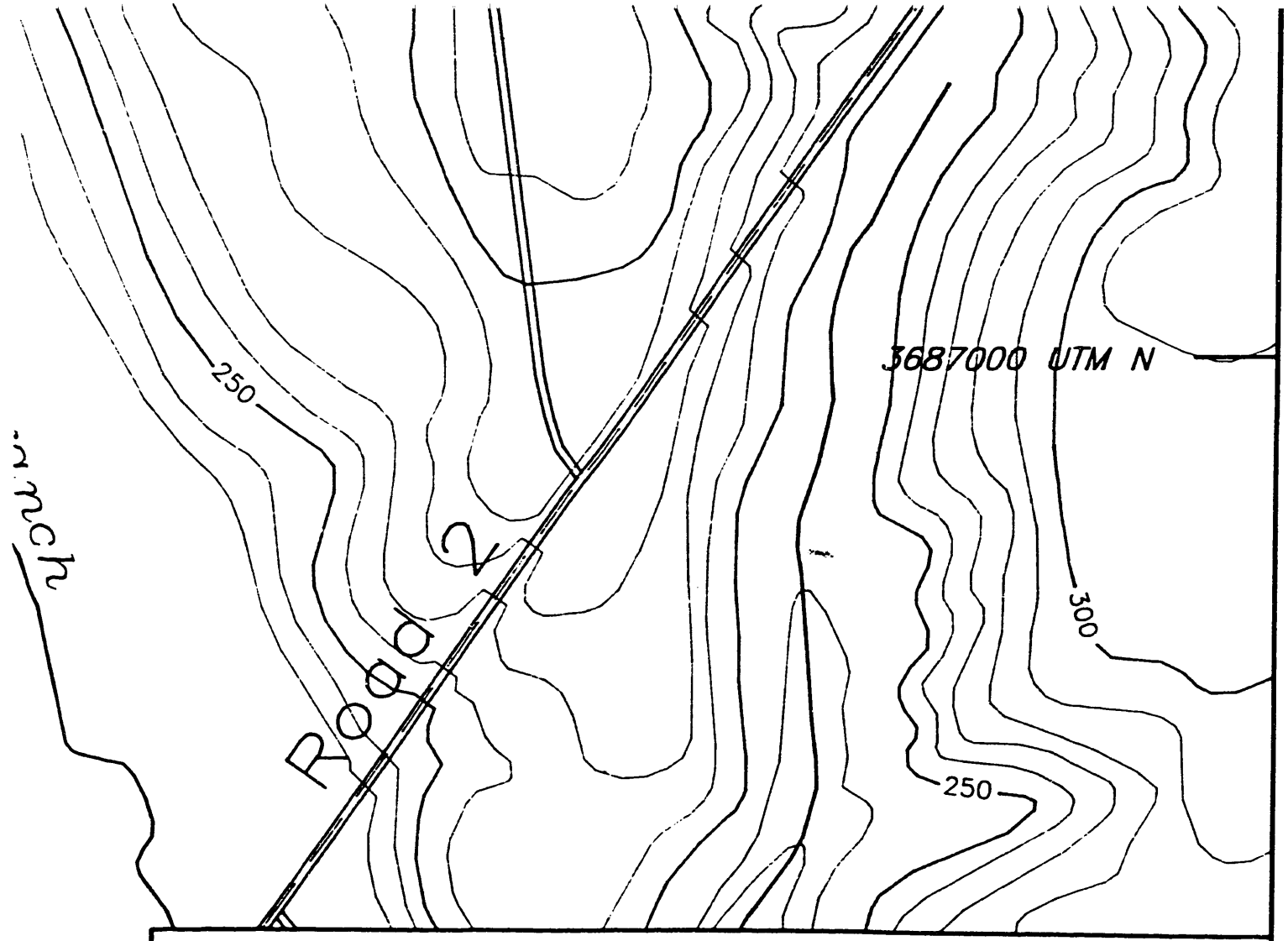

3687000 UTM N
250
300
200
SRW 12B
192.02
SRW 9B
203.2
Road A
Road C
81° 46' 15" W


300
210
SRW 2B
209.4
SRW 14B
206.94
SRW 13B
205.46
SRW 9B
203.2
AC 3A
210.87
430000 UTM E


MSB 70C
217.85
MSB 7C
223.01
350
210
A-AREA BURNING
RUBBLE PIT
200
350
350
ABP 3C
198.29
MCB 6C
196.87
MCB 5C
196.42
A-AREA METALS
BURNING PIT
ABP 8C
198.36
MCB 7C
195.41
MISCELLANEOU
CHEMICAL
BASIN


MSB 75C
210.15
MSB 79C
210.28
RWM 16PA
RWM 16
MSB 40C
205.6
RWM 16PB
Note: Posted wa
considered anom
potentiometric cc
300
81° 43' 45" W


Tim's Branch
250
250
Road
433000 UTM E
sted water elevations which were
ed anomalous were not used for
netric contouring.
M-AREA HAZARD
FACILITY POST-
GROUNDWATER MONITORI
POTENTIOME
UPF
Monitoring well showing well name and water elevation in feet msl
MSB
230.
Water elevation contour interval: 2 feet
Recovery well showing well name
RWM
Topographic contour interval: 10 feet
Scale in feet
0
250
500
Source: USGS 7.5 minute
Jackson, SC. Universal Tr
Latitude/Longitude ticks i



M-AREA HAZARDOUS WASTE MANAGEMENT FACILITY POST-CLOSURE CARE PERMIT

GROUNDWATER MONITORING AND CORRECTIVE ACTION PROGRAM

POTENTIOMETRIC SURFACE MAP (2Q93) UPPER CONGAREE UNIT

Monitoring well showing well name and water elevation in feet msl — MSB 85D △ 230.42

Water elevation contour interval: 2 feet

Recovery well showing well name — RWM 2 ◆

Topographic contour interval: 10 feet

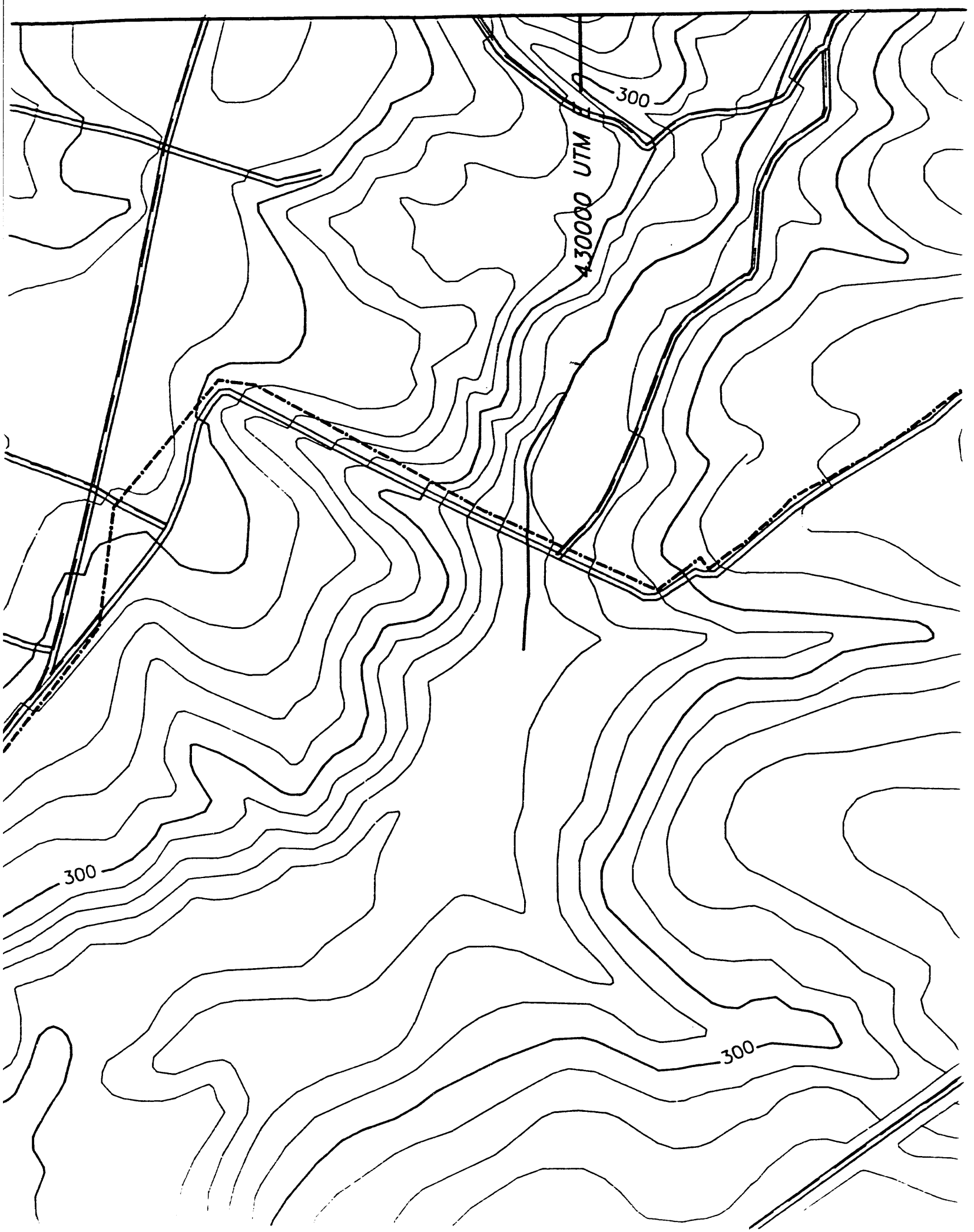
Paved road
Dirt road
Railroad
Streams
Power line
Waste unit
Site boundary
Topography — 250
Potentiometric contour — 210

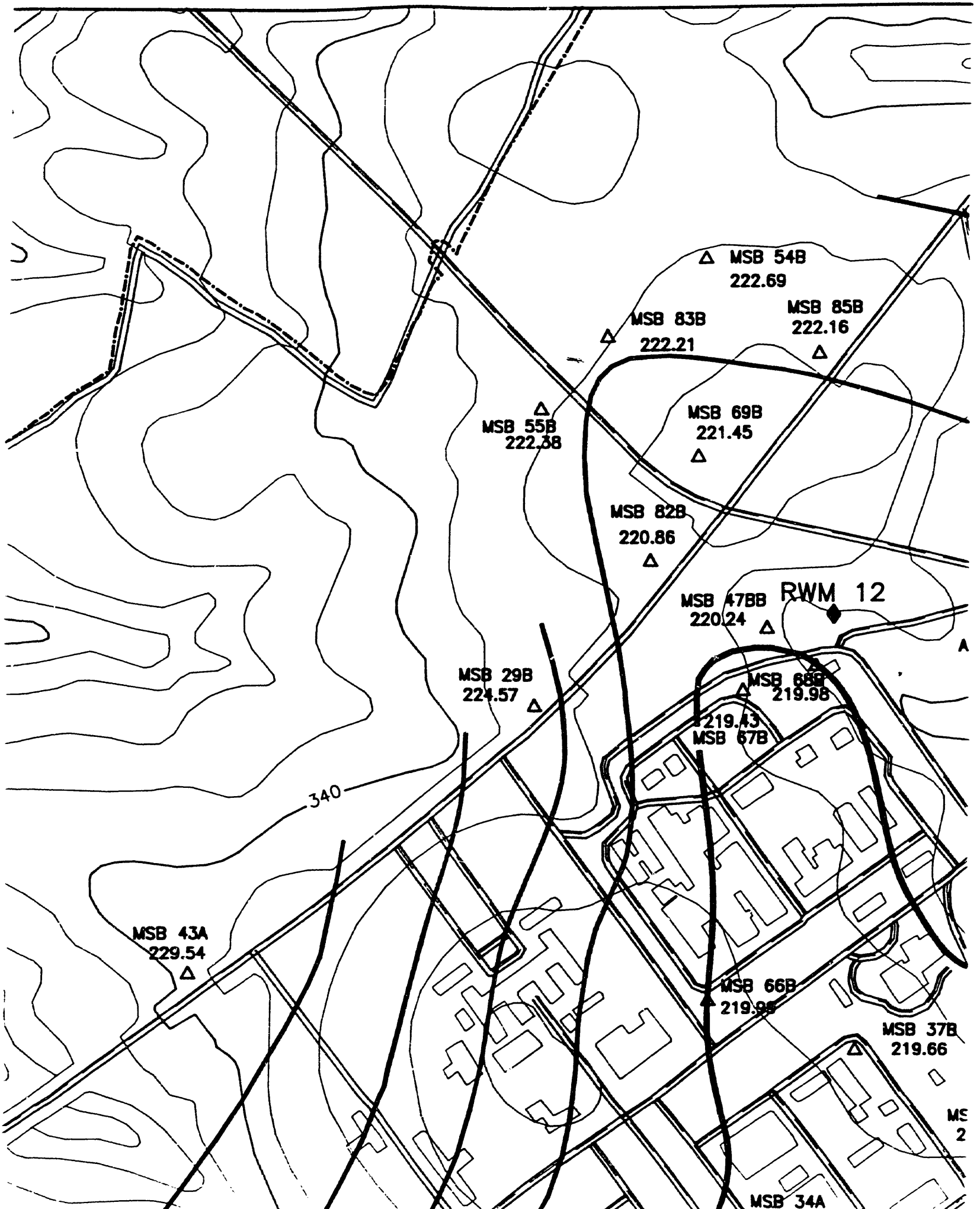
Scale in feet: 0 250 500 1000

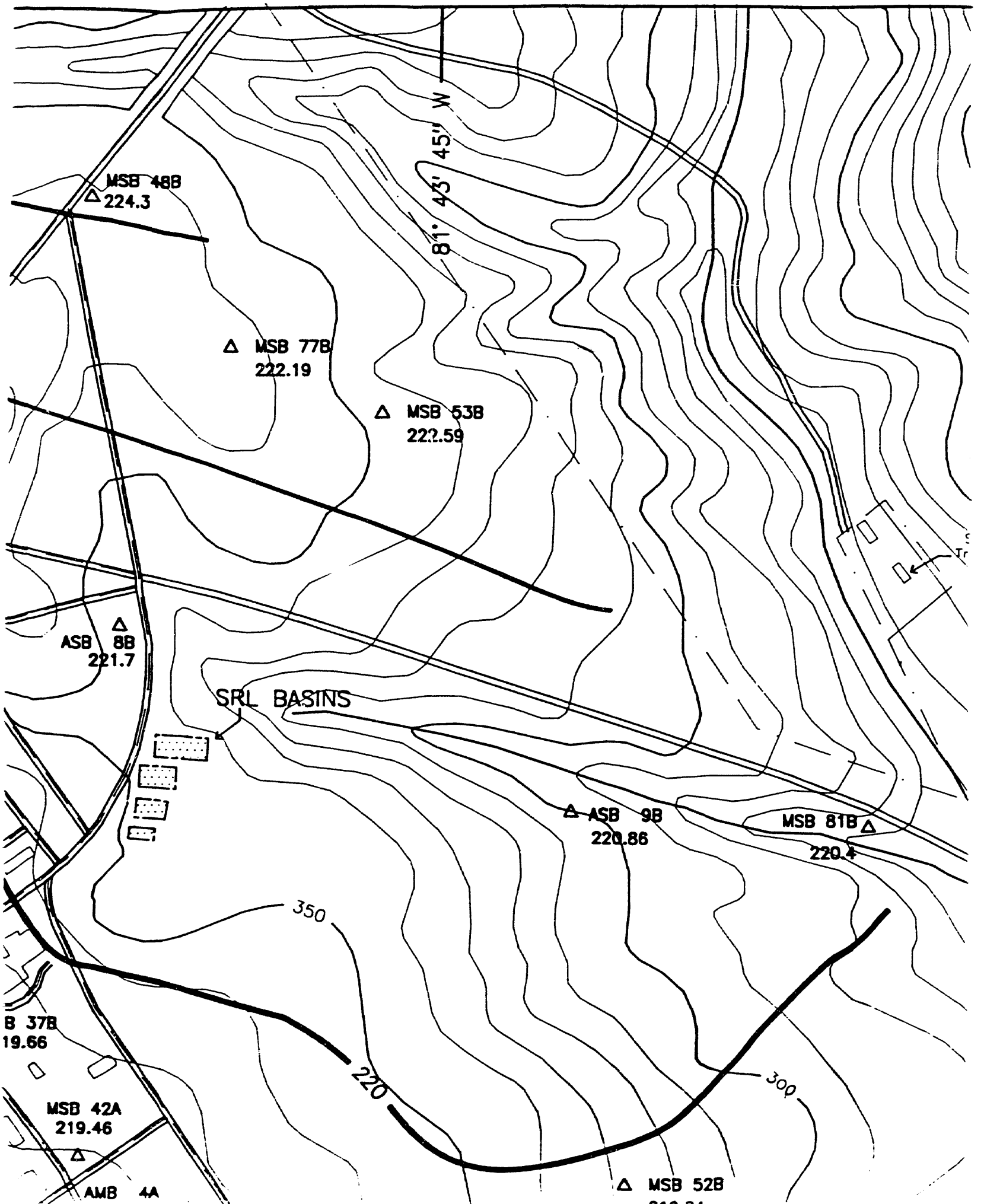
Scale in meters: 0 100 200 1000

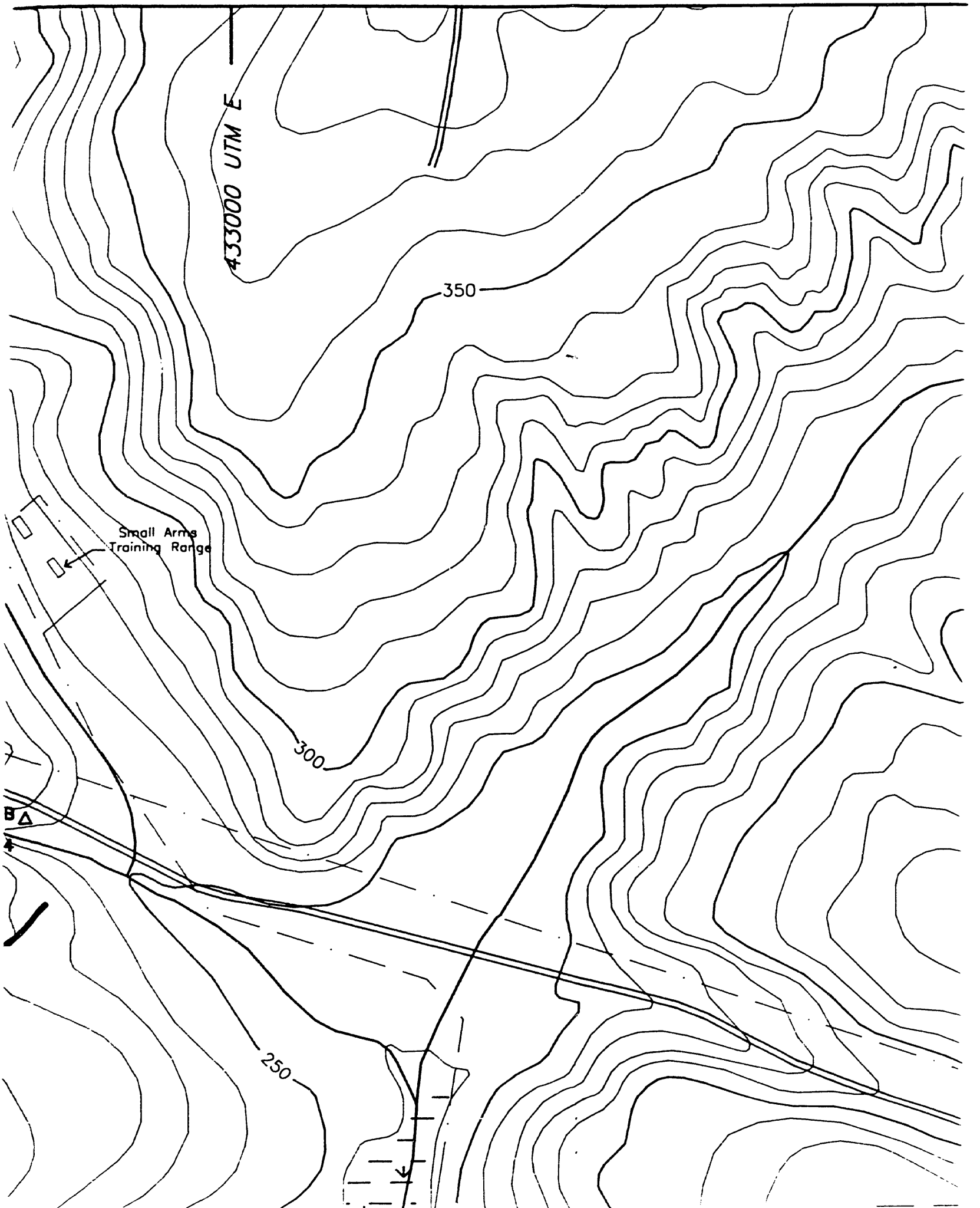
Source: USGS 7.5 minute quadrangle maps for New Ellenton SW and Jackson, SC. Universal Transverse Mercator (UTM) projection, Zone 17. Latitude/Longitude ticks in plain text, UTM ticks in Italics.

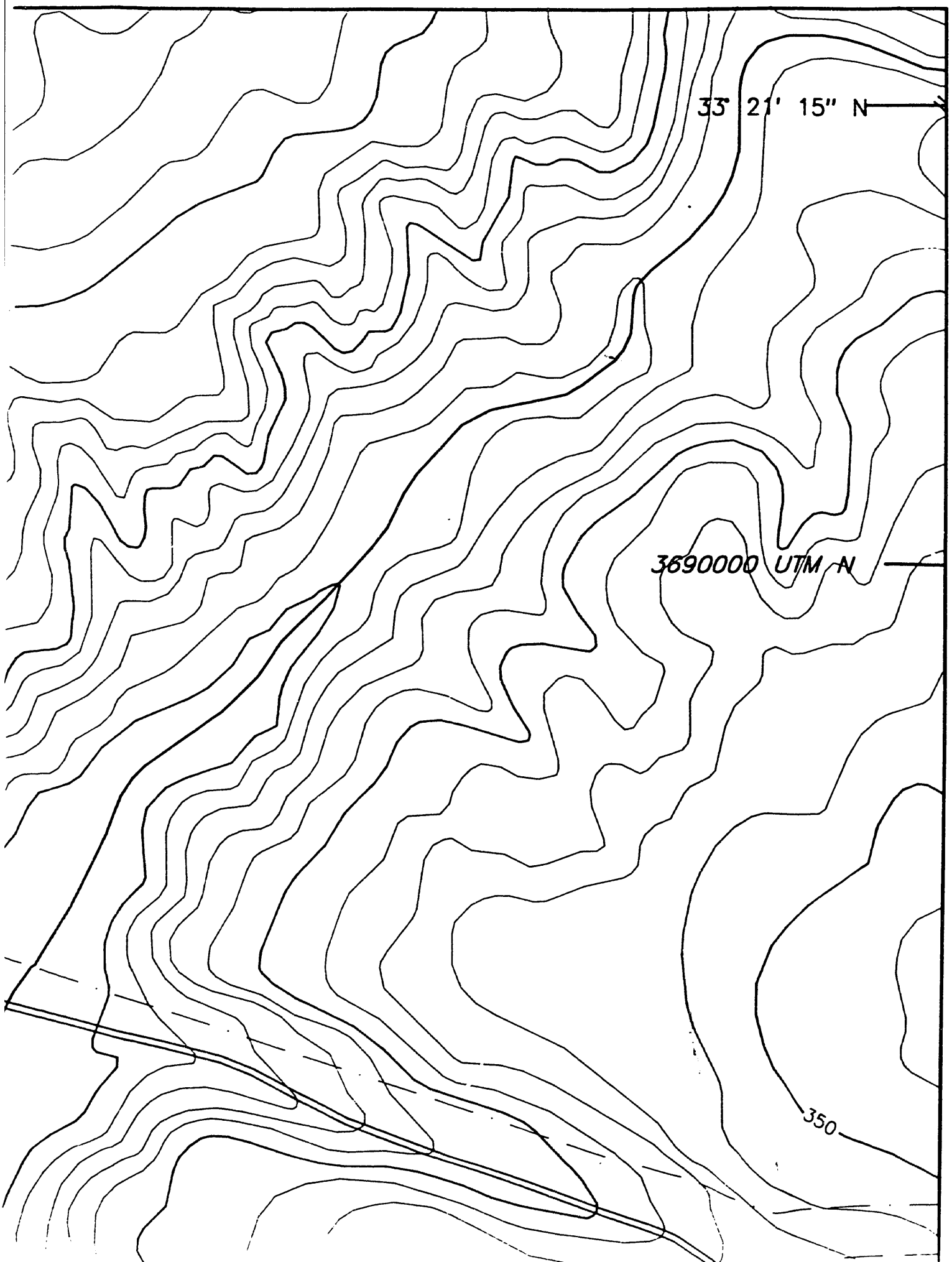
3690000 UTM N
33° 21' 15" N
81° 46' 15" W
300
350
350
SRS BOUNDARY

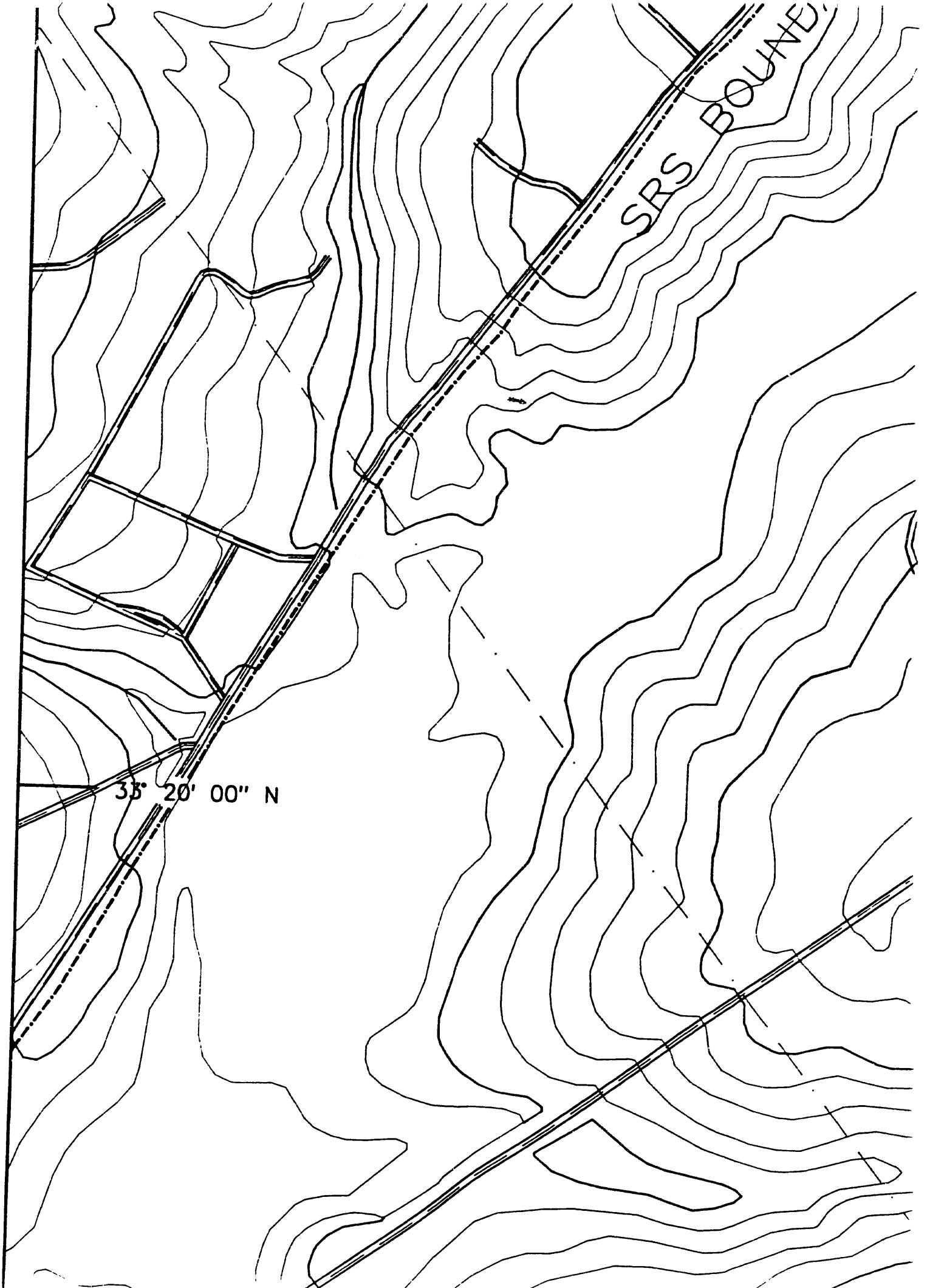

300
430000 UTM
300
300

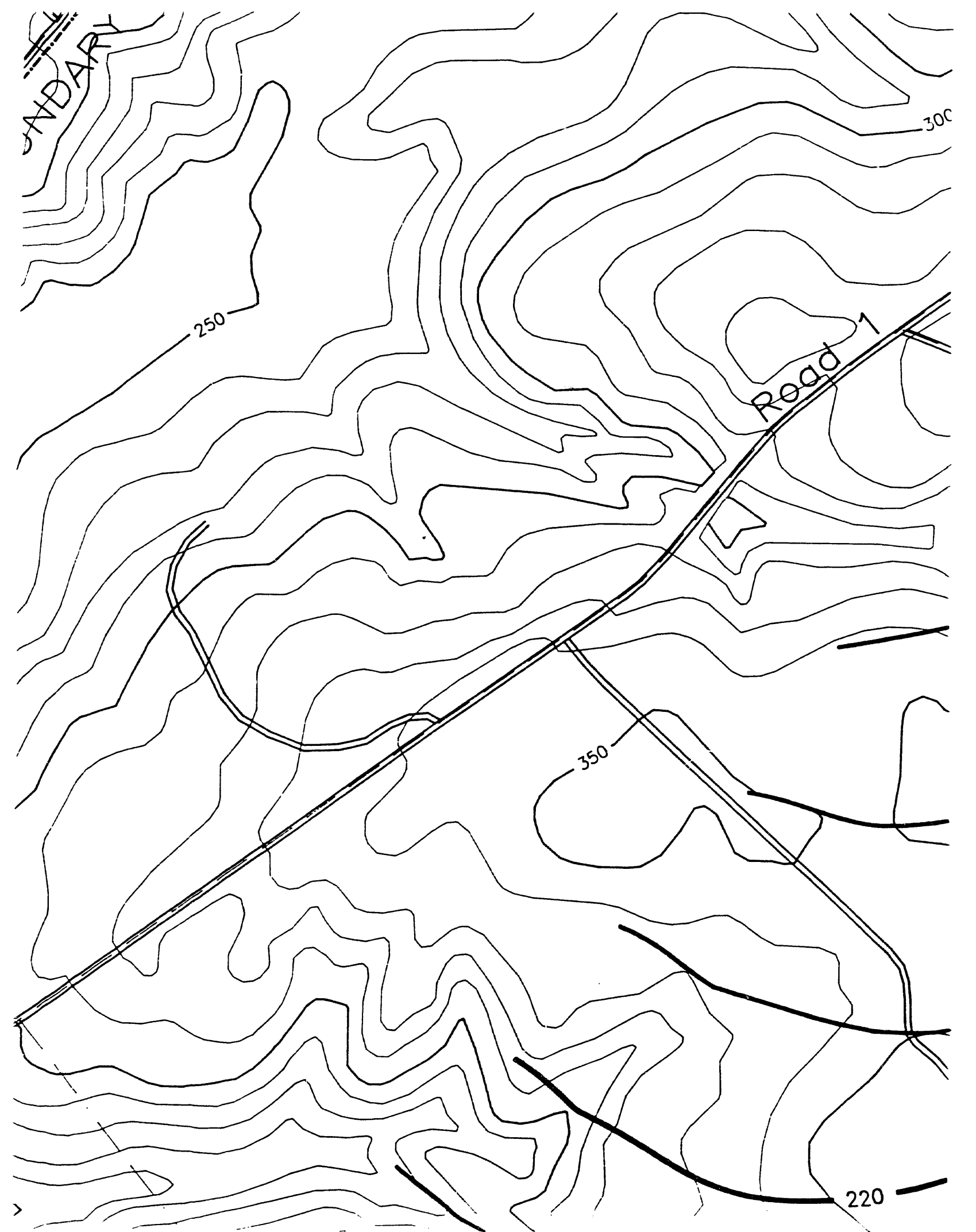

MSB 54B
222.69
MSB 83B
222.21
MSB 85B
222.16
MSB 55B
222.38
MSB 69B
221.45
MSB 82B
220.86
RWM 12
MSB 47BB
220.24
MSB 29B
224.57
MSB 68B
219.98
219.43
MSB 67B
340
MSB 43A
229.54
MSB 66B
219.99
MSB 37B
219.66
MSB 34A

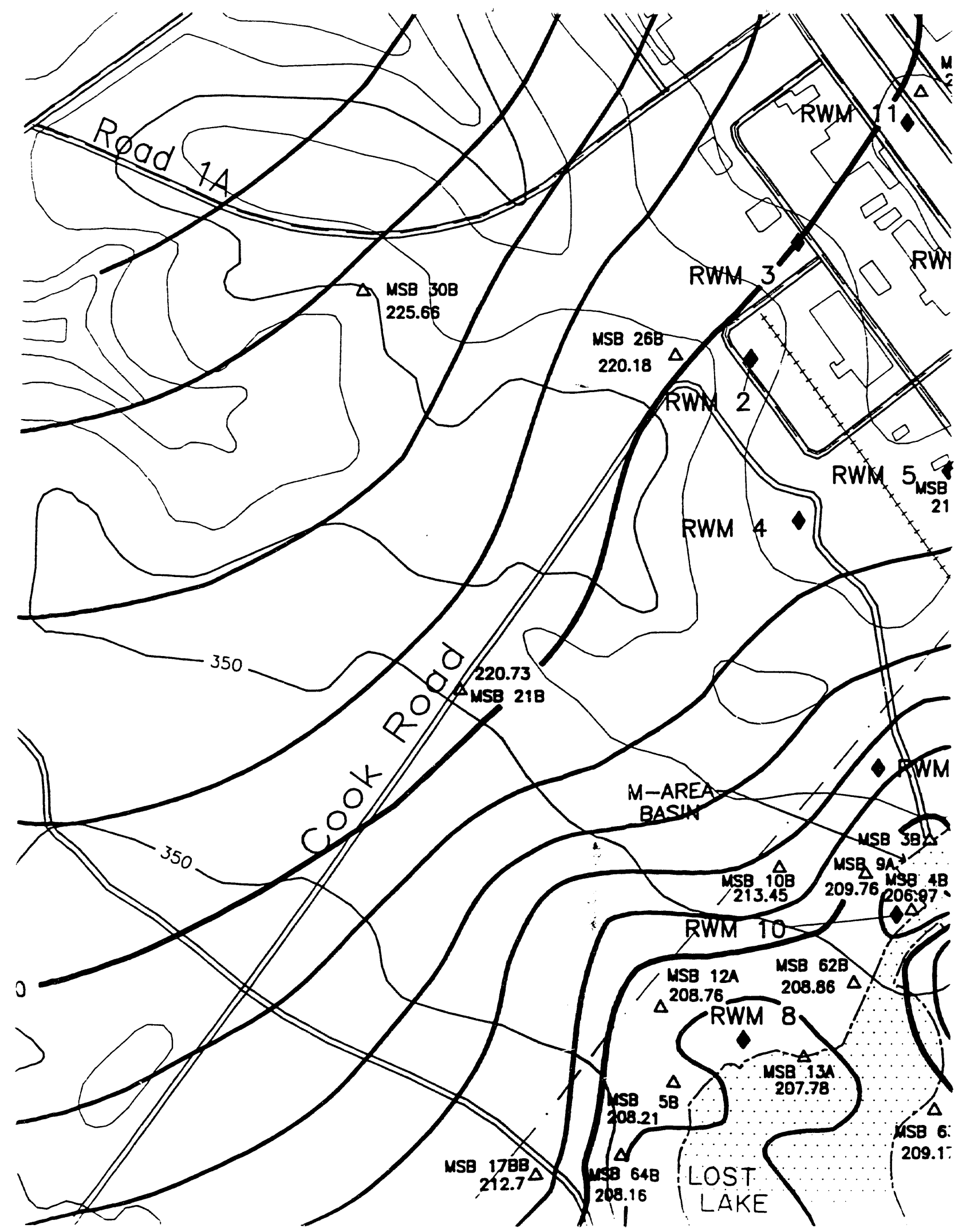

81° 43' 45" W
MSB 48B
224.3
MSB 77B
222.19
MSB 53B
222.59
ASB 8B
221.7
SRL BASINS
ASB 9B
220.86
MSB 81B
220.4
350
220
300
B 37B
19.66
MSB 42A
219.46
AMB 4A
MSB 52B

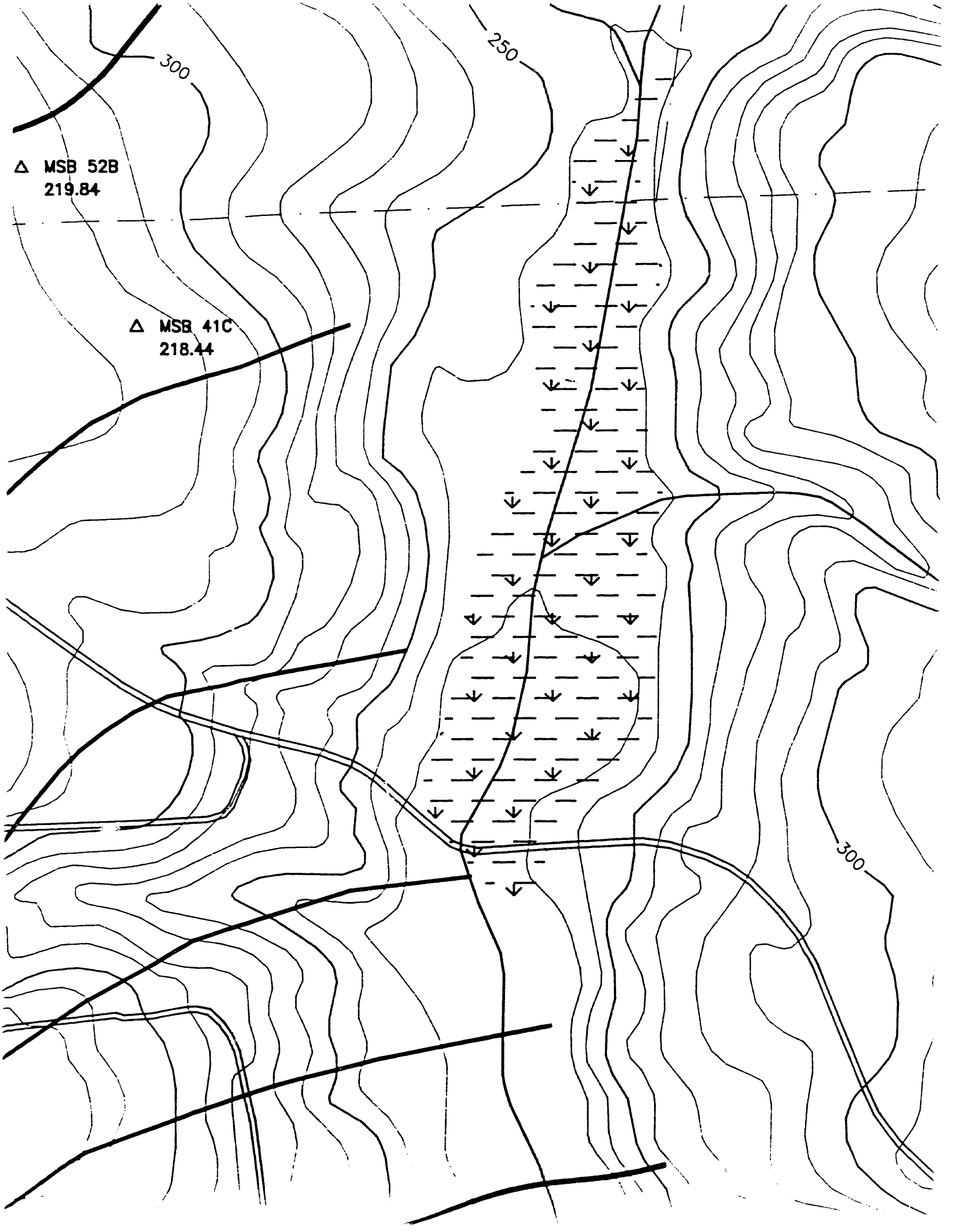

433000 UTM E
350
300
250
Small Arms
Training Range
B

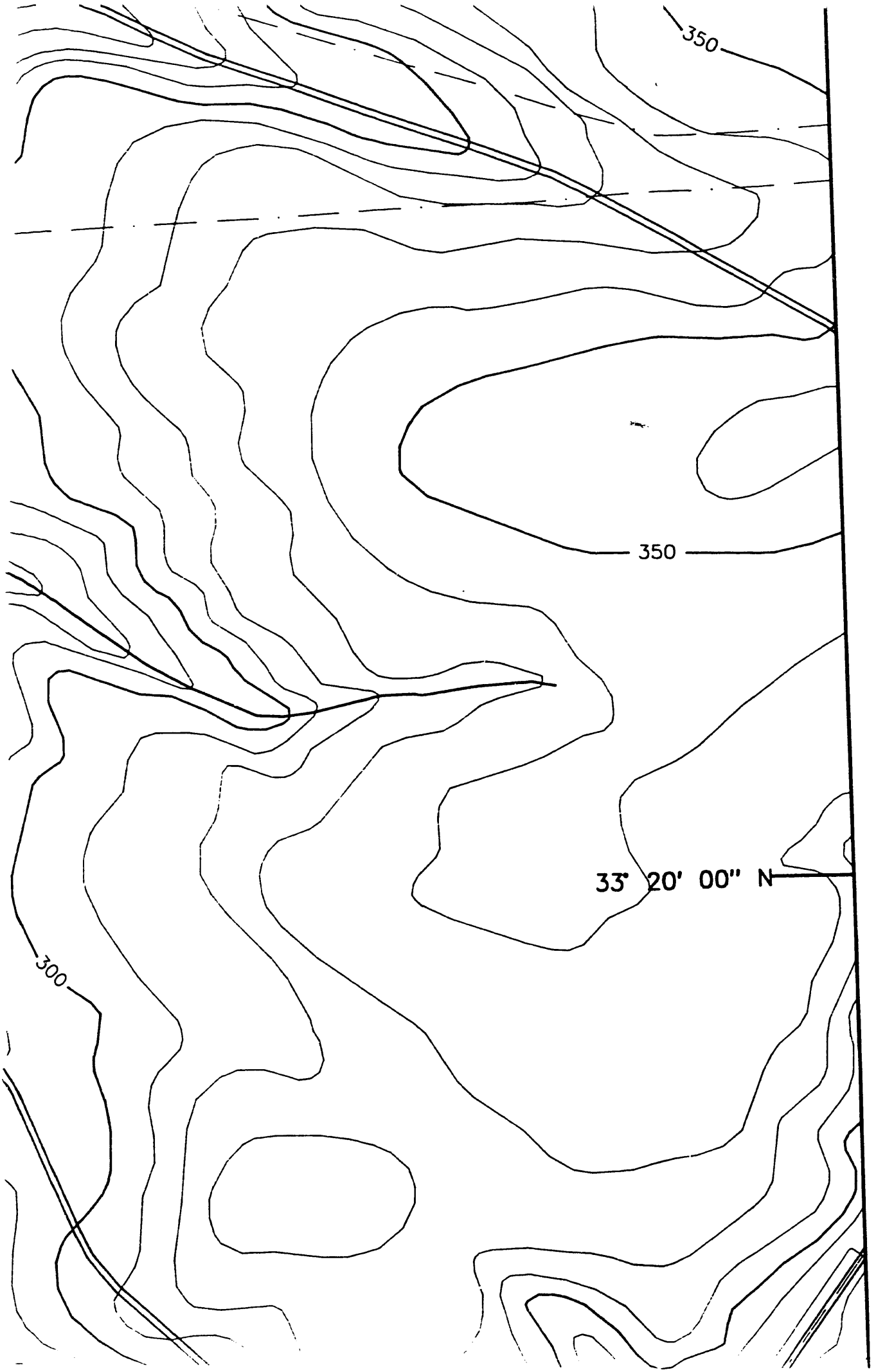

33° 21' 15" N
3690000 UTM N
350

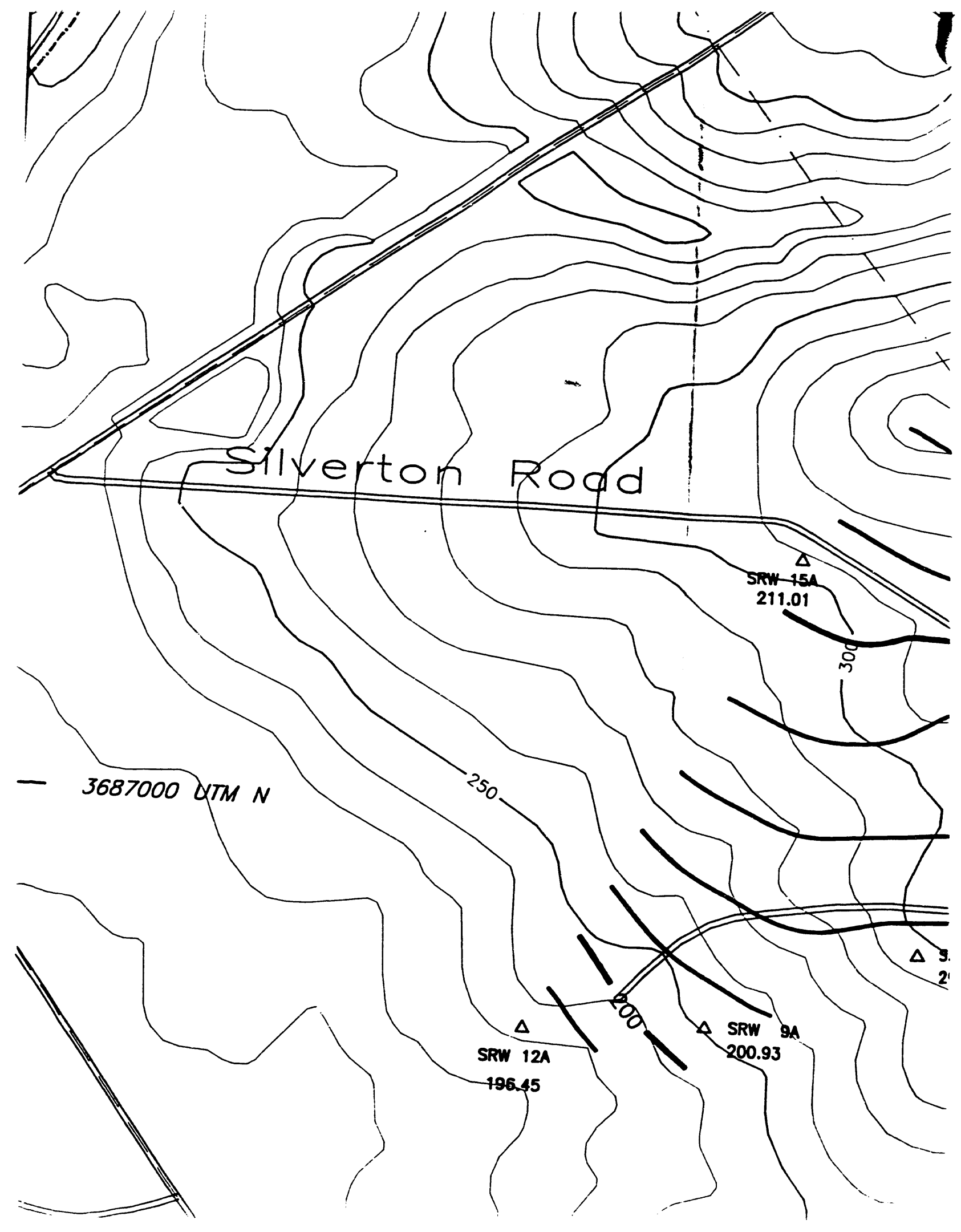

SRS BOUNDA
33° 20' 00" N

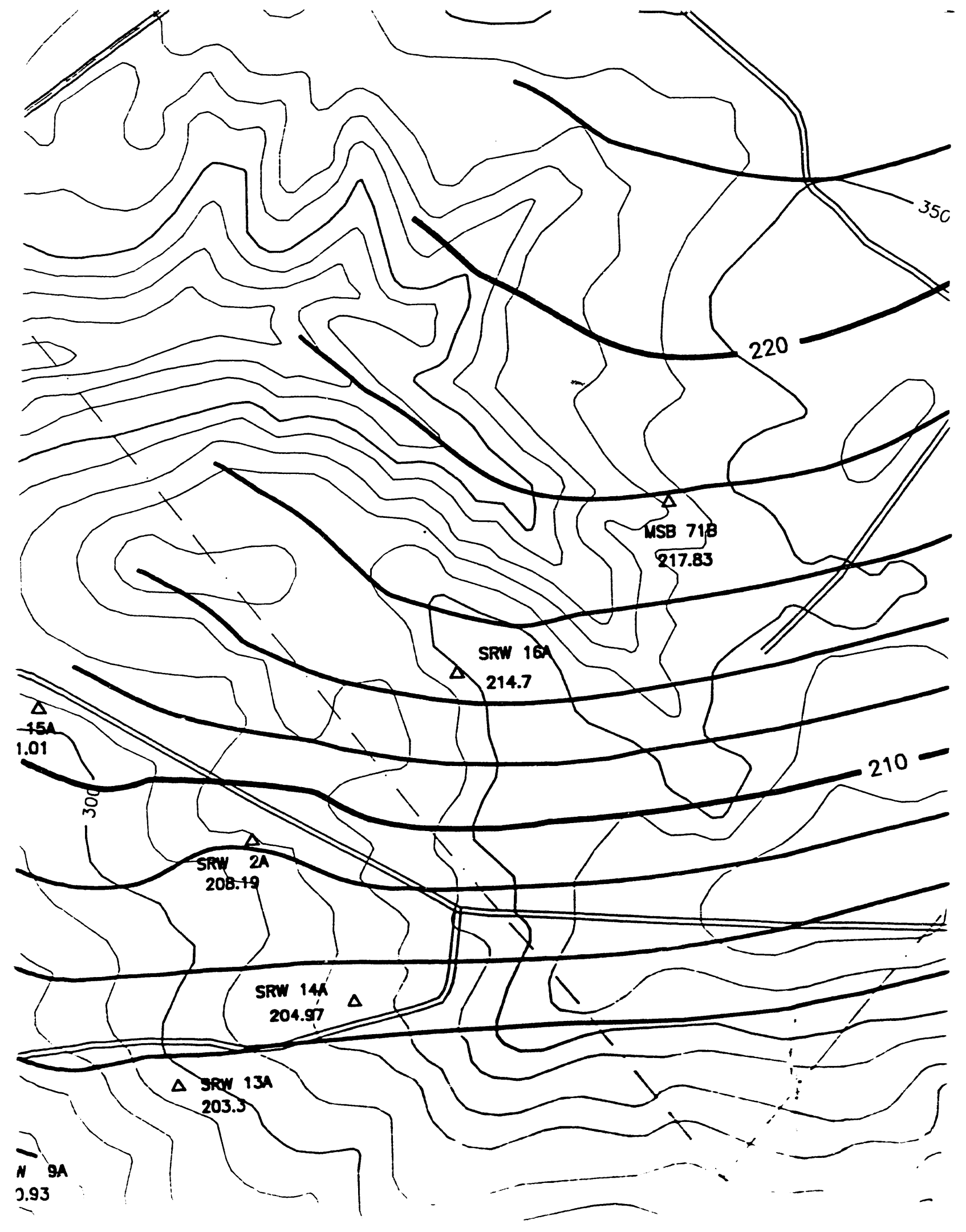

NDARY
300
250
Road 1
350
220

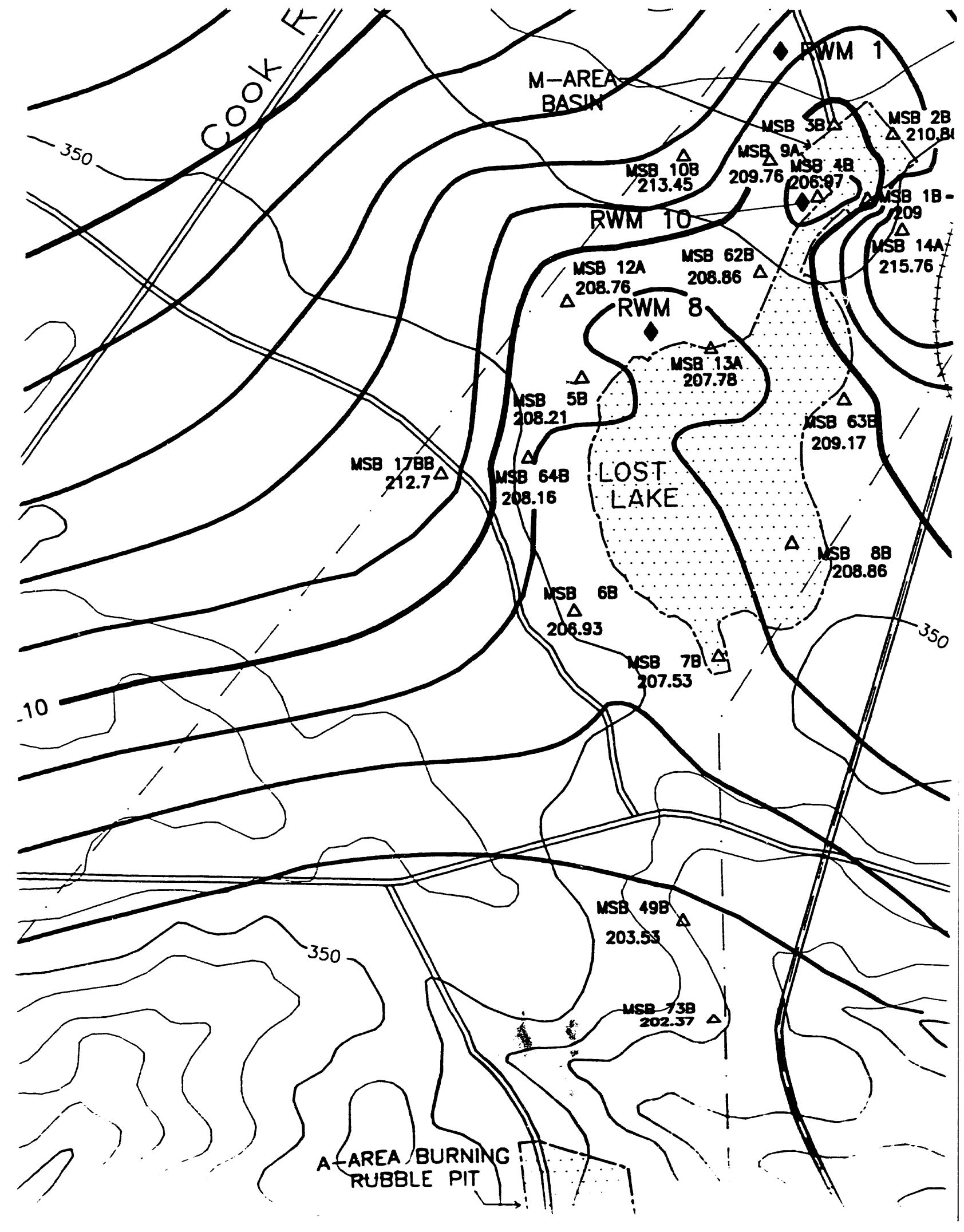

Road 1A
RWM 11
RWM 3
MSB 30B
225.66
MSB 26B
220.18
RWM 2
RWM 5
MSB
21
RWM 4
350
220.73
MSB 21B
Cook Road
RWM
M-AREA
BASIN
MSB 3B
MSB 9A
209.76
MSB 10B
213.45
MSB 4B
206.97
350
RWM 10
MSB 12A
208.76
MSB 62B
208.86
RWM 8
MSB 13A
207.78
MSB 5B
208.21
MSB 6
209.1
MSB 17BB
212.7
MSB 64B
208.16
LOST
LAKE

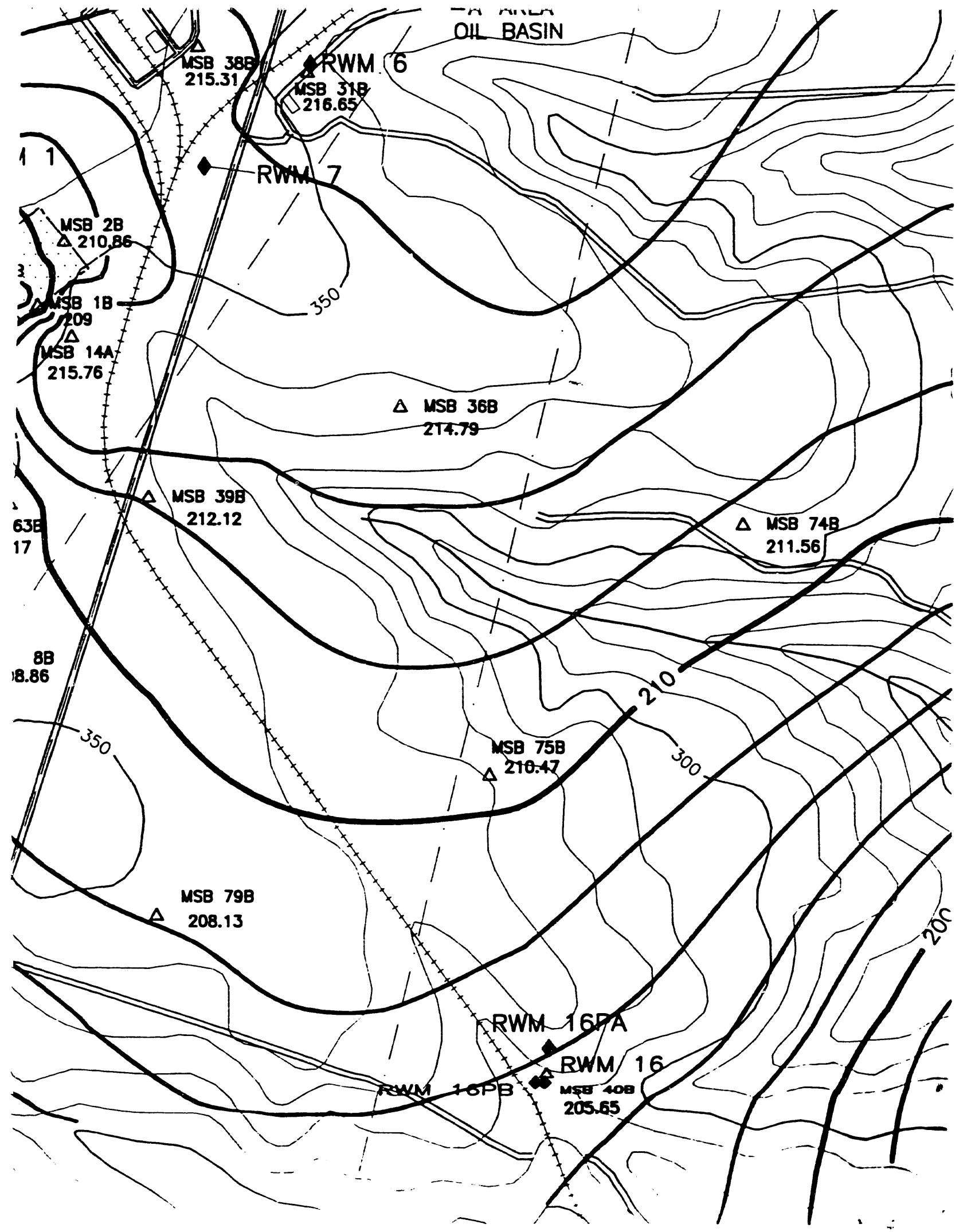

300
250
MSB 52B
219.84
MSB 41C
218.44
300

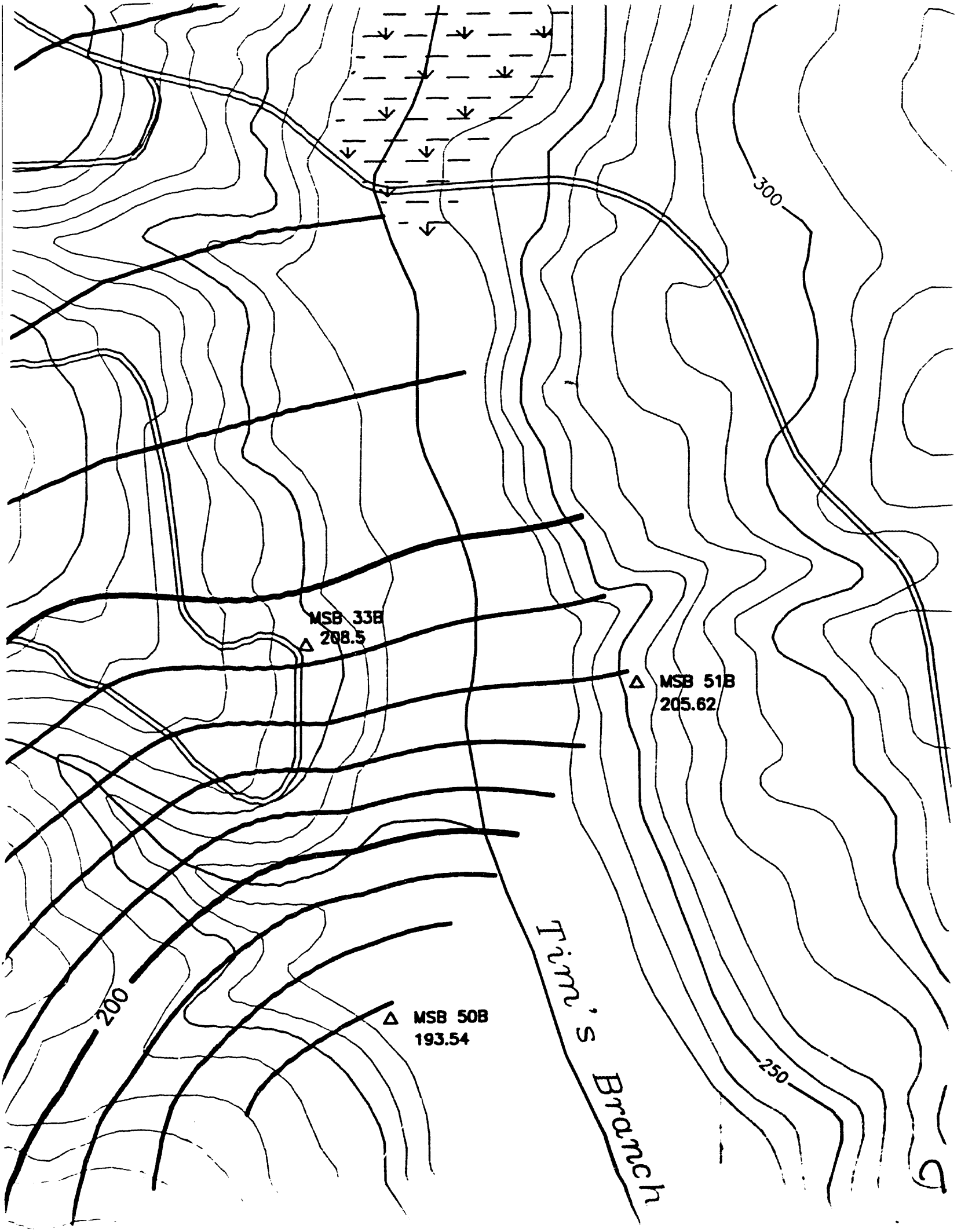

350
350
33° 20' 00" N
300

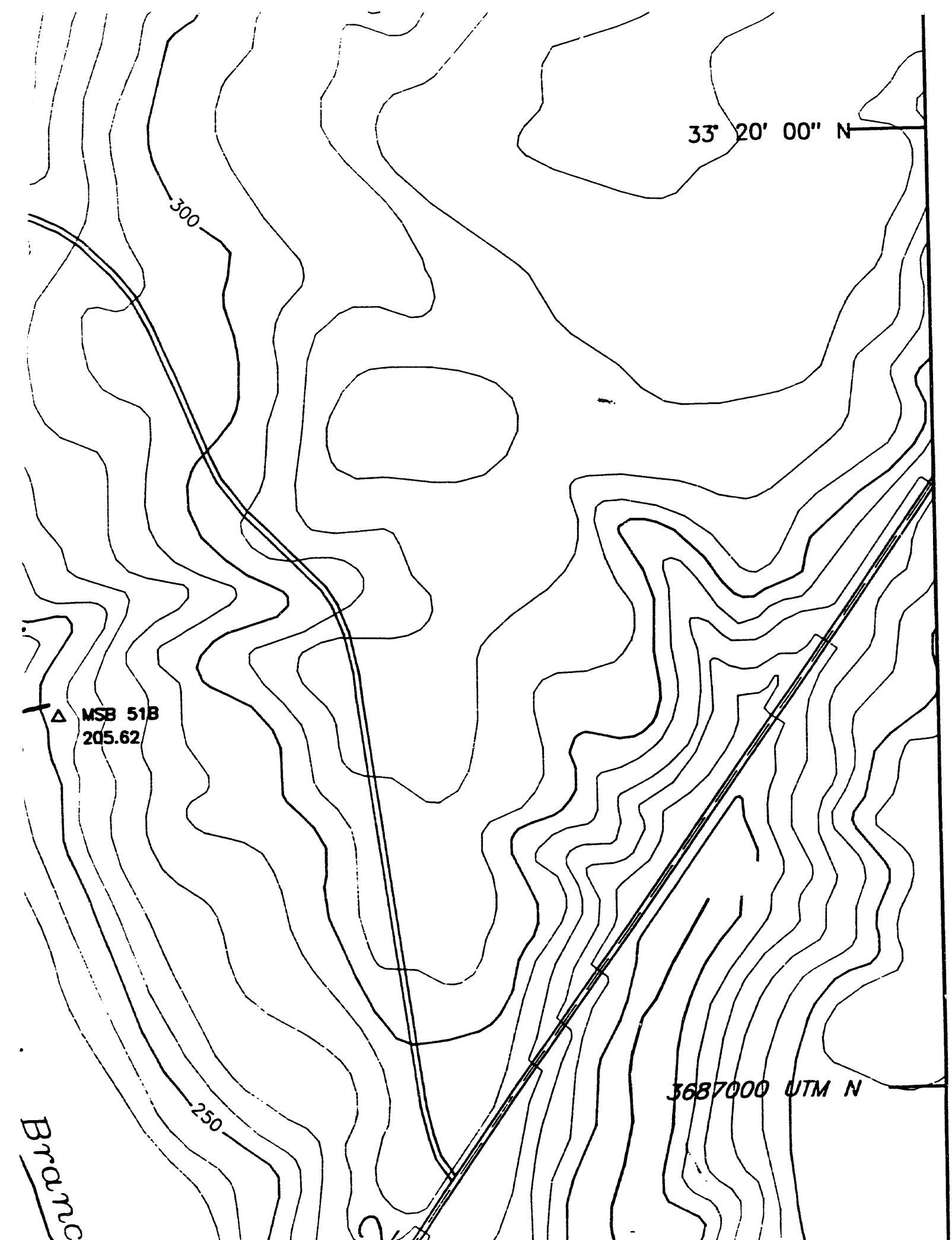

Silverton Road
SRW 15A
211.01
300
250
3687000 UTM N
200
SRW 12A
196.45
SRW 9A
200.93

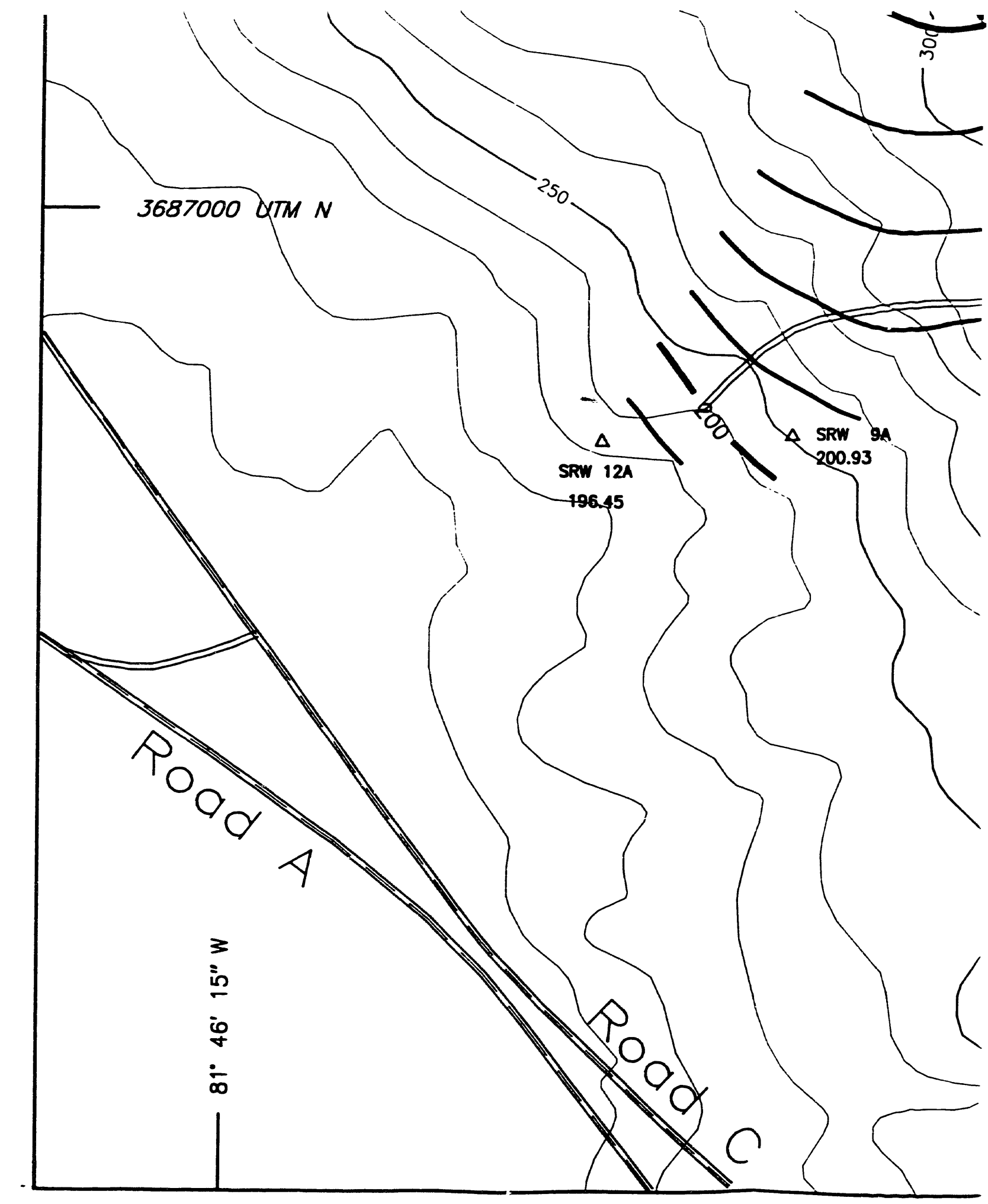

350
220
MSB 718
217.83
SRW 16A
214.7
15A
1.01
210
300
SRW 2A
208.19
SRW 14A
204.97
SRW 13A
203.3
N 9A
0.93

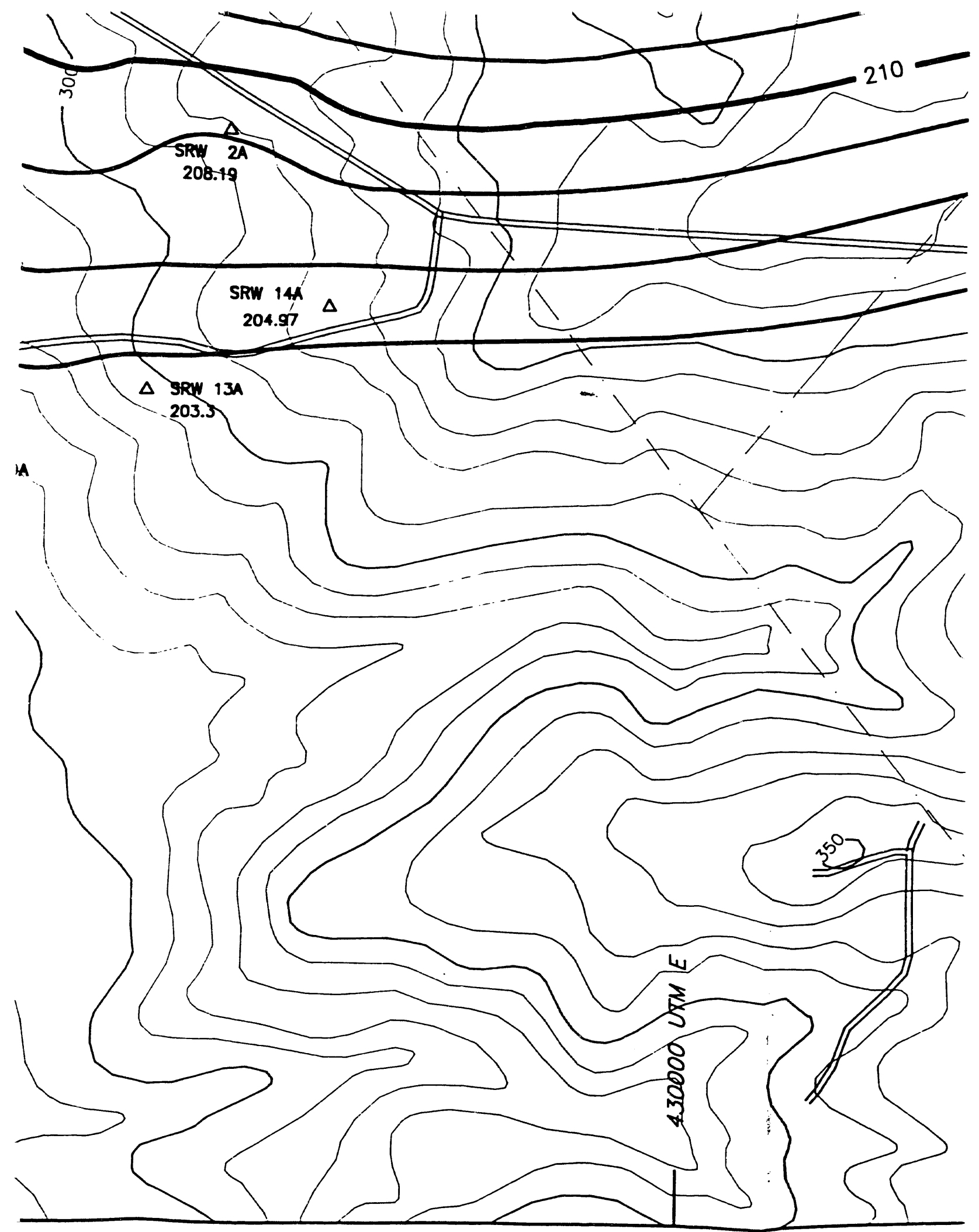

COOK R
M—AREA
BASIN
RWM 1
RWM 10
RWM 8
MSB 3B
MSB 2B
210.8
MSB 9A
209.76
MSB 4B
206.97
MSB 10B
213.45
MSB 1B
209
MSB 14A
215.76
MSB 62B
208.86
MSB 12A
208.76
MSB 13A
207.78
MSB 5B
208.21
MSB 63B
209.17
MSB 17BB
212.7
MSB 64B
208.16
LOST
LAKE
MSB 8B
208.86
MSB 6B
206.93
MSB 7B
207.53
MSB 49B
203.53
MSB 73B
202.37
350
350
350
A—AREA BURNING
RUBBLE PIT

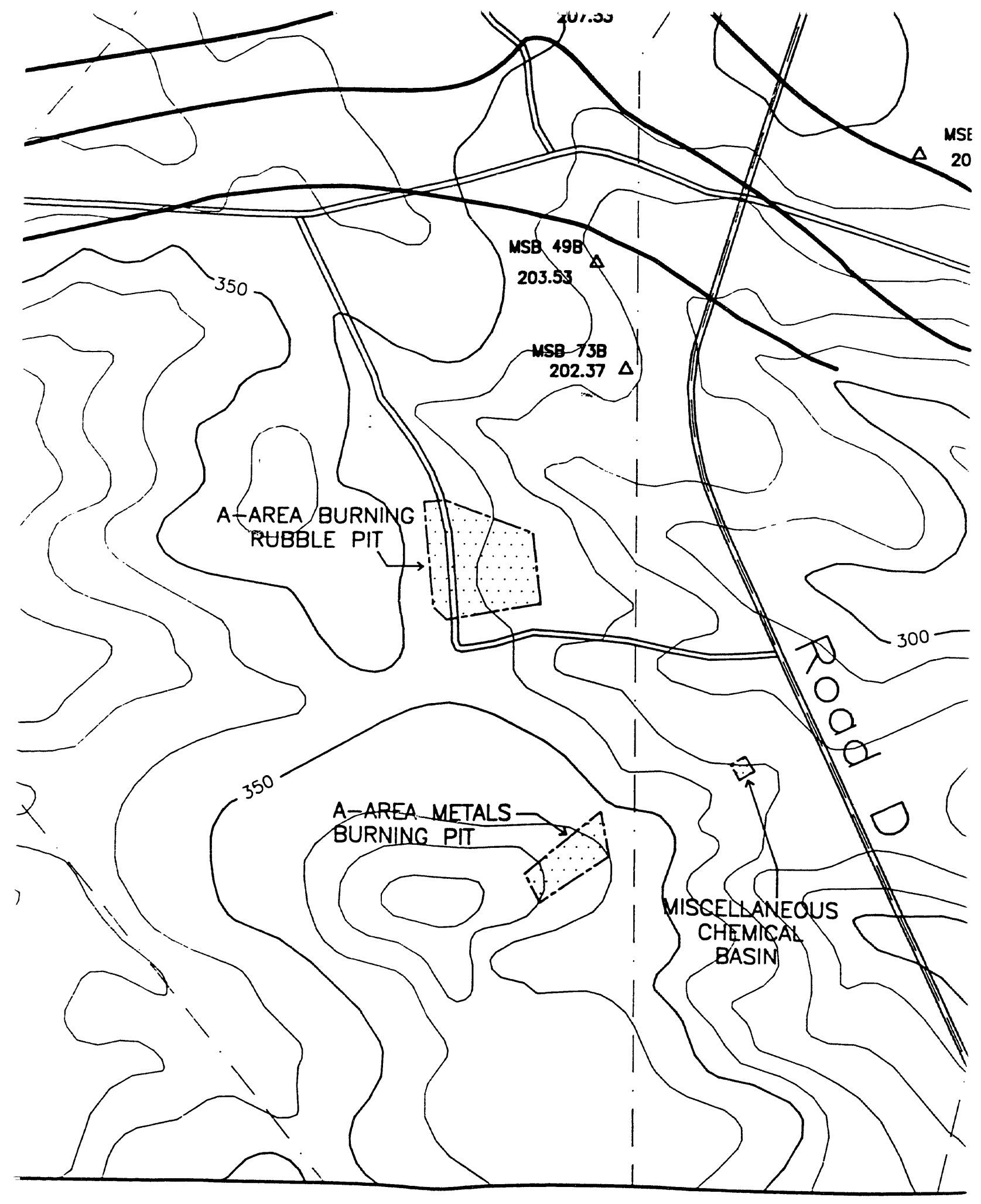

OIL BASIN
MSB 38B
215.31
RWM 6
MSB 31B
216.65
RWM 7
MSB 2B
210.86
MSB 1B
209
MSB 14A
215.76
350
MSB 36B
214.79
MSB 39B
212.12
MSB 74B
211.56
210
300
350
MSB 75B
210.47
MSB 79B
208.13
RWM 16PA
RWM 16
RWM 16PB
MSB 40B
205.65

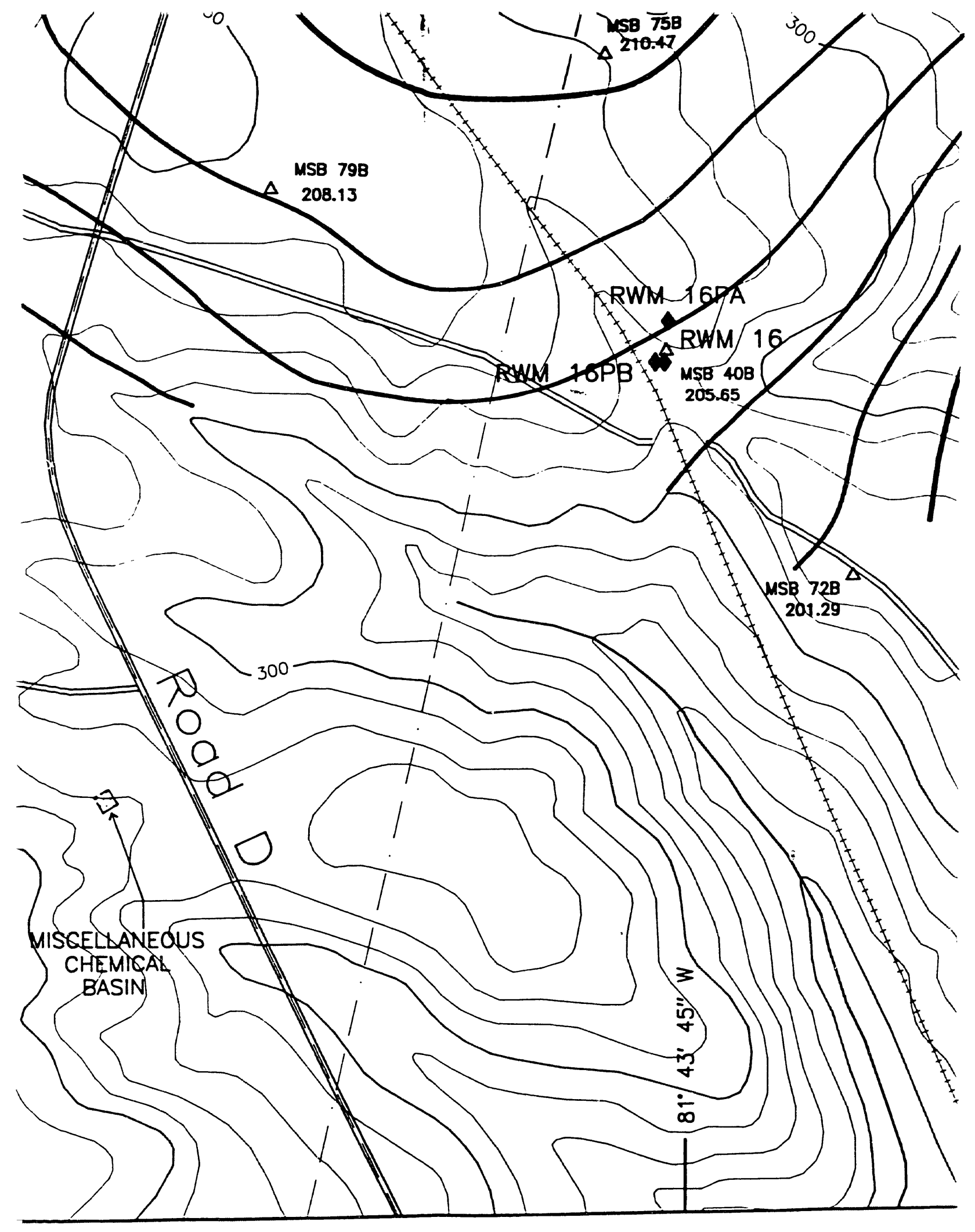

300
MSB 33B
208.5
MSB 51B
205.62
MSB 50B
193.54
200
250
Tim's Branch

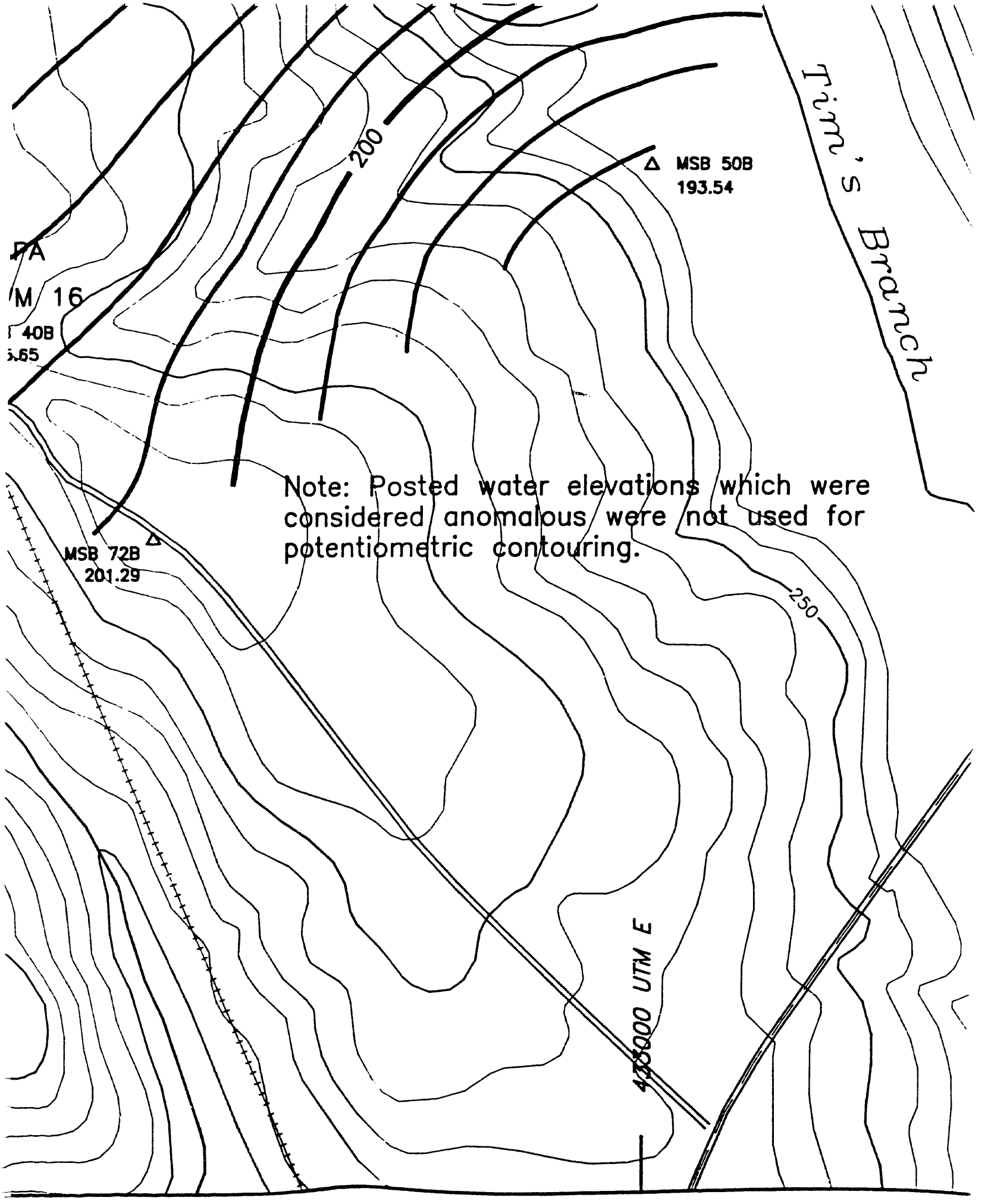

33° 20' 00" N
300
MSB 51B
205.62
250
3687000 UTM N

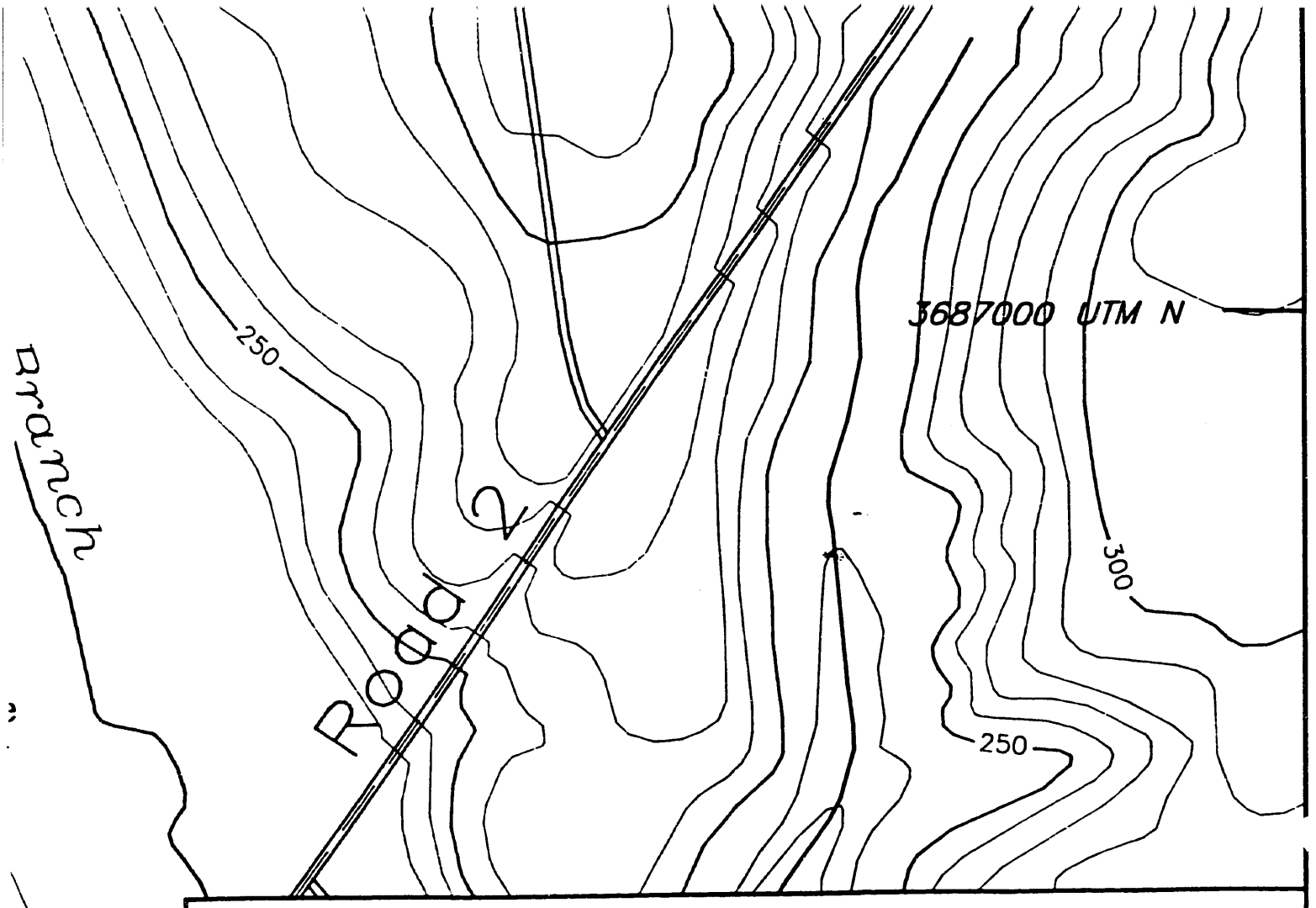

3687000 UTM N
250
200
SRW 12A
196.45
SRW 9A
200.93
Road A
Road C
81° 46' 15" W


300
210
SRW 2A
208.19
SRW 14A
204.97
SRW 13A
203.3
350
430000 UTM E


MSB 49B
203.53
MSB 73B
202.37
350
350
300
A-AREA BURNING
RUBBLE PIT
A-AREA METALS
BURNING PIT
MISCELLANEOUS
CHEMICAL
BASIN
Road D


MSB 75B
210.47
300
MSB 79B
208.13
RWM 16PA
RWM 16
RWM 16PB
MSB 40B
205.65
MSB 72B
201.29
300
Road D
MISCELLANEOUS
CHEMICAL
BASIN
81° 43' 45" W


Tim's Branch
200
250
MSB 50B
193.54
MSB 72B
201.29
Note: Posted water elevations which were considered anomalous were not used for potentiometric contouring.
435000 UTM E



M-AREA HAZARDOUS WASTE MANAGEMENT FACILITY POST-CLOSURE CARE PERMIT

GROUNDWATER MONITORING AND CORRECTIVE ACTION PROGRAM

POTENTIOMETRIC SURFACE MAP (2Q93)
LOWER CONGAREE UNIT

Monitoring well showing well name and water elevation in feet msl — MSB 85D △ 230.42

Water elevation contour interval: 2 feet

Recovery well showing well name — RWM 2 ♦

Topographic contour interval: 10 feet

Paved road
Dirt road
Railroad
Streams
Power line
Waste unit
Site boundary
Topography — 250
Potentiometric contour — 210

Scale in feet: 0 250 500 1000

Scale in meters: 0 100 200 1000

Source: USGS 7.5 minute quadrangle maps for New Ellenton SW and Jackson, SC. Universal Transverse Mercator (UTM) projection, Zone 17. Latitude/Longitude ticks in plain text, UTM ticks in italics.

DATE
FILMED
6/3/94
END