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PRELIMINARY ANALYSIS OF GROUNDWATER DATA
FOR THE UNITED NUCLEAR SITE
AT THE Y-12 PLANT
OAK RIDGE, TENNESSEE

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Environmental Management Department
Health, Safety, Environment
and Accountability Division

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April 6, 1987

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Prepared for the
Y-12 Assessment and Remediation Program
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ABSTRACT

Preliminary groundwater investigations have been conducted for a currently used waste disposal site, the United Nuclear Corporation, on the U. S. Department of Energy Y-12 Plant.

Data on hydrostatic heads and water quality for the shallow flow regime in soils and the upper weathered bedrock zone and deep flow regimes within the bedrock below the zone of significant weathering have been obtained. This document provides an initial summary and interpretation of hydrostatic head, water chemistry, and water quality data obtained during CY 1986.

During CY 1986 wells at this site were monitored for inorganic and organic parameters. There is no evidence of contamination entering the groundwater from this site. During 1987 and subsequent years, the wells will be sampled on a semi-annual basis.

1. INTRODUCTION

1.1 Background

This document provides an initial summary and interpretation of hydrostatic head and water chemistry data obtained from groundwater investigation wells surrounding the currently-used waste disposal site, United Nuclear Corporation, at the U. S. Department of Energy Y-12 Plant in Oak Ridge, Tennessee (Fig. 1). Water level observations for the calender year (CY) 1986 are presented using hydrographs, water table elevation maps, and hydrological cross sections. Major and minor element chemical data for groundwaters from the sites are presented using Piper diagrams and triangular plots.

Generalized, preliminary hydrological and hydrochemical interpretation of results for the site is presented. Detailed interpretations will be presented after the completion of CY 1987 hydrostatic head measurements and chemical sampling.

1.2 Data Sources and Methods

Hydrological and chemical data used in this report were obtained from the Y-12 Assessment and Remediation Program . The data were collected as part of that programs CY 1986 environmental monitoring activities. All data used in the preparation of this report are on file in the Assessment and Remediation Program central data base.

Water level measurements were obtained on a weekly basis by ORNL or Y-12 personnel. Measurements were obtained with either sonic or electric tape devices. Quarry water level measurements were obtained at either weekly or daily intervals by manually reading a staff gage at the quarry outfall. The hydrographs presented in this report were prepared with data from the central data base. Water table contour maps for the site was prepared for selected dates on a topographic base maps of the site. The maps is based on the data contained in the hydrographs. Both true north and grid north are shown on the map; however, observations made in this report are in reference to true north. Hydrological cross sections were prepared from site topographic maps, using the data contained in the hydrographs. Hydrological cross sections are, when practical, oriented parallel to the gradient of the water table at the site. The orientation of each cross section is shown on the well location map provided for each site.

Chemical data used in this report were obtained during quarterly sampling of the wells in CY 1986 by personnel from the Oak Ridge Gaseous Diffusion Plant (ORGDP). The chemical data are contained in the central data base of the Assessment and Remediation Program. All analytical data were produced by the analytical chemistry facility at ORGDP and were originally reported on a mg/L or ug/mL basis. To construct the Piper diagrams, data for the major cations and anions were recalculated to a milliequivalents/L basis. Alkalinity values and specific analyses for carbonate and bicarbonate were not obtained for CY1986 samples discussed in this report. To obtain estimated values for bicarbonate ions, a charge balance calculation was performed and the different charge was assumed to be equivalent to that produced by bicarbonate ions. The Piper diagrams

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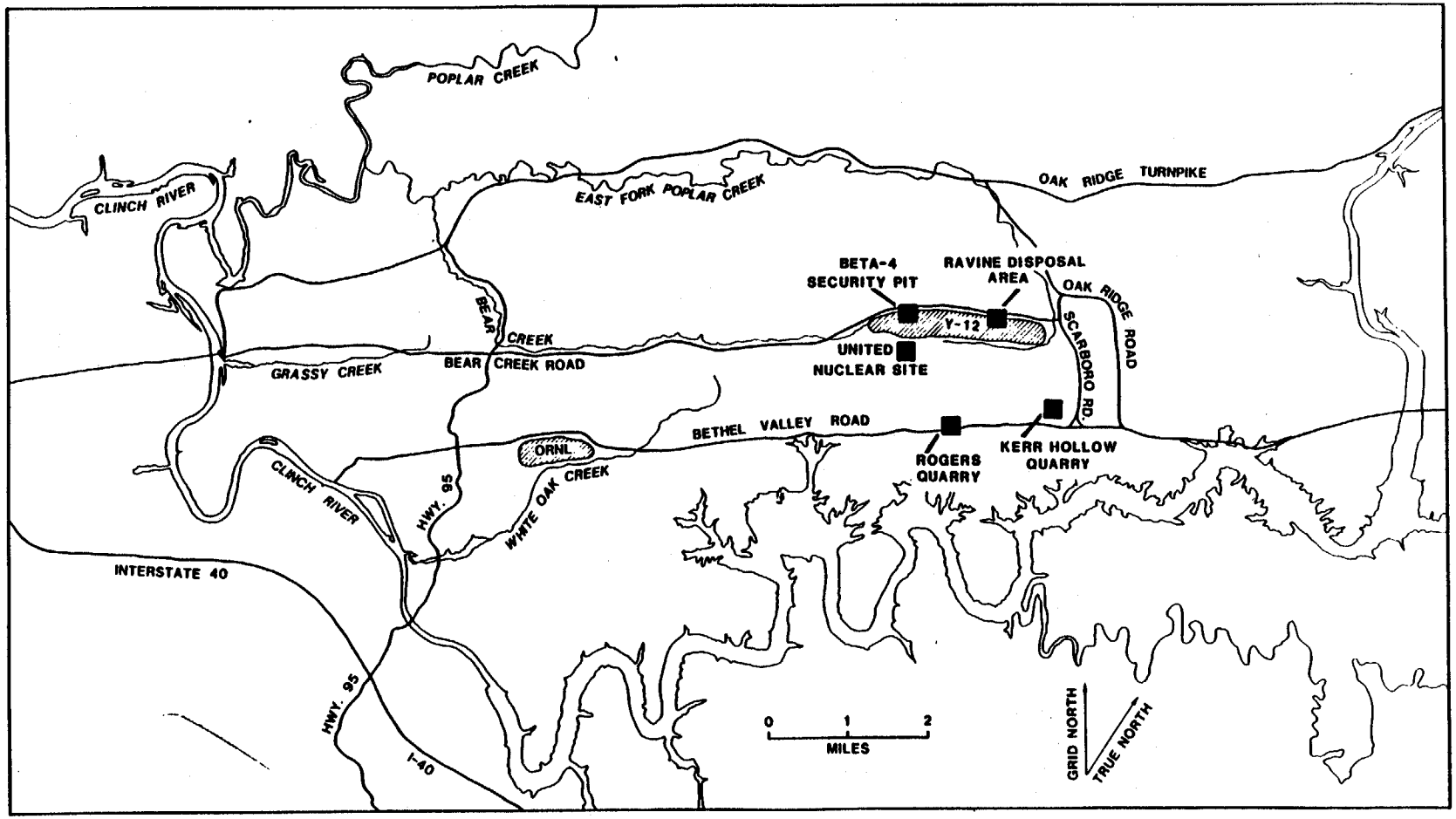


FIGURE 1: Index map showing site covered by this report.

illustrated in this report are calculated on a milliequivalents/L basis for the ionic species indicated on the diagrams. The trilinear diagrams plotting silicon, (calcium+magnesium), and (sodium+potassium) were prepared by recalculating data for these components to millimoles/L.

2. UNITED NUCLEAR SITE

2.1 Background

The United Nuclear Site is located on the northern crest of Chestnut Ridge, immediately south of the western end of the Y-12 complex (Fig. 1). The site is used to dispose of waste from the United Nuclear Company which is located in Rhode Island. Materials disposed of are low-level radioactive wastes and contaminated equipment that is packaged in 55-gallon drums and in boxes. A summary of site disposal activities and groundwater chemistry is presented by Geraghty and Miller (1985).

The United Nuclear Site is located in soil and residuum developed on top of the stratigraphically lowermost portion of the Copper Ridge Dolomite, which is the basal formation in the Knox Group. The soil and residuum locally contain abundant chert and rubble-rich horizons that occur both at the top of bedrock and dispersed irregularly throughout the soil column. Depth to bedrock at the site varies from 50 to 90 ft.

Available information on site hydrology has been summarized by Geraghty and Miller (1985). Groundwater flow directions have not been determined but, as at the other sites mentioned, are probably generally controlled by a groundwater divide that runs along the crest of Chestnut Ridge in the vicinity of the site. The location of the groundwater divide would influence a general control as to whether water from the site would flow northward into the Bear Creek watershed or southward toward watersheds in Bethel Valley.

2.2 Hydrological Data

2.2.1 Well Network

Three groundwater investigation wells were installed at the United Nuclear Site locality (see Fig. 2). Construction details for the wells are presented in Haase et al. (1987a). Wells GW-203, GW-205, and GW-221, are water table wells finished in the weathered zone at the top of bedrock. Existing wells at the site, 1090 and 1091, are also water table wells completed in the top of bedrock. Construction details for these wells are summarized in Haase et al. (1987b).

2.2.2 Water Levels and Hydrographs

Hydrographs for the five table wells are illustrated in Fig. 3. Hydrostatic head data collection at the United Nuclear Site began on a weekly basis in June 1986.

The hydrographs for the water table wells illustrated in Fig. 3 indicate that there is a northeastward- to eastward decreasing hydrostatic head gradient across the site. Well 1090, the westernmost well, has the highest hydrostatic head and is the up-gradient well for the site. Well 1091, located along the northeastern edge of the site, has the lowest hydrostatic head. Wells GW-203, GW-205, and GW-221 have hydrostatic heads intermediate to those in wells 1090 and 1091.

ORNL-DWG 86-9606

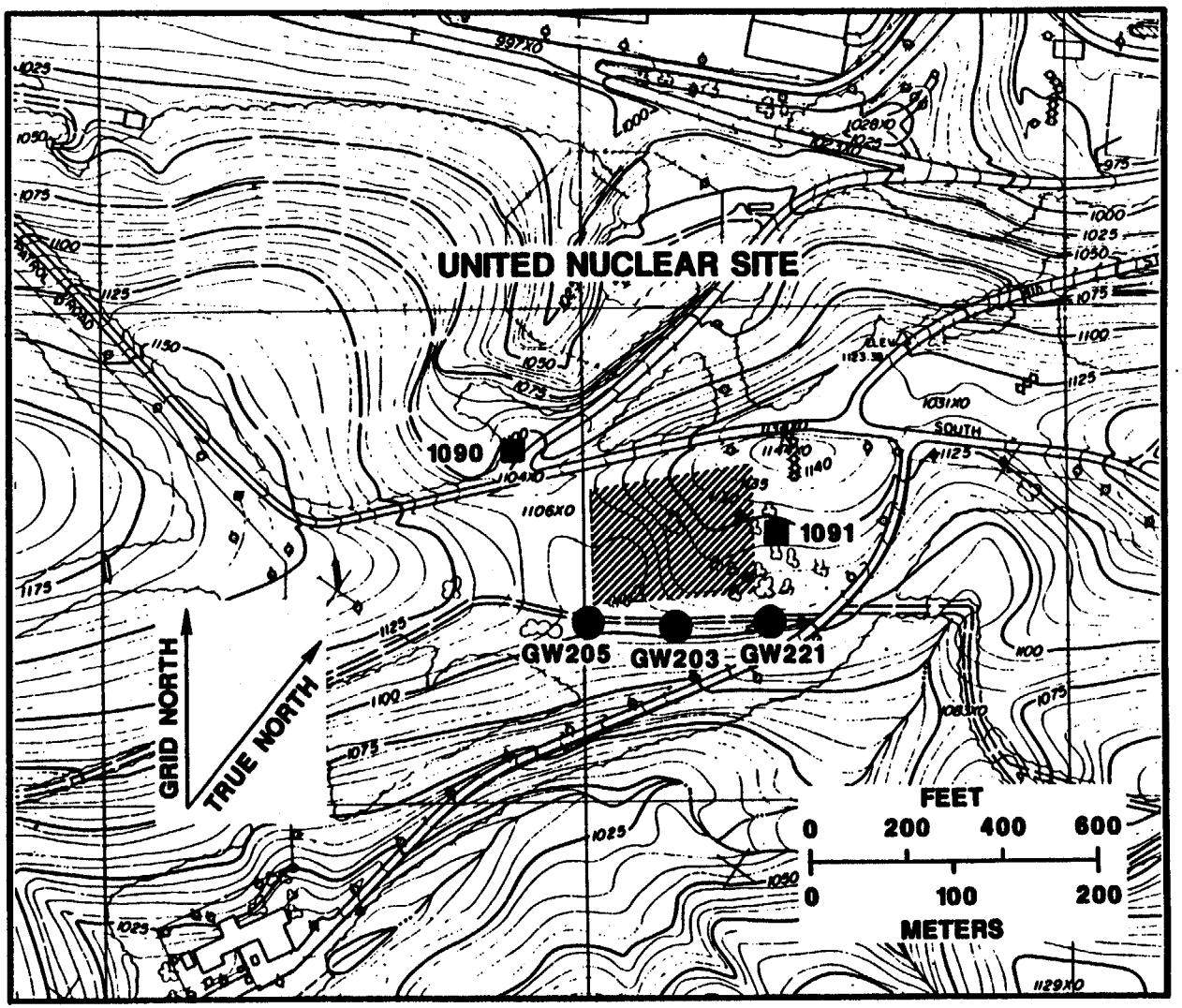


FIGURE 2: Well location map for the United Nuclear Site.

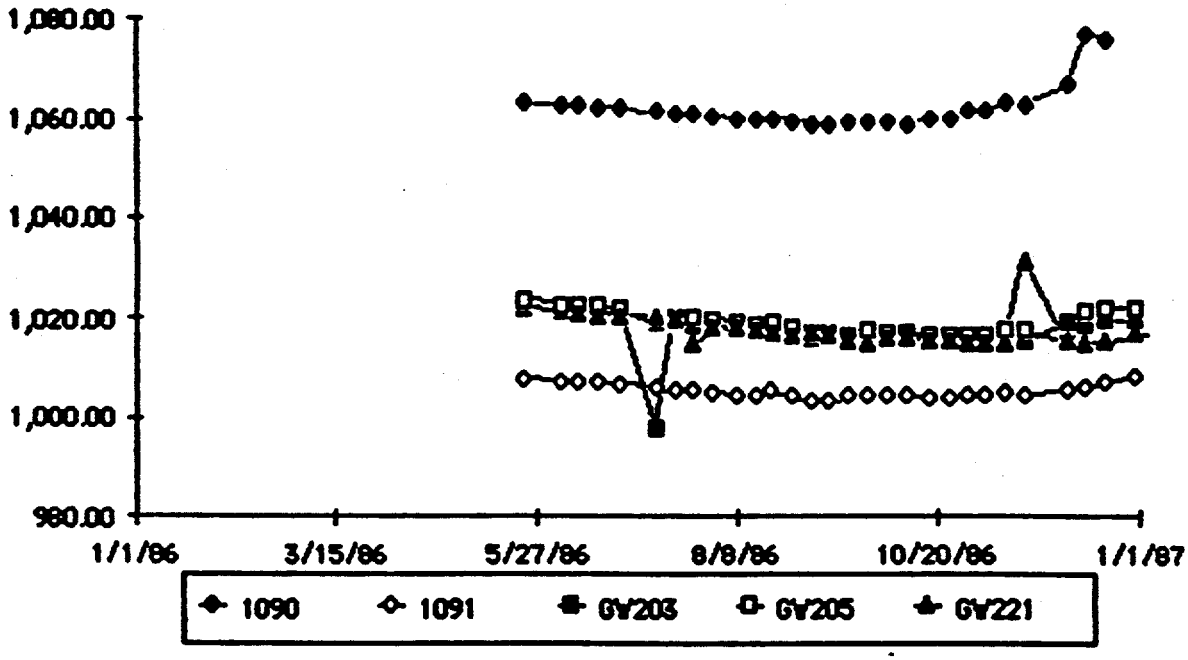


FIGURE 3: Hydrographs for water-table wells at the United Nuclear Site.

2.2.3 Water Table Map and Hydrological Cross Section

A water table elevation contour map and hydrological cross section for October 2, 1986, are presented in Figs. 4 and 5. Data for the map and the cross section were taken from the hydrographs illustrated in Fig. 3. The data from the hydrographs suggest that the water table contour presented in Fig. 4 would be representative of conditions at the site throughout a typical hydrological year.

A northeastward- to eastward decreasing gradient across the site is apparent from the contours illustrated in Fig. 4. The contour patterns suggest that shallow groundwater flow directions across the site would be predominantly to the northeast. In furthermore, the contour patterns suggest that the groundwater divide associated with Chestnut Ridge must occur to the north of the site. The pattern of equipotential lines on the hydrological cross section (Fig. 5) suggest that there is a downward component of flow associated with groundwater movement across the site.

2.3 Water Chemistry

Chemical variations in groundwaters at the United Nuclear Site are illustrated in Figs. 6 and 7. With respect to major element compositions, all the groundwaters of the site are generally similar and plot within a relatively tight cluster at the bicarbonate+carbonate-alkaline earth apex of a Piper diagram (Fig. 6). Calcium and magnesium are the major cations, with Ca/Mg ratio varying from 0.45 and 0.60. Carbonate-bicarbonate are the major anions. Groundwaters from the site have small, but relatively constant silicon contents (Fig. 7).

2.4 Water Quality

The five wells at the United Nuclear Corporation (UNC) Site were all sampled during four quarters of CY 1986. The sampling and analysis program being followed is consistent with the state regulation TN 1200-1-11-.05 "Interim Status Groundwater Monitoring Requirements." The program is outlined as:

ORNL-DWG 87-10474

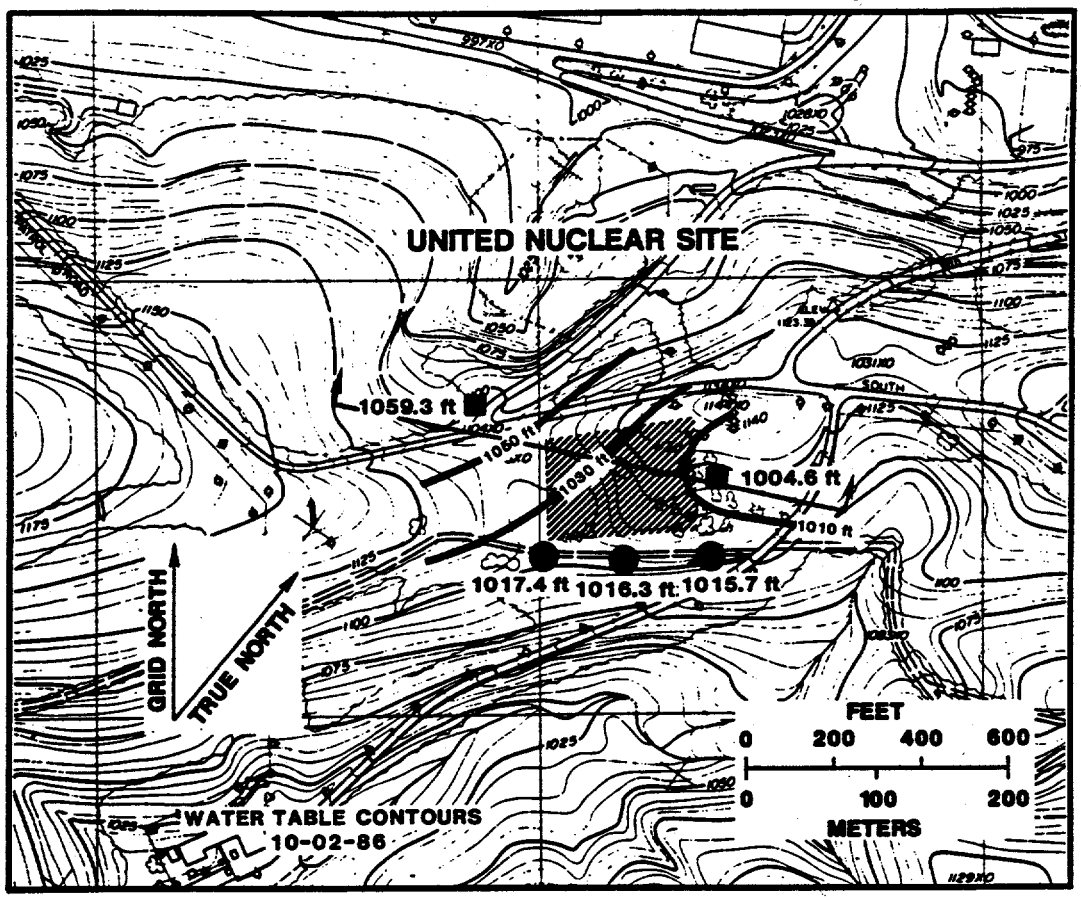


FIGURE 4: Water table elevation contour map for the United Nuclear Site. Line with arrowheads indicates orientation of hydrological cross section illustrated in Fig. 5.

ORNL-DWG 87-10479

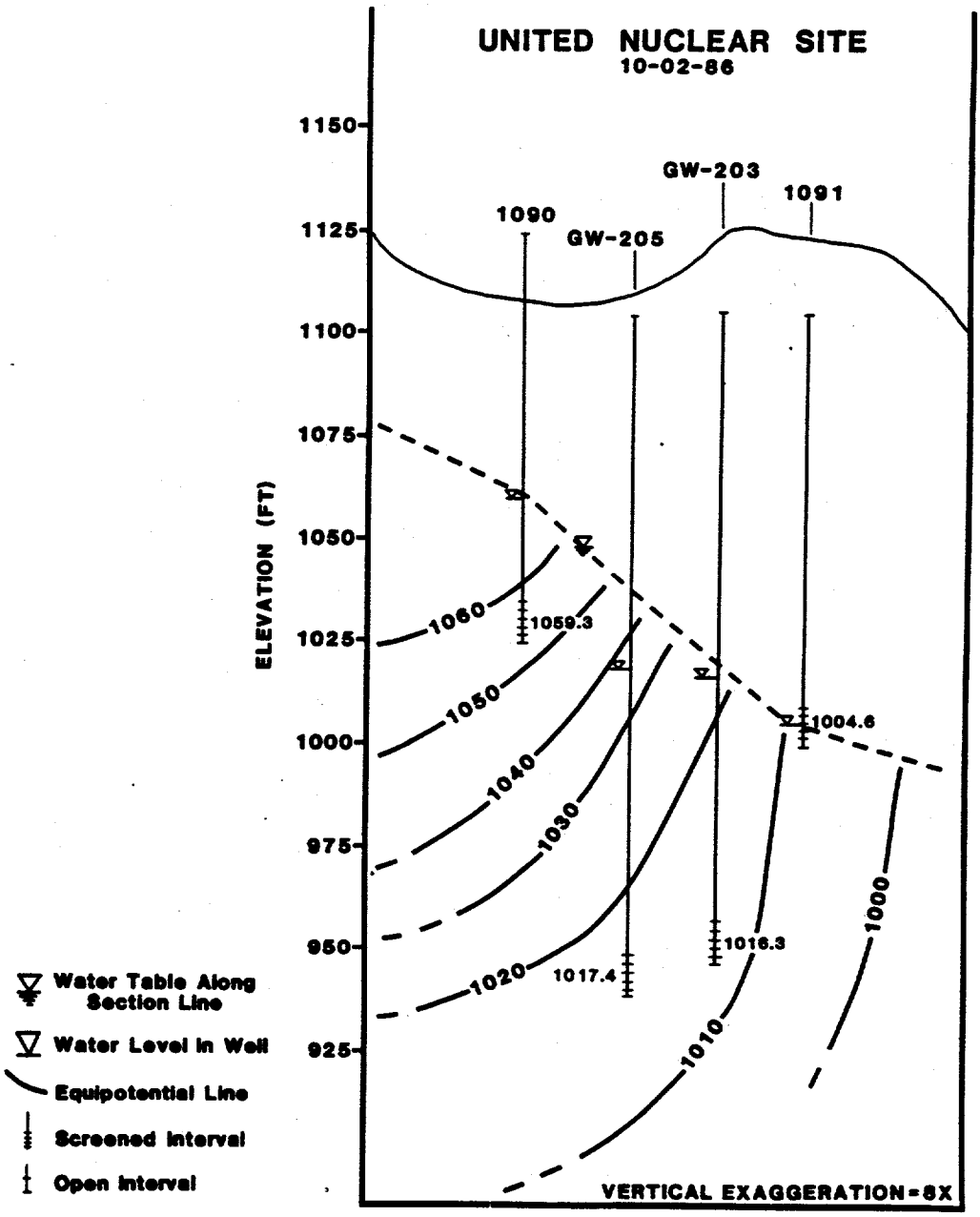


FIGURE 5: Hydrological cross section of the United Nuclear Site.

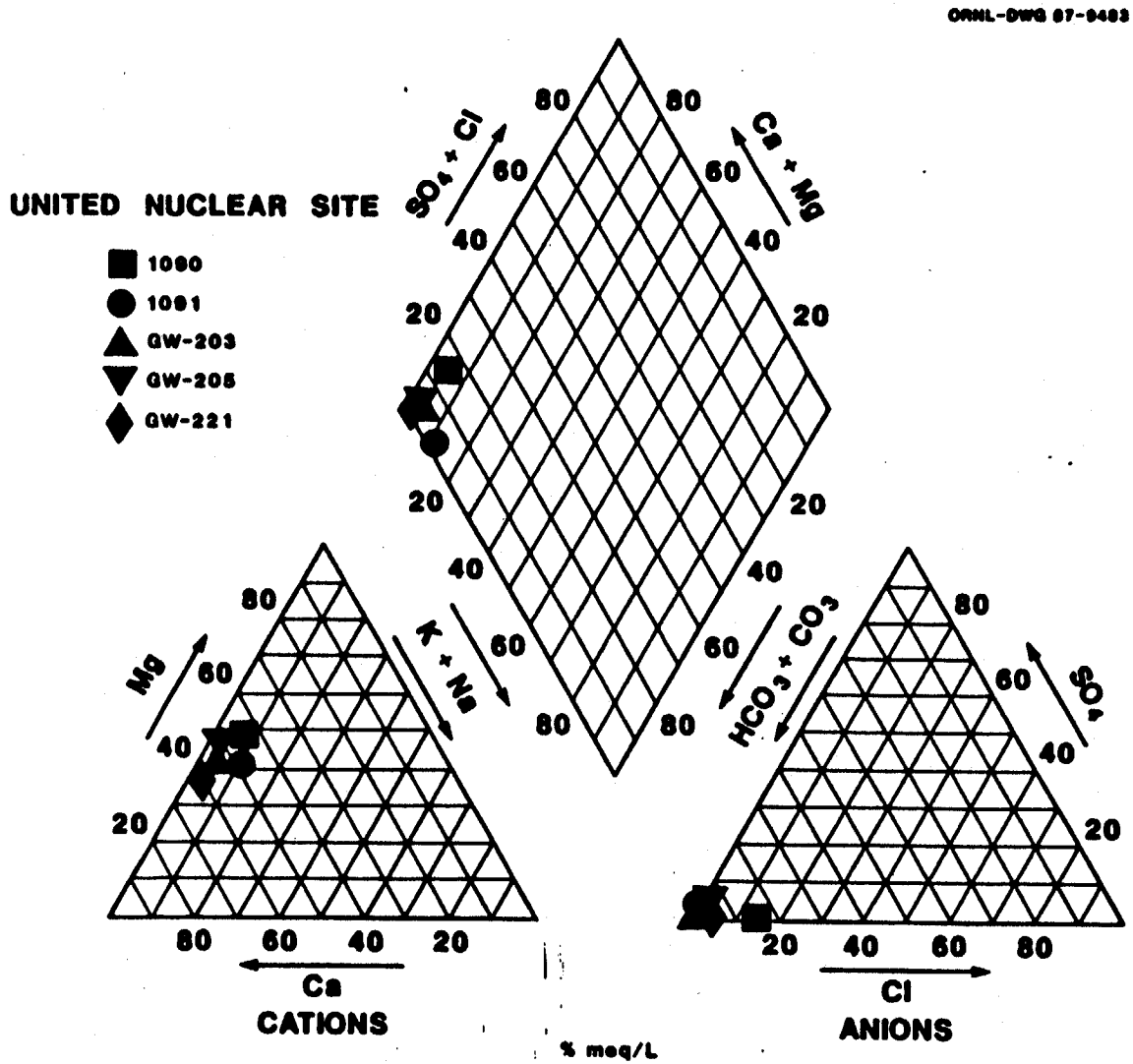


FIGURE 6: Piper diagram plot of groundwater compositions from the United Nuclear Site. Chemical data are plotted on the basis of milliequivalents/L.

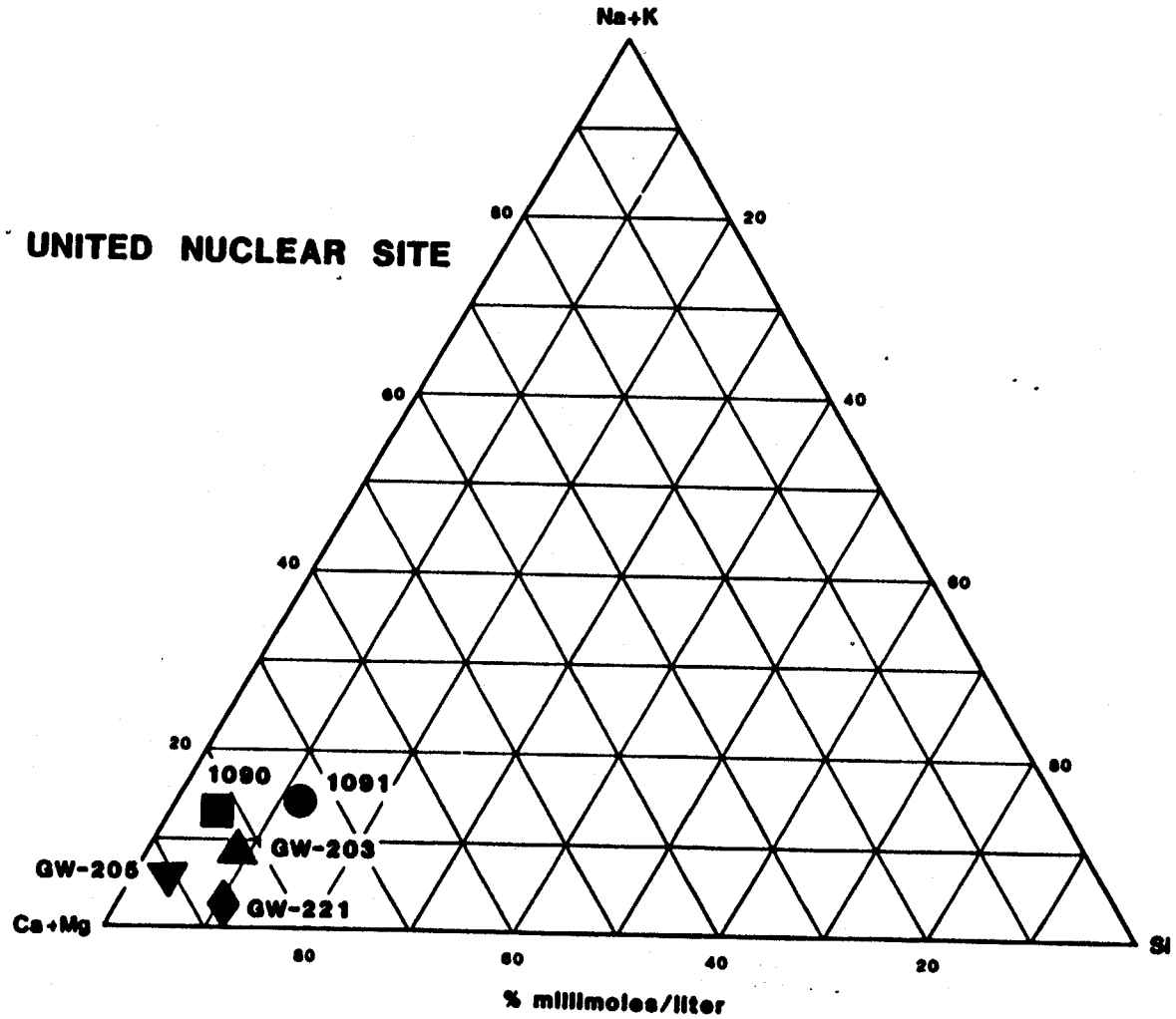


FIGURE 7: Triangular diagram plot of Ca+Mg, K+Na, and Si groundwater compositions from the United Nuclear Site. Chemical data are plotted on the basis of millimoles/L.

YEAR 1

Primary Drinking Water Standards	Indicator Parameters
Arsenic	pH
Barium	Specific conductance
Cadmium	Total organic carbon
Chromium	Total organic halogen
Fluoride	
Lead	**Parameters Establishing Groundwater Quality**
Mercury	
Nitrate	
Selenium	Chloride
Silver	Iron
Endrin	Manganese
Lindane	Phenols
Methoxychlor	Sodium
Toxaphene	Sulfate
2,4-D	
2,4,5-TP	
Radium	
Gross alpha	
Gross beta	

In addition the Y-12 Plant has added to the requirements:

Total metals scan
Dissolved metals scan
Total uranium

YEAR 2 AND SUBSEQUENT YEARS

Semi-annually for indicator parameters
Annually for groundwater quality parameters and total uranium

Since this site has not shown evidence of leakage during the CY 1986 first year program, the second year program will be followed during CY 1987 and subsequent years or until evidence of groundwater contamination is found.

The data are tabulated well in Appendix 1 and the Primary Drinking Water, indicator, and groundwater quality parameters, with the exception of the herbicides and pesticides are compared graphically for all wells in Appendix 2. The data from four sampling events are insufficient to allow a complete statistical interpretation and assessment for groundwater contamination.

Preliminary analysis of the groundwater monitoring data (Appendix 1) does not show any trends which would indicate concern. Values for pH for all wells have generally been in the range of 7.5-8.5; well GW-203 had a pH of 9 both second and third quarters which may indicate either a bad reading or a small quantity of grout which is not uncommon in a new well. Conductivity readings were found in the range of 150-300 umhos/cm for four wells and at the higher value of 500 umhos/cm in the upgradient well 1090. Water chemistry was slightly different throughout the year in well 1090 which also exhibited the highest sodium and

chloride values at the site. Such conductivities are consistent with waters found in other wells along Chestnut Ridge.

Bacteriological water quality, as indicated by total coliform counts, was fair. Four ct/100 ml were found in GW-203 first quarter, 2 cells/100 ml second and third quarter in Well 1090. All other samples had no detectable coliform bacteria.

During CY 1986, evidence of organic contamination was sought using analyses for herbicides, pesticides, total phenols, total organic chlorides, and total organic carbon. No herbicides and pesticides were detected. Total phenols were at or near the detection limit. Total organic carbon values were higher in the upgradient well 1090 than it was in any of the downgradient wells. The total organic carbon data (Appendix 2, Fig. 30) for the wells is anomalous, with values ranging from 10 to 100 times those expected for groundwater uncontaminated with organic chemicals. Natural uncontaminated groundwater is not expected to contain more than 1 to 5 mg/l of TOC and thus the wells are either highly contaminated with organic compounds or the data are inaccurate. The latter explanation is currently favored because one round of field splits of samples between the K-25 Analytical Laboratory who performed all analyses on groundwater at this site, and the Roy F. Weston Laboratory, indicated that the K-25 results were possibly too high by a factor of 100 and that TOC samples run by K-25 have not been purged to remove inorganic carbon. Total organic chloride results were low and consistent for all wells. All of these data contain no indication of organic based groundwater contamination.

Eight metals (As, Ba, Cd, Cr, Hg, Pb, Ag, and Se) are regulated under the Primary Drinking Water Standards; none of these metals, except Pb, were detected above the maximum concentration limits during CY 1986. In terms of water chemistry, it is interesting to note that barium was found at a higher level in the upgradient well 1090 than in any of the downgradient wells. Lead appears to have been above regulatory limit in well 1090 first quarter due to high turbidity (>2 NTU) of the sample.

Radioactivity, as indicated by measurements of gross activities of alpha and beta emitters and of radium, was generally within the regulatory limits. The exception were for radium in GW-221 fourth quarter and for gross alpha in 1090 first and second quarter. It should be noted that the reported laboratory detection limit was much lower for radium third quarter and so the plots of concentration versus time for radium have an odd appearance caused when less than values indicating detection limits were plotted as absolute values.

Anion analysis were carried out for chloride, nitrate, and sulfate. All three parameters were found below regulatory standards in all wells. As was noted earlier, the upgradient well which was higher in chloride, was also higher in nitrate than the downgradient wells.

Sodium, iron, and manganese are indicative of groundwater quality. Sodium, which has no recommended standard, was higher in 1090 than the other wells. Iron was found to be 50% higher than the Recommended Drinking Water Standard (RMCL) about 50% of the time; there was no consistent pattern between wells. Manganese was usually below the RMCL. The sodium, manganese, and iron levels are not of concern in the context of contamination from the site. During year one (CY

1986), these parameters served only to establish the background water quality. The levels found are consistent with typical waters in the area.

2.5 Summary

Hydrological data for the United Nuclear Site indicate that the shallow groundwater system is relatively uncomplicated. Shallow groundwater flow directions are consistently to the northeast. The data also indicate that there is a downward flow component to the shallow groundwater system throughout the site.

Major element data suggest that all of the groundwaters at the site are chemically similar and belong to the same groundwater flow system. The groundwaters from the United Nuclear Site generally resemble group I waters from the Kerr Hollow Quarry locality (Haase et al. 1987c). The Ca/Mg ratio of the United Nuclear Site groundwaters, however, exhibits a much smaller range of variation (0.45 to 0.60) than noted for group I waters from Kerr Hollow Quarry.

Based on one year of data from new wells, the water quality data is consistent with the conclusion that the United Nuclear Corporation Site is not contributing contamination to the groundwater. The water from the upgradient well 1090 is of slightly different quality, being higher in sodium, iron, chloride, nitrate, and specific conductivity than the downgradient wells. The wells will be sampled during CY 1987 and subsequent years semi-annually.

3. REFERENCES

Geraghty and Miller, Inc, 1985b, Proposed Groundwater Monitoring Plans for the New Hope Pond and for Four Disposal Sites on Chestnut Ridge: Report Y/SUB/85-00206C/2, Oak Ridge, TN.

Haase, C. S., G. A. Gillis, and H. L. King 1987a. Fiscal Year 1985 Groundwater Investigation Drilling Program at the Y-12 Plant, Oak Ridge, Tennessee. ORNL/TM-9999, Oak Ridge National Laboratory.

Haase, C. S., G. A. Gillis, and H. L. King 1987b. Subsurface Data Base for Bear Creek Valley, Chestnut Ridge, and a Portion of Bethel Valley on the U. S. Department of Energy Oak Ridge Reservation. ORNL/TM-10000, Oak Ridge National Laboratory.

Haase, C. S., H. L. King, G. A. Gillis, and C. W. Kimbrough, 1987c, Preliminary Analysis of Groundwater Data for the Kerr Hollow Quarry Site at the Y-12 Plant, Oak Ridge, TN. Y/TS-267.

APPENDIX 1

GROUNDWATER DATA FOR CY 1986

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

Table 1

TOTAL METALS-RADIOACTIVITY-RADIUM
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	GW-203 TOTAL	GW-203 TOTAL	GW-203 TOTAL	GW-203 TOTAL
DATE SAMPLED	02/06/86	04/16/86	07/09/86	10/06/86
TIME SAMPLED	14:00:00	16:30:00	12:30:00	11:20:00
METHOD	ICAP	ICAP	ICAP	ICAP
ALUMINUM	0.054	<0.02	<0.02	0.71
ANTIMONY	<0.05	.	<0.05	<0.05
BARIUM	0.016	0.011	0.01	0.01
BERYLLIUM	<0.0003	<0.0003	<0.0003	5.0E-04
BORON	<0.004	<0.004	0.013	0.03
CADMIUM	<0.003	<0.003	<0.003	<0.003
CALCIUM	27	23	25	26
CHROMIUM	<0.01	<0.01	<0.01	<0.01
COBALT	<0.005	<0.005	<0.005	<0.005
COPPER	<0.004	<0.004	0.011	0.016
IRON	0.026	0.01	0.0074	0.55
LITHIUM	<0.004	<0.004	<0.004	<0.004
MAGNESIUM	11	12	12	13
MANGANESE	0.0035	0.0027	0.0015	0.024
MOLYBDENUM	<0.01	<0.01	<0.01	<0.01
NICKEL	<0.01	<0.01	<0.01	<0.01
NIOBIUM	<0.007	<0.007	<0.007	0.032
PHOSPHOROUS	<0.2	<0.2	<0.2	<0.2
POTASSIUM	7.6	3.8	3.4	2.6
SILICON	3.3	2.9	2.7	3.8
SILVER	<0.006	<0.006	<0.006	<0.006
SODIUM	1.2	0.82	0.7	0.69
STRONTIUM	0.043	0.025	0.021	0.035
THORIUM	<0.2	<0.2	<0.2	<0.2
TITANIUM	<0.003	<0.003	0.012	0.012
VANADIUM	<0.005	<0.005	<0.005	<0.005
ZINC	<0.001	<0.001	<0.001	0.009
ZIRCONIUM	<0.005	<0.005	<0.005	<0.005
METHOD	AAS	AAS	AAS	AAS
ARSENIC	<0.005	<0.005	<0.005	<0.005
LEAD	0.004	<0.004	0.005	0.006
SELENIUM	<0.005	<0.005	<0.005	<0.005
THALLIUM	<0.01	<0.01	<0.01	<0.01
MERCURY	<0.0002	<0.0002	<0.0002	<0.0002
ALPHA ACTIVITY (PCI/L)	1.35	0.92	<1	2
BETA ACTIVITY (PCI/L)	5.29	6.04	<2	1
URANIUM	0.002	1.0E-03	<0.001	0.008
RADIUM (BQ/L)	<0.1	<0.1	0.016	<0.1

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

DISSOLVED METALS-RADIOACTIVITY-RADIUM
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	GW-203 DISSOLVED	GW-203 DISSOLVED	GW-203 DISSOLVED	GW-203 DISSOLVED
DATE SAMPLED	02/06/86	04/16/86	07/09/86	10/06/86
TIME SAMPLED	14:00:00	16:30:00	12:30:00	11:20:00
METHOD	ICAP	ICAP	ICAP	ICAP
ALUMINUM	<0.02	<0.02	0.036	0.086
ANTIMONY	<0.05	.	<0.05	<0.05
BARIUM	0.0097	0.0042	0.01	0.0074
BERYLLIUM	<0.0003	<0.0003	<0.0003	<0.0003
BORON	<0.004	<0.004	0.023	0.024
CADMIUM	<0.003	<0.003	<0.003	<0.003
CALCIUM	17	16	15	20
CHROMIUM	<0.01	<0.01	<0.01	<0.01
COBALT	<0.005	<0.005	<0.005	<0.005
COPPER	<0.004	<0.004	0.013	0.04
IRON	<0.004	0.0077	0.0056	0.019
LITHIUM	<0.004	<0.004	0.0048	<0.004
MAGNESIUM	11	11	10	12
MANGANESE	<0.001	<0.001	0.0015	<0.001
MOLYBDENUM	<0.01	<0.01	<0.01	<0.01
NICKEL	<0.01	<0.01	<0.01	<0.01
NIOBIUM	<0.007	<0.007	<0.007	0.024
PHOSPHOROUS	<0.2	<0.2	<0.2	<0.2
POTASSIUM	6.3	3.1	4.3	2.7
SILICON	3.2	2.8	2.5	2.7
SILVER	<0.006	<0.006	<0.006	<0.006
SODIUM	1	0.82	0.78	0.73
STRONTIUM	0.031	0.016	0.024	0.031
THORIUM	<0.2	<0.2	<0.2	<0.2
TITANIUM	<0.003	<0.003	0.016	<0.003
VANADIUM	<0.005	<0.005	<0.005	<0.005
ZINC	<0.001	<0.001	<0.001	0.0039
ZIRCONIUM	<0.005	<0.005	<0.005	<0.005
METHOD	AAS	AAS	AAS	AAS
ARSENIC	<0.005	<0.005	<0.005	<0.005
LEAD	<0.004	<0.004	0.005	0.004
SELENIUM	<0.005	<0.005	<0.005	<0.005
THALLIUM	<0.01	<0.01	<0.01	<0.01
MERCURY	2.0E-04	<0.0002	<0.0002	<0.0002
ALPHA ACTIVITY (PCI/L)	.	.	.	.
BETA ACTIVITY (PCI/L)	.	.	.	.
URANIUM	0.004	<0.001	1.0E-03	0.007
RADIUM (BQ/L)	.	.	.	.

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

MISCELLANEOUS CONVENTIONAL AND NON-CONVENTIONAL POLLUTANTS AND RELATED PARAMETE
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	GW-203	GW-203	GW-203	GW-203
DATE SAMPLED	02/06/86	04/16/86	07/09/86	10/06/86
TIME SAMPLED	14:00:00	16:30:00	12:30:00	11:20:00
WATER LEVEL (FT +/- GRADE)	-85.3	-79	-83.5	-86.9
WATER TEMP (DEG. CENT.)	15.7	11.1	22.4	16.6
DISSOLVED OXYGEN	6.6	10.8	10.6	8
CONDUCTIVITY (IN UMHOS/CM)	160	180	170	180
PH (IN PH UNITS)	9.8	7.5	7.9	8.8
REDOX (IN MV)	142.1	176	161	226
ALKALINITY (CO3)	.	.	.	.
ALKALINITY (HCO3)	.	.	.	.
TOTAL SUSPENDED SOLIDS	.	.	.	.
TOTAL KJELDAHL NITROGEN	.	.	.	.
AMMONIA - N	.	.	.	.
TURBIDITY (IN NTU)	18	3	8	30
COLIFORM (CC/100 MLS)	4	N	N	N
FLUORIDE	0.1016	<0.1	0.1	<0.1
PHENOLS	0.003	<0.001	<0.001	0.002
CHLORIDE	0.5	1	1.2	1.2
NITRATE NITROGEN	0.59	0.7	0.68	0.75
NITRATE	.	.	.	.
NITRITE	.	.	.	.
SULFATE	2.1	1.2	1	<1

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

VOLATILE ORGANIC PRIORITY AND NON-PRIORITY POLLUTANTS
UNIT IS UG/L

WELL	GW-203	GW-203	GW-203	GW-203
DATE SAMPLED	02/06/86	04/16/86	07/09/86	10/06/86
TIME SAMPLED	14:00:00	16:30:00	12:30:00	11:20:00
CHLOROMETHANE	N	.	.	.
BROMOMETHANE	N	.	.	.
VINYL CHLORIDE	N	.	.	.
CHLOROETHANE	N	.	.	.
METHYLENE CHLORIDE	G	.	.	.
ACETONE	N	.	.	.
CARBON DISULFIDE	G	.	.	.
1,1-DICHLOROETHENE	G	.	.	.
1,1-DICHLOROETHANE	G	.	.	.
TRANS-1,2-DICHLOROETHENE	G	.	.	.
CHLOROFORM	G	.	.	.
1,2-DICHLOROETHANE	G	.	.	.
2-BUTANONE	N	.	.	.
1,1,1-TRICHLOROETHANE	G	.	.	.
CARBON TETRACHLORIDE	G	.	.	.
VINYL ACETATE	N	.	.	.
BROMODICHLOROMETHANE	G	.	.	.
1,1,2,2-TETRACHLOROETHANE	G	.	.	.
1,2-DICHLOROPROPANE	G	.	.	.
TRANS-1,3-DICHLOROPROPENE	G	.	.	.
TRICHLOROETHENE	G	.	.	.
CHLORODIBROMOMETHANE	G	.	.	.
1,1,2-TRICHLOROETHANE	G	.	.	.
BENZENE	G	.	.	.
CIS-1,3-DICHLOROPROPENE	G	.	.	.
2-CHLOROETHYLVINYL ETHER	N	.	.	.
BROMOFORM	G	.	.	.
2-HEXANONE	N	.	.	.
4-METHYL-2-PENTANONE	N	.	.	.
TETRACHLOROETHENE	G	.	.	.
TOLUENE	G	.	.	.
CHLOROBENZENE	G	.	.	.
ETHYLBENZENE	G	.	.	.
STYRENE	G	.	.	.
XYLENES	G	.	.	.

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

HERBICIDES AND PESTICIDES
UNIT IS UG/L

WELL	GW-203	GW-203	GW-203	GW-203
DATE SAMPLED	02/06/86	04/16/86	07/09/86	10/06/86
TIME SAMPLED	14:00:00	16:30:00	12:30:00	11:20:00
2,4-D	<1	<2	<2	<1
ENDRIN	<0.05	<0.1	<0.1	<0.05
LINDANE	<0.01	<0.02	<0.02	<0.01
METHOXYCHLOR	<0.04	<0.08	<0.08	<0.04
SILVEX	<0.1	<0.2	<0.2	<0.1
TOXAPHENE	<1	<2	<2	<1

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

LAB REPLICATES
UNIT IS UG/L FOR TOX - MG/L FOR TOC

WELL	GW-203	GW-203	GW-203	GW-203
DATE SAMPLED	02/06/86	04/16/86	07/09/86	10/06/86
TIME SAMPLED	14:00:00	16:30:00	12:30:00	11:20:00
CONDUCTIVITY (IN UMHOS/CM)	151	142	149	196
	158	136	154	174
	160	137	151	175
	160	136	152	180
PH (IN PH UNITS)	7.7	8.9	9	8.4
	7.7	8.9	9	8.3
	7.6	9	9	8.4
	7.8	9	9.1	8.4
TOTAL ORGANIC CARBON	12	22	24	24
	25	22	25	29
	35	23	23	28
	12	22	24	27
TOTAL ORGANIC CHLORIDE	16	<5	10	22
	15	11	10	32
	13	6	10	<10
	14	190	10	<10

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

Table 2

TOTAL METALS-RADIOACTIVITY-RADIUM
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	GW-205 TOTAL	GW-205 TOTAL	GW-205 TOTAL	GW-205 TOTAL
DATE SAMPLED	02/06/86	04/16/86	07/08/86	10/03/86
TIME SAMPLED	9:40:00	12:20:00	12:30:00	13:00:00
METHOD	ICAP	ICAP	ICAP	ICAP
ALUMINUM	2.8	2.2	0.062	1.2
ANTIMONY	<0.05	.	<0.05	<0.05
BARIUM	0.012	0.02	0.011	0.012
BERYLLIUM	<0.0003	<0.0003	4.0E-04	3.0E-04
BORON	0.029	<0.004	0.014	0.024
CADMIUM	<0.003	<0.003	<0.003	<0.003
CALCIUM	48	40	31	65
CHROMIUM	<0.01	<0.01	<0.01	<0.01
COBALT	<0.005	<0.005	<0.005	<0.005
COPPER	0.07	<0.004	0.0066	0.1
IRON	6.5	3.3	0.076	4
LITHIUM	<0.004	<0.004	<0.004	<0.004
MAGNESIUM	30	23	19	35
MANGANESE	0.15	0.17	0.016	0.13
MOLYBDENUM	<0.01	<0.01	<0.01	<0.01
NICKEL	<0.01	<0.01	<0.01	<0.01
NIOBIUM	<0.007	<0.007	<0.007	0.023
PHOSPHOROUS	<0.2	<0.2	<0.2	<0.2
POTASSIUM	3	1.6	1.1	1.7
SILICON	11	6.9	3.6	5.1
SILVER	<0.006	<0.006	<0.006	<0.006
SODIUM	2.5	0.73	0.57	0.78
STRONTIUM	0.0014	<0.0004	<0.0004	0.026
THORIUM	<0.2	<0.2	<0.2	<0.2
TITANIUM	0.092	0.058	0.011	0.018
VANADIUM	<0.005	<0.005	<0.005	<0.005
ZINC	<0.001	0.0046	<0.001	0.018
ZIRCONIUM	<0.005	<0.005	<0.005	<0.005
METHOD	AAS	AAS	AAS	AAS
ARSENIC	<0.005	<0.005	<0.005	<0.005
LEAD	0.03	0.013	0.005	0.04
SELENIUM	<0.005	<0.005	<0.005	<0.005
THALLIUM	<0.01	<0.01	<0.01	<0.01
MERCURY	2.0E-04	<0.0002	<0.0002	<0.0002
ALPHA ACTIVITY (PCI/L)	16.8	4.08	<1	2
BETA ACTIVITY (PCI/L)	16	3.78	<2	3
URANIUM	0.002	<0.001	0.002	0.008
RADIUM (BQ/L)	<0.1	<0.1	0.012	<0.1

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

DISSOLVED METALS-RADIOACTIVITY-RADIUM
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	GW-205 DISSOLVED	GW-205 DISSOLVED	GW-205 DISSOLVED	GW-205 DISSOLVED
DATE SAMPLED	07/08/76	02/06/86	04/16/86	10/03/86
TIME SAMPLED	12:30:00	9:40:00	12:20:00	13:00:00
METHOD	ICAP	ICAP	ICAP	ICAP
ALUMINUM	<0.02	<0.02	<0.02	0.09
ANTIMONY	<0.05	<0.05	.	<0.05
BARIUM	0.012	0.0038	0.012	0.0097
BERYLLIUM	<0.0003	<0.0003	<0.0003	<0.0003
BORON	0.018	0.014	<0.004	0.017
CADMIUM	<0.003	<0.003	<0.003	<0.003
CALCIUM	30	24	32	28
CHROMIUM	<0.01	<0.01	<0.01	<0.01
COBALT	<0.005	<0.005	<0.005	<0.005
COPPER	<0.004	0.024	<0.004	0.048
IRON	<0.004	0.018	<0.004	0.082
LITHIUM	<0.004	<0.004	<0.004	<0.004
MAGNESIUM	18	16	19	18
MANGANESE	0.013	0.034	0.028	0.0066
MOLYBDENUM	<0.01	<0.01	<0.01	<0.01
NICKEL	<0.01	<0.01	<0.01	<0.01
NIOBIUM	<0.007	<0.007	<0.007	0.02
PHOSPHOROUS	<0.2	<0.2	<0.2	<0.2
POTASSIUM	1.1	2.6	1.1	1.2
SILICON	3.5	3.2	3.7	3.6
SILVER	<0.006	<0.006	<0.006	<0.006
SODIUM	0.54	2.6	0.72	0.59
STRONTIUM	<0.0004	0.0015	<0.0004	0.012
THORIUM	<0.2	<0.2	<0.2	<0.2
TITANIUM	0.0084	<0.003	<0.003	<0.003
VANADIUM	<0.005	<0.005	<0.005	<0.005
ZINC	<0.001	<0.001	<0.001	0.0042
ZIRCONIUM	<0.005	<0.005	<0.005	<0.005
METHOD	AAS	AAS	AAS	AAS
ARSENIC	<0.005	<0.005	<0.005	<0.005
LEAD	0.004	<0.004	0.01	0.006
SELENIUM	<0.005	<0.005	<0.005	<0.005
THALLIUM	<0.01	<0.01	<0.01	<0.01
MERCURY	<0.0002	<0.0002	<0.0002	<0.0002
ALPHA ACTIVITY (PCI/L)	.	.	.	.
BETA ACTIVITY (PCI/L)	.	.	.	.
URANIUM	0.002	0.002	0.002	0.006
RADIUM (BQ/L)	.	.	.	.

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

MISCELLANEOUS CONVENTIONAL AND NON-CONVENTIONAL POLLUTANTS AND RELATED PARAMETE
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	GW-205	GW-205	GW-205	GW-205
DATE SAMPLED	02/06/86	04/16/86	07/08/86	10/03/86
TIME SAMPLED	9:40:00	12:20:00	12:30:00	13:00:00
WATER LEVEL (FT +/- GRADE)	-82.4	-77	-80	-84.9
WATER TEMP (DEG. CENT.)	13	9.3	27.2	28.6
DISSOLVED OXYGEN	2.8	16.6	10.8	7.5
CONDUCTIVITY (IN UMHOS/CM)	250	240	270	270
PH (IN PH UNITS)	7.1	7.6	8.1	8
REDOX (IN MV)	247	281	214	260.6
ALKALINITY (CO3)	.	.	.	.
ALKALINITY (HCO3)	.	.	.	.
TOTAL SUSPENDED SOLIDS	.	.	.	.
TOTAL KJELDAHL NITROGEN	.	.	.	.
AMMONIA - N	.	.	.	.
TURBIDITY (IN NTU)	G	121	5	<1
COLIFORM (CC/100 MLS)	N	N	N	N
FLUORIDE	0.1	<0.1	0.1	<0.1
PHENOLS	0.007	<0.001	0.004	0.002
CHLORIDE	<1	<1	<1	<1
NITRATE NITROGEN	<0.11	0.16	0.16	0.2
NITRATE	.	.	.	.
NITRITE	.	.	.	.
SULFATE	8	4.6	3.9	3.3

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

VOLATILE ORGANIC PRIORITY AND NON-PRIORITY POLLUTANTS
UNIT IS UG/L

WELL	GW-205	GW-205	GW-205	GW-205
DATE SAMPLED	02/06/86	04/16/86	07/08/86	10/03/86
TIME SAMPLED	9:40:00	12:20:00	12:30:00	13:00:00
CHLOROMETHANE	N	.	.	.
BROMOMETHANE	N	.	.	.
VINYL CHLORIDE	N	.	.	.
CHLOROETHANE	N	.	.	.
METHYLENE CHLORIDE	G	.	.	.
ACETONE	N	.	.	.
CARBON DISULFIDE	G	.	.	.
1,1-DICHLOROETHENE	G	.	.	.
1,1-DICHLOROETHANE	G	.	.	.
TRANS-1,2-DICHLOROETHENE	G	.	.	.
CHLOROFORM	G	.	.	.
1,2-DICHLOROETHANE	G	.	.	.
2-BUTANONE	N	.	.	.
1,1,1-TRICHLOROETHANE	G	.	.	.
CARBON TETRACHLORIDE	G	.	.	.
VINYL ACETATE	N	.	.	.
BROMODICHLOROMETHANE	G	.	.	.
1,1,2,2-TETRACHLOROETHANE	G	.	.	.
1,2-DICHLOROPROPANE	G	.	.	.
TRANS-1,3-DICHLOROPROPENE	G	.	.	.
TRICHLOROETHENE	G	.	.	.
CHLORODIBROMOMETHANE	G	.	.	.
1,1,2-TRICHLOROETHANE	G	.	.	.
BENZENE	G	.	.	.
CIS-1,3-DICHLOROPROPENE	G	.	.	.
2-CHLOROETHYLVINYL ETHER	N	.	.	.
BROMOFORM	G	.	.	.
2-HEXANONE	N	.	.	.
4-METHYL-2-PENTANONE	N	.	.	.
TETRACHLOROETHENE	G	.	.	.
TOLUENE	G	.	.	.
CHLOROBENZENE	G	.	.	.
ETHYLBENZENE	G	.	.	.
STYRENE	G	.	.	.
XYLENES	G	.	.	.

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

HERBICIDES AND PESTICIDES
UNIT IS UG/L

WELL	GW-205	GW-205	GW-205	GW-205
DATE SAMPLED	02/06/86	04/16/86	07/08/86	10/03/86
TIME SAMPLED	9:40:00	12:20:00	12:30:00	13:00:00
2,4-D	<1	<2	<2	<1
ENDRIN	<0.05	<0.1	<0.1	<0.05
LINDANE	<0.01	<0.02	<0.02	<0.01
METHOXYCHLOR	<0.04	<0.08	<0.08	<0.04
SILVEX	<0.1	<0.2	<0.2	<0.1
TOXAPHENE	<1	<2	<2	<1

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

LAB REPLICATES
UNIT IS UG/L FOR TOX - MG/L FOR TOC

WELL	GW-205	GW-205	GW-205	GW-205
DATE SAMPLED	02/06/86	04/16/86	07/08/86	10/03/86
TIME SAMPLED	9:40:00	12:20:00	12:30:00	13:00:00
CONDUCTIVITY (IN UMHOS/CM)	278	247	273	273
	294	260	273	272
	294	262	274	274
	299	262	274	273
PH (IN PH UNITS)	7.7	7.8	7.7	8.1
	7.7	7.8	7.7	8
	7.6	8.1	7.8	8.3
	7.8	7.9	7.8	8.1
TOTAL ORGANIC CARBON	12	44	39	60
	10	45	39	50
	12	45	38	55
	10	43	39	68
TOTAL ORGANIC CHLORIDE	11	357	16	50
	9	<5	17	54
	10	7	19	45
	10	217	14	63

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

Table 3

TOTAL METALS-RADIOACTIVITY-RADIUM
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	GW-221 TOTAL	GW-221 TOTAL	GW-221 TOTAL	GW-221 TOTAL	GW-221 TOTAL FIELD DUPE
DATE SAMPLED	02/07/86	04/17/86	07/09/86	10/07/86	10/07/86
TIME SAMPLED	12:05:00	13:00:00	.	12:15:00	12:15:00
METHOD	ICAP	ICAP	ICAP	ICAP	ICAP
ALUMINUM	0.28	0.085	0.32	0.13	0.14
ANTIMONY	.	.	<0.05	0.17	0.19
BARIUM	0.0013	0.0042	0.0037	0.0078	0.0077
BERYLLIUM	<0.0003	<0.0003	3.0E-04	0.0016	0.0015
BORON	0.0059	0.013	0.037	0.017	0.017
CADMIUM	<0.003	<0.003	<0.003	<0.003	<0.003
CALCIUM	31	29	29	29	29
CHROMIUM	<0.01	<0.01	0.014	0.031	0.032
COBALT	<0.005	<0.005	<0.005	<0.005	<0.005
COPPER	<0.004	<0.004	0.024	<0.004	0.0046
IRON	0.14	0.11	0.18	0.086	0.086
LITHIUM	<0.004	<0.004	<0.004	<0.004	<0.004
MAGNESIUM	20	18	18	18	18
MANGANESE	0.0049	0.0036	0.0095	0.0021	0.0024
MOLYBDENUM	<0.01	<0.01	<0.01	<0.01	<0.01
NICKEL	<0.01	<0.01	<0.01	0.011	0.013
NIOBIUM	<0.007	<0.007	<0.007	0.064	0.065
PHOSPHOROUS	<0.2	<0.2	0.24	<0.2	<0.2
POTASSIUM	<0.6	<0.6	1	<0.6	<0.6
SILICON	5.2	3.2	4	4.1	4.1
SILVER	<0.006	<0.006	<0.006	<0.006	<0.006
SODIUM	0.41	0.38	0.66	0.56	0.58
STRONTIUM	<0.0004	<0.0004	<0.0004	0.011	0.011
THORIUM	<0.2	<0.2	<0.2	<0.2	<0.2
TITANIUM	0.0056	<0.003	0.021	0.02	0.02
VANADIUM	<0.005	<0.005	<0.005	<0.005	<0.005
ZINC	<0.001	0.0043	<0.001	0.0017	0.0028
ZIRCONIUM	<0.005	<0.005	<0.005	0.019	0.02
METHOD	AAS	AAS	AAS	AAS	AAS
ARSENIC	<0.005	<0.005	<0.005	<0.005	<0.005
LEAD	0.006	0.004	0.01	0.009	0.009
SELENIUM	<0.005	<0.005	<0.005	<0.005	<0.005
THALLIUM	<0.01	<0.01	<0.01	<0.01	<0.01
MERCURY	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ALPHA ACTIVITY (PCI/L)	0.77	10.28	<1	<1	<1
BETA ACTIVITY (PCI/L)	<1	4.64	<2	<1	.
URANIUM	0.003	1.0E-03	0.005	0.007	0.009
RADIUM (BQ/L)	<0.1	<0.1	0.014	0.28	<0.1

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

DISSOLVED METALS-RADIOACTIVITY-RADIUM
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	GW-221 DISSOLVED	GW-221 DISSOLVED	GW-221 DISSOLVED	GW-221 DISSOLVED	GW-221 DISSOLVED FIELD DUPE
DATE SAMPLED	02/07/86	04/17/86	07/09/86	10/07/86	10/07/86
TIME SAMPLED	12:05:00	13:00:00	.	12:15:00	12:15:00
METHOD	ICAP	ICAP	ICAP	ICAP	ICAP
ALUMINUM	<0.02	<0.02	<0.02	0.086	0.095
ANTIMONY	.	.	<0.05	0.066	0.066
BARIUM	<0.001	0.0031	0.0031	0.013	0.0042
BERYLLIUM	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
BORON	0.0057	0.012	0.02	0.024	0.03
CADMIUM	<0.003	<0.003	<0.003	<0.003	<0.003
CALCIUM	29	28	28	29	29
CHROMIUM	<0.01	<0.01	<0.01	0.016	0.018
COBALT	<0.005	<0.005	<0.005	<0.005	<0.005
COPPER	<0.004	<0.004	0.016	0.0061	0.0082
IRON	<0.004	<0.004	0.0087	0.031	0.043
LITHIUM	<0.004	<0.004	<0.004	<0.004	<0.004
MAGNESIUM	19	18	17	17	17
MANGANESE	<0.001	<0.001	0.0024	0.0012	<0.001
MOLYBDENUM	<0.01	<0.01	<0.01	<0.01	<0.01
NICKEL	<0.01	<0.01	<0.01	0.021	0.02
NIOBIUM	<0.007	<0.007	<0.007	0.017	0.011
PHOSPHOROUS	<0.2	<0.2	<0.2	<0.2	<0.2
POTASSIUM	<0.6	<0.6	0.74	0.79	<0.6
SILICON	4.3	2.8	3.5	4	4
SILVER	<0.006	<0.006	<0.006	<0.006	<0.006
SODIUM	0.41	0.42	0.46	0.59	0.55
STRONTIUM	<0.0004	<0.0004	<0.0004	0.011	0.01
THORIUM	<0.2	<0.2	<0.2	<0.2	<0.2
TITANIUM	<0.003	<0.003	0.013	<0.003	<0.003
VANADIUM	<0.005	<0.005	<0.005	<0.005	<0.005
ZINC	<0.001	0.003	<0.001	0.0018	0.0034
ZIRCONIUM	<0.005	<0.005	<0.005	<0.005	<0.005
METHOD	AAS	AAS	AAS	AAS	AAS
ARSENIC	<0.005	<0.005	<0.005	<0.005	<0.005
LEAD	<0.004	<0.004	0.008	<0.004	<0.004
SELENIUM	<0.005	<0.005	<0.005	<0.005	<0.005
THALLIUM	<0.01	<0.01	<0.01	<0.01	<0.0
MERCURY	<0.0002	<0.0002	<0.0002	<0.0002	<0.000
ALPHA ACTIVITY (PCI/L)	.	.	.	.	
BETA ACTIVITY (PCI/L)	.	.	.	.	
URANIUM	0.008	1.0E-03	1.0E-03	0.01	0.0
RADIUM (BQ/L)	.	.	.	.	

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

MISCELLANEOUS CONVENTIONAL AND NON-CONVENTIONAL POLLUTANTS AND RELATED PARAMETE
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	GW-221	GW-221	GW-221	GW-221	GW-22 FIELD DUP
DATE SAMPLED	02/07/86	04/17/86	07/09/86	10/07/86	10/07/8
TIME SAMPLED	12:05:00	13:00:00	.	12:15:00	12:15:0
WATER LEVEL (FT +/- GRADE)	-85	-81.7	-84.4	-88.7	.
WATER TEMP (DEG. CENT.)	18.7	12.8	22.8	19.8	.
DISSOLVED OXYGEN	15.2	10.1	12.2	8.2	.
CONDUCTIVITY (IN UMHOS/CM)	230	250	270	240	.
PH (IN PH UNITS)	7	7.1	7.1	8.6	.
REDOX (IN MV)	337	272	203	252	.
ALKALINITY (CO3)	.	.	.	.	.
ALKALINITY (HCO3)	.	.	.	.	.
TOTAL SUSPENDED SOLIDS	.	.	.	.	.
TOTAL KJELDAHL NITROGEN	.	.	.	.	.
AMMONIA - N	.	.	.	.	.
TURBIDITY (IN NTU)	9	6	15	<1	<1
COLIFORM (CC/100 MLS)	N	N	1	N	N
FLUORIDE	0.07	0.2	0.1	0.1	0.1
PHENOLS	<0.001	<0.002	0.003	0.009	0.021
CHLORIDE	<0.1	1.1	1.1	1.1	1.1
NITRATE NITROGEN	0.25	0.41	0.36	0.36	0.38
NITRATE	.	.	.	.	.
NITRITE	.	.	.	.	.
SULFATE	<1	1.3	1	<1	<1

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

VOLATILE ORGANIC PRIORITY AND NON-PRIORITY POLLUTANTS
UNIT IS UG/L

WELL	GW-221	GW-221	GW-221	GW-221	GW-221 FIELD DUPL
DATE SAMPLED	02/07/86	04/17/86	07/09/86	10/07/86	10/07/86
TIME SAMPLED	12:05:00	13:00:00	.	12:15:00	12:15:00
CHLOROMETHANE	.	.	.	.	.
BROMOMETHANE	.	.	.	.	.
VINYL CHLORIDE	.	.	.	.	.
CHLOROETHANE	.	.	.	.	.
METHYLENE CHLORIDE	.	.	.	.	.
ACETONE	.	.	.	.	.
CARBON DISULFIDE	.	.	.	.	.
1,1-DICHLOROETHENE	.	.	.	.	.
1,1-DICHLOROETHANE	.	.	.	.	.
TRANS-1,2-DICHLOROETHENE	.	.	.	.	.
CHLOROFORM	.	.	.	.	.
1,2-DICHLOROETHANE	.	.	.	.	.
2-BUTANONE	.	.	.	.	.
1,1,1-TRICHLOROETHANE	.	.	.	.	.
CARBON TETRACHLORIDE	.	.	.	.	.
VINYL ACETATE	.	.	.	.	.
BROMODICHLOROMETHANE	.	.	.	.	.
1,1,2,2-TETRACHLOROETHANE	.	.	.	.	.
1,2-DICHLOROPROPANE	.	.	.	.	.
TRANS-1,3-DICHLOROPROPENE	.	.	.	.	.
TRICHLOROETHENE	.	.	.	.	.
CHLORODIBROMOMETHANE	.	.	.	.	.
1,1,2-TRICHLOROETHANE	.	.	.	.	.
BENZENE	.	.	.	.	.
CIS-1,3-DICHLOROPROPENE	.	.	.	.	.
2-CHLOROETHYLVINYL ETHER	.	.	.	.	.
BROMOFORM	.	.	.	.	.
2-HEXANONE	.	.	.	.	.
4-METHYL-2-PENTANONE	.	.	.	.	.
TETRACHLOROETHENE	.	.	.	.	.
TOLUENE	.	.	.	.	.
CHLOROBENZENE	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.
STYRENE	.	.	.	.	.
XYLENES	.	.	.	.	.

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

HERBICIDES AND PESTICIDES
UNIT IS UG/L

WELL	GW-221	GW-221	GW-221	GW-221	GW-221 FIELD DUPE
DATE SAMPLED	02/07/86	04/17/86	07/09/86	10/07/86	10/07/86
TIME SAMPLED	12:05:00	13:00:00	.	12:15:00	12:15:00
2,4-D	<1	<2	<2	<1	<1
ENDRIN	<0.05	<0.1	<0.1	<0.05	<0.05
LINDANE	<0.01	<0.02	<0.02	<0.01	<0.01
METHOXYCHLOR	<0.04	<0.08	<0.08	<0.04	<0.04
SILVEX	<0.1	<0.2	<0.2	<0.1	<0.1
TOXAPHENE	<1	<2	<2	<1	<1

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

LAB REPLICATES
UNIT IS UG/L FOR TOX - MG/L FOR TOC

WELL	GW-221	GW-221	GW-221	GW-221	GW-221 FIELD DUP
DATE SAMPLED	02/07/86	04/17/86	07/09/86	10/07/86	10/07/86
TIME SAMPLED	12:05:00	13:00:00	.	12:15:00	12:15:00
CONDUCTIVITY (IN UMHOS/CM)	253	257	270	278	278
	280	266	272	278	279
	286	266	273	278	277
	287	266	273	278	278
PH (IN PH UNITS)	7.6	7.4	7.8	7.8	7.8
	7.5	7.4	7.7	7.8	7.8
	7.5	7.4	7.7	7.8	7.8
	7.5	7.4	7.7	7.8	7.8
TOTAL ORGANIC CARBON	15	39	38	47	45
	13	38	37	42	36
	13	39	37	47	43
	20	39	37	44	44
TOTAL ORGANIC CHLORIDE	1	<5	9	17	<10
	1	<5	10	<10	<10
	1	<5	9	39	<10
	1	<5	10	<10	<10

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

Table 4

TOTAL METALS-RADIOACTIVITY-RADIUM
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	1090 TOTAL	1090 TOTAL	1090 TOTAL	1090 TOTAL
DATE SAMPLED	02/13/86	04/17/86	07/10/86	10/07/86
TIME SAMPLED	15:15:00	16:38:00	13:00:00	16:00:00
METHOD	ICAP	ICAP	ICAP	ICAP
ALUMINUM	31	<0.02	<0.02	0.14
ANTIMONY	.	.	<0.05	<0.05
BARIUM	0.14	0.021	0.02	0.02
BERYLLIUM	0.0023	<0.0003	3.0E-04	<0.0003
BORON	0.07	0.017	0.025	0.031
CADMIUM	<0.003	<0.003	<0.003	<0.003
CALCIUM	53	50	50	46
CHROMIUM	0.019	<0.01	<0.01	0.014
COBALT	0.022	<0.005	<0.005	<0.005
COPPER	0.043	<0.004	<0.004	<0.004
IRON	46	0.085	0.024	0.16
LITHIUM	0.03	<0.004	<0.004	<0.004
MAGNESIUM	36	33	32	29
MANGANESE	1.8	0.0088	0.008	0.0095
MOLYBDENUM	<0.01	<0.01	<0.01	<0.01
NICKEL	0.049	<0.01	<0.01	0.02
NIOBIUM	<0.007	<0.007	<0.007	0.022
PHOSPHOROUS	0.61	<0.2	<0.2	<0.2
POTASSIUM	6.5	<0.6	0.89	<0.6
SILICON	32	3.7	4	4.3
SILVER	<0.006	<0.006	<0.006	<0.006
SODIUM	7.3	11	10	7.9
STRONTIUM	0.0013	<0.0004	<0.0004	0.021
THORIUM	<0.2	<0.2	<0.2	<0.2
TITANIUM	0.31	<0.003	0.014	<0.003
VANADIUM	0.084	<0.005	<0.005	<0.005
ZINC	0.33	0.012	<0.001	0.0044
ZIRCONIUM	0.022	<0.005	<0.005	<0.005
METHOD	AAS	AAS	AAS	AAS
ARSENIC	<0.005	<0.005	<0.005	<0.005
LEAD	0.112	0.004	0.006	0.008
SELENIUM	<0.005	<0.005	<0.005	<0.005
THALLIUM	<0.01	<0.01	<0.01	<0.01
MERCURY	6.0E-04	<0.0002	<0.0002	<0.0002
ALPHA ACTIVITY (PCI/L)	54	51.93	<1	<1
BETA ACTIVITY (PCI/L)	31	27.16	<2	1
URANIUM	0.002	0.002	1.0E-03	0.015
RADIUM (BQ/L)	<0.1	<0.1	0.036	<0.1

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

DISSOLVED METALS-RADIOACTIVITY-RADIUM
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	1090 DISSOLVED	1090 DISSOLVED	1090 DISSOLVED	1090 DISSOLVED
DATE SAMPLED	02/13/86	04/17/86	07/10/86	10/07/86
TIME SAMPLED	15:15:00	16:38:00	13:00:00	16:00:00
METHOD	ICAP	ICAP	ICAP	ICAP
ALUMINUM	<0.02	<0.02	<0.02	0.067
ANTIMONY	.	.	<0.05	<0.05
BARIUM	0.026	0.02	0.02	0.02
BERYLLIUM	<0.0003	<0.0003	<0.0003	<0.0003
BORON	0.03	0.018	0.02	0.034
CADMIUM	<0.003	<0.003	<0.003	<0.003
CALCIUM	48	51	50	47
CHROMIUM	<0.01	<0.01	<0.01	0.017
COBALT	<0.005	<0.005	<0.005	<0.005
COPPER	<0.004	<0.004	<0.004	<0.004
IRON	0.034	<0.004	0.013	0.028
LITHIUM	<0.004	<0.004	<0.004	<0.004
MAGNESIUM	30	34	33	29
MANGANESE	0.013	<0.001	0.003	0.0033
MOLYBDENUM	<0.01	<0.01	<0.01	<0.01
NICKEL	<0.01	<0.01	<0.01	0.015
NIOBIUM	<0.007	<0.007	<0.007	0.0099
PHOSPHOROUS	<0.2	<0.2	<0.2	<0.2
POTASSIUM	<0.6	<0.6	0.89	<0.6
SILICON	3.8	3.5	4	4.2
SILVER	<0.006	<0.006	<0.006	<0.006
SODIUM	7.2	12	11	8
STRONTIUM	<0.0004	<0.0004	<0.0004	0.022
THORIUM	<0.2	<0.2	<0.2	<0.2
TITANIUM	<0.003	<0.003	0.0089	<0.003
VANADIUM	<0.005	<0.005	<0.005	<0.005
ZINC	<0.001	0.0085	<0.001	0.0031
ZIRCONIUM	<0.005	<0.005	<0.005	<0.005
METHOD	AAS	AAS	AAS	AAS
ARSENIC	<0.005	<0.005	<0.005	<0.005
LEAD	<0.004	0.004	0.005	0.007
SELENIUM	<0.005	<0.005	<0.005	<0.005
THALLIUM	<0.01	<0.01	<0.01	<0.01
MERCURY	<0.0002	<0.0002	<0.0002	<0.0002
ALPHA ACTIVITY (PCI/L)	.	.	.	.
BETA ACTIVITY (PCI/L)	.	.	.	.
URANIUM	0.004	<0.001	1.0E-03	0.008
RADIUM (BQ/L)	.	.	.	.

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

MISCELLANEOUS CONVENTIONAL AND NON-CONVENTIONAL POLLUTANTS AND RELATED PARAMET
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	1090	1090	1090	1090
DATE SAMPLED	02/13/86	04/17/86	07/10/86	10/07/86
TIME SAMPLED	15:15:00	16:38:00	13:00:00	16:00:00
WATER LEVEL (FT +/- GRADE)	-57	-56	-60	-62.6
WATER TEMP (DEG. CENT.)	11	11.3	19	20.1
DISSOLVED OXYGEN	7	8.6	6.8	4.7
CONDUCTIVITY (IN UMHOS/CM)	490	510	520	370
PH (IN PH UNITS)	7.2	7.6	7.8	7.2
REDOX (IN MV)	366	344	266	278
ALKALINITY (CO3)	.	.	.	.
ALKALINITY (HCO3)	.	.	.	.
TOTAL SUSPENDED SOLIDS	.	.	.	.
TOTAL KJELDAHL NITROGEN	.	.	.	.
AMMONIA - N	.	.	.	.
TURBIDITY (IN NTU)	G	2	2	<1
COLIFORM (CC/100 MLS)	N	2	N	N
FLUORIDE	0.1	0.1	0.1	0.1
PHENOLS	<0.003	0.016	0.012	0.003
CHLORIDE	19	36.8	26	17.7
NITRATE NITROGEN	1.46	2.03	1.65	1.25
NITRATE	.	.	.	.
NITRITE	.	.	.	.
SULFATE	3	3.4	2.6	1.8

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

VOLATILE ORGANIC PRIORITY AND NON-PRIORITY POLLUTANTS
UNIT IS UG/L

WELL	1090	1090	1090	1090
DATE SAMPLED	02/13/86	04/17/86	07/10/86	10/07/86
TIME SAMPLED	15:15:00	16:38:00	13:00:00	16:00:00
CHLOROMETHANE	.	.	.	.
BROMOMETHANE	.	.	.	.
VINYL CHLORIDE	.	.	.	.
CHLOROETHANE	.	.	.	.
METHYLENE CHLORIDE	.	.	.	.
ACETONE	.	.	.	.
CARBON DISULFIDE	.	.	.	.
1,1-DICHLOROETHENE	.	.	.	.
1,1-DICHLOROETHANE	.	.	.	.
TRANS-1,2-DICHLOROETHENE	.	.	.	.
CHLOROFORM	.	.	.	.
1,2-DICHLOROETHANE	.	.	.	.
2-BUTANONE	.	.	.	.
1,1,1-TRICHLOROETHANE	.	.	.	.
CARBON TETRACHLORIDE	.	.	.	.
VINYL ACETATE	.	.	.	.
BROMODICHLOROMETHANE	.	.	.	.
1,1,2,2-TETRACHLOROETHANE	.	.	.	.
1,2-DICHLOROPROPANE	.	.	.	.
TRANS-1,3-DICHLOROPROPENE	.	.	.	.
TRICHLOROETHENE	.	.	.	.
CHLORODIBROMOMETHANE	.	.	.	.
1,1,2-TRICHLOROETHANE	.	.	.	.
BENZENE	.	.	.	.
CIS-1,3-DICHLOROPROPENE	.	.	.	.
2-CHLOROETHYLVINYL ETHER	.	.	.	.
BROMOFORM	.	.	.	.
2-HEXANONE	.	.	.	.
4-METHYL-2-PENTANONE	.	.	.	.
TETRACHLOROETHENE	.	.	.	.
TOLUENE	.	.	.	.
CHLOROBENZENE	.	.	.	.
ETHYLBENZENE	.	.	.	.
STYRENE	.	.	.	.
XYLENES	.	.	.	.

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

HERBICIDES AND PESTICIDES
UNIT IS UG/L

WELL	1090	1090	1090	1090
DATE SAMPLED	02/13/86	04/17/86	07/10/86	10/07/86
TIME SAMPLED	15:15:00	16:38:00	13:00:00	16:00:00
2,4-D	<1	<2	<2	<1
ENDRIN	<0.05	<0.1	<0.1	<0.05
LINDANE	<0.01	<0.02	<0.02	<0.01
METHOXYCHLOR	<0.04	<0.08	<0.08	<0.04
SILVEX	<0.1	<0.2	<0.2	<0.1
TOXAPHENE	<1	<2	<2	<1

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

LAB REPLICATES
UNIT IS UG/L FOR TOX - MG/L FOR TOC

WELL	1090	1090	1090	1090
DATE SAMPLED	02/13/86	04/17/86	07/10/86	10/07/86
TIME SAMPLED	15:15:00	16:38:00	13:00:00	16:00:00
CONDUCTIVITY (IN UMHOS/CM)	493	534	517	486
	507	555	518	489
	509	557	518	489
	510	558	518	490
PH (IN PH UNITS)	7.5	7.2	7.4	7.7
	7.5	7.2	7.4	7.7
	7.6	7.2	7.4	7.7
	7.6	7.2	7.4	7.7
TOTAL ORGANIC CARBON	15	76	61	72
	13	58	60	73
	11	66	60	77
	10	10	58	78
TOTAL ORGANIC CHLORIDE	1.17	44	10	<10
	1.16	44	11	<10
	1.16	97	11	<10
	1.22	148	12	<10

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

Table 5

TOTAL METALS-RADIOACTIVITY-RADIUM
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	1091 TOTAL	1091 TOTAL	1091 TOTAL	1091 TOTAL FIELD DUPE	1091 TOTAL
DATE SAMPLED	02/19/86	04/17/86	07/11/86	07/11/86	10/06/8
TIME SAMPLED	10:50:00	12:46:00	11:00:00	11:00:00	14:00:0
METHOD	ICAP	ICAP	ICAP	ICAP	ICA
ALUMINUM	<0.02	<0.02	18	0.14	0.4
ANTIMONY	.	.	<0.05	<0.05	<0.0
BARIUM	0.0035	0.0031	0.1	0.0038	0.006
BERYLLIUM	<0.0003	<0.0003	0.002	4.0E-04	<0.000
BORON	0.017	0.026	0.012	0.019	0.01
CADMIUM	<0.003	<0.003	0.0042	<0.003	<0.00
CALCIUM	26	23	230	19	2
CHROMIUM	<0.01	<0.01	0.031	<0.01	<0.0
COBALT	<0.005	<0.005	0.031	<0.005	<0.00
COPPER	<0.004	<0.004	0.03	<0.004	0.05
IRON	0.016	0.013	25	0.049	0.2
LITHIUM	<0.004	<0.004	0.022	0.0042	<0.00
MAGNESIUM	12	12	29	9.9	1
MANGANESE	<0.001	<0.001	1.4	<0.001	0.01
MOLYBDENUM	<0.01	<0.01	<0.01	<0.01	<0.0
NICKEL	<0.01	<0.01	0.044	<0.01	<0.0
NIOBIUM	<0.007	<0.007	<0.007	<0.007	0.02
PHOSPHOROUS	<0.2	<0.2	0.37	<0.2	<0.
POTASSIUM	3.2	3.2	7.6	4.5	
SILICON	4	4.3	22	4.6	4.
SILVER	<0.006	<0.006	<0.006	<0.006	<0.00
SODIUM	1.4	1.7	2.2	2.1	
STRONTIUM	0.031	0.034	0.16	0.029	0.06
THORIUM	<0.2	<0.2	<0.2	<0.2	<0.
TITANIUM	<0.003	<0.003	0.26	0.017	<0.00
VANADIUM	<0.005	<0.005	0.046	<0.005	<0.00
ZINC	0.0047	0.0021	0.23	<0.001	0.007
ZIRCONIUM	<0.005	<0.005	0.018	0.0093	<0.00
METHOD	AAS	AAS	AAS	AAS	AA
ARSENIC	<0.005	<0.005	<0.005	<0.005	<0.00
LEAD	<0.004	<0.004	0.016	0.015	0.0
SELENIUM	0.006	<0.005	<0.005	<0.005	<0.00
THALLIUM	<0.01	<0.01	<0.01	<0.01	<0.0
MERCURY	<0.0002	<0.0002	3.0E-04	<0.0002	<0.000
ALPHA ACTIVITY (PCI/L)	7.6	0.51	8.5	4.6	<
BETA ACTIVITY (PCI/L)	10.6	3.06	12	3.6	
URANIUM	<0.001	1.0E-03	0.004	1.0E-03	0.00
RADIUM (BQ/L)	<0.1	<0.1	0.13	0.0055	<0.

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

DISSOLVED METALS-RADIOACTIVITY-RADIUM
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	1091 DISSOLVED	1091 DISSOLVED	1091 DISSOLVED	1091 DISSOLVED FIELD DUPE	1091 DISSOLVED
DATE SAMPLED	02/19/86	04/17/86	07/11/86	07/11/86	10/06/86
TIME SAMPLED	10:50:00	12:46:00	11:00:00	11:00:00	14:00:00
METHOD	ICAP	ICAP	ICAP	ICAP	ICAP
ALUMINUM	<0.02	<0.02	0.57	0.047	0.1
ANTIMONY	.	.	<0.05	<0.05	<0.05
BARIUM	0.0036	0.0029	0.005	0.0033	0.0059
BERYLLIUM	<0.0003	<0.0003	5.0E-04	5.0E-04	<0.0003
BORON	0.019	0.0078	0.017	0.016	0.025
CADMIUM	<0.003	<0.003	<0.003	<0.003	<0.003
CALCIUM	26	23	19	19	25
CHROMIUM	<0.01	<0.01	<0.01	<0.01	<0.01
COBALT	<0.005	<0.005	<0.005	<0.005	<0.005
COPPER	<0.004	<0.004	<0.004	<0.004	0.047
IRON	0.046	<0.004	0.38	0.0069	0.061
LITHIUM	<0.004	<0.004	0.0045	0.0041	<0.004
MAGNESIUM	13	12	9.6	9.7	14
MANGANESE	<0.001	<0.001	0.014	<0.001	0.0025
MOLYBDENUM	<0.01	<0.01	<0.01	<0.01	<0.01
NICKEL	<0.01	<0.01	<0.01	<0.01	<0.01
NIOBIUM	<0.007	<0.007	<0.007	<0.007	0.022
PHOSPHOROUS	<0.2	<0.2	<0.2	<0.2	<0.2
POTASSIUM	3.8	3.1	5.1	4.5	3.5
SILICON	3.3	3.9	5.3	4.5	4.1
SILVER	<0.006	<0.006	<0.006	<0.006	<0.006
SODIUM	1.5	1.4	2.2	2.1	1.9
STRONTIUM	0.032	0.033	0.03	0.028	0.056
THORIUM	<0.2	<0.2	<0.2	<0.2	<0.2
TITANIUM	<0.003	<0.003	0.021	0.0093	<0.003
VANADIUM	<0.005	<0.005	<0.005	<0.005	<0.005
ZINC	0.0055	0.0025	<0.001	<0.001	0.0077
ZIRCONIUM	<0.005	<0.005	0.0076	<0.005	<0.005
METHOD	AAS	AAS	AAS	AAS	AAS
ARSENIC	<0.005	<0.005	<0.005	<0.005	<0.005
LEAD	<0.004	<0.004	0.013	0.015	<0.004
SELENIUM	<0.005	<0.005	<0.005	<0.005	<0.005
THALLIUM	<0.01	<0.01	<0.01	<0.01	<0.01
MERCURY	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ALPHA ACTIVITY (PCI/L)	.	.	.	.	.
BETA ACTIVITY (PCI/L)	.	.	.	.	.
URANIUM	0.003	0.002	<0.001	0.002	0.012
RADIUM (BQ/L)	.	.	.	.	.

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

MISCELLANEOUS CONVENTIONAL AND NON-CONVENTIONAL POLLUTANTS AND RELATED PARAMETE
UNIT IS MG/L - UNLESS OTHERWISE STATED

WELL	1091	1091	1091	1091 FIELD DUPE	1091
DATE SAMPLED	02/19/86	04/17/86	07/11/86	07/11/86	10/06/86
TIME SAMPLED	10:50:00	12:46:00	11:00:00	11:00:00	14:00:00
WATER LEVEL (FT +/- GRADE)	-95	-93	-95.5	.	-99
WATER TEMP (DEG. CENT.)	12.4	12.1	22.8	.	18
DISSOLVED OXYGEN	9.4	8	.	.	9.2
CONDUCTIVITY (IN UMHOS/CM)	200	190	240	.	210
PH (IN PH UNITS)	7.1	8.2	8.4	.	9.1
REDOX (IN MV)	310	312	280	.	380
ALKALINITY (CO3)	.	.	.	.	.
ALKALINITY (HCO3)	.	.	.	.	.
TOTAL SUSPENDED SOLIDS	.	.	.	.	.
TOTAL KJELDAHL NITROGEN	.	.	.	.	.
AMMONIA - N	.	.	.	.	.
TURBIDITY (IN NTU)	1	1.5	5	4	<1
COLIFORM (CC/100 MLS)	N	N	N	N	N
FLUORIDE	0.026	0.1	0.1	0.1	<0.1
PHENOLS	0.002	0.003	0.002	0.008	0.002
CHLORIDE	<1	1.1	1	1	<1
NITRATE NITROGEN	0.41	0.41	0.33	0.29	0.29
NITRATE	.	.	.	.	.
NITRITE	.	.	.	.	.
SULFATE	1.8	1.2	1.5	1.5	1.5

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

VOLATILE ORGANIC PRIORITY AND NON-PRIORITY POLLUTANTS
UNIT IS UG/L

WELL	1091	1091	1091	1091 FIELD DUPE	1091
DATE SAMPLED	02/19/86	04/17/86	07/11/86	07/11/86	10/06/86
TIME SAMPLED	10:50:00	12:46:00	11:00:00	11:00:00	14:00:00
CHLOROMETHANE	.	.	.	.	.
BROMOMETHANE	.	.	.	.	.
VINYL CHLORIDE	.	.	.	.	.
CHLOROETHANE	.	.	.	.	.
METHYLENE CHLORIDE	.	.	.	.	.
ACETONE	.	.	.	.	.
CARBON DISULFIDE	.	.	.	.	.
1,1-DICHLOROETHENE	.	.	.	.	.
1,1-DICHLOROETHANE	.	.	.	.	.
TRANS-1,2-DICHLOROETHENE	.	.	.	.	.
CHLOROFORM	.	.	.	.	.
1,2-DICHLOROETHANE	.	.	.	.	.
2-BUTANONE	.	.	.	.	.
1,1,1-TRICHLOROETHANE	.	.	.	.	.
CARBON TETRACHLORIDE	.	.	.	.	.
VINYL ACETATE	.	.	.	.	.
BROMODICHLOROMETHANE	.	.	.	.	.
1,1,2,2-TETRACHLOROETHANE	.	.	.	.	.
1,2-DICHLOROPROPANE	.	.	.	.	.
TRANS-1,3-DICHLOROPROPENE	.	.	.	.	.
TRICHLOROETHENE	.	.	.	.	.
CHLORODIBROMOMETHANE	.	.	.	.	.
1,1,2-TRICHLOROETHANE	.	.	.	.	.
BENZENE	.	.	.	.	.
CIS-1,3-DICHLOROPROPENE	.	.	.	.	.
2-CHLOROETHYLVINYL ETHER	.	.	.	.	.
BROMOFORM	.	.	.	.	.
2-HEXANONE	.	.	.	.	.
4-METHYL-2-PENTANONE	.	.	.	.	.
TETRACHLOROETHENE	.	.	.	.	.
TOLUENE	.	.	.	.	.
CHLOROBENZENE	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.
STYRENE	.	.	.	.	.
XYLENES	.	.	.	.	.

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

HERBICIDES AND PESTICIDES
UNIT IS UG/L

WELL	1091	1091	1091	1091 FIELD DUPE	1091
DATE SAMPLED	02/19/86	04/17/86	07/11/86	07/11/86	10/06/86
TIME SAMPLED	10:50:00	12:46:00	11:00:00	11:00:00	14:00:00
2,4-D	<1	<2	<2	<2	<1
ENDRIN	<0.05	<0.1	<0.1	<0.1	<0.05
LINDANE	<0.01	<0.02	<0.02	<0.02	<0.02
METHOXYCHLOR	<0.04	<0.08	<0.08	<0.08	<0.04
SILVEX	<0.1	<0.2	<0.2	<0.2	<0.1
TOXAPHENE	<1	<2	<2	<2	<1

RESULTS OF 1986 K25 GROUNDWATER SAMPLING
UNITED NUCLEAR SITE

LAB REPLICATES
UNIT IS UG/L FOR TOX - MG/L FOR TOC

WELL	1091	1091	1091	1091 FIELD DUPE	1091
DATE SAMPLED	02/19/86	04/17/86	07/11/86	07/11/86	10/06/86
TIME SAMPLED	10:50:00	12:46:00	11:00:00	11:00:00	14:00:00
CONDUCTIVITY (IN UMHOS/CM)	251	214	172	180	255
	254	220	179	180	253
	254	221	178	181	252
	254	223	176	183	252
PH (IN PH UNITS)	7.7	7.9	8.6	8.5	7.9
	7.7	7.9	8.6	8.5	7.8
	7.7	7.9	8.6	8.5	7.8
	7.8	7.9	8.6	8.6	7.9
TOTAL ORGANIC CARBON	15	30	26	24	38
	15	28	24	22	39
	13	29	24	23	34
	.	24	22	24	37
TOTAL ORGANIC CHLORIDE	40	75	11	10	<10
	40	31	11	11	<10
	48	60	12	11	<10
	46	70	10	11	79

APPENDIX 2

WATER QUALITY GRAPHS BY CONSTITUENT FOR CY 1986

FIGURE 8

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL ARSENIC (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 0.05 MG/L - MAX. DETECTION LIMIT: 0.005 MG/L

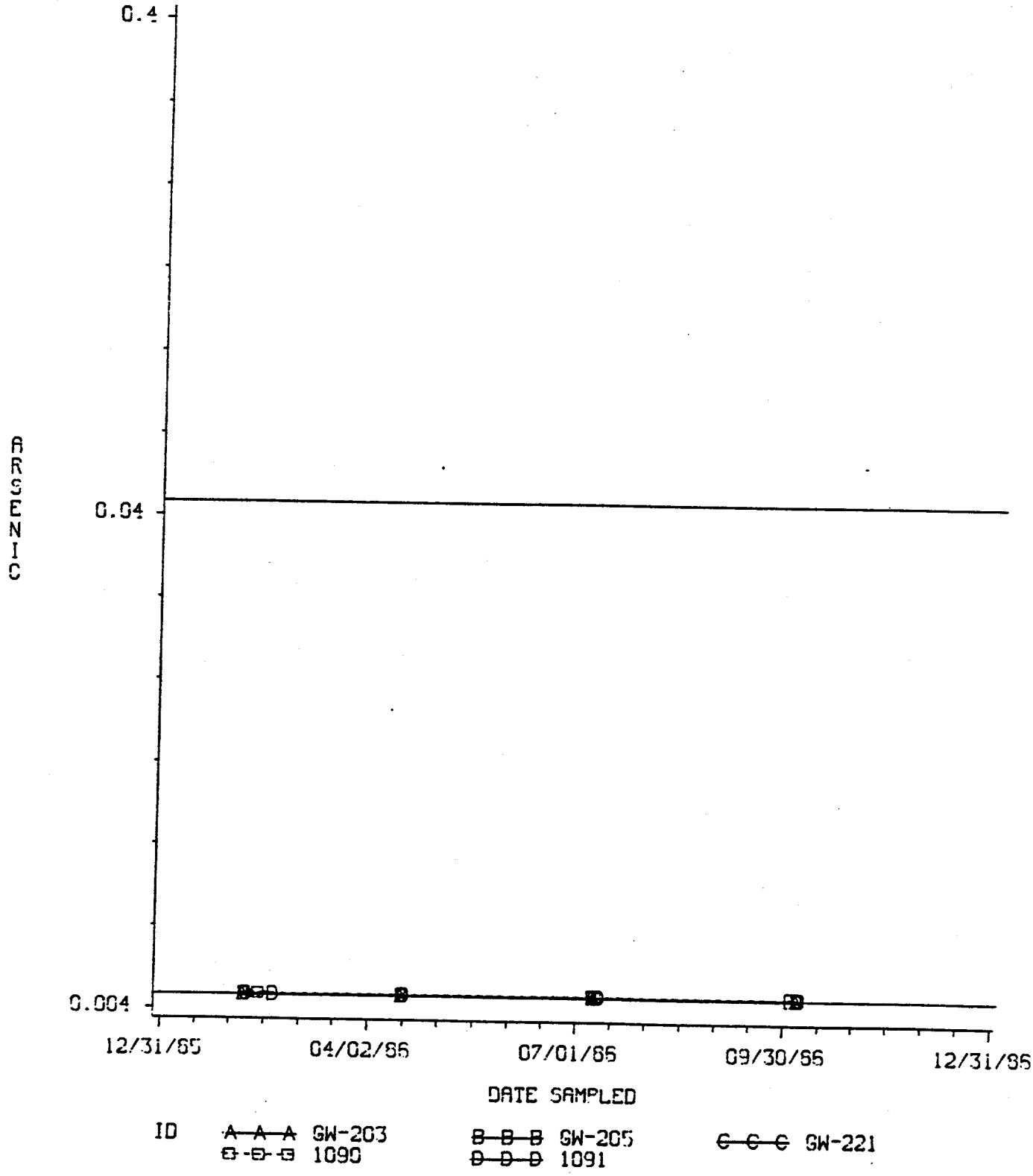


FIGURE 9

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL BARIUM (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 1 MG/L

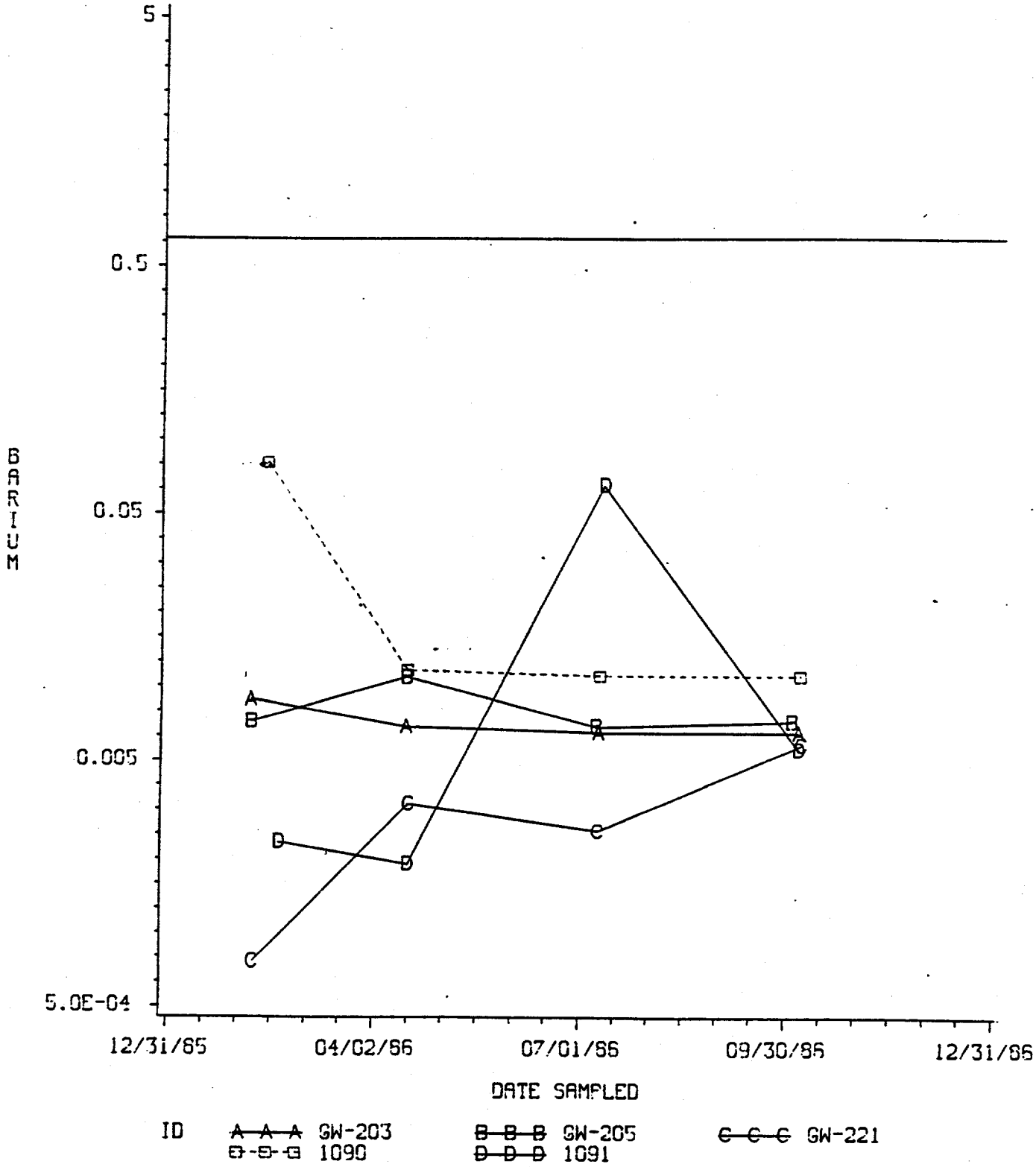


FIGURE 10

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL CADMIUM (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 0.01 MG/L - MAX. DETECTION LIMIT: 0.003 MG/L

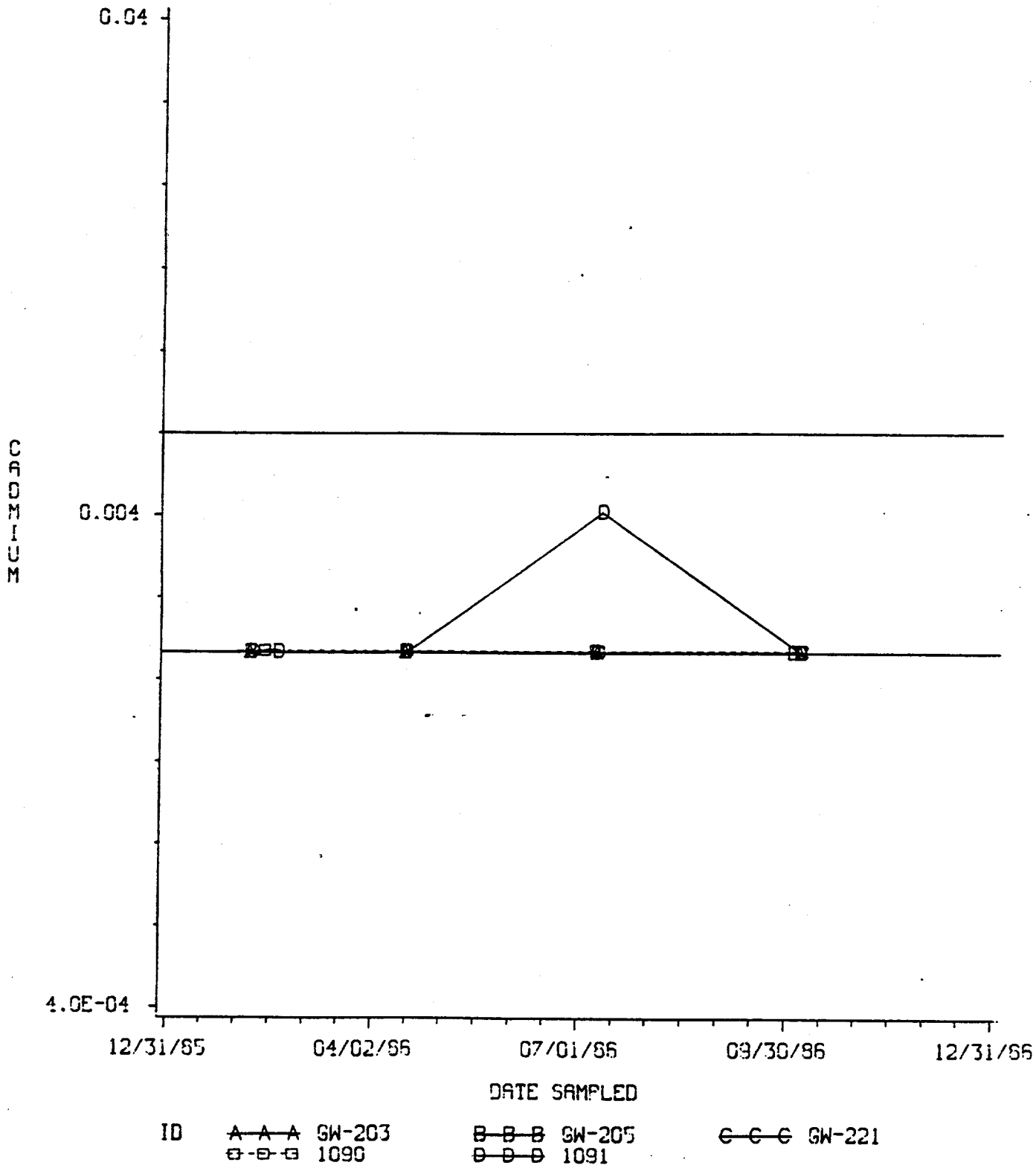


FIGURE 11

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL CHROMIUM (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 0.05 MG/L - MAX. DETECTION LIMIT: 0.01 MG/L

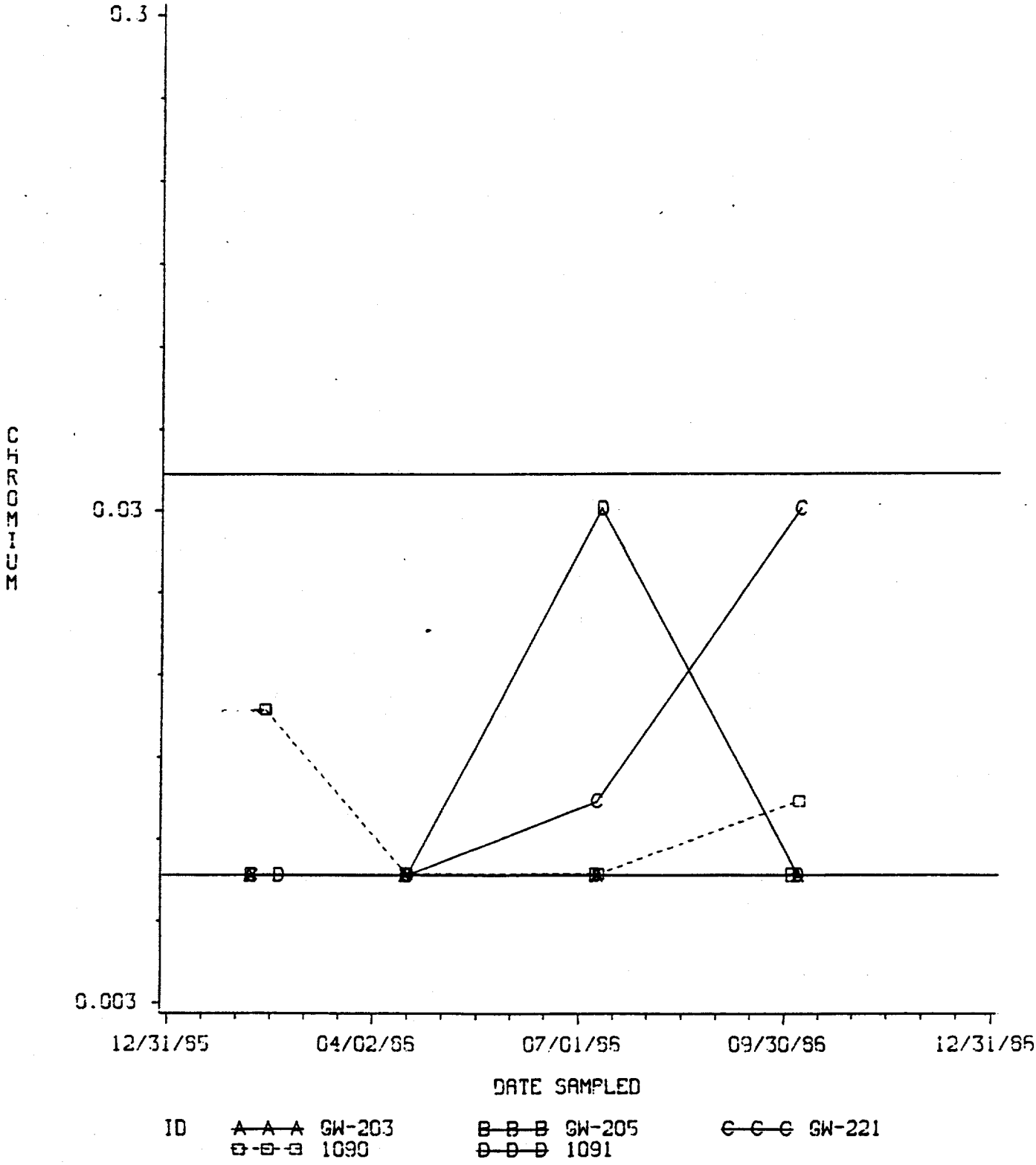


FIGURE 12

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL LEAD (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 0.05 MG/L - MAX. DETECTION LIMIT: 0.005 MG/L

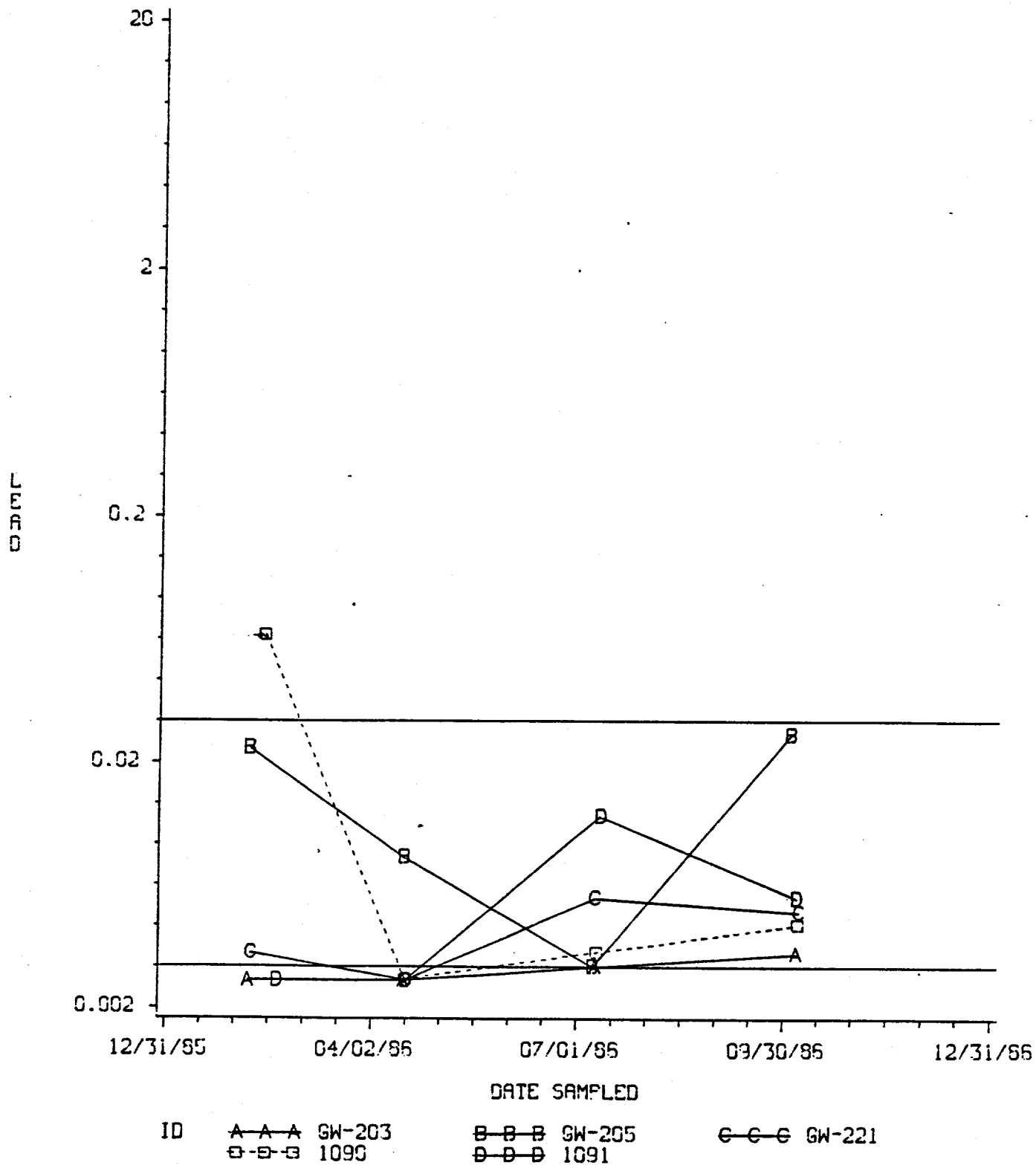


FIGURE 13

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL MERCURY (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 0.002 MG/L - MAX. DETECTION LIMIT: 0.0002 MG/L

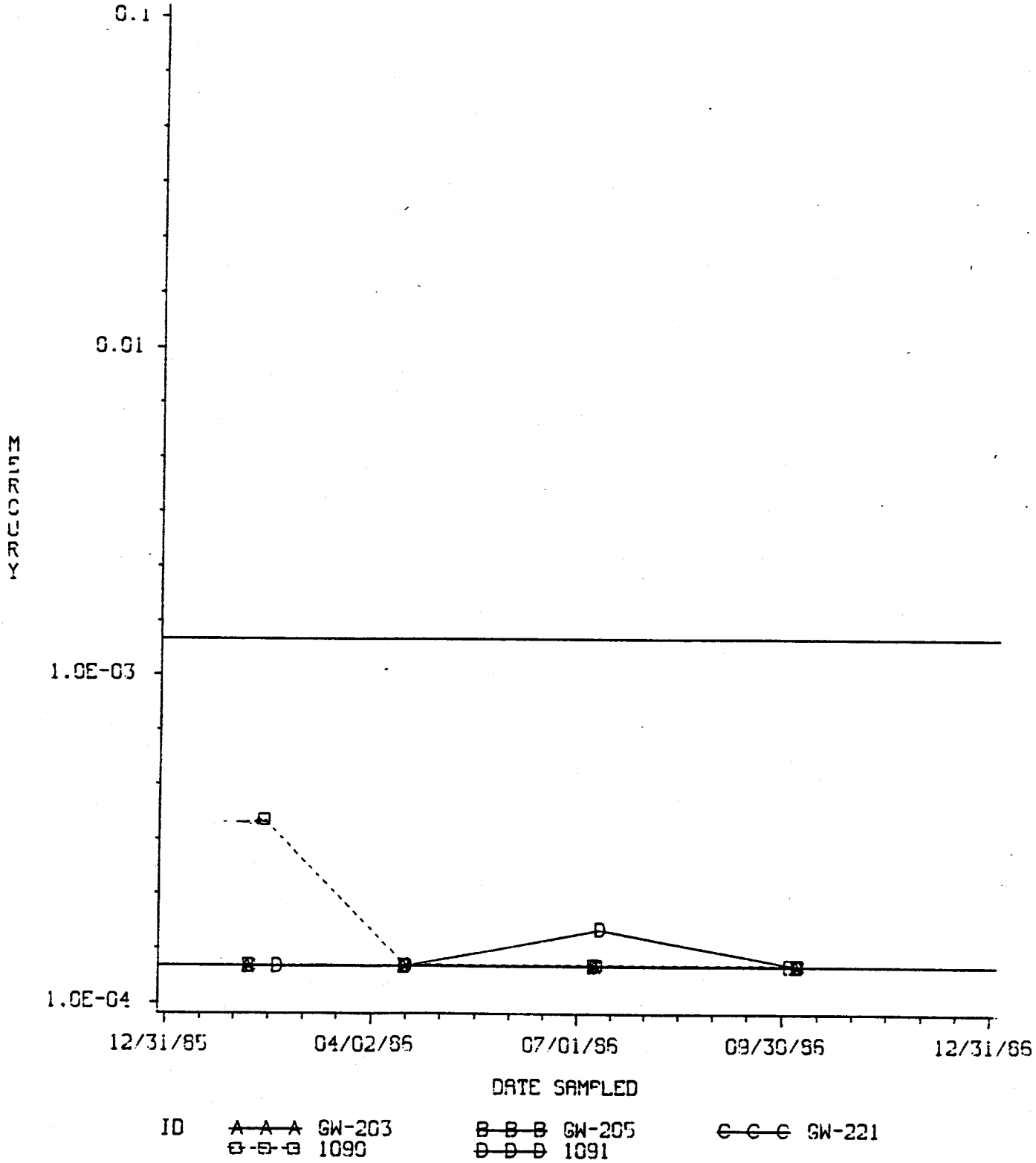


FIGURE 14

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL SELENIUM (MG/L)

UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 0.01 MG/L - MAX. DETECTION LIMIT: 0.005 MG/L

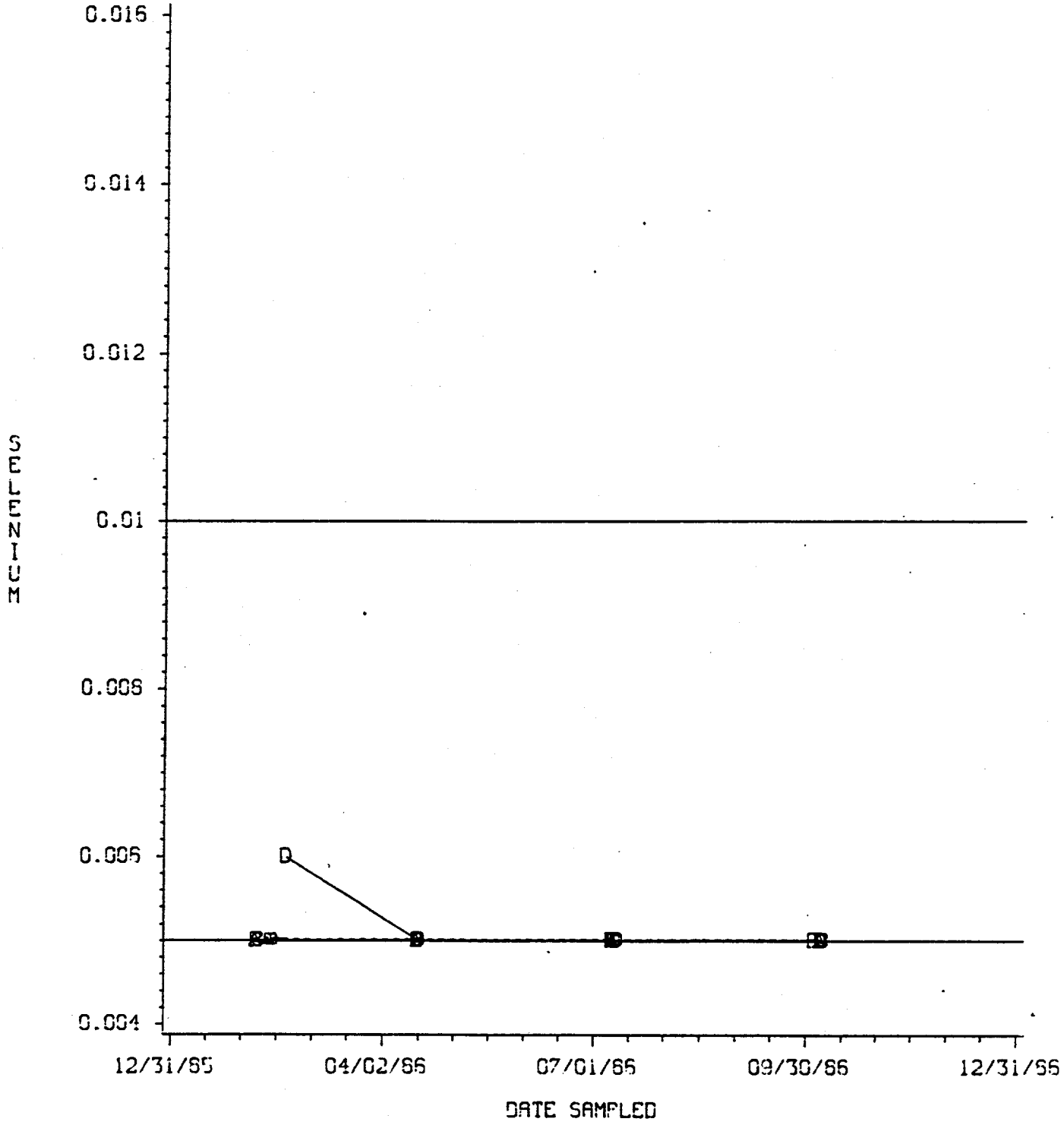


FIGURE 15

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL SILVER (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 0.05 MG/L - MAX. DETECTION LIMIT: 0.006 MG/L

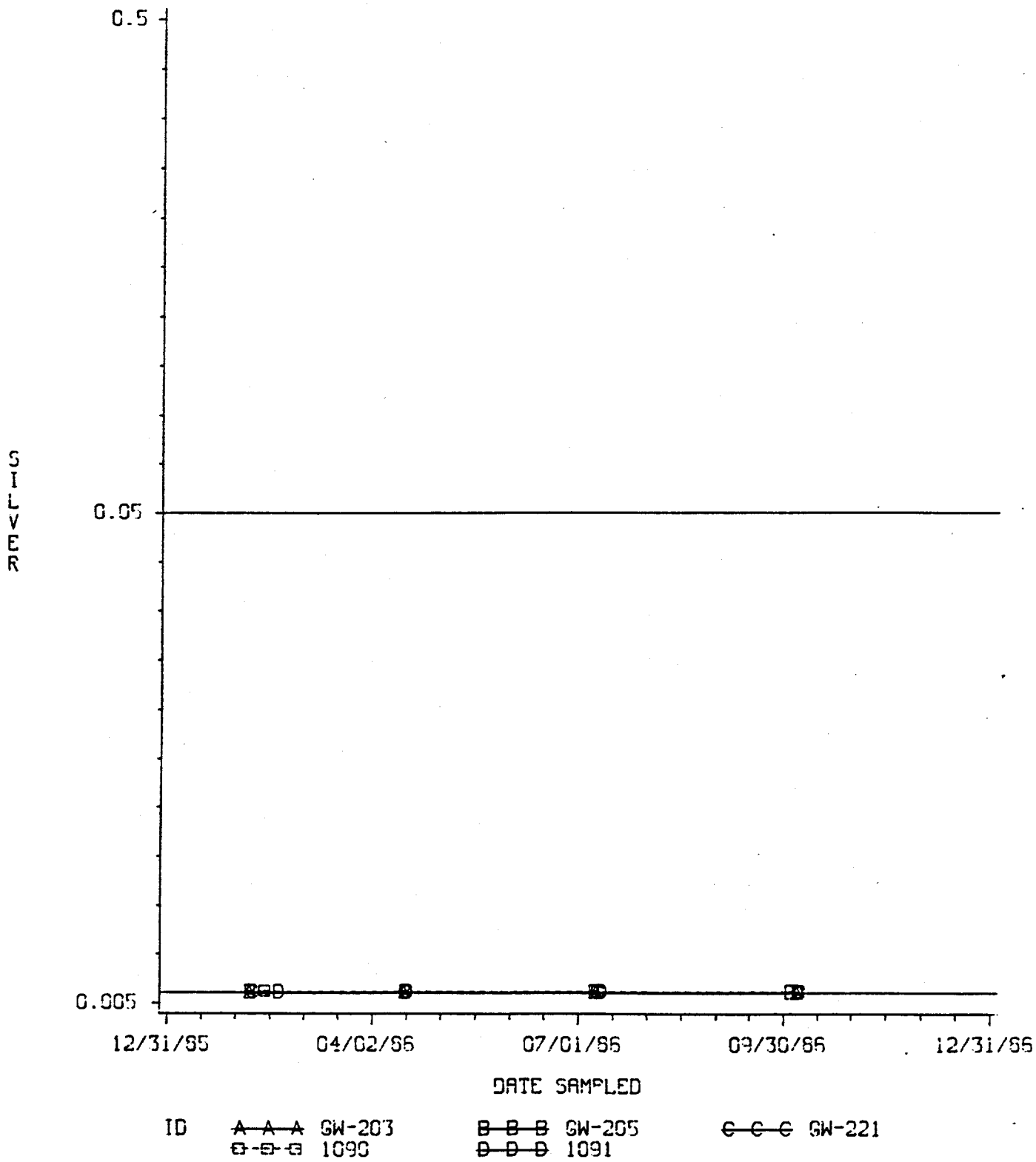


FIGURE 16

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
FLUORIDE (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 1.0 MG/L - MAX. DETECTION LIMIT: 0.11 MG/L

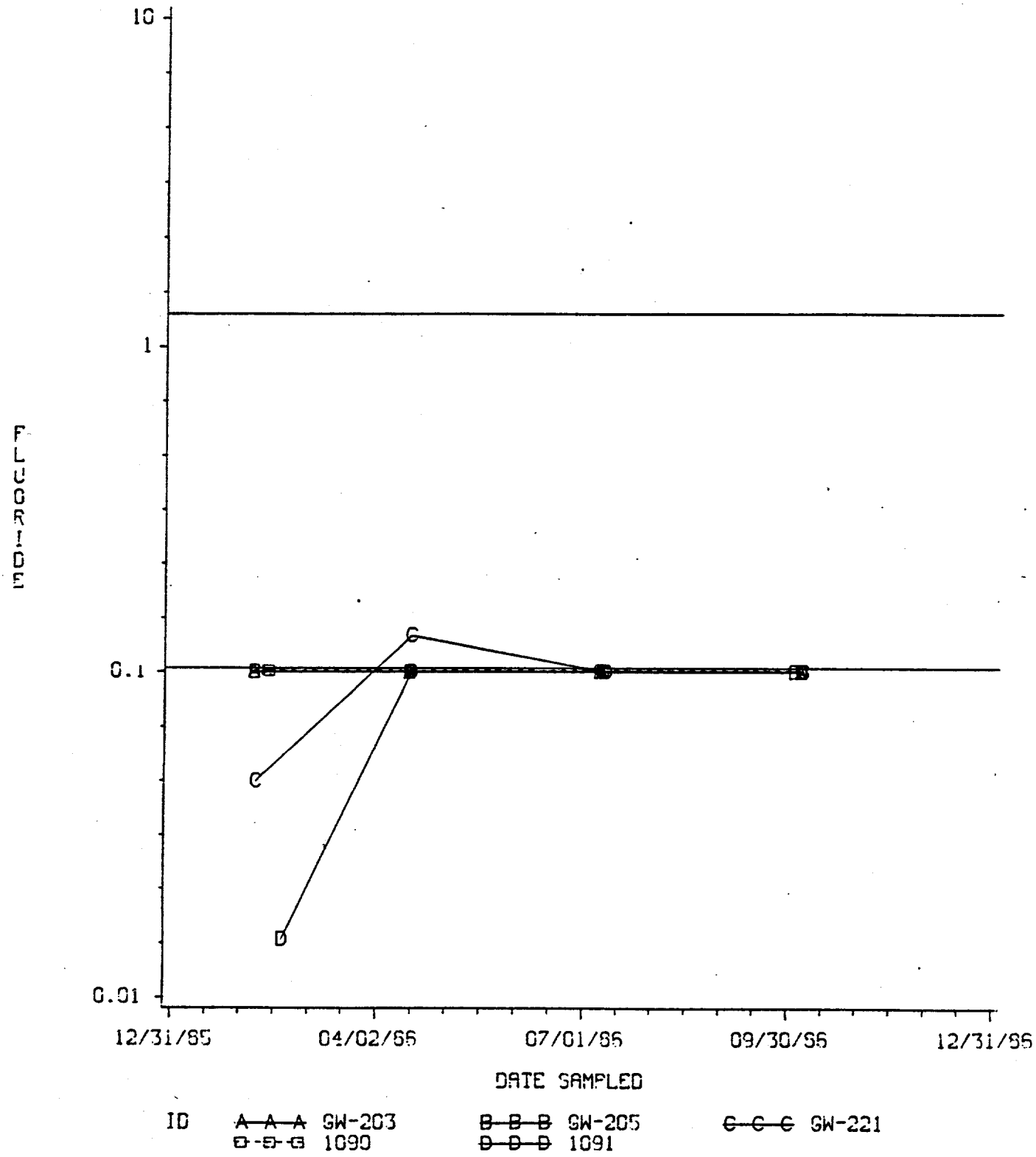


FIGURE 17

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
NITRATE-N (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 10 MG/L - MAX. DETECTION LIMIT: 0.5 MG/L

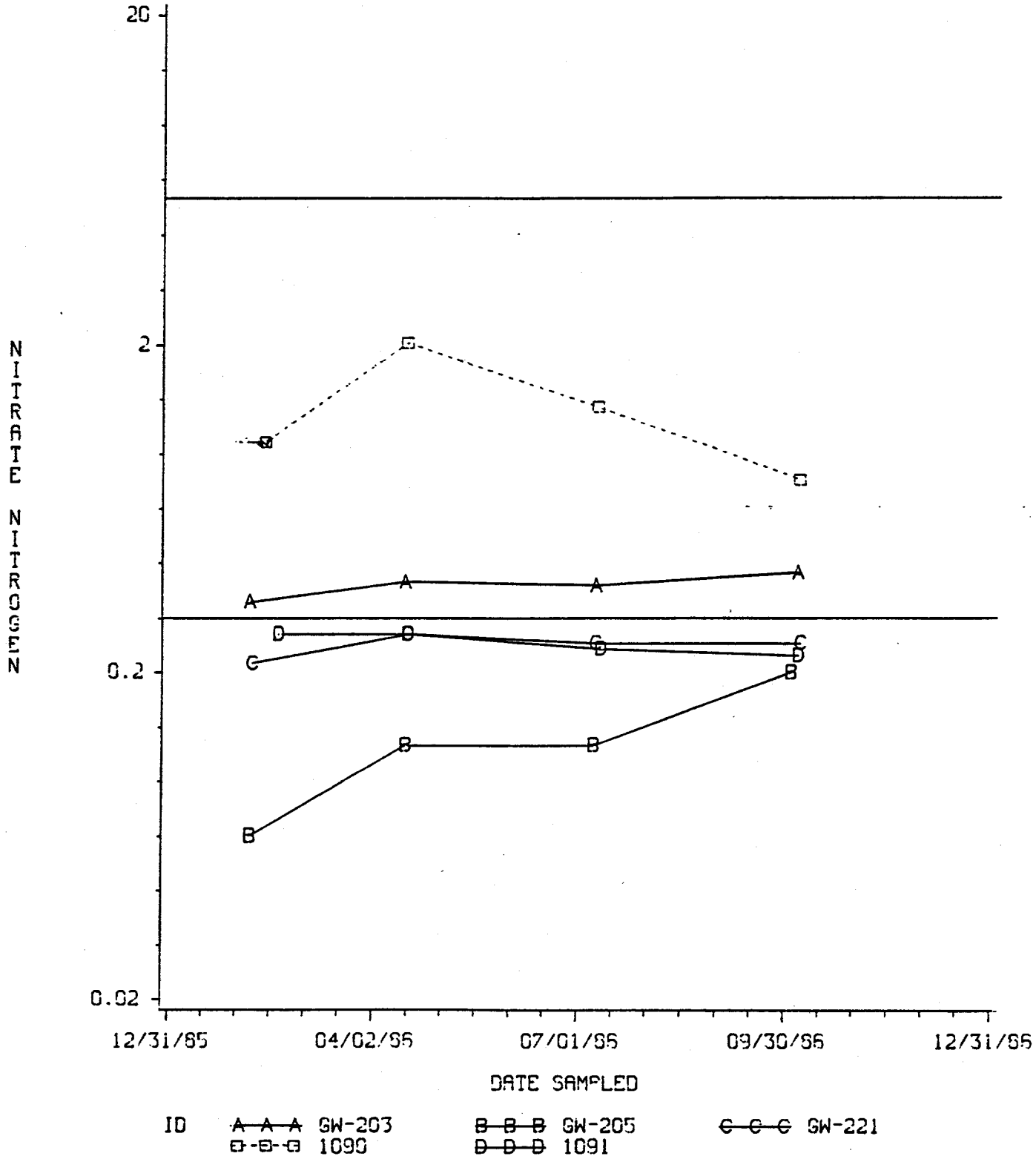


FIGURE 18

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
GROSS ALPHA (PCI/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 15 PCI/L - MAX. DETECTION LIMIT: 3 PCI/L

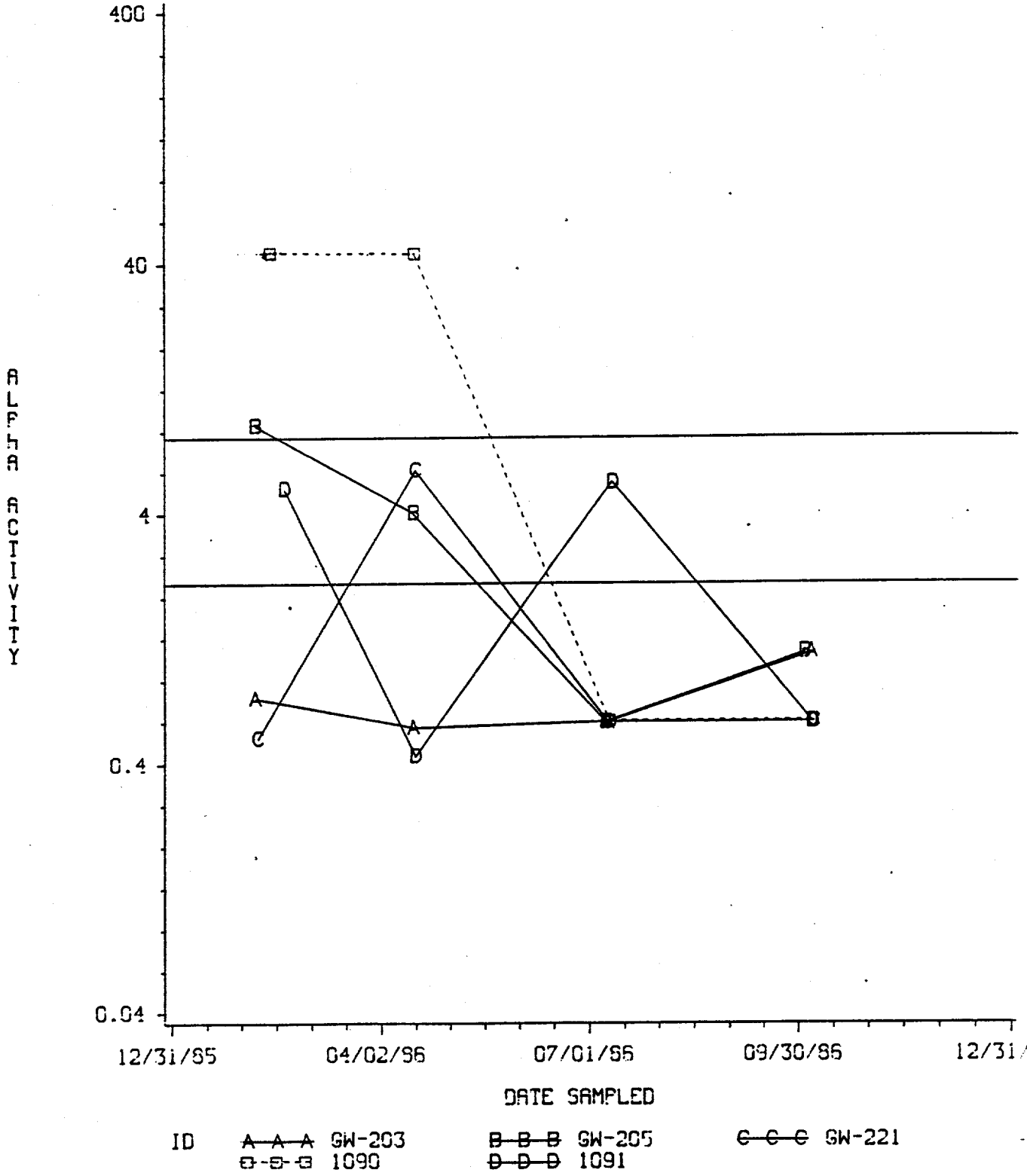


FIGURE 19

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
GROSS BETA (PCI/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 50 PCI/L - MAX. DETECTION LIMIT: 7 PCI/L

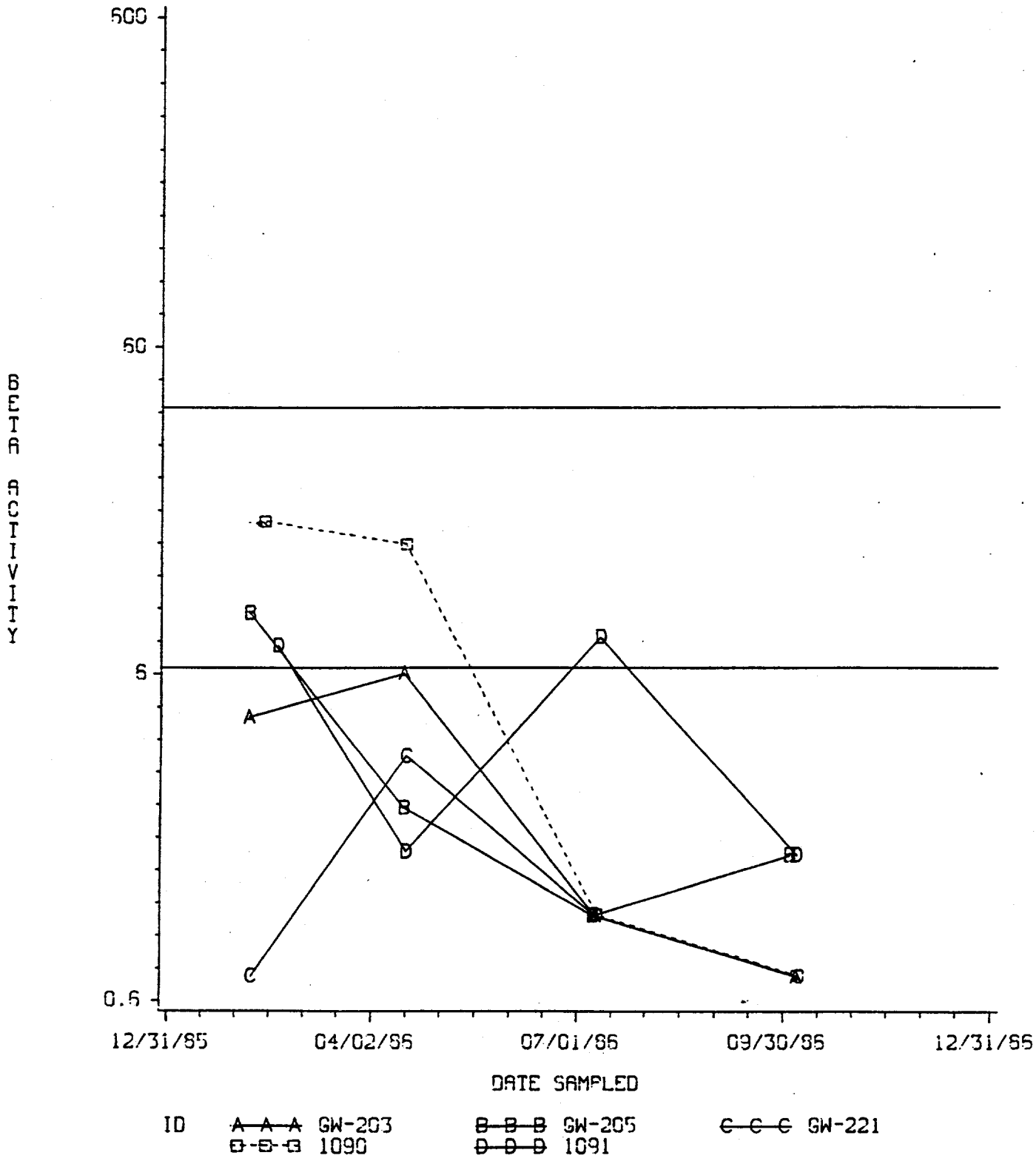


FIGURE 20

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
RADIUM (BQ/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 0.185 BQ/L - MAX. DETECTION LIMIT: 0.1 BQ/L

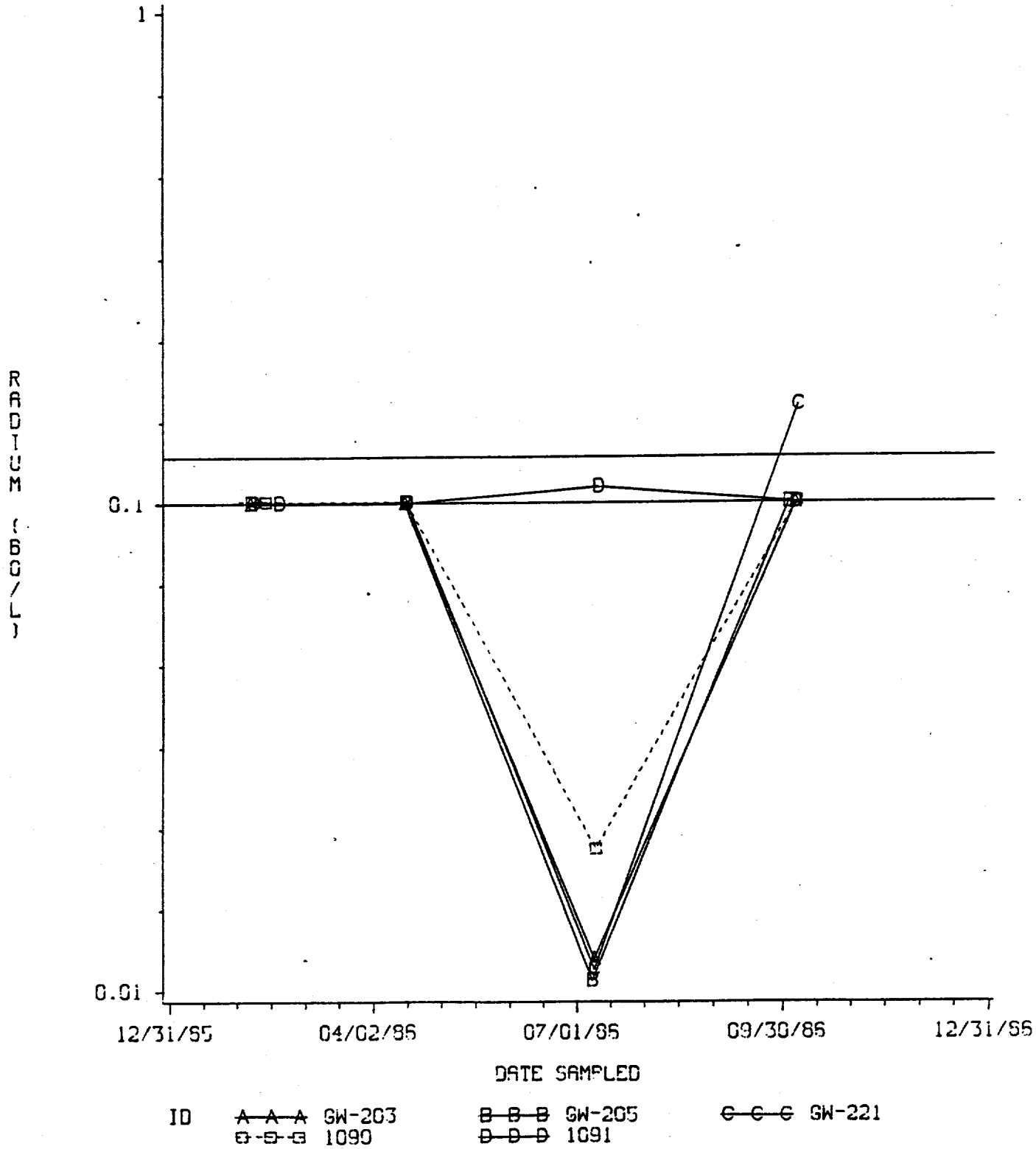


FIGURE 21

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
COLIFORM (CC/100 ML)

UPGRADIENT: 1030
DOWNGRADIENT: ALL OTHER WELLS
MAX. CONC. LIMIT: 1 CC/100 ML

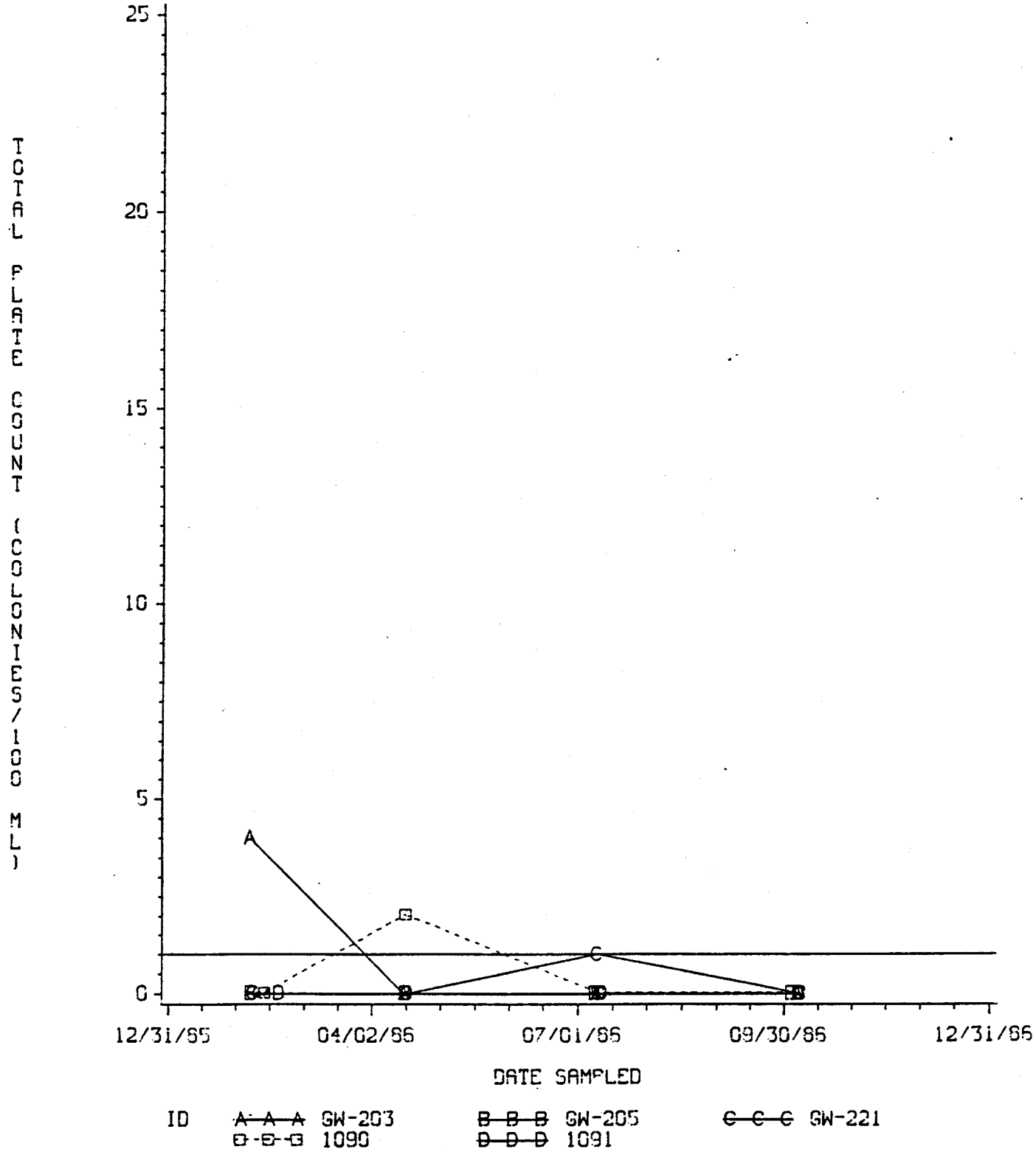


FIGURE 22

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
CHLORIDE (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
RECOM. MAX. CONC. LIMIT: 250 MG/L - MAX. DETECTION LIMIT: 1 MG/L

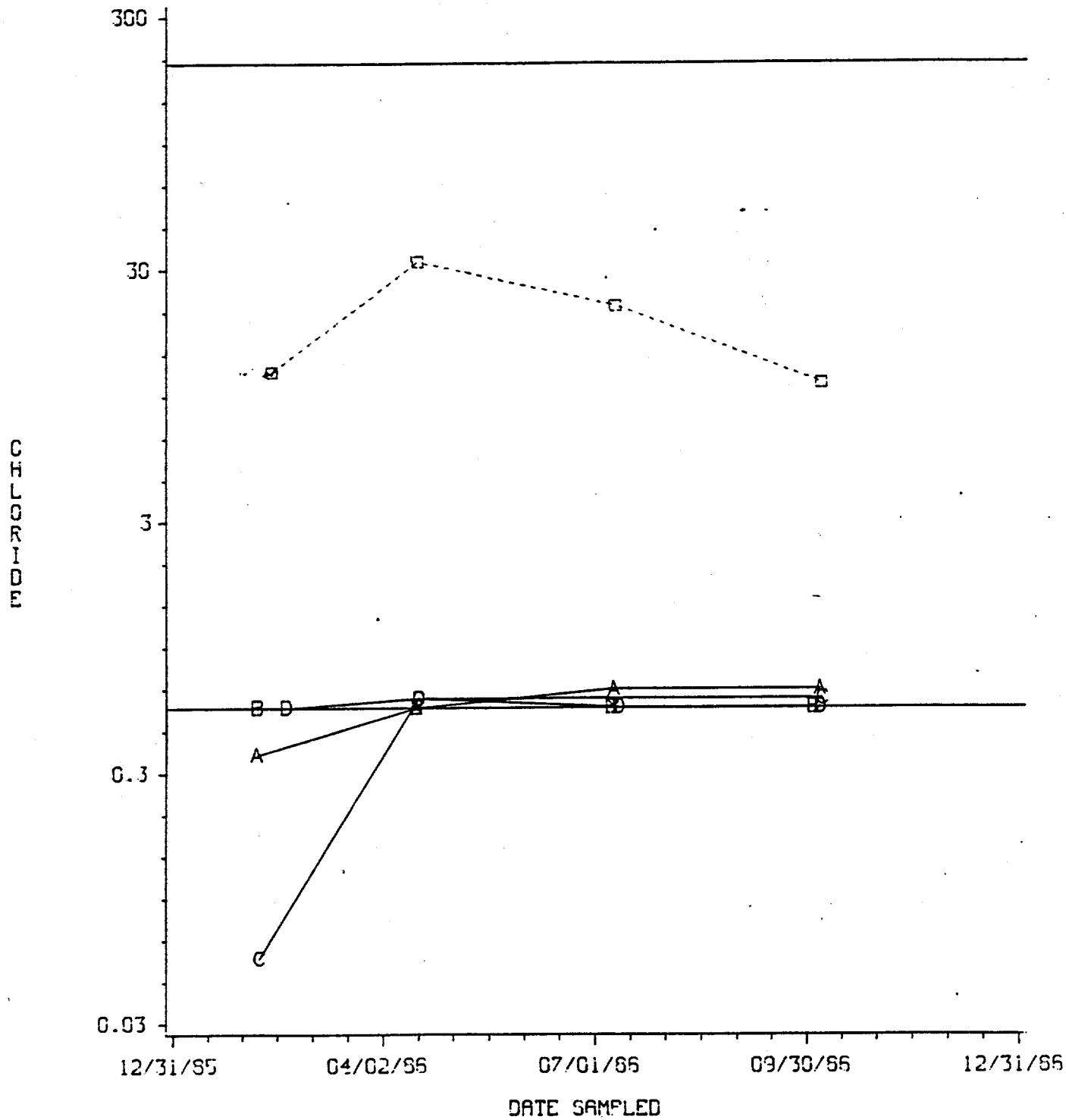


FIGURE 23

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL IRON (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
RECOM. MAX. CONC. LIMIT: 0.3 MG/L - MAX. DETECTION LIMIT: 0.004 MG/L

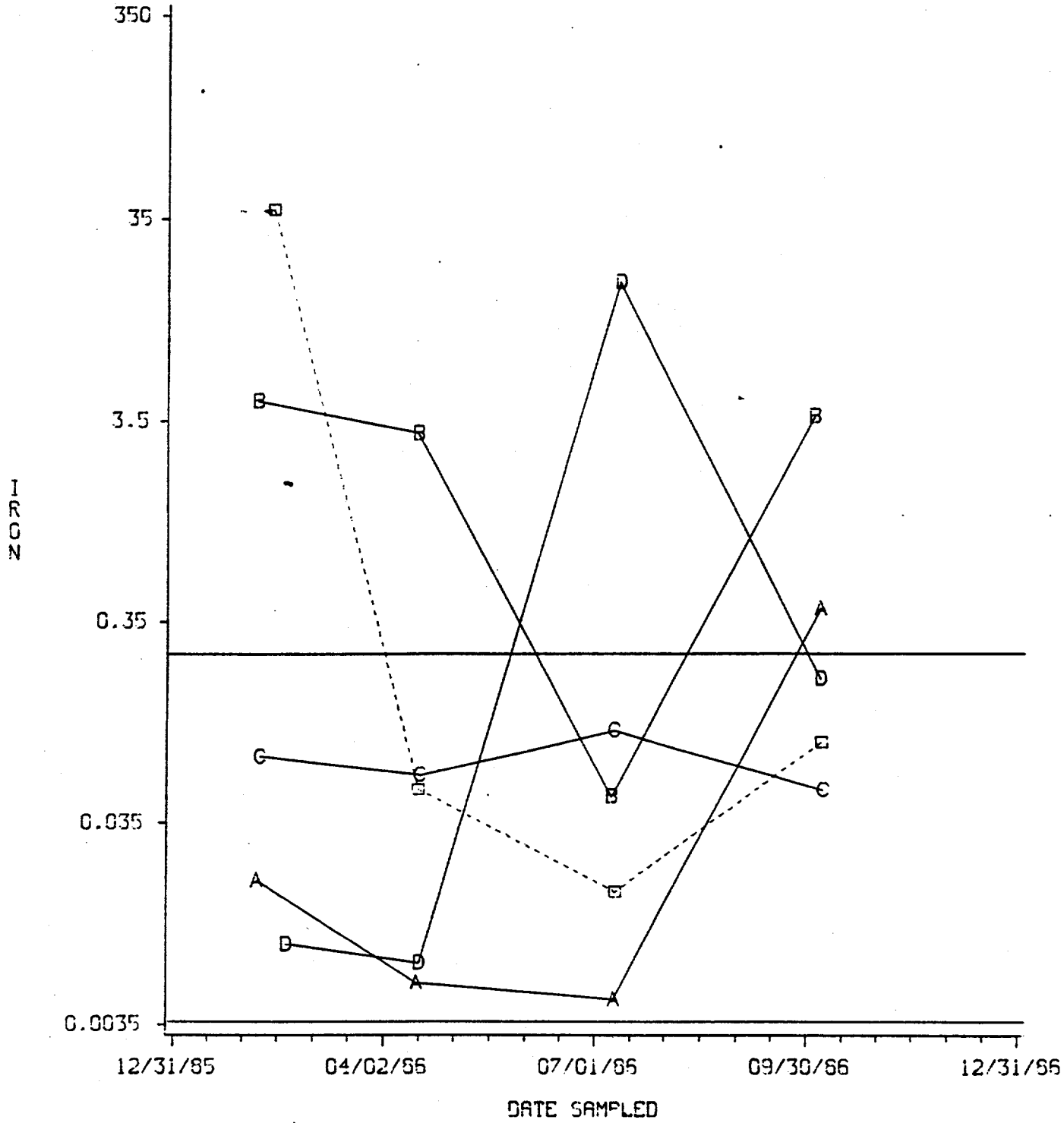


FIGURE 24

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL MANGANESE (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS
RECOM. MAX. CONC. LIMIT: 0.05 MG/L - MAX. DETECTION LIMIT: 0.001 MG/L

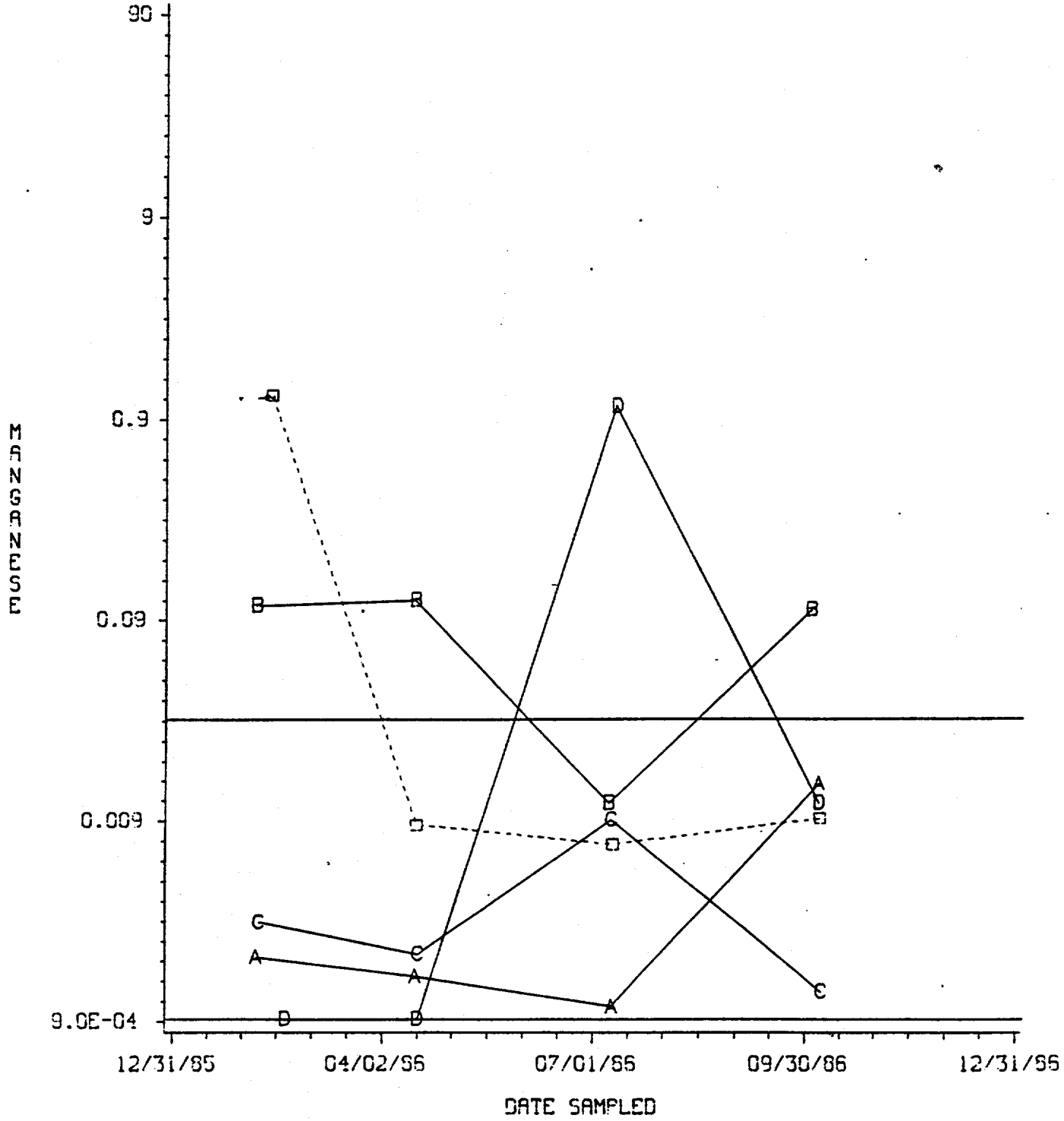


FIGURE 25

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
PH (PH UNITS)

UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS

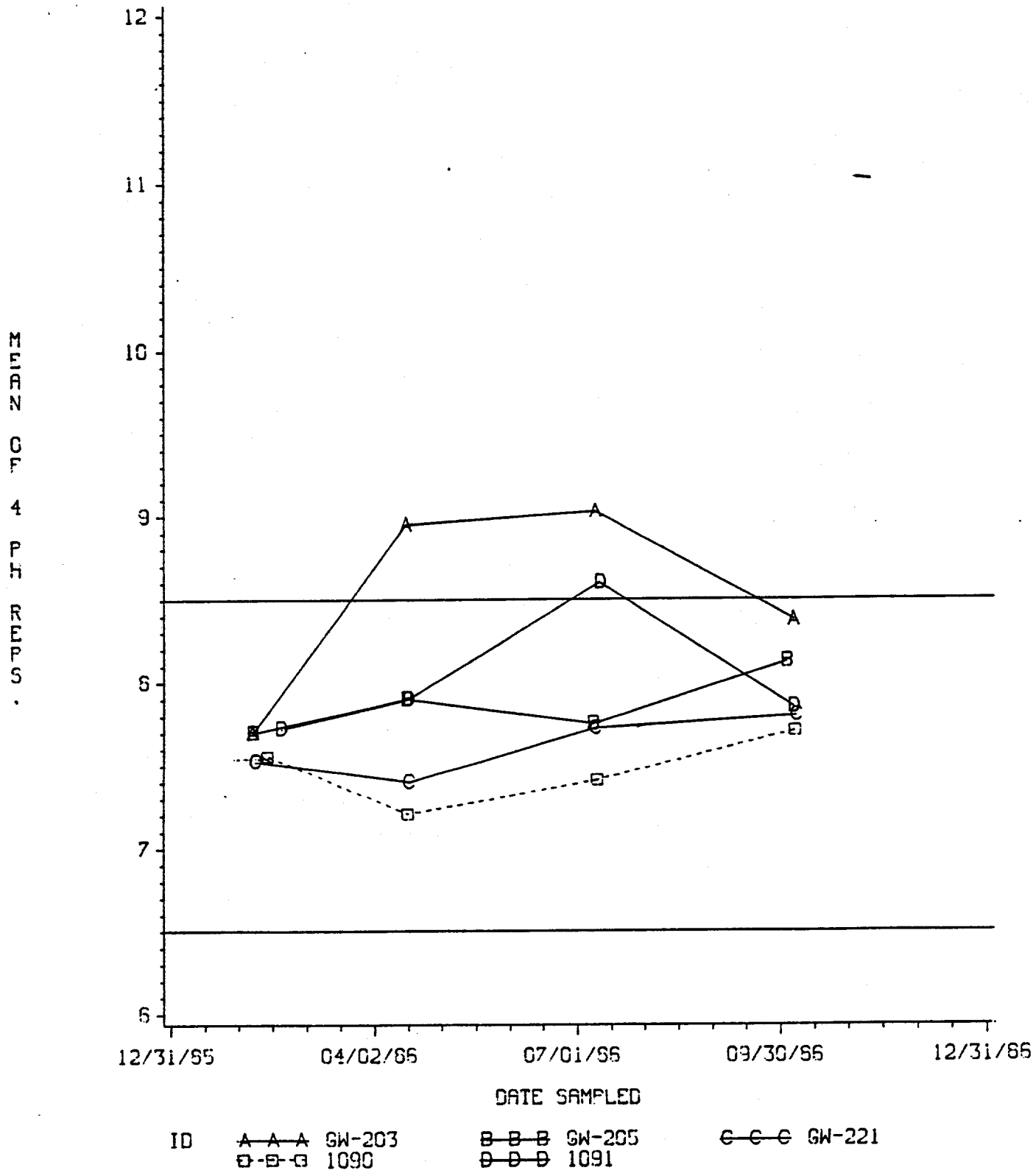


FIGURE 26

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
PHENOLS (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS

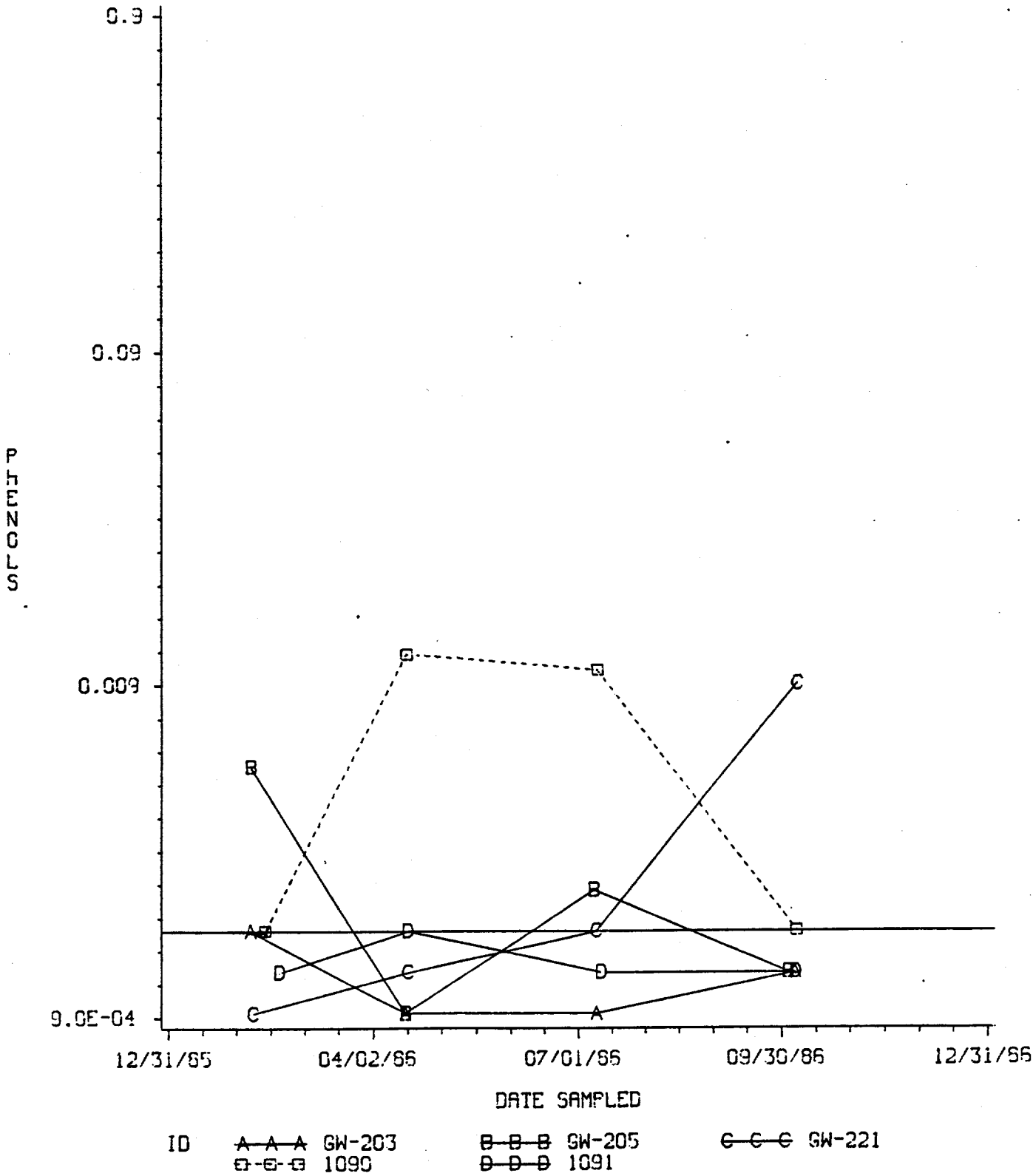


FIGURE 27

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL SODIUM (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS

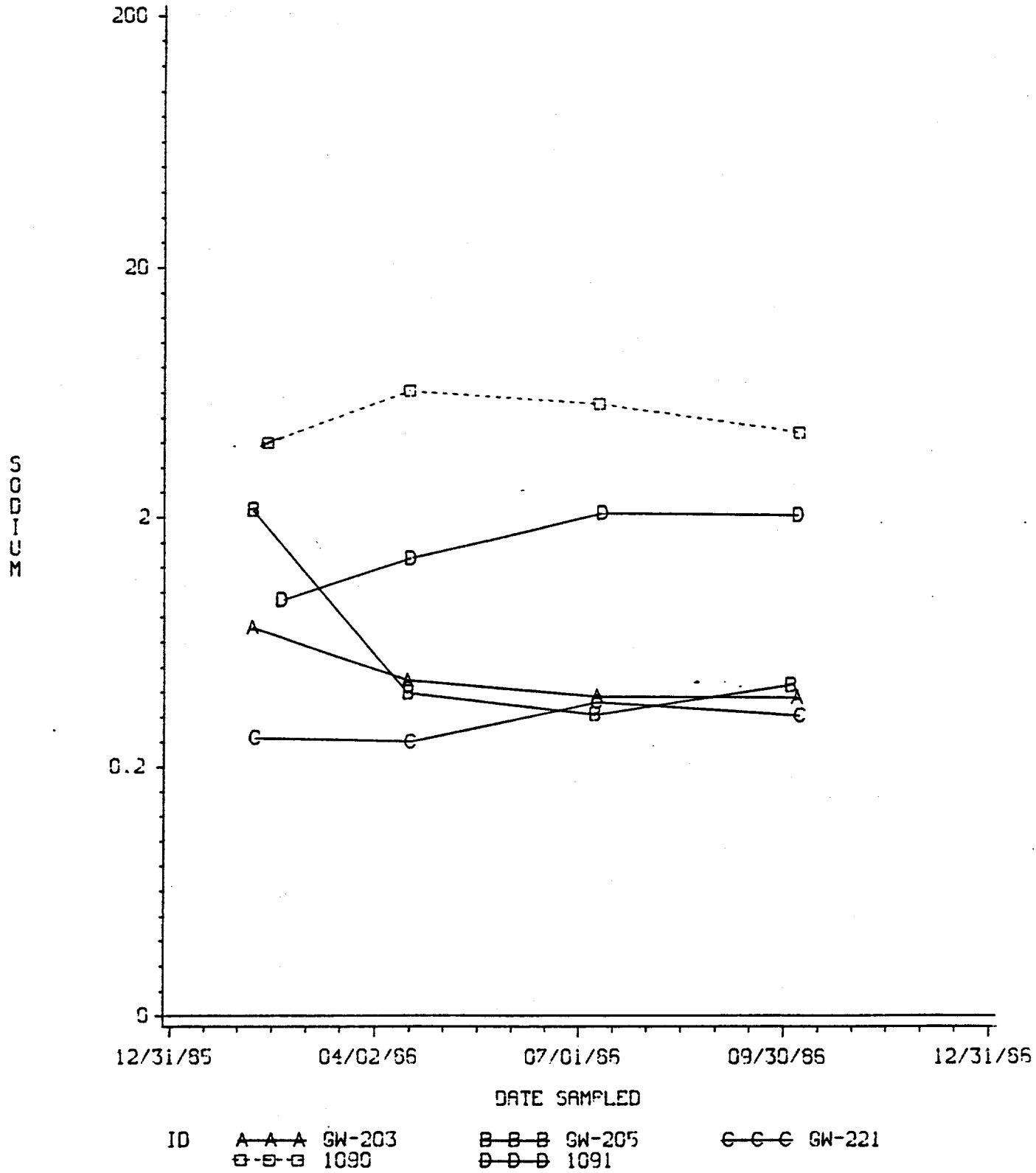


FIGURE 28

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
SULFATE (MG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS

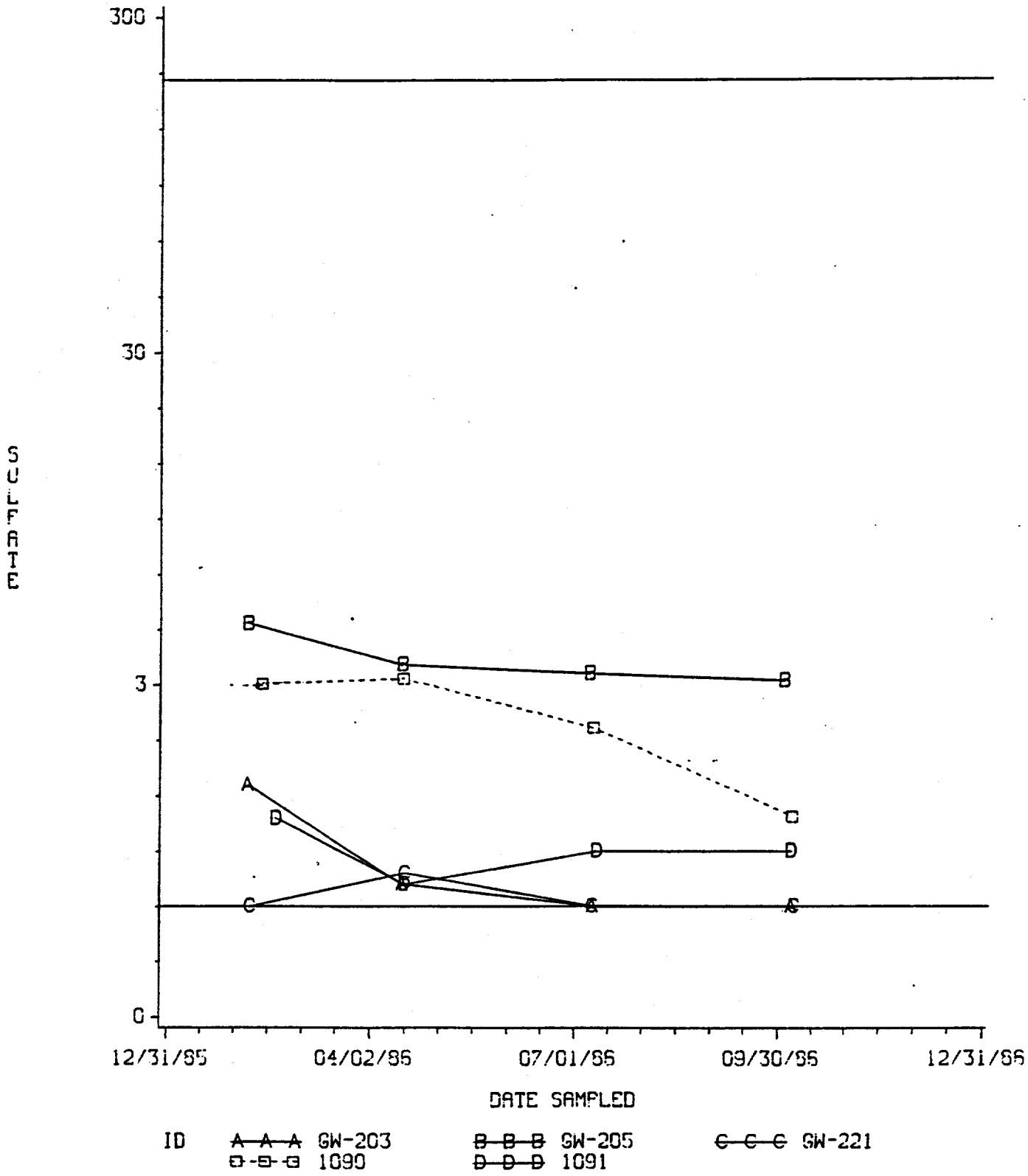


FIGURE 29

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
CONDUCTIVITY (UMHOS/CM)

UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS

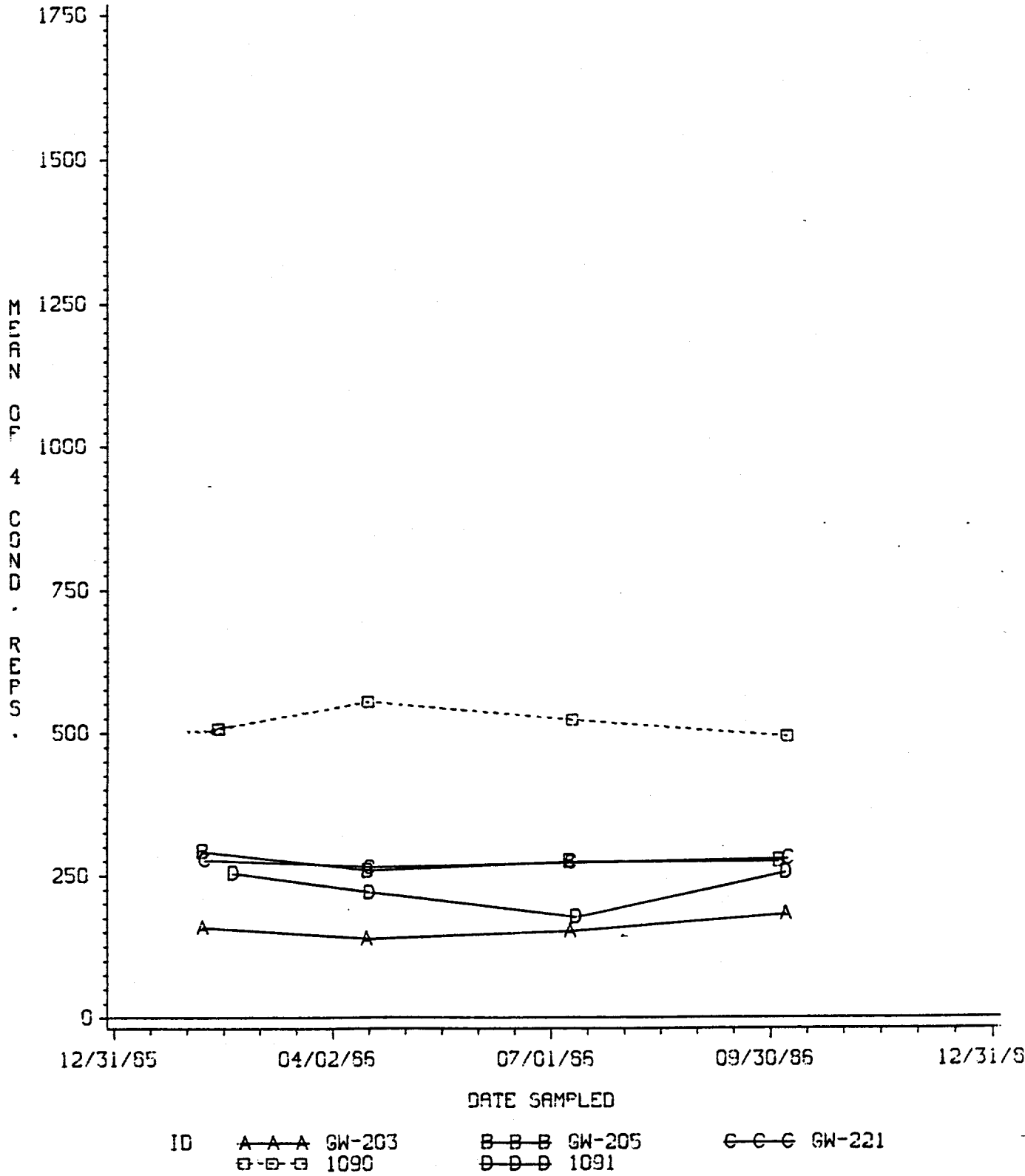


FIGURE 30

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL ORGANIC CARBON (MG/L)

UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS

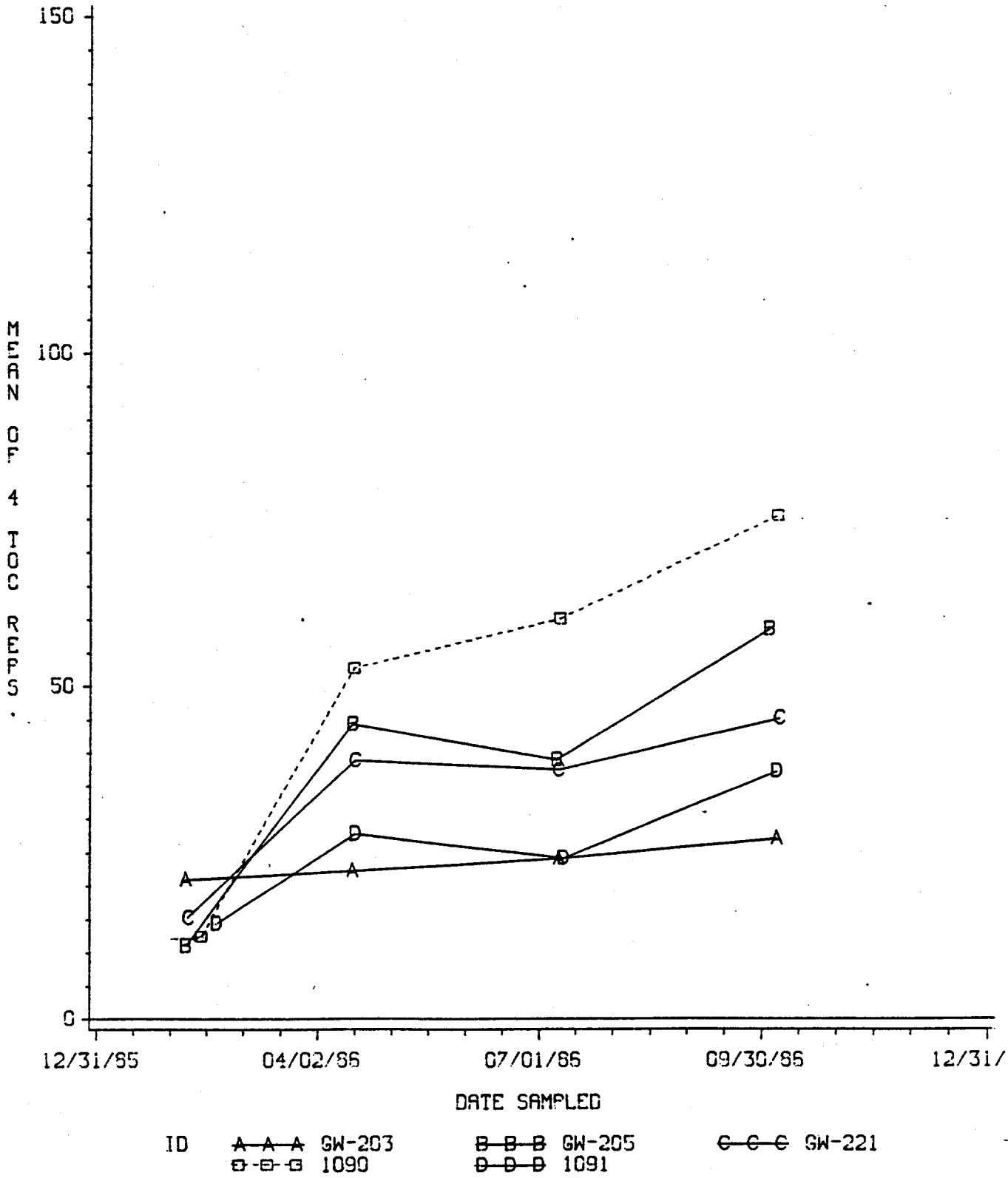
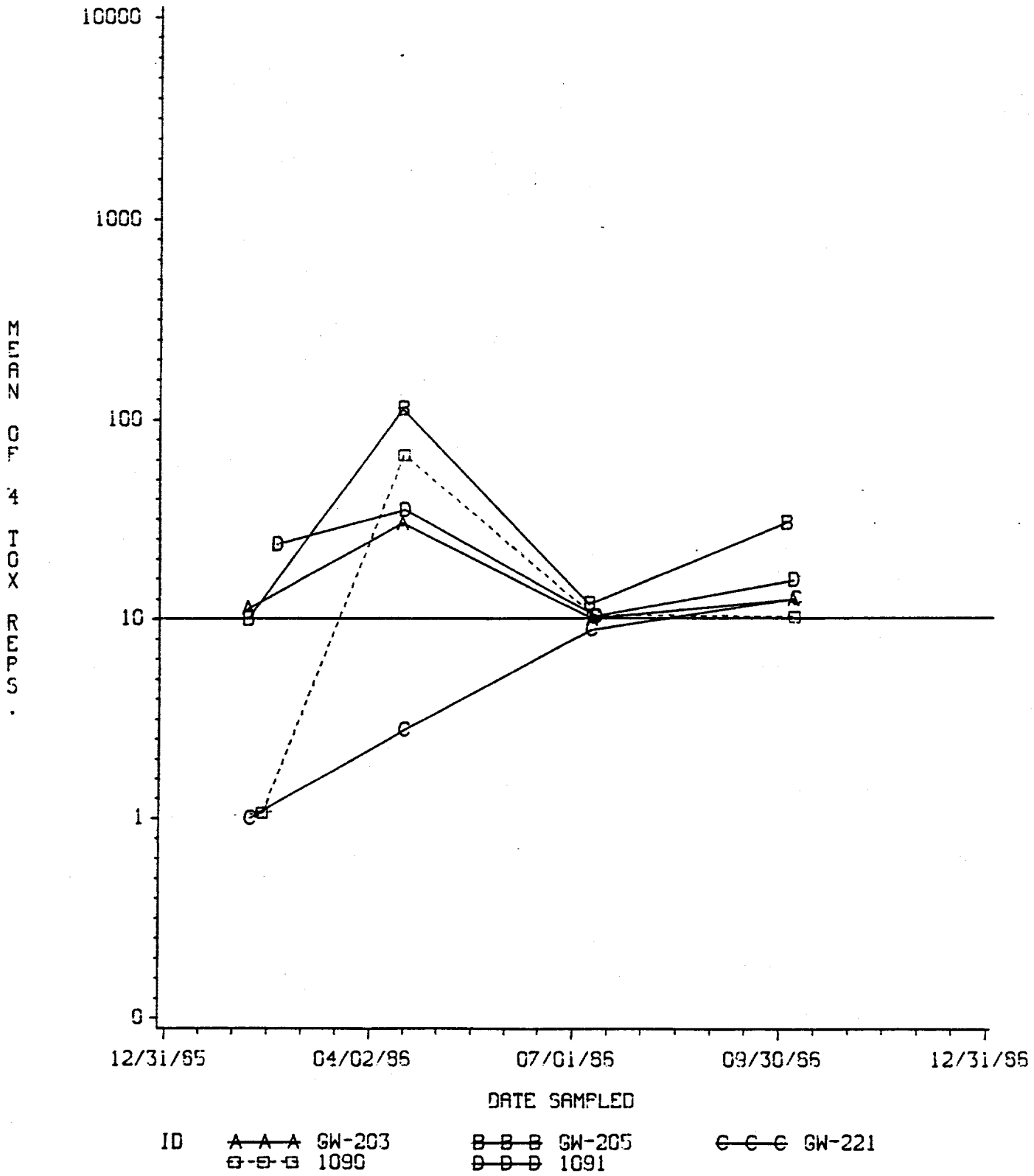


FIGURE 31

UNITED NUCLEAR SITE

1986 GROUNDWATER DATA
TOTAL ORGANIC HALOGEN (UG/L)

APPROXIMATION TO LOG PLOT
UPGRADIENT: 1090
DOWNGRADIENT: ALL OTHER WELLS



APPENDIX 3

WATER LEVEL DATA BY WELL FOR CY 1986

1986 WATER LEVEL DATA
FOR WELLS IN THE Y-12 WASTE DISPOSAL FACILITLIES
HEAD = TOC ELEV - (DEPTH TO WATER FROM TOC X 3.28)

WELL=GW-203

DATE SAMPLED	HEAD (FT)	TOP OF CASING ELEV. (FT)	DEPTH TO WATER FROM TOC (M)
01/02/86	1020.71	1105.2	25.76
01/09/86	1020.44	1105.2	25.84
01/16/86	1019.40	1105.2	26.16
01/23/86	1019.76	1105.2	26.05
01/30/86	1019.30	1105.2	26.19
02/06/86	.	1105.2	.
02/13/86	1019.53	1105.2	26.12
02/20/86	1021.72	1105.2	25.45
03/05/86	1022.81	1105.2	25.12
03/13/86	1023.13	1105.2	25.02
03/20/86	1024.18	1105.2	24.70
03/26/86	1023.79	1105.2	24.82
04/04/86	1023.95	1105.2	24.77
04/10/86	1024.18	1105.2	24.70
04/17/86	1021.59	1105.2	25.49
04/24/86	1023.53	1105.2	24.90
05/01/86	1023.53	1105.2	24.90
05/08/86	1023.36	1105.2	24.95
05/16/86	1022.90	1105.2	25.09
05/22/86	1022.38	1105.2	25.25
06/04/86	1021.63	1105.2	25.48
06/11/86	1021.56	1105.2	25.50
06/18/86	1021.23	1105.2	25.60
06/26/86	1020.74	1105.2	25.75
07/09/86	998.01	1105.2	32.68
07/16/86	1019.17	1105.2	26.23
07/23/86	1018.80	1105.2	26.34
07/30/86	1018.61	1105.2	26.40
08/08/86	1017.98	1105.2	26.59
08/15/86	1017.56	1105.2	26.72
08/21/86	1018.02	1105.2	26.58
08/28/86	1017.07	1105.2	26.87
09/04/86	1016.18	1105.2	27.14
09/11/86	1016.02	1105.2	27.19
09/18/86	1016.51	1105.2	27.04
09/25/86	1016.51	1105.2	27.04
10/02/86	1016.25	1105.2	27.12
10/09/86	1015.92	1105.2	27.22
10/17/86	1015.62	1105.2	27.31
10/24/86	1015.56	1105.2	27.33
10/31/86	1015.79	1105.2	27.26
11/06/86	1015.75	1105.2	27.27
11/13/86	1015.79	1105.2	27.26
11/20/86	1015.52	1105.2	27.34
12/05/86	1019.43	1105.2	26.15
12/12/86	1018.84	1105.2	26.33
12/19/86	1019.76	1105.2	26.05
12/29/86	1020.08	1105.2	25.95

1986 WATER LEVEL DATA
FOR WELLS IN THE Y-12 WASTE DISPOSAL FACILITLIES
HEAD = TOC ELEV - (DEPTH TO WATER FROM TOC X 3.28)

WELL=GW-205

DATE SAMPLED	HEAD (FT)	TOP OF CASING ELEV. (FT)	DEPTH TO WATER FROM TOC (M)
01/02/86	.	1103.66	.
01/09/86	.	1103.66	.
01/16/86	.	1103.66	.
01/23/86	.	1103.66	.
01/30/86	.	1103.66	.
02/06/86	.	1103.66	.
02/13/86	.	1103.66	.
02/20/86	1023.99	1103.66	24.29
03/05/86	1024.64	1103.66	24.09
03/13/86	1024.64	1103.66	24.09
03/20/86	1025.89	1103.66	23.71
03/26/86	1025.63	1103.66	23.79
04/04/86	1025.56	1103.66	23.81
04/10/86	1025.63	1103.66	23.79
04/17/86	1024.71	1103.66	24.07
04/24/86	1024.97	1103.66	23.99
05/01/86	1024.94	1103.66	24.00
05/08/86	1024.78	1103.66	24.05
05/16/86	1024.28	1103.66	24.20
05/22/86	1023.79	1103.66	24.35
06/04/86	1022.94	1103.66	24.61
06/11/86	1022.84	1103.66	24.64
06/18/86	1022.64	1103.66	24.70
06/26/86	1022.12	1103.66	24.86
07/09/86	1019.13	1103.66	25.77
07/16/86	1020.45	1103.66	25.37
07/23/86	1020.22	1103.66	25.44
07/30/86	1019.99	1103.66	25.51
08/08/86	1019.20	1103.66	25.75
08/15/86	1018.77	1103.66	25.88
08/21/86	1019.30	1103.66	25.72
08/28/86	1018.41	1103.66	25.99
09/04/86	1017.43	1103.66	26.29
09/11/86	1017.13	1103.66	26.38
09/18/86	1017.72	1103.66	26.20
09/25/86	1017.63	1103.66	26.23
10/02/86	1017.40	1103.66	26.30
10/09/86	1016.97	1103.66	26.43
10/17/86	1016.74	1103.66	26.50
10/24/86	1016.64	1103.66	26.53
10/31/86	1016.90	1103.66	26.45
11/06/86	1016.87	1103.66	26.46
11/13/86	1017.99	1103.66	26.12
11/20/86	1017.79	1103.66	26.18
12/05/86	1014.94	1103.66	27.05
12/12/86	1021.50	1103.66	25.05
12/19/86	1022.25	1103.66	24.82
12/29/86	1022.18	1103.66	24.84

1986 WATER LEVEL DATA
FOR WELLS IN THE Y-12 WASTE DISPOSAL FACILITLIES
HEAD = TOC ELEV - (DEPTH TO WATER FROM TOC X 3.28)

WELL=GW-221

DATE SAMPLED	HEAD (FT)	TOP OF CASING ELEV. (FT)	DEPTH TO WATER FROM TOC (M)
01/02/86	1019.51	1105.91	26.34
01/09/86	1019.32	1105.91	26.40
01/16/86	1018.30	1105.91	26.71
01/23/86	1018.69	1105.91	26.59
01/30/86	1018.37	1105.91	26.69
02/06/86	1018.01	1105.91	26.80
02/13/86	1018.40	1105.91	26.68
02/20/86	1019.97	1105.91	26.20
03/05/86	1021.32	1105.91	25.79
03/13/86	1021.55	1105.91	25.72
03/20/86	1022.50	1105.91	25.43
03/26/86	1022.34	1105.91	25.48
04/04/86	1022.34	1105.91	25.48
04/10/86	1022.79	1105.91	25.34
04/17/86	1020.24	1105.91	26.12
04/24/86	1022.24	1105.91	25.51
05/01/86	1022.27	1105.91	25.50
05/08/86	1022.34	1105.91	25.48
05/16/86	1021.75	1105.91	25.66
05/22/86	1021.29	1105.91	25.80
06/04/86	1020.56	1105.91	26.02
06/11/86	1020.56	1105.91	26.02
06/18/86	1020.43	1105.91	26.06
06/26/86	1019.97	1105.91	26.20
07/09/86	1014.99	1105.91	27.72
07/16/86	1018.43	1105.91	26.67
07/23/86	1018.07	1105.91	26.78
07/30/86	1017.94	1105.91	26.82
08/08/86	1017.15	1105.91	27.06
08/15/86	1016.79	1105.91	27.17
08/21/86	1017.38	1105.91	26.99
08/28/86	1016.43	1105.91	27.28
09/04/86	1015.48	1105.91	27.57
09/11/86	1015.25	1105.91	27.64
09/18/86	1015.91	1105.91	27.44
09/25/86	1016.23	1105.91	27.34
10/02/86	1015.74	1105.91	27.49
10/09/86	1015.35	1105.91	27.61
10/17/86	1014.96	1105.91	27.73
10/24/86	1014.96	1105.91	27.73
10/31/86	1015.15	1105.91	27.67
11/06/86	1031.55	1105.91	22.67
11/13/86	1015.45	1105.91	27.58
11/20/86	1015.25	1105.91	27.64
12/05/86	1015.48	1105.91	27.57
12/12/86	1016.99	1105.91	27.11
12/19/86	1018.14	1105.91	26.76
12/29/86	1018.63	1105.91	26.61

1986 WATER LEVEL DATA
FOR WELLS IN THE Y-12 WASTE DISPOSAL FACILITLIES
HEAD = TOC ELEV - (DEPTH TO WATER FROM TOC X 3.28)

WELL=1090

DATE SAMPLED	HEAD (FT)	TOP OF CASING ELEV. (FT)	DEPTH TO WATER FROM TOC (M)
01/02/86	1064.09	1123.39	18.08
01/09/86	1063.50	1123.39	18.26
01/16/86	1062.58	1123.39	18.54
01/23/86	1062.87	1123.39	18.45
01/30/86	1062.81	1123.39	18.47
02/06/86	1064.55	1123.39	17.94
02/13/86	1065.14	1123.39	17.76
02/20/86	1072.16	1123.39	15.62
03/05/86	1070.09	1123.39	16.25
03/13/86	1069.34	1123.39	16.48
03/20/86	1071.34	1123.39	15.87
03/26/86	1070.02	1123.39	16.27
04/04/86	1068.52	1123.39	16.73
04/10/86	1067.89	1123.39	16.92
04/17/86	1066.74	1123.39	17.27
04/24/86	1065.60	1123.39	17.62
05/01/86	1064.87	1123.39	17.84
05/08/86	1064.15	1123.39	18.06
05/16/86	1063.53	1123.39	18.25
05/22/86	1063.17	1123.39	18.36
06/04/86	1062.64	1123.39	18.52
06/11/86	1062.58	1123.39	18.54
06/18/86	1062.45	1123.39	18.58
06/26/86	1062.12	1123.39	18.68
07/09/86	1061.43	1123.39	18.89
07/16/86	1061.30	1123.39	18.93
07/23/86	1060.97	1123.39	19.03
07/30/86	1060.77	1123.39	19.09
08/08/86	1060.09	1123.39	19.30
08/15/86	1059.82	1123.39	19.38
08/21/86	1060.05	1123.39	19.31
08/28/86	1059.73	1123.39	19.41
09/04/86	1059.17	1123.39	19.58
09/11/86	1058.97	1123.39	19.64
09/18/86	1059.43	1123.39	19.50
09/25/86	1059.59	1123.39	19.45
10/02/86	1059.30	1123.39	19.54
10/09/86	1059.04	1123.39	19.62
10/17/86	1059.86	1123.39	19.37
10/24/86	1059.79	1123.39	19.39
10/31/86	1061.86	1123.39	18.76
11/06/86	1061.82	1123.39	18.77
11/13/86	1063.23	1123.39	18.34
11/20/86	1063.04	1123.39	18.40
12/05/86	1067.30	1123.39	17.10
12/12/86	1077.08	1123.39	14.12
12/19/86	1075.99	1123.39	14.45

1986 WATER LEVEL DATA
FOR WELLS IN THE Y-12 WASTE DISPOSAL FACILITLIES
HEAD = TOC ELEV - (DEPTH TO WATER FROM TOC X 3.28)

WELL=1091

DATE SAMPLED	HEAD (FT)	TOP OF CASING ELEV. (FT)	DEPTH TO WATER FROM TOC (M)
01/02/86	1007.01	1104.03	29.58
01/09/86	1007.07	1104.03	29.56
01/16/86	1006.02	1104.03	29.88
01/23/86	1006.65	1104.03	29.69
01/30/86	1006.25	1104.03	29.81
02/06/86	1006.55	1104.03	29.72
02/13/86	1006.38	1104.03	29.77
02/20/86	1006.48	1104.03	29.74
03/05/86	1008.19	1104.03	29.22
03/13/86	1008.48	1104.03	29.13
03/20/86	1009.57	1104.03	28.80
03/26/86	1009.17	1104.03	28.92
04/04/86	1009.24	1104.03	28.90
04/10/86	1009.47	1104.03	28.83
04/17/86	.	1104.03	.
04/24/86	1009.07	1104.03	28.95
05/01/86	1008.88	1104.03	29.01
05/08/86	1008.88	1104.03	29.01
05/16/86	1008.48	1104.03	29.13
05/22/86	1008.12	1104.03	29.24
05/22/86	1008.12	1104.03	29.24
06/04/86	1007.34	1104.03	29.48
06/11/86	1007.27	1104.03	29.50
06/18/86	1007.27	1104.03	29.50
06/26/86	1006.91	1104.03	29.61
07/09/86	1006.22	1104.03	29.82
07/16/86	1005.66	1104.03	29.99
07/23/86	1005.47	1104.03	30.05
07/30/86	1005.37	1104.03	30.08
08/08/86	1004.71	1104.03	30.28
08/15/86	1004.51	1104.03	30.34
08/20/86	1005.40	1104.03	30.07
08/28/86	1004.51	1104.03	30.34
09/04/86	1003.50	1104.03	30.65
09/11/86	1003.37	1104.03	30.69
09/18/86	1004.45	1104.03	30.36
09/25/86	1004.78	1104.03	30.26
10/02/86	1004.55	1104.03	30.33
10/09/86	1004.42	1104.03	30.37
10/17/86	1004.09	1104.03	30.47
10/24/86	1004.22	1104.03	30.43
10/31/86	1004.74	1104.03	30.27
11/06/86	1004.81	1104.03	30.25
11/13/86	1005.11	1104.03	30.16
11/20/86	1004.65	1104.03	30.30
12/05/86	1005.56	1104.03	30.02
12/12/86	1006.19	1104.03	29.83
12/19/86	1007.34	1104.03	29.48
12/29/86	1008.16	1104.03	29.23