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Environmental Sciences Division
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ACKNOWLEDGMENTS

The Remedial Action Program (RAP) Data and Information Management System (DIMS) would not have been possible without the cooperation of numerous investigators and agencies collecting data related to the Oak Ridge National Laboratory. The authors appreciate the willingness of these sources to share data files; acknowledgment of these contributions are made throughout this report. In addition, various users of the data base have helped to ensure its quality and have provided suggestions to improve its usefulness. The authors express their appreciation to W. M. McMaster and J. A. Watts for their critical review of the report.

ACRONYMS AND INITIALISMS

AA	Alternative Assessments
ACD	Analytical Chemistry Division
ATDD	Atmospheric Turbulence and Diffusion Division
BMAP	Biological Monitoring and Abatement Program
BNI	Bechtel National, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCONS	Construction data for CERCLA wells
CH2M Hill	CH2M Hill, Oak Ridge, Tennessee
-CONS	Construction data
DIMS	Data and Information Management System
EMC	Environmental Monitoring and Compliance
EPA	U.S. Environmental Protection Agency
ESD	Environmental Sciences Division
FS	Feasibility Study
GIS	Geographic Information System
HASRD	Health and Safety Research Division
HF	Hydrofracture
HFCONS	Construction data for hydrofracture wells
HFIR	High-Flux Isotope Reactor
HHMS	Hydrostatic head monitoring station
HHMSCONS	Construction data for HHMS wells
HRE	Homogeneous Reactor Experiment
ID	Identification Code
ISV	In situ vitrification
MB	Melton Branch
MCI	Mining Consultants, Inc
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWT	Northwest Tributary
OHF	Old Hydrofracture Facility
ORGDP	Oak Ridge Gaseous Diffusion Plant
ORNL	Oak Ridge National Laboratory

ORR	Oak Ridge Reservation
PA/SI	Preliminary Assessment and Site Investigation
PCB	Polychlorinated biphenyl
PIEZ	Piezometer
PIEZCONS	Construction data for piezometer wells
PP	Priority pollutant
PRAP	Pre-Remedial Action Program
PRAPCONS	Construction data for PRAP wells
RAP	Remedial Action Program
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigations
SLB	Shallow Land Burial
STP	Sewage Treatment Plant
SWMU	Solid Waste Management Unit
SWSA	Solid Waste Storage Area
TARA	Test Area for Remedial Action
TARACONS	Construction data for wells in TARA
TOC	Total organic carbon
TOX	Total organic halides
TRU	Transuranic
TTO	Total toxic organics
USGS	U.S. Geological Survey
UT	University of Tennessee
WAG	Waste Area Grouping
WOC	White Oak Creek
WOD	White Oak Dam
WOL	White Oak Lake
WQ	Water Quality
WQCONS	Construction data for water quality wells

ABSTRACT

Voorhees, L. D., L. A. Hook, M. J. Gentry, R. A. McCord, M. A. Faulkner, J. L. Bledsoe, K. A. Newman, P. T. Owen, and A. E. Rosen. 1989. Annual Report of Data Base Management Activities for the Remedial Action Program at ORNL: Calendar Year 1988. ORNL/TM-11147. Oak Ridge National Laboratory, Oak Ridge, Tennessee. 191 pp.

Radioactive and/or hazardous materials have been handled at Oak Ridge National Laboratory (ORNL) for more than 40 years. Research, development, and waste management activities conducted during this time have resulted in residual contamination of facilities and the environment. The ORNL Remedial Action Program (RAP) was established in 1985 in response to state and federal regulations mandating corrective actions at contaminated sites. To achieve this goal, numerous and varied studies are being conducted to characterize the type and extent of contamination. Environmental data collected in support of other programs at ORNL are also of use to RAP. Collectively, these studies are generating a voluminous amount of data. A computerized Data and Information Management System (DIMS) was developed for RAP to (1) provide a centralized repository for data pertinent to RAP and (2) provide support for the investigations and assessments leading to the long-term remediation of contaminated facilities and sites.

The current DIMS and its role in supporting RAP during 1988 are described. The DIMS consists of three components: (1) the Numeric Data Base, (2) the Bibliographic Data Base, and (3) the Records Control Data Base. This report addresses all three data bases, but focuses on a description of the contents of the Numeric Data Base. The types of numeric data currently available are summarized in the tables and figures. More detailed information on the contents of the RAP Numeric Data Base has been assembled in a menu-driven format on IBM PC diskettes, which are available upon request.

1. INTRODUCTION

Radioactive and/or hazardous materials have been handled at Oak Ridge National Laboratory (ORNL) for more than 40 years. Research, development, and waste management activities conducted during this time have resulted in residual contamination of facilities and the environment. Such areas include Solid Waste Storage Areas (SWSAs), waste ponds and seepage pits, radioactive waste processing and transfer facilities, research laboratories, dedicated environmental research sites, experimental reactors, radioisotope development facilities, the surrounding environments, and off-site contamination of the Clinch River and Watts Bar Reservoir.

ORNL has had a continuing responsibility to monitor and control these contaminated areas to ensure that on-site personnel exposures and off-site releases are maintained within applicable Department of Energy guidelines. Over the past several years, however, significant federal and state environmental legislation has been enacted to provide more comprehensive control over facility discharges and the cleanup of contaminated sites. The ORNL Remedial Action Program (RAP) was established in 1985 in response to specific state and federal regulations mandating corrective measures at areas contaminated with radioactive and/or hazardous chemicals. Although the regulatory requirements associated with ORNL remedial actions are still evolving, the most important of these legislative acts are currently the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Clean Water Act (CWA), and the Safe Drinking Water Act (SDWA). It appears imminent that the Oak Ridge Reservation, on which ORNL is located, will be listed on the CERCLA National Priority List. The implications of this action to RAP are still unresolved.

The majority of the ORNL contaminated sites are currently being treated as RCRA solid waste management units (SWMUs). Because of the large number of sites (more than 250, many of which are located close to one another) and the proven hydrologic interconnections between many of these sites, individual monitoring and assessment was shown to be impractical. Therefore, the SWMUs were divided into 20 waste area groupings (WAGs) based on geographic and hydrologic information (Fig. 1).

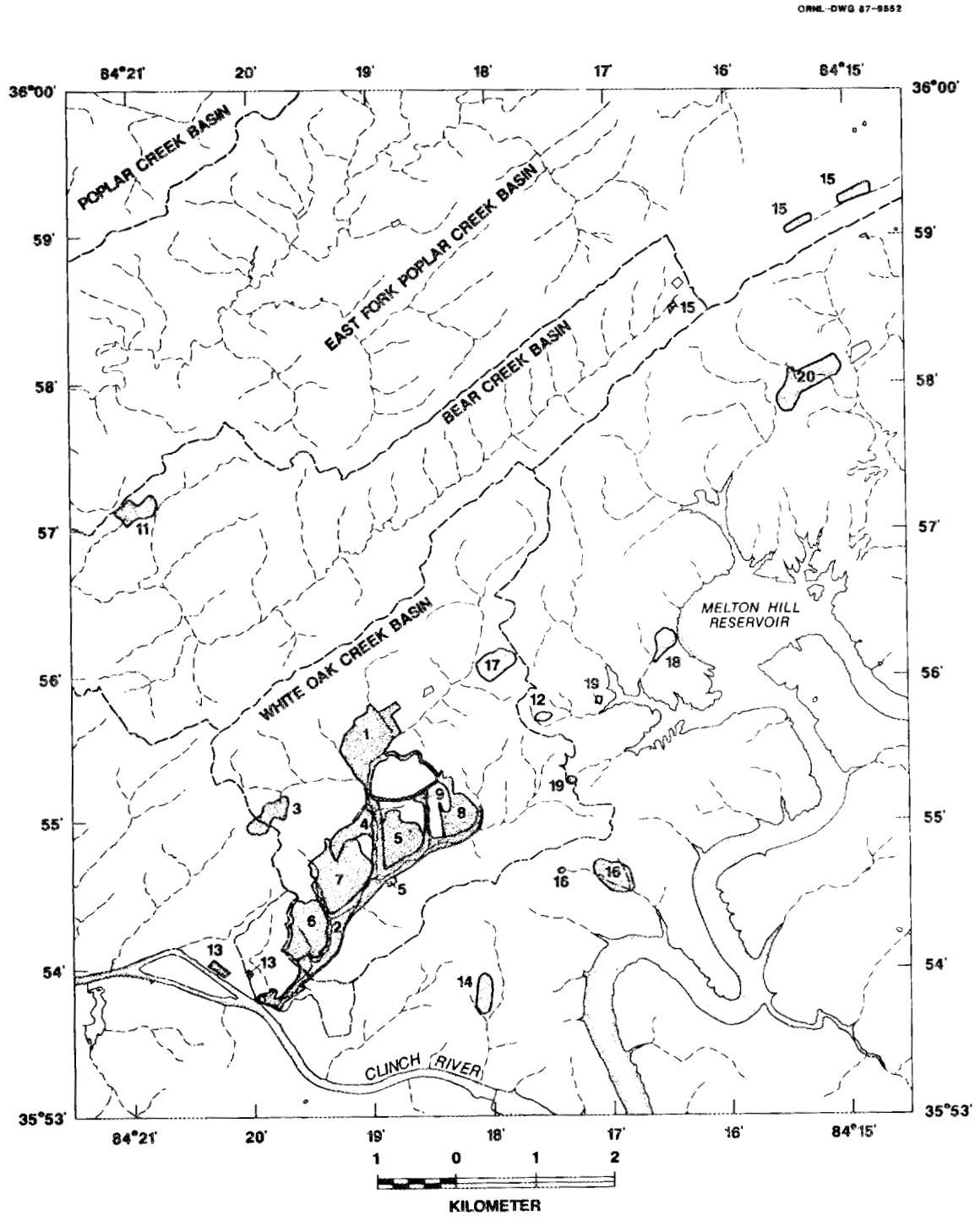

Fig. 1. Oak Ridge National Laboratory's active and inactive waste management areas, contaminated facilities, and potential sources of contaminants have been divided into 20 waste area groupings (WAGs).

According to Section 3004(u) of RCRA, all SWMUs must be evaluated to determine if they are sources of continuing releases of hazardous substances to the environment. Similar requirements are imposed for off-site contamination under RCRA Section 3004(v). Investigations have been and will continue to be conducted to characterize the extent of contamination for possible maintenance and ultimately corrective actions. Environmental data collected in support of other programs at ORNL are also applicable to RAP. Collectively, these studies are generating a voluminous amount of data.

Because implementation of RAP is regulatory controlled, information generated by the program must be retained to support any future legal or administrative actions that may be taken. These actions may not occur for years after the data have been collected; thus, it is crucial that a management system be maintained for identifying, logging, and filing project data and records and for assisting in the search and retrieval of such information. To meet these needs, a Data and Information Management System (DIMS) has been developed for RAP.

DIMS consists of three components: (1) the Bibliographic Data Base, (2) the Records Control Data Base, and (3) the Numeric Data Base. The Bibliographic Data Base and associated hardcopy reference collection serves as a repository for all reports published as a result of the program as well as other pertinent publications. The Records Control Data Base serves as an index for retrieval of unpublished information generated by the program, such as correspondence, project plans, field notebooks, and chain-of-custody records. The Numeric Data Base serves as a central repository for technical data generated by the program and applicable data from other studies. Such data will be used to evaluate the condition of the environment as it relates to the ORNL's past waste management practices and research activities. Ultimately, analyses based on the data will be used to justify decisions regarding corrective action.

The current regulatory compliance effort involves a sequential approach of conducting (1) Preliminary Assessments and Site Investigations (PA/SI) for each WAG, (2) Remedial Investigations (RI) and Alternative Assessments (AA) for WAGs determined to be contaminated, and (3) a single,

comprehensive Feasibility Study (FS) for determining corrective actions to be implemented at the contaminated WAGs (Fig. 2). The program also conducts routine maintenance, surveillance, and interim corrective actions at sites awaiting final closure, performs technology demonstrations to evaluate decommissioning or closure techniques under field conditions, and designs and implements site and facility closures.

The RI, AA, and FS phases of the program (collectively referred to as the RI/FS process) are being implemented with significant subcontracted assistance; field investigations for this RI/FS process began in late 1988. The lead RI/FS subcontractor, Bechtel National, Inc. (BNI), will create an RI/FS Data Base to manage data generated by their studies. These data will also be incorporated into the RAP DIMS.

This report summarizes the status of the DIMS and its role in supporting RAP during calendar year 1988. It focuses on a description of the contents of the Numeric Data Base; previous reports (Voorhees et al. 1986, 1988) describe its design, development, organization, data management techniques, quality assurance, accessibility, security, etc. Work performed in 1988 for the Records Control and Bibliographic Data Bases is also briefly described.

Data per se will not be presented in this report. Rather, the primary objective is to let the reader know what kind of data are available, the geographic areas for which data have been collected, and the period of time for which data are available. This information is summarized in tables and figures. A more detailed synopsis of the contents of the RAP Numeric Data Base has been assembled in a menu-driven format on IBM PC diskettes, which are available upon request. The structure and contents of this synopsis are also described in this report.

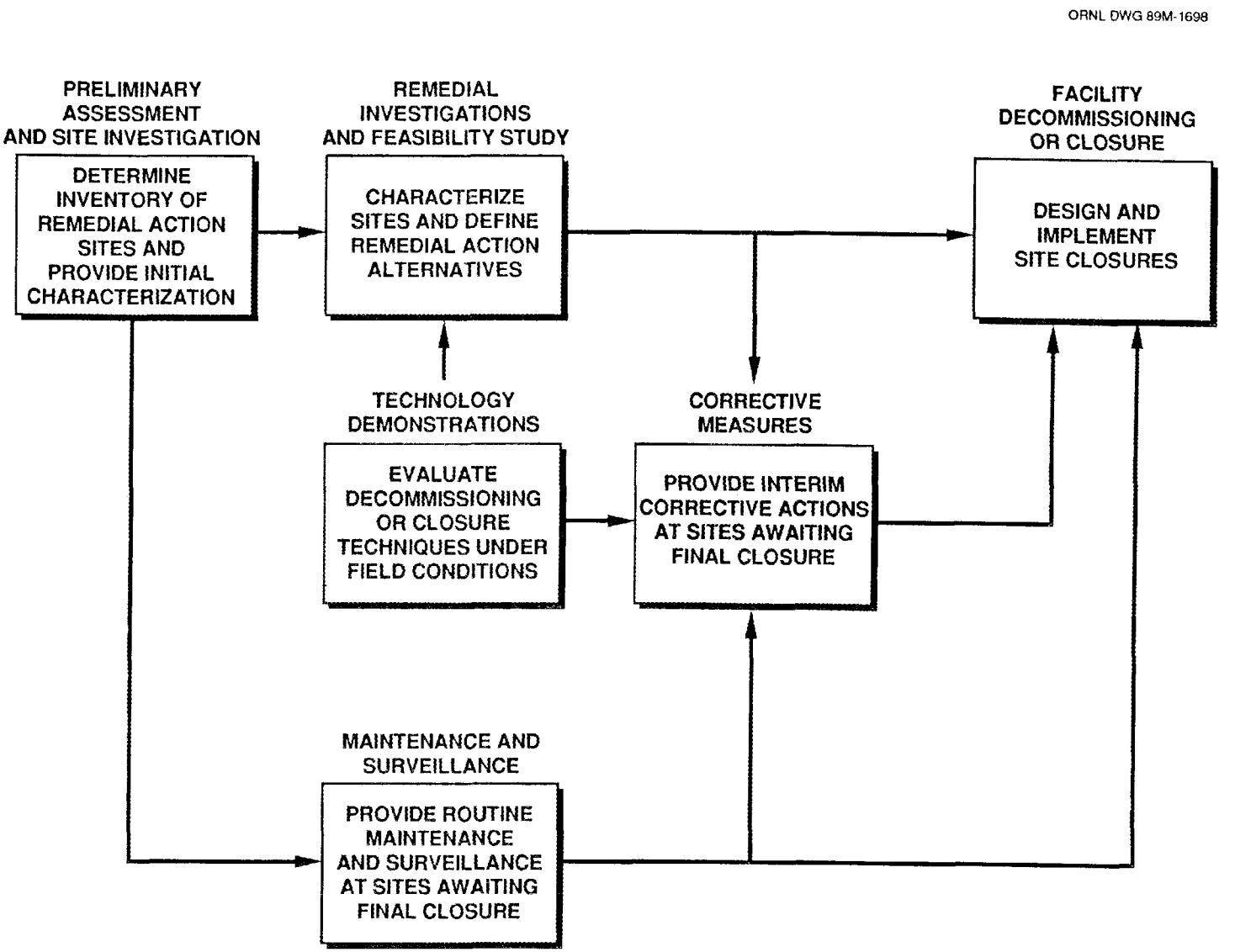

Fig. 2. Oak Ridge National Laboratory Remedial Action Program implementation flowchart.

2. NUMERIC DATA BASE

The RAP Numeric Data Base serves as a central repository for technical data related to the program. The data base was designed to take advantage of computer systems as an aid in acquiring, checking, and processing data so that accurate information is available for analysis and assessment. The data base principally uses SAS[1] software installed on IBM and VAX mainframe computers and on several PCs used by data management staff. Other software is used to manage lengthy descriptive documentation of the data sets, administrative or record-keeping tasks, and some forms of data entry. For these tasks, software such as dBASE III Plus, Lotus 1-2-3, and WordPerfect are used. Files created in dBASE and Lotus can be transferred directly into PC-based SAS data sets and subsequently uploaded to a mainframe computer.

A Geographic Information System (GIS), using ARC/INFO[2] software, is used to analyze and present spatially oriented data. ARC/INFO allows the user to combine and subset descriptive data associated with spatially defined data and provides complete graphic and mapping capabilities.

The general structure of the Numeric Data Base consists of a collection of SAS libraries, with each library containing one or more SAS data sets. The manner in which the data sets are organized allows the investigator for a particular task to easily access his or her own data, yet restricts access to other data within the data base. Some types of data such as precipitation and surface discharge, however, come from several sources and may be applicable to several tasks; these data are cataloged in separate libraries according to the type of data. For the purposes of describing the contents of the RAP Numeric Data Base, the libraries have been grouped into the following data categories:

- well construction,
- groundwater,

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[1]SAS is a registered trademark of SAS Institute, Inc., Cary, N.C.

[2]ARC/INFO is a registered trademark of Environmental Systems Research Institute, Redlands, Calif.

- surface water,
- precipitation,
- contaminant characterization,
- maintenance and surveillance,
- biological monitoring,
- technology demonstrations, and
- miscellaneous.

The contents of the Numeric Data Base are presented with respect to this organization (Sects. 2.1-2.9). Rather than discussing only what was added to the data base in 1988, a comprehensive description of the contents of the data base is presented in this report. This approach requires repeating some of the information presented in last year's annual report (Voorhees et al. 1988), but it is believed that the resulting report will be of more benefit to the user. In addition, the development of SAS format files (Sect. 2.10) and the role of the GIS (Sect. 2.11) are also discussed.

The Numeric Data Base contains nearly 150 SAS data sets with a total of more than 5.5 million data entries. The relative amount of space occupied by the various data types is illustrated in Fig. 3. Although contaminant characterization data occupy the majority of the data base in terms of space, this is only because of the large number of analyses associated with a single sample. The other categories of data are just as important as the contaminant characterization data and represent a significant amount of information, as discussed below.

For those individuals who wish to know more details about the data sets (i.e, data set structures and examples of contents), a synopsis of the RAP DIMS has been prepared on IBM PC diskettes and is available upon request. This synopsis has been updated to reflect the additional data obtained during the past year. Sect. 2.12 lists the hardware requirements for using this resource and describes the synopsis, along with examples of its contents.

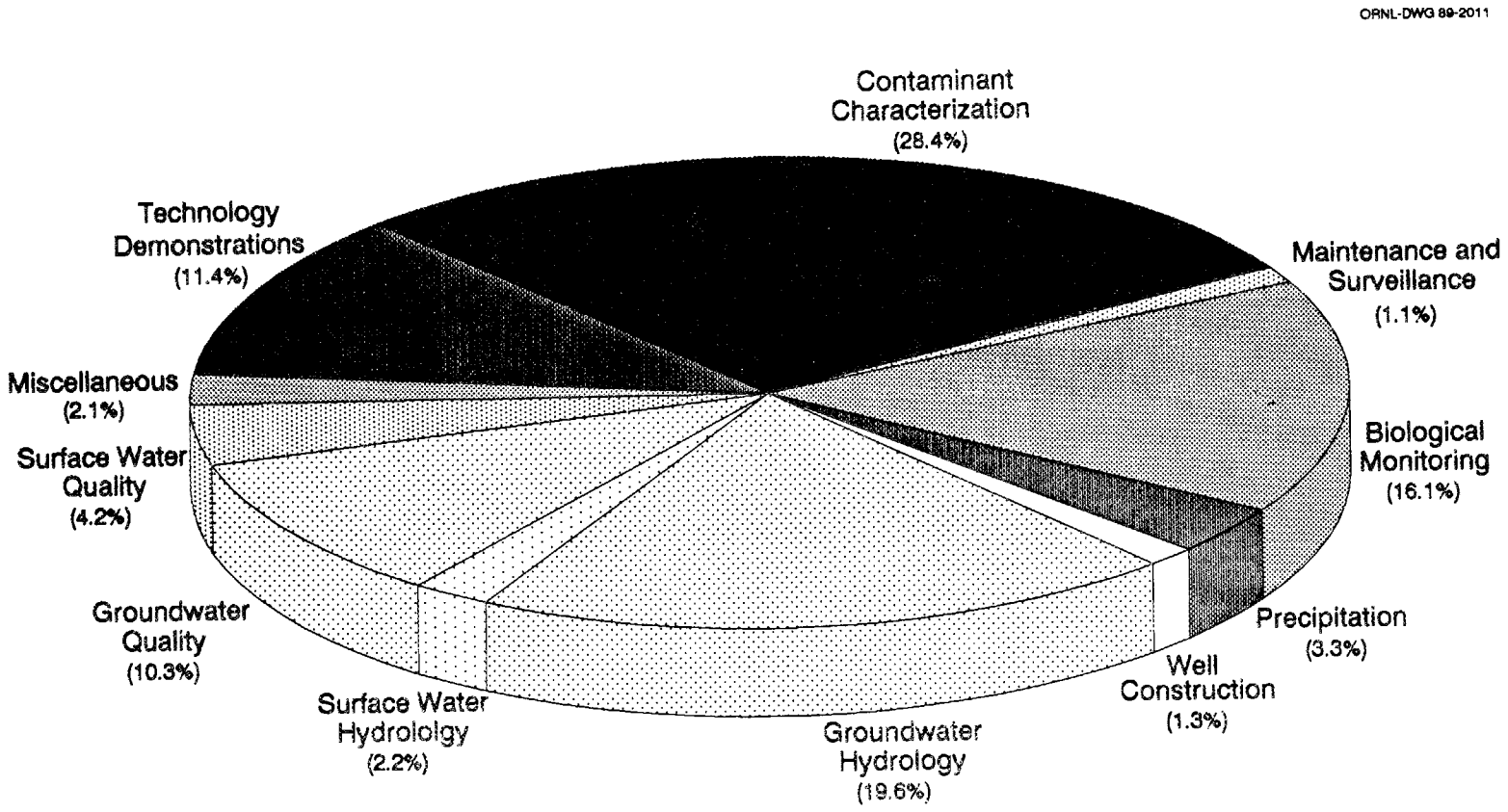

Fig. 3. Relative size of the Remedial Action Program Numeric Data Base by data type.

2.1 WELL-CONSTRUCTION INFORMATION

More than 1300 observation wells have been drilled in the vicinity of ORNL during its 45-year history. As indicated by Fig. 4, which simply shows the geographic extent of the wells, a fairly broad coverage exists for the ORNL area. The wells were drilled at different times and for different purposes, with the result that there is some variation in the parameters recorded during construction. Construction data (-CONS) for these wells have been recorded in seven SAS data sets (Table 1) based on the general installation date and/or general purpose but can easily be combined into a single data set as needed. In addition to the wells in Table 1, the U.S. Geological Survey (USGS) has installed another 28 wells (U-series wells), for which we have only the location data; associated construction parameters will be added to the data base when they become available.

Nearly all of the older, pre-RAP (PRAP) wells (Table 1, PRAPCONS) are located in the vicinity of the SWSAs and the Pits and Trenches Area (Fig. 1, WAGs 3-7). Many of the older wells in the ORNL Main Plant Area (Fig. 1, WAG 1) have been destroyed or damaged by construction activities. Therefore, more than 330 piezometer (PIEZ) wells were installed by RAP to obtain basic geologic and hydrologic data as an aid in determining suitable locations for and design of water quality monitoring wells required by the RCRA (Table 1, PIEZCONS).

The piezometer well locations were selected to supplement the available information from existing wells in the burial grounds and to establish a basic network for gathering groundwater data in other WAGs. Most of the wells were shallow, drilled only until aquifer inflow was detected. Some wells, however, were drilled to reach deeper aquifers in order to determine the potentiometric heads of water-bearing zones at these levels and to determine vertical hydraulic gradients; at some locations, pairs of piezometer wells were installed for these purposes.

The hydrofracture (HF) wells are located in four distinct areas associated with the experimental and operational hydrofracture sites in Melton Valley (Table 1, HFCONS). As with the older (PRAP) wells discussed

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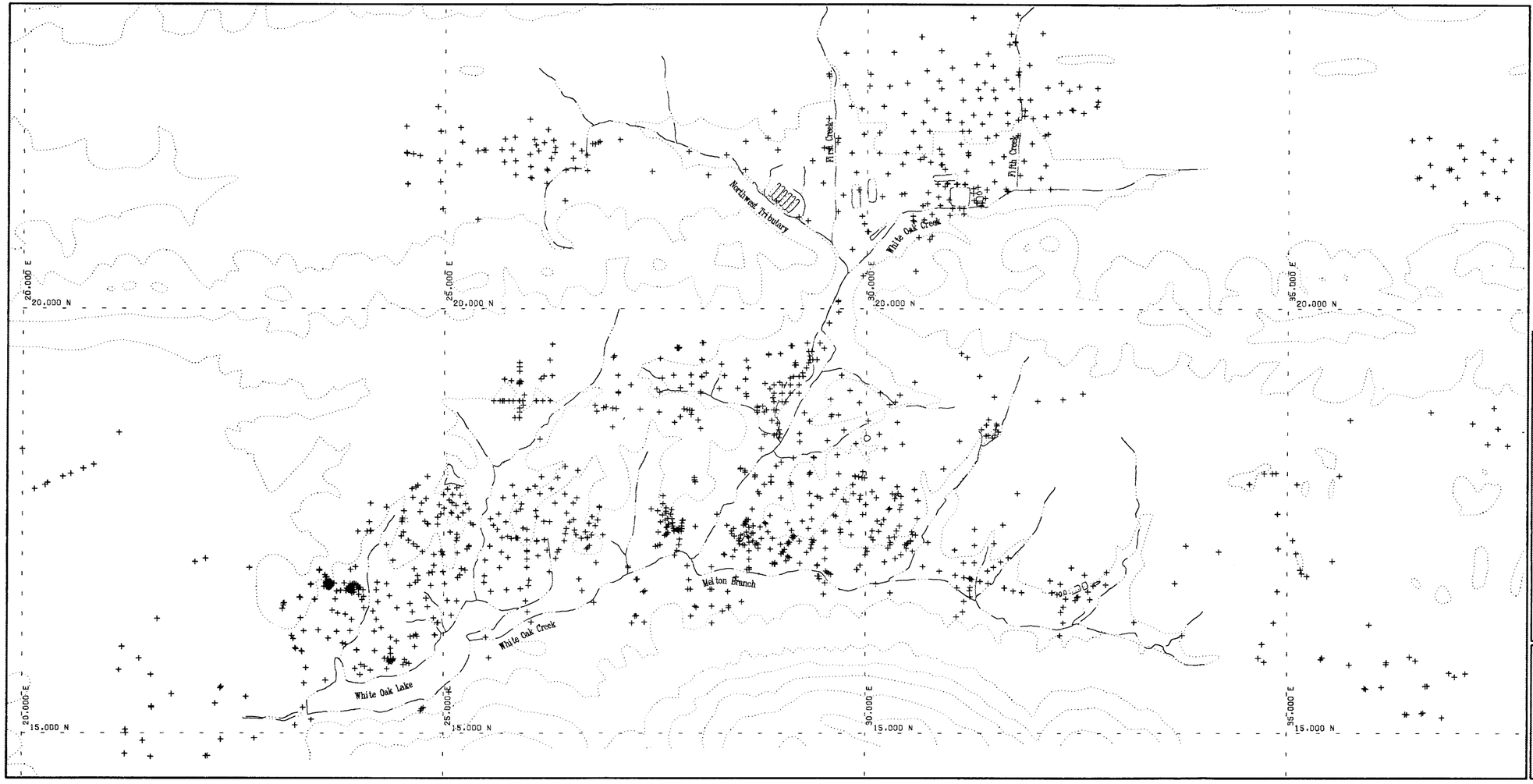


Fig. 4.

Locations of All Wells in the Remedial Action Program Numeric Data Base.

Table 1. SAS data sets of well-construction parameters

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
ENVSCI.MAP25255.SAS.ERFU2	Well construction data			
PIEZCONS	Construction data on piezometer wells installed by RAP	05DEC85 - 21JUL87	348	33
WQCONS	Construction data on water quality wells installed by RAP	19JUL85 - 01JUL87	77	40
PRAPCONS	Construction data on monitoring wells installed before establishment of RAP	1949 - 1983	763	32
HHMSCONS	Construction data on hydrostatic head monitoring stations installed by RAP	17MAR86 - 07APR88	31	43
HFCONS	Construction data on hydrofracture wells installed before establishment of RAP	1959 - 1984	89	27
CERCONS	Construction data on water quality wells installed by RAP to comply with CERCLA	08JAN85 - 15MAR85	13	25
TARACONS	Construction data on wells installed by RAP in the Test Area for Remedial Action study area	13MAR87 - 15APR87	13	32

[a]Definitions:
RAP = Remedial Action Program
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

above, the information for these wells came from various documented and undocumented sources, including ORNL and USGS publications, borehole geophysical logs, and personal communications.

In accordance with the U.S. Environmental Protection Agency (EPA) regulations (40 CFR, Part 265, Subpart F), 77 water quality (WQ) wells have been installed in the ORNL area. Eight of the wells are located in WAG 8, 30 in WAG 6, and 39 in WAG 1. The wells are classified as upgradient (reference), downgradient, or internal WAG characterization wells, depending on their position in relation to the general direction of groundwater flow. Initially, these wells (Table 1, WQCONS) were sampled quarterly for one year and then less frequently (e.g., semiannually), depending upon the results of the analyses (Sect. 2.2.2). There are 35 additional water quality wells, in various stages of development, that are part of a total of more than 170 to be installed at the perimeters of the WAGs. Construction information for these wells will be entered into the data base as they are completed.

A series of hydrostatic head monitoring stations (HHMS) has been installed in the Pits and Trenches Area and SWSA 6 in order to characterize water levels, geology, and water quality in and surrounding these waste management areas (Table 1, HHMSCONS). Each HHMS consists of a cluster of three telescoping wells of varied depths, spaced approximately 25 ft apart. The deepest well was drilled to approximately 400 ft; the depths of the intermediate and shallow wells are approximately 200 and 80 ft, respectively. Data from these wells are providing information on the vertical and lateral distribution of hydraulic head and thus characterize deeper flow systems that have potential for transporting groundwater contaminants. These data will support two- and three-dimensional groundwater simulation models and will supplement the ORNL groundwater monitoring network in general.

Thirteen wells installed to meet CERCLA requirements are located adjacent to three impoundments: the 3513 pond, the Old Hydrofracture Facility (OHF) pond, and the Homogeneous Reactor Experiment (HRE) pond. Thirteen wells were also installed in the Test Area for Remedial Action

(TARA) located in SWSA 6 for the purpose of studying trench closure alternatives. Data sets containing construction information for these wells have been developed (Table 1, CERCONS and TARACONS).

Appendix A contains a series of maps showing the locations of all wells in the ORNL area, along with their well identifiers (IDs); the type and extent of data associated with these wells are presented in Appendix B. This information is provided so that one can more easily determine what kind of monitoring data are available for each well. For example, if one is interested in finding out how many water-level measurements are available for wells in WAG 3 and for what period of time, one should first locate that particular area on the index map (Fig. A.1), turn to the appropriate detailed map showing well numbers, and then refer to these well IDs in the tables of Appendix B.

2.2 GROUNDWATER

Groundwater hydrology and water quality data sets in the RAP Numeric Data Base are described in Table 2.

2.2.1 Groundwater Hydrology

Periodic depth-to-water measurements have been and continue to be made at selected piezometer wells installed by RAP and at selected older wells (Table 1, PIEZCONS and PRAPCONS, respectively). The objectives of such monitoring are to (1) determine the configuration of the water table, the directions of groundwater movement, and both the lateral and the vertical hydraulic gradients in the WAGs; (2) assess short-term water level changes resulting from periods of precipitation (aquifer recharge) and drought; (3) determine the amount of seasonal fluctuation of the water level in wells; and (4) track long-term water level trends in representative wells to detect effects of climatic change and human activities. The period of record and number of observations for each well are listed in Appendix B, Table B.1. Water temperature and specific

Table 2. SAS data sets of groundwater data

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
ENVSCI.MAF25255.SAS.ERFU2	ORNL water-level measurements			
PZ85_86	Depth-to-water measurements conducted at piezometer wells in 1985-1986	06FEB85 - 31DEC86	4,005	12
PZ87	Depth-to-water measurements conducted at piezometer wells in 1987	07JAN87 - 31DEC87	5,709	12
PZ88	Depth-to-water measurements conducted at piezometer wells in 1988	04JAN88 - 31JAN89	5,596	12
TEMPCHK	Temperature and specific conductance measured at selected piezometer wells	03MAR88 - 09MAR89	744	9
PZTEMPER	Probe depth and field-measured depth of the well for wells in TEMPCHK	03MAR88 - 26OCT88	57	6
STRMCHK	Records of wet or dry conditions at various seeps or stream check points; data used in support of depth-to-water measurements	18JUL86 - 29JUN88	297	8
GW5888	Periodic water-level measurements collected by the USGS; primarily historical data	20JUN50 - 28JUN88	24,335	7
ENVSCI.LDV25255.SAS.GSWELLS	USGS water-level measurements for wells equipped with continuous recorders			
CY85	Calendar year 1985 data	01OCT85 - 31DEC85	3,890	7
CY86	Calendar year 1986 data	01JAN86 - 31DEC86	21,089	8

Table 2. continued

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
CY87	Calendar year 1987 data	01JAN87 - 31DEC87	28,550	8
CY88	Calendar year 1988 data	01JAN88 - 31DEC88	20,102	8
ENVSCI.LDV25255.SAS.KETELLEV	Groundwater contaminant scoping survey, ORNL Main Plant Area and SWSA 3			
ACD1	Results of anion, cation, alkalinity, volatile organic, total organic carbon, and radiological analyses	15APR86 - 21OCT86	3,938	18
FIELD1	Sample date, well IDs, pH, specific conductance, and temperature results	15APR86 - 21OCT86	56	9
ENVSCI.LDV25255.SAS.MCCRAC	Groundwater contaminant scoping survey, White Oak Creek floodplain			
ACD2	Results of anion, cation, alkalinity, volatile organics, total organic carbon, and radiological analyses; also includes sample date, pH, specific conductance, and temperature results	20JUN87 - 07JUL87	1,108	20
ENVSCI.LDV25255.SAS.TORAN	Groundwater samples taken from 19 HHMS wells			
ACD1	Results of cation, anion, total organic carbon, and radiological analyses	23FEB87 - 31JUL87	986	19

Table 2. continued

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
ENVSCI.LDV25255.SAS.STANSV	Characterization of groundwater quality around the Waste Holding Basin (pond 3513) and ponds associated with the Old Hydrofracture Facility and the Homogeneous Reactor Experiment			
GDW_M	Groundwater monitoring well samples analyzed for cations, anions, fecal coliforms, mercury, polychlorinated biphenyls, pesticides, phenols, and radiological activity	06FEB85 - 28JUL87	1,866	29
W_COMP_M	Groundwater monitoring well samples analyzed for dissolved oxygen, pH, specific conductance, temperature, total organic carbon, and total organic halides; multiple sample results used to compare wells	06FEB85 - 27JUL87	1,081	29
ENVSCI.LDV25255.SAS.GWQUAL	RCRA water quality monitoring wells established for detection of groundwater contamination; data provided by EMC/ORNL			
FIELD85	Specific conductivity, pH, and temperatures	18SEP85 - 02JAN86	756	9
DIS85	Dissolved metals; filtered samples	18SEP85 - 07JAN86	418	13
TOT85	Total metals, organics, anions; unfiltered samples	18SEP85 - 07JAN86	1,402	14
FIELD86	Specific conductivity, pH, and temperatures	17MAR86 - 10DEC86	924	9

Table 2. continued

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
DIS86	Dissolved metals; filtered samples	17MAR86 - 10DEC86	495	13
TOT86	Total metals, organics, anions; unfiltered samples	17MAR86 - 10DEC86	1,734	14
FIELD87	Specific conductivity, pH, and temperature	09MAR87 - 04DEC87	693	9
DIS87	Dissolved metals; filtered samples	09MAR87 - 17MAR87	264	13
TOT87	Total metals, organics, anions; unfiltered samples	09MAR87 - 04DEC87	1,108	14
FIELD88	Specific conductivity, pH, and temperature	05JUN88 - 20DEC88	1,136	15
DIS88	Dissolved metals; filtered samples	05JUN88 - 04NOV88	341	21
TOT88	Total metals, organics, anions; unfiltered samples	05JUN88 - 20DEC88	5,955	21

[a]Definitions:

ORNL = Oak Ridge National Laboratory
USGS = U.S. Geological Survey
SWSA = Solid Waste Storage Area
HHMS = Hydrostatic Head Monitoring Station
RCRA = Resource Conservation and Recovery Act
EMC = Environmental Monitoring and Compliance

conductance are also being measured at 57 wells in conjunction with the water-level measurements (Table 2, TEMPCHK and PZTEMPER). These measurements will be used to more completely characterize the ORNL hydrogeology.

In addition to the periodic water-level measurements made by ORNL, USGS operated continuous water-level recorders on approximately 90 wells in the ORNL vicinity through 1988 (Table 2, CY85 - CY88). Monitored wells included the HHMS wells, the USGS U-series wells, and a few of the PRAP wells (see Sect. 2.1). Daily mean water levels, calculated from hourly unit values, have been retrieved from the USGS computer system in Nashville. The number of observations for these wells, which are organized by calendar year in the RAP Numeric Data Base, are presented in Appendix B, Table B.2.

Periodic groundwater elevation measurements conducted by the USGS are also available from the RAP Numeric Data Base (Table 2, GW5888). These measurements are of historical interest, dating back to 1950; the majority of these data were collected in the mid to late 1970s (Appendix B, Table B.3).

In conjunction with the water-level measurements, ORNL has periodically observed selected seeps and stream check points in the ORNL area (Table 2, STRMCHK). Such qualitative information is used in the study of groundwater hydrology, particularly for developing water-table contour maps.

2.2.2 Groundwater Quality

Groundwater quality at ORNL has been studied through both regulatory monitoring programs (routine sampling) and scoping surveys (one-time sampling efforts). The groundwater contaminant scoping surveys listed in Table 2 were conducted by R. H. Ketelle for the Main Plant area (WAG 1) and SWSA 3 (WAG 3); by D. W. McCrackin for the White Oak Creek floodplain (WAG 2); and by L. E. Toran for the Pits and Trenches area (WAG 7), SWSA 6 (WAG 6), and near White Oak Lake (WAG 2). Ketelle and McCrackin analyzed unfiltered water samples taken from the piezometer wells installed by RAP. Locations of these wells can be found in Appendix A. Water samples from this one-time sampling effort were analyzed for cations, anions, alkalinity,

volatile organics, total organic carbon (TOC), and radionuclides. Field pH, specific conductivity, and temperature were also recorded. Toran also conducted a one-time sampling of 19 HHMS wells. Toran's samples were filtered and analyzed for alkalinity, cations, anions, TOC, fluorescein (drilling fluid tracer) and radiological contaminants, as well as field pH, specific conductivity, redox, and temperature.

F. G. Taylor also conducted a contaminant scoping survey that included groundwater samples. Because he sampled cores from White Oak Lake as well as seeps from the SWSAs and the Pits and Trenches Area, his study is discussed further in Sect 2.5 (Contaminant Characterization).

Water quality wells installed by RAP (Table 1, WQCONS; Appendix A) are monitored by ORNL's Environmental Monitoring and Compliance (EMC) Department in accordance with EPA regulation (40 CFR Part 265, Subpart F). The results of these analyses are summarized and reported to the regulatory authorities by EMC, and copies of the electronic data are made available to RAP data management. The data, which are organized by calendar year in the RAP Numeric Data Base, are grouped according to the types of analyses: (1) dissolved metals in filtered samples; (2) total metals, organics, and anions in unfiltered samples; and (3) pH, specific conductivity, and temperature (Table 2). The sampling events for these wells are presented in Appendix B, Table B.4.

Wells installed around pond 3513, OHF, and HRE (Table 1, CERCONS) were monitored beginning February 1985, in compliance with CERCLA. The samples were analyzed for cations, anions, fecal coliforms, mercury, polychlorinated biphenyls (PCBs), pesticides, phenols, and radiological contaminants. Multiple sample results for dissolved oxygen, pH, temperature, specific conductance, TOC, and total organic halides (TOX) were used to compare wells. Sampling was discontinued in 1986 but was resumed in 1987 because of the potential presence of RCRA-listed toxic metals and fecal coliforms. Corresponding studies to characterize the contents of the pond water, pond sediments, and underlying strata are discussed in Sect. 2.5.

2.3 SURFACE WATER

Surface water hydrology and water quality data sets in the RAP Numeric Data Base are described in Table 3. Surface water quality is also studied as part of ORNL's Biological Monitoring and Abatement Program (BMAP) (Sect 2.7).

2.3.1 Surface Water Hydrology

Data on surface discharge in the Oak Ridge area are collected and managed by staff in ORNL's Environmental Sciences Division (ESD), EMC, and the USGS using a variety of methods and data management software. Average daily flow from three EMC stations and six USGS stations (Fig. 5) in the vicinity of ORNL are assembled by RAP data management staff into SAS data sets organized by calendar year. The raw EMC data are total flows read once a day, whereas the USGS data are average daily flows calculated from stage height readings made at 15-min intervals. Data from twelve additional USGS stations in the vicinity of the Oak Ridge Reservation (ORR) are also included in the data base. The period of record for observations in the RAP Numeric Data Base by site ID is shown in Table 4. In addition to the flow data, a SAS data set was created to record descriptive information (type of gage, collection frequency) for each monitoring station (Table 3, FLOW_LOC).

2.3.2 Surface Water Quality

The EMC Department routinely monitors water quality at three surface water sites in White Oak Creek and its tributaries and nine point source discharges, in accordance with the National Pollutant Discharge Elimination System (NPDES) permit issued to ORNL. Summaries of the NPDES data are published quarterly by EMC (e.g., Daniels et al. 1987). Monitoring sites are shown in Fig. 6. The data set describing the surface water stations (see Sect. 2.3.1) defines the site IDs. The water chemistry data are organized by calendar year in the RAP Numeric Data Base.

Radiological concentrations in surface water monitored by EMC are also available from the RAP Numeric Data Base. Water samples are collected regularly from more than 20 stations (Table 5); the stream sampling

Table 3. SAS data sets of surface water data

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
ENVSCI.LDV25255.SAS.FLOW	Daily surface discharge data collected by EMC/ORNL and USGS			
FLOW_LOC	Station description information	--	32	24
CY84	Calendar year 1984 flow data	01OCT84 - 31DEC84	276	5
CY85	Calendar year 1985 flow data	01JAN85 - 31DEC85	3,407	5
CY86	Calendar year 1986 flow data	01JAN86 - 31DEC86	4,308	5
CY87	Calendar year 1987 flow data	01JAN87 - 31DEC87	7,140	5
CY88	Calendar year 1988 flow data	01JAN88 - 31DEC88	7,668	5
ENVSCI.LDV25255.SAS.SWQUAL	Surface water quality data collected by EMC/ORNL			
SWCHM85	Calendar year 1985 water chemistry data	01JAN85 - 31DEC85	5,211	9
SWCHM87	Calendar year 1987 water chemistry data	02JAN87 - 31DEC87	6,646	9
SWCHM88	Calendar year 1988 water chemistry data	04JAN88 - 30DEC88	6,990	9
RADM87	Calendar year 1987 radiological concentrations in surface water; monthly values	31JAN87 - 30DEC87	812	14
RADQ87	Calendar year 1987 radiological concentrations in surface water; quarterly values	31MAR87 - 30DEC87	92	11
RADWK87	Calendar year 1987 radiological concentrations in surface water; weekly values	06JAN87 - 29DEC87	468	15

Table 3. continued

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
DAS86_87	Stream flow, pH, temperature, conductivity, turbidity, dissolved oxygen, and beta and gamma activity; hourly values during calendar years 1986 and 1987	01OCT86 - 31DEC87	30,035	15
DAS88	Stream flow, pH, temperature, conductivity, turbidity, dissolved oxygen, and beta and gamma activity; hourly values during calendar year 1988	01JAN88 - 31DEC88	26,040	15

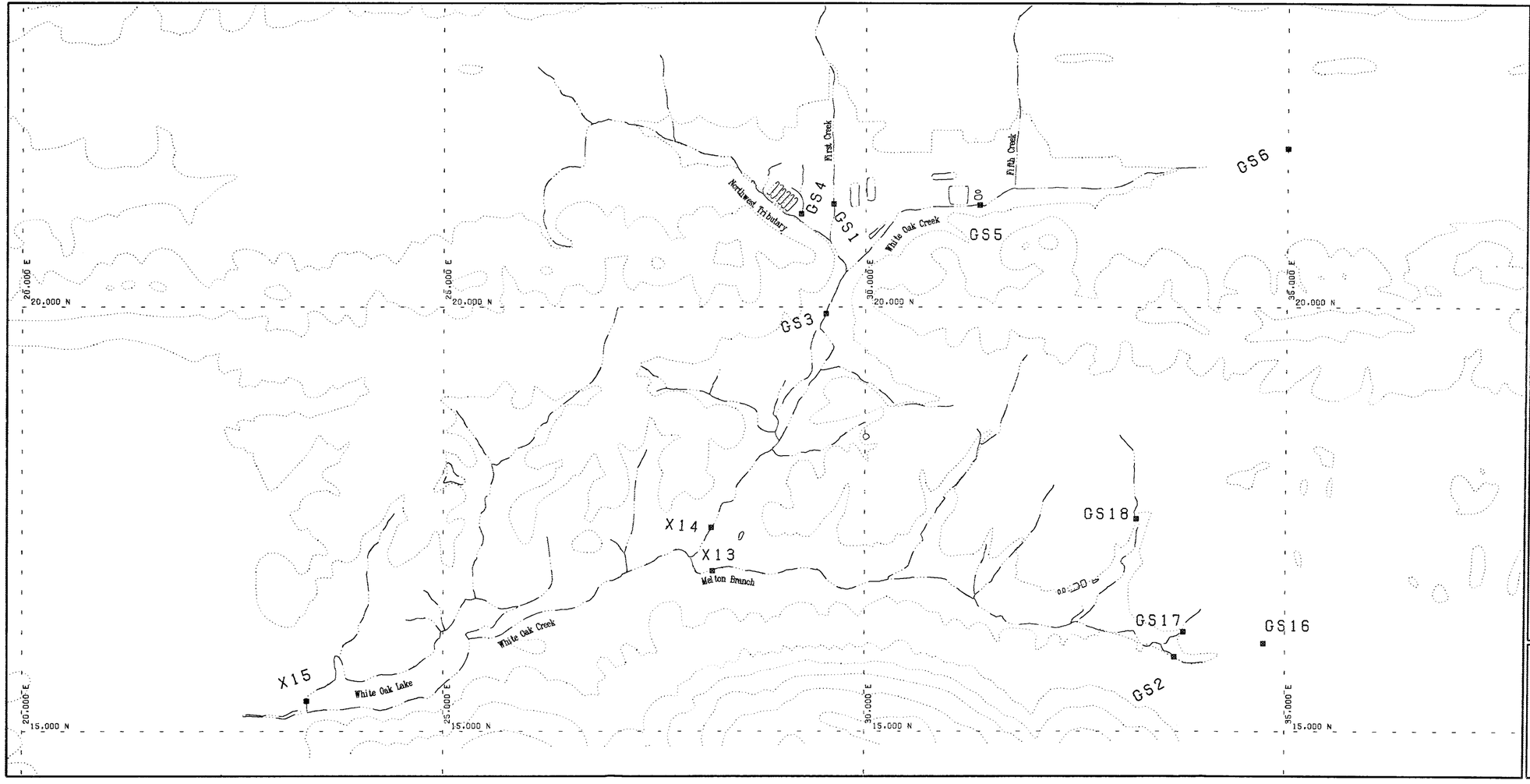
[a]Definitions:

EMC = Environmental Monitoring and Compliance

ORNL = Oak Ridge National Laboratory

USGS = U.S. Geological Survey

ORNL-DWG 89-2086



Legend

Sites

- Surface Discharge Sites

Lines

- X-10 Grid, 1000 ft interval
- Creeks, Ponds, and Basins
- Contours, 100 ft Interval (approx)

Map Scale 1:12000
March 1989

Fig. 5.

Locations of Surface Discharge Monitoring Sites for which Data Exist in the Remedial Action Program Numeric Data Base.

Table 4. Number of surface discharge values (mean daily flow) in the Remedial Action Program Numeric Data Base

Site ID[a]	Station name[b]	Number of observations by year			
		1985	1986	1987	1988
GS1	FIRST CREEK	-	-	334	366
GS2	MELTON BRANCH NEAR MELTON HILL (CENTER 7)	275	365	365	366
GS3	WOC BELOW MELTON VALLEY DR. (7500B)	275	365	365	366
GS4	NORTHWEST TRIBUTARY	-	-	254	366
GS5	PARSHALL FLUME: WHITE OAK CREEK	-	31	365	366
GS6	WHITE OAK CREEK NEAR MELTON HILL	-	-	268	366
GS7	BEAR CREEK AT STATE HIGHWAY 95	306	365	365	366
GS8	BEAR CREEK AT PINE RIDGE NEAR WHEAT	-	98	365	366
GS9	BEAR CREEK NEAR WHEAT	-	98	365	366
GS10	BEAR CREEK TRIB AT BEAR CREEK RD NEAR WHEAT	-	98	365	366
GS11	BEAR CREEK TRIB NEAR WHEAT	-	98	365	366
GS12	BEAR CREEK TRIB AT HWY 95 NEAR WHEAT	-	98	365	366
GS13	CLINCH RIVER AT MELTON HILL DAM (TAILWATER)	363	363	365	366
GS14	POPLAR CREEK NEAR OAK RIDGE	365	365	365	366
GS15	EAST FORK POPLAR CREEK NEAR OAK RIDGE	365	365	365	182
GS16	MELTON BRANCH TRIB (EAST SEVEN) NR OAK RIDGE, TN	-	-	150	366
GS17	MELTON BRANCH TRIB (CENTER SEVEN) NR OAK RIDGE, TN	-	-	150	366
GS18	MELTON BRANCH TRIB (WEST SEVEN) NR OAK RIDGE, TN	-	-	128	366

Table 4. continued

Site ID[a]	Station name[b]	Number of observations by year			
		1985	1986	1987	1988
X13	MELTON BRANCH ABOVE WHITE OAK CREEK CONFLUENCE	365	280	250	249
X14	WHITE OAK CREEK ABOVE MELTON BRANCH CONFLUENCE	365	280	250	246
X15	WHITE OAK CREEK AT WHITE OAK DAM	365	280	250	249

[a]The U.S. Geological Survey site IDs are as follows:

GS1 = 03536450	GS7 = 03538270	GS13 = 03535912
GS2 = 03537100	GS8 = 03538273	GS14 = 03538225
GS3 = 03536550	GS9 = 035382673	GS15 = 03538250
GS4 = 03536440	GS10 = 035382672	GS16 = 03537050
GS5 = 03536380	GS11 = 035382677	GS17 = 03537200
GS6 = 03536320	GS12 = 03538272	GS18 = 03537300

Sites labeled X13, X14, and X15 are monitored by the Oak Ridge National Laboratory.

[b]These specific station names are used in the data sets.

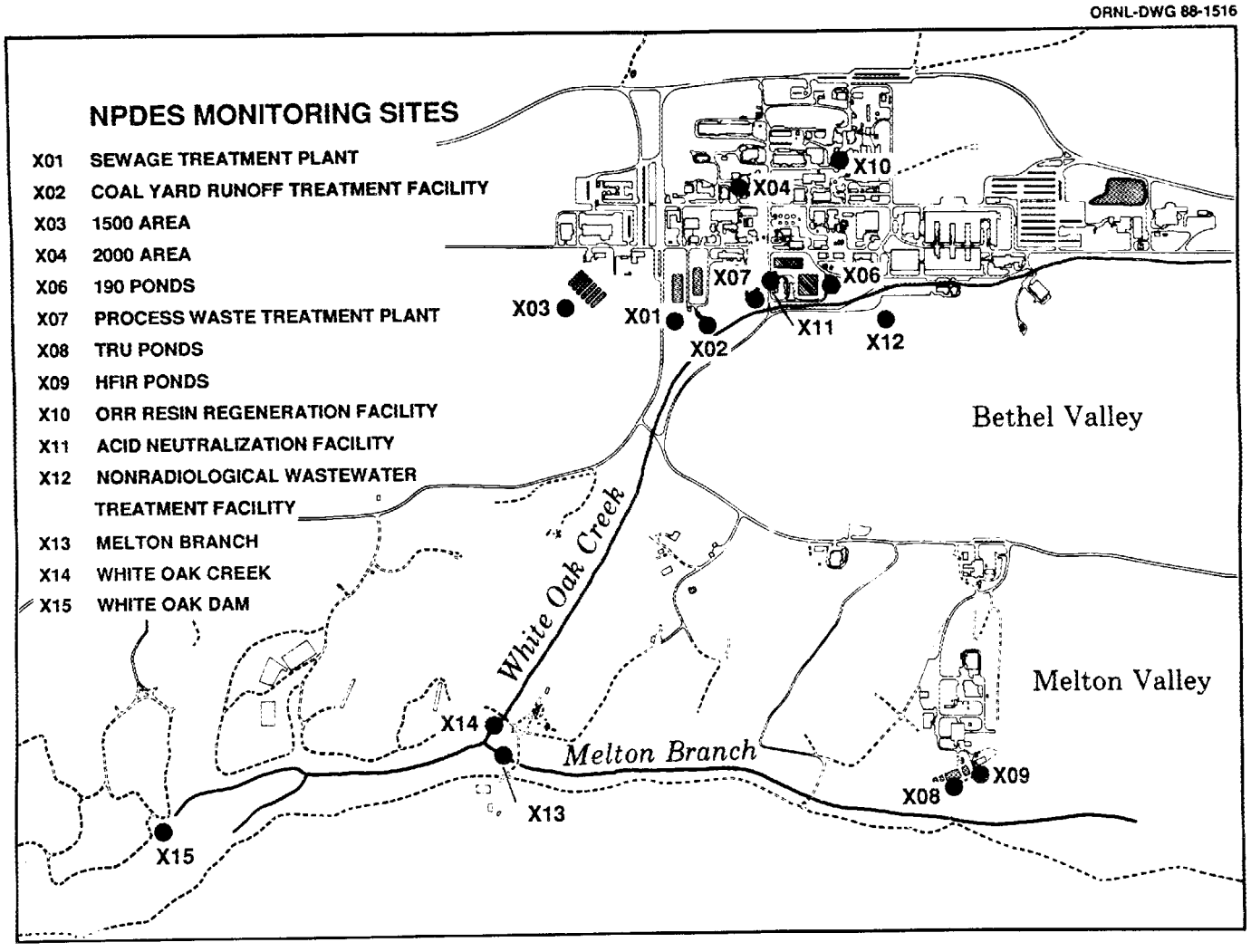


Fig. 6. Locations of monitoring sites for the National Pollutant Discharge Elimination System permit.

Table 5. Summary of collection and frequencies of radiological analyses of surface water and tap water samples

Station[a]	Parameter[b]	Collection frequency	Type	Analysis frequency
190 Ponds	Gamma scan, gross alpha, gross beta	Weekly	Flow proportional	Monthly
1500 Area, 3518	Gross alpha, gross beta	Weekly	Flow proportional	Monthly
2000 Area, STP	Gamma scan, gross beta, total Sr	Weekly	Flow proportional	Monthly
3544	Gross alpha, gross beta, gamma scan, total Sr	Weekly	Flow proportional	Monthly
7500 Bridge	Gamma scan, total Sr	Daily	Time proportional	Daily
7500 Bridge, MB1, WOC, MB2	Gamma scan, total Sr, ^{3}H	Weekly	Flow proportional	Monthly
First Creek, Fifth Creek, Raccoon Creek	Gamma scan, total Sr	Weekly	Grab	Monthly
Gallaher, Kingston	^{3}H, ^{60}Co, ^{137}Cs, gamma scan, gross alpha, gross beta, Pu, total Sr, U	Weekly	Grab	Quarterly
HFIR Ponds	Gamma scan, gross alpha, gross beta	After discharge	Flow proportional	Monthly
Melton Hill Dam	^{241}Am, ^{244}Cm, ^{60}Co, ^{137}Cs, gross alpha, Pu, Th, U, total Sr, ^{3}H	Weekly	Flow proportional	Quarterly
NWT	Gamma scan, total Sr	Weekly	Flow proportional	Monthly
ORNL Tap	^{60}Co, ^{137}Cs, gross alpha, gross beta, Pu, total Sr, U	Daily	Grab	Quarterly

Table 5. continued

Station[a]	Parameter[b]	Collection frequency	Type	Analysis frequency
ORR	^{60}Co, ^{137}Cs, gross alpha, gross beta	After discharge	Flow proportional	Monthly
WOC Headwaters	^{241}Am, ^{244}Cm, ^{60}Co, ^{137}Cs, gross alpha, total Sr, ^{3}H, Pu, Th, U	Weekly	Grab	Monthly
WOD	^{241}Am, ^{244}Cm, ^{60}Co, ^{137}Cs, gross beta, Pu, total Sr, ^{3}H	Weekly	Flow proportional	Weekly
TRU Ponds	Gross beta	After discharge	Flow proportional	Monthly

[a]Definitions:

STP = Sewage treatment plant
MB = Melton Branch
WOC = White Oak Creek
HFIR = High-Flux Isotope Reactor
NWT = Northwest Tributary
ORNL = Oak Ridge National Laboratory
ORR = Oak Ridge Reservation
WOD = White Oak Dam
TRU = Transuranic

[b]Total radioactive Sr (^{89}Sr + ^{90}Sr)

locations are shown in Fig. 7. Details of this monitoring activity are presented in EMC's quarterly reports (e.g., Daniels et al. 1987).

EMC also operates a Data Acquisition System (DAS) to obtain real-time data on surface flow, pH, temperature, conductivity, turbidity, dissolved oxygen, and beta and gamma activity (in counts per min) at NPDES stations X13, X14, and X15 (Fig. 6). Hourly summaries of these data are periodically retrieved for the RAP Numeric Data Base. DAS is designed and operated to detect irregularities in these data which may reflect abnormal plant operations. These data should be used with caution because when irregularities are detected, whether they occur because of abnormal plant operations or a malfunctioning sensor, the data are not flagged accordingly.

2.4 PRECIPITATION

Precipitation data in the Oak Ridge area are collected and managed by several investigators using a variety of methods and data management software. Total daily precipitation data from 25 sites -- 11 EMC, 10 ESD, 3 USGS, and 1 ATDD (Fig. 8) are assembled into SAS data sets organized by calendar year (Table 6). The period of record for observations for each site in the RAP Numeric Data Base is shown in Table 7. In addition to the precipitation data, a SAS data set was created to record descriptive information for each monitoring site (Table 6, PCIP_LOC). Selected information from this data set is presented in Table 8.

2.5 CONTAMINANT CHARACTERIZATION

Initial site investigations focused on the use of scoping surveys to characterize the environment with respect to the presence of radionuclides and hazardous chemicals. In addition to the groundwater scoping surveys discussed in Sect. 2.2.2, several other studies have been or are being conducted to characterize contaminants in the ORNL area (Table 9).

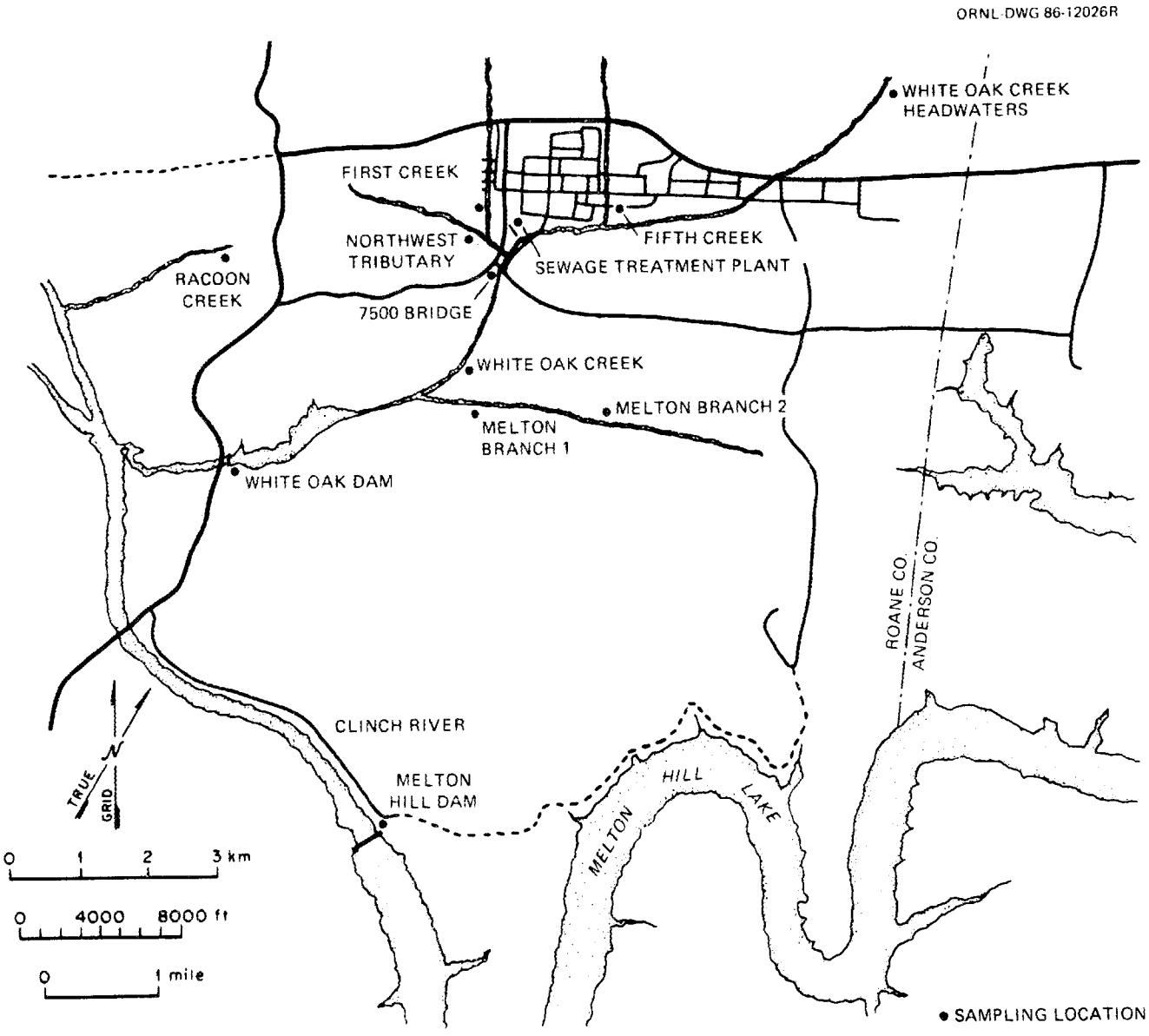


Fig. 7. Locations of Oak Ridge National Laboratory surface water radiological monitoring sites.

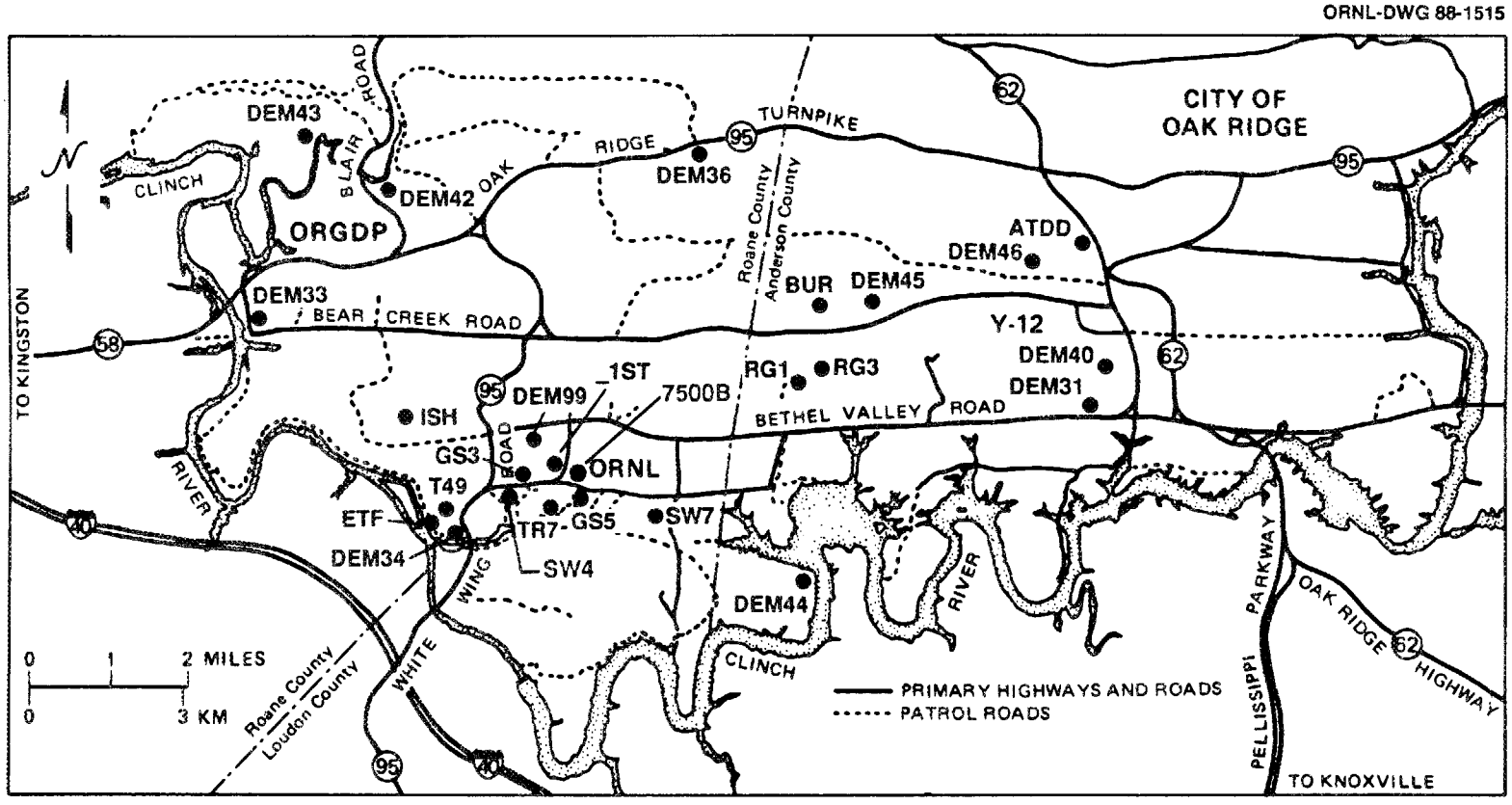


Fig. 8. Locations of precipitation monitoring sites for which data exist in the Remedial Action Program Numeric Data Base.

Table 6. SAS data sets of precipitation data

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
ENVSCI.LDV25255.SAS.PRECIP	Daily precipitation data collected by ESD/ORNL, EMC/ORNL, and USGS			
PCIP_LOC	Station description information	--	25	22
CY76	Calendar year 1976 data	01JAN76 - 31DEC76	732	5
CY77	Calendar year 1977 data	01JAN77 - 31DEC77	730	5
CY78	Calendar year 1978 data	01JAN78 - 31DEC78	730	5
CY79	Calendar year 1979 data	01JAN79 - 31DEC79	730	5
CY80	Calendar year 1980 data	01JAN80 - 31DEC80	875	5
CY81	Calendar year 1981 data	01JAN81 - 31DEC81	1,095	5
CY82	Calendar year 1982 data	01JAN82 - 31DEC82	1,459	5
CY83	Calendar year 1983 data	01JAN83 - 31DEC83	2,190	5
CY84	Calendar year 1984 data	01JAN84 - 31DEC84	2,280	5
CY85	Calendar year 1985 data	01JAN85 - 31DEC85	2,920	5
CY86	Calendar year 1986 data	01JAN86 - 31DEC86	6,761	5
CY87	Calendar year 1987 data	01JAN87 - 31DEC87	6,316	5
CY88	Calendar year 1988 data	01JAN88 - 31DEC88	7,960	5
ORT51_60	Oak Ridge Townsite, 1951-1960 data	01JAN51 - 31DEC60	3,653	5
ORT61_70	Oak Ridge Townsite, 1961-1970 data	01JAN61 - 31DEC70	3,652	5
ORT71_75	Oak Ridge Townsite, 1971-1975 data	01JAN71 - 31DEC75	1,826	5

[a]Definitions:

ESD = Environmental Sciences Division
ORNL = Oak Ridge National Laboratory
EMC = Environmental Monitoring and Compliance
USGS = U.S. Geological Survey

Table 7. Precipitation data (daily totals) in the Remedial Action Program Numeric Data Base

Site ID[a]	Site name[b]	Number of observations by year													
		1950 to 1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
_1ST	FIRST CREEK	--	--	--	--	--	--	--	--	--	--	--	--	184	366
ATDD	ATDD/NOAA	9,125	366	365	365	365	366	365	365	365	366	365	365	365	366
BUR	BEAR CREEK BURIAL GD	--	--	--	--	--	--	--	--	--	--	365	365	365	366
DEM31	KERR HOLLOW	--	--	--	--	--	--	--	--	--	--	--	297	173	357
DEM33	GALLAHER (NEAR K-25)	--	--	--	--	--	--	--	--	--	--	--	288	209	344
DEM34	WHITE OAK DAM	--	--	--	--	--	--	--	--	--	--	--	293	179	353
DEM36	OAK RIDGE TURNPIKE	--	--	--	--	--	--	--	--	--	--	--	302	173	362
DEM40	Y-12 (EAST)	--	--	--	--	--	--	--	--	--	--	--	317	199	360
DEM42	BLAIR ROAD (K-25)	--	--	--	--	--	--	--	--	--	--	--	320	206	362
DEM43	K-25 PENMETER	--	--	--	--	--	--	--	--	--	--	--	307	210	350
DEM44	DOSAR FACILITY	--	--	--	--	--	--	--	--	--	--	--	326	210	348
DEM45	Y-12 (WEST)	--	--	--	--	--	--	--	--	--	--	--	283	210	333
DEM46	SCARBORO FACILITY	--	--	--	--	--	--	--	--	--	--	--	75	137	--
DEM99	MET TOWER C	--	--	--	--	--	--	--	--	--	--	--	--	242	--
ETF	SWSA 6	--	--	--	--	--	143	365	365	365	366	365	365	365	366
GS3	USGS/SWSA 3	--	--	--	--	--	--	--	--	--	85	365	365	365	366
GS5	USGS/SWSA 5	--	366	365	365	365	366	365	365	365	366	365	365	365	366
ISH	ISH CREEK	--	--	--	--	--	--	--	12	365	366	365	365	365	366
RG1	WALKER BRANCH GAGE #1	--	--	--	--	--	--	--	176	365	366	365	365	365	366
RG3	WALKER BRANCH GAGE #3	--	--	--	--	--	--	--	176	365	366	365	365	365	366
SW4	SWSA 4	--	--	--	--	--	--	--	--	--	--	--	--	--	184
SW7	CENTER 7 CREEK WSHED	--	--	--	--	--	--	--	--	--	--	--	365	365	366
TR7	TRENCH 7	--	--	--	--	--	--	--	--	--	--	--	365	181	--
T49	49 TRENCH (SWSA 6)	--	--	--	--	--	--	--	--	--	--	--	303	365	366
75008	USGS/7500 BRIDGE	--	--	--	--	--	--	--	--	--	--	--	--	153	366

[a]Site IDs were assigned by the Remedial Action Program.
[b]These specific site names are used in the data sets:
ATDD = Atmospheric Turbulence and Diffusion Division
K-25 = Oak Ridge Gaseous Diffusion Plant
NOAA = National Oceanic and Atmospheric Administration
SWSA = Solid Waste Storage Area
USGS = U.S. Geological Survey

Table 8. Station descriptions for precipitation-monitoring sites generated from the SAS data set

Site ID[a]	Site name[b]	Type of gage	Collection frequency	Smallest unit of measure
_1ST	FIRST CREEK	BELFORT WEIGHING	10 MINUTES[c]	.01"
ATDD	NOAA/ATDD OAK RIDGE	BELFORT WEIGH & STICK GA.	HOURLY	.01"
BUR	BEAR CREEK BURIAL GD	BELFORT WEIGHING	10 MINUTES[c]	.01"
DEM31	KERR HOLLOW	BELFORT HEATED TIP BUCKET	10 MINUTES	.01"
DEM33	GALLAHER (NEAR K-25)	BELFORT HEATED TIP BUCKET	10 MINUTES	.01"
DEM34	WHITE OAK DAM	BELFORT HEATED TIP BUCKET	10 MINUTES	.01"
DEM36	OAK RIDGE TURNPIKE	BELFORT HEATED TIP BUCKET	10 MINUTES	.01"
DEM40	Y-12 (EAST)	BELFORT HEATED TIP BUCKET	10 MINUTES	.01"
DEM42	BLAIR ROAD (K-25)	BELFORT HEATED TIP BUCKET	10 MINUTES	.01"
DEM43	K-25 PENMETER	BELFORT HEATED TIP BUCKET	10 MINUTES	.01"
DEM44	DOSAR FACILITY	BELFORT HEATED TIP BUCKET	10 MINUTES	.01"
DEM45	Y-12 (WEST)	BELFORT HEATED TIP BUCKET	10 MINUTES	.01"
DEM46	SCARBORO FACILITY	BELFORT HEATED TIP BUCKET	10 MINUTES	.01"
DEM99	MET TOWER C	MRI TIPPING BUCKET	HOURLY	.01"
ETF	SWSA 6	BELFORT WEIGHING	10 MINUTES[c]	.01"
GS3	USGS/SWSA 3	BELFORT WEIGHING	DAILY	.01"
GS5	USGS/SWSA 5	ELECT. TIPPING BUCKET	DAILY	.01"
ISH	ISH CREEK	BELFORT WEIGHING	10 MINUTES[c]	.01"
RG1	WALKER BRANCH GAGE #1	BELFORT WEIGHING	10 MINUTES[c]	.01"
RG3	WALKER BRANCH GAGE #3	BELFORT WEIGHING	10 MINUTES[c]	.01"
SW4	SWSA 4	BELFORT WEIGHING	10 MINUTES[c]	.01"
SW7	CENTER 7 CREEK WSHED	BELFORT WEIGHING	10 MINUTES[c]	.01"
TR7	TRENCH 7	BELFORT WEIGHING	10 MINUTES[c]	.01"
T49	49 TRENCH (SWSA 6)	BELFORT WEIGHING	10 MINUTES[c]	.01"
7500B	USGS/7500 BRIDGE	TIPPING BUCKET	15 MINUTES	.01"

[a]Site IDs were assigned by the Remedial Action Program.
[b]These specific site names are used in the data sets:
ATDD = Atmospheric Turbulence and Diffusion Division
K-25 = Oak Ridge Gaseous Diffusion Plant
NOAA = National Oceanic and Atmospheric Administration
SWSA = Solid Waste Storage Area
USGS = U.S. Geological Survey
[c]Data are stored in breakpoint format; level of resolution is 10 min.

Table 9. SAS data sets on contaminant characterization studies

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
ENVSCI.LDV25255.SAS.HUFFV	Characterization of soil (drill cuttings) at water quality wells installed by RAP			
ACD	Pesticide, semivolatile organic, anions, cations, and radiological analyses	16JUL85 - 02MAR88	6,425	21
FIELD	Date sampled, well ID, sample ID, and core sample depth	16JUL85 - 02MAR88	130	11
WOD	Cation and radiological analyses of drill cuttings taken during WOD integrity study	06JAN88 - 21JAN88	332	18
ENVSCI.LDV25255.SAS.STANSV	Characterization of soil at wells installed around impoundments 3513, OHF, and HRE			
SOIL	Well drilling cuttings analyzed for radiological activity	07JAN85 - 13MAR85	26	20
SOIL2	Radiological analyses of soil samples taken near pond 3513	02APR86	88	21
CORES	Radiological analyses of rock cores beneath impoundments 3513 and OHF	10SEP86 - 28OCT86	279	23
ENVSCI.LDV25255.SAS.TAYLORV	Contaminant scoping survey of wells and seeps in the Solid Waste Storage Areas, the Pits and Trenches, and in sediment cores from White Oak Lake			
ACD1	Cations, organics, mercury, and radiological analyses results	09JUL85 - 07NOV85	10,141	19
FIELD1	Field data including sampling date and location, sample type, sample ID, sample depth, etc.	09JUL85 - 07NOV85	120	13

Table 9. continued

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
ENVSCI.LDV25255.SAS.CERLINGV	Contaminant scoping surveys of streambed materials and water			
ACD	Cations, anions, mercury, pesticides, organics, and radiological analyses results; a few alkalinity, polychlorinated biphenyls, and pH results	19JUL85 - 14MAY87	17,617	22
FIELD	Field data including sampling date and location, sample type, sample ID, etc.	19JUL85 - 14MAY87	768	16
ENVSCI.LDV25255.SAS.STANSV				
Characterization of pond water and sediments at impoundments 3513, OHF, and HRE				
POND_W	Pond water, analyzed for dissolved oxygen, pH, specific conductance, temperature, total organic carbon, total organic halides, cations, anions, fecal coliforms, mercury, polychlorinated biphenyls, pesticides, phenols, and radiological activity	26JAN85 - 02NOV87	1,529	22
SEDI	Pond sediments analyzed for cations, mercury, polychlorinated biphenyls, pesticides, and radiological activity	14NOV84 - 02APR87	940	23
^{85}Sr tracer study of OHF impoundment				
SR85_T12	Level of ^{85}Sr in pond water	18MAR87 - 17MAR88	54	14
SR85_T3	Analyses of radiological activity in pond sediments	13JUL87	13	17

Table 9. continued

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
SR85_T5	Levels of ^{85}Sr and ^{90}Sr in pond water	18MAR87 - 17MAR88	24	14
SR85_T67	Levels of ^{137}Cs in pond water	18MAR87 - 17MAR88	53	14
ENVSCI.LDV25255.SAS.TANKS	Characterization of inactive waste storage tanks and their contents			
TANKINFO	Description of inactive waste storage tanks	--	33	27
TANKDAT1	Field sampling data; contents profile, external contamination levels, and procedural variations	02JUN88 - 26SEP88	30	25
TANKDAT2	Field sampling data; sample IDs, sample types, and sample depths	02JUN88 - 26SEP88	142	8
ACD	Tank contents analyzed for alkalinity, pH, anions, cations, volatile and semivolatile organics, PCBs, and radiological activity	02JUN88 - 26SEP88	11,463	13

[a]Definitions:

RAP = Remedial Action Program
OHF = Old Hydrofracture Facility
HRE = Homogeneous Reactor Experiment
PCB = Polychlorinated biphenyl

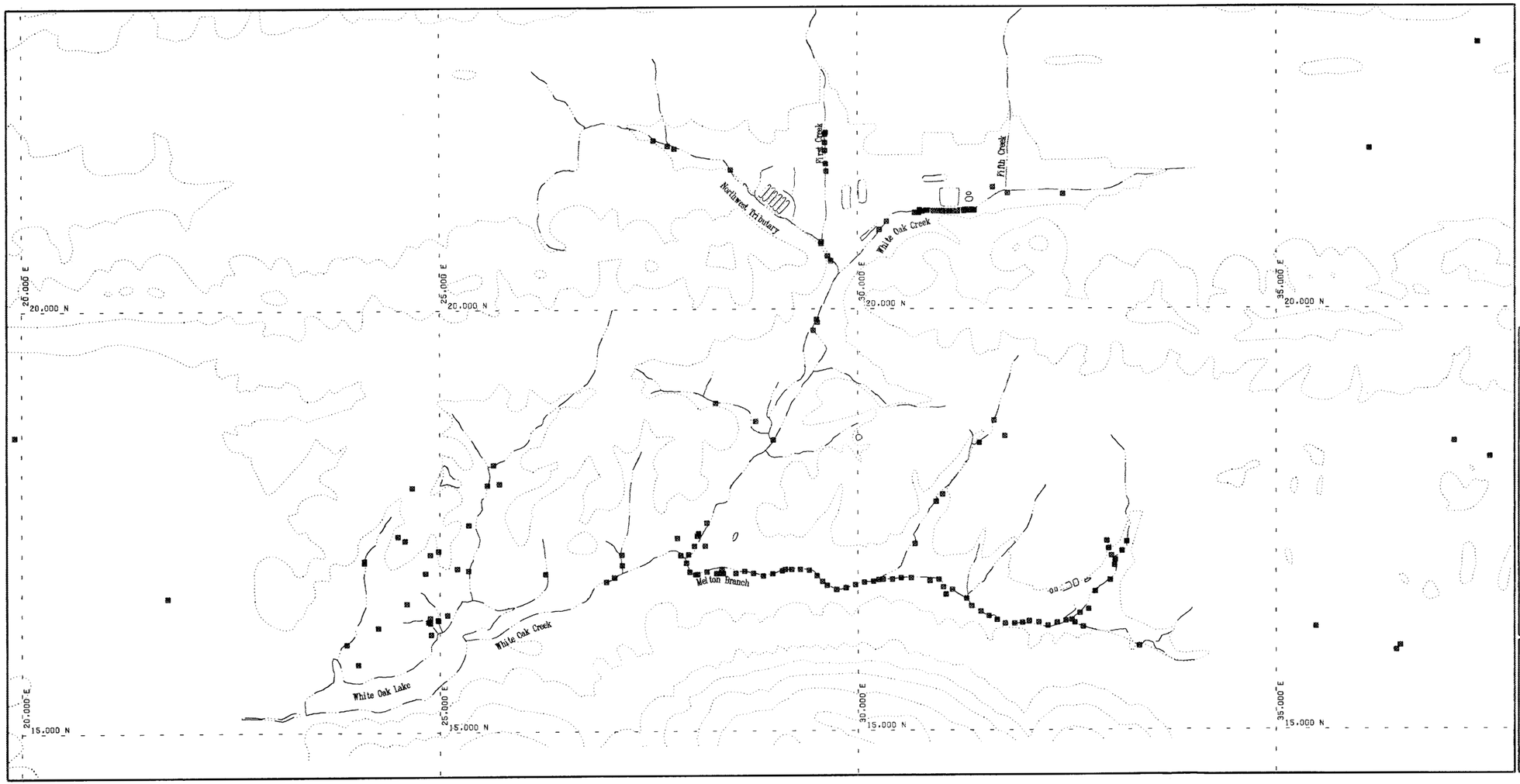
Drill cuttings taken during the installation of water quality wells in 1985 were analyzed for pesticides, organics, and radiological contaminants. In 1987 and 1988, an additional 55 WAG perimeter water quality wells were completed. Samples of drill cuttings and drilling water periodically taken during the installation of these wells were analyzed for cations, anions, and radionuclides. While drilling cores in White Oak Dam to determine its structural integrity, soil samples were collected near the saturation zone. These samples were analyzed only for cations and radiological activity. Drill cuttings taken during installation of wells around impoundments 3513, OHF, and HRE were analyzed for radioactivity only.

One of the first field studies in the program to characterize the environment over a broad area of the ORNL complex was conducted by F. G. Taylor in 1985. A total of 31 PRAP wells, 4 seeps, and 3 cores from White Oak Lake were analyzed for metals, organic compounds, and radionuclides. Results from this preliminary contaminant scoping survey were used to characterize the environmental contamination and to assess ORNL's remedial action needs and priorities.

In 1985, T. E. Cerling also conducted a contaminant scoping survey which focused on streambed materials and water in White Oak Creek and tributaries. The objectives of his study were to provide a basis for ranking areas in need of corrective action and to identify sites where further studies are needed to characterize contaminant migration in the White Oak Creek watershed (Fig. 9). The samples were analyzed for metals, anions, pesticides, organics, and radionuclides. Cerling continued to sample additional streambed sediments and a few selected PRAP wells in 1986 and in the spring of 1987 to evaluate whether there are continuing releases of contaminants within WAGs at ORNL. The primary purpose of the WAG scoping survey was to provide information requested in the ORNL Hazardous Waste Facility's draft permit under provisions of Section 3004(u) of RCRA. The results of Cerling's studies supported (1) recommendations to regulatory agencies about WAGs that require cleanup under RCRA and (2) a ranking of the WAGs based on the magnitude of potential releases.

Characteristics of pond water and sediments at impoundments 3513, OHF, and HRE were studied by R. G. Stansfield and C. W. Francis in 1985.

ORNL-DWG 89-2087



Legend

Sites

- Cerling Sample Sites

Lines

- X-10 Grid, 1000 ft interval
- Creeks, Ponds, and Basins
- Contours, 100 ft Interval (approx)

Map Scale 1:12000
March 1989

Fig. 9.

Sampling Locations for Cerling Contaminant Scoping Survey to Detect Continuing Release of Contaminants.

Sediment samples were analyzed for cations, mercury, PCBs, pesticides, and radiological activity. Water samples were analyzed for these same parameters and also dissolved oxygen, pH, specific conductance, temperature, TOC, TOX, and fecal coliforms. Data on groundwater surrounding the ponds are contained in data sets identified in Sect. 2.2.2.

The inactive waste storage tanks at ORNL are being characterized to plan remedial action (Table 9). Physical descriptive information for the tanks (e.g., tank location, age, size, configuration) has been compiled. The contents of 30 accessible tanks were profiled, and samples were collected from the 27 which contained liquids and/or sludge. The liquid and sludge levels, external contamination data, and procedural information were recorded as the tanks were sampled. Sample types, the depth of the liquid or sludge sample, and the amount of surface radioactivity were noted for each sample. Chemical analyses of the samples included alkalinity, pH, anions, organics, metals, PCBs, and radiological constituents.

2.6 MAINTENANCE AND SURVEILLANCE

A series of radiological and hazardous waste scoping surveys have been and continue to be conducted by the Health and Safety Research Division (HASRD) of ORNL for the Maintenance and Surveillance Phase of the program. The surveys include a variety of sites known to have historical contamination problems. The purpose of these surveys is (1) to identify levels of radioactive contamination and hazardous waste and (2) to determine if the concentrations of these contaminants warrant corrective actions to minimize personnel exposure and/or further surface contamination. A description of the survey methods and instrumentation is presented in Myrick et al. (1987).

Measurements taken at many of the sites include gamma exposure rate at the surface, gamma exposure rate at 1 m, alpha, and beta-gamma dose rate. In addition, soil samples were collected at selected locations and analyzed for a variety of radionuclides, metals (As, Ba, Cd, Cr, Pb, Hg, Se and Ag), insecticides (lindane, endrin, toxaphene and methoxychlor) and herbicides (2,4-D and 2,4,5-TP). The data sets from these surveys, which have been incorporated into the RAP Numeric Data Base, are described in Table 10.

Table 10. SAS data sets of surface radiological and hazardous waste scoping surveys

SAS library/ SAS data set	Description of library/data set	Time period	Number of observations	Number of variables
ENVSCI.AXR25255.SAS.MSCAP	Results of routine maintenance and surveillance monitoring to determine the need for near-term corrective action			
FIELD	Sampling locations	AUG86 - MAY87	220	9
BACKGRND	Background radiation concentrations	AUG86 - FEB87	24	9
REGSTNDS	Regulatory standards	--	14	4
RAD1	Gamma exposure rate	AUG86 - FEB87	407	22
RAD2	Alpha and beta-gamma activity levels	AUG86 - FEB87	47	11
SOILS	Concentrations of radionuclides, metals, and pesticides in soil samples; soil characteristics	AUG86 - MAY87	3,086	13

2.7 BIOLOGICAL MONITORING

As a condition of the NPDES permit issued to ORNL on April 1, 1986, a Biological Monitoring and Abatement Program (BMAP) was developed for White Oak Creek (WOC), selected tributaries, and the Clinch River. The BMAP consists of the following seven major tasks: (1) toxicity monitoring; (2) bioaccumulation monitoring of nonradiological contaminants in aquatic biota; (3) biological indicator studies; (4) instream ecological monitoring; (5) assessment of contaminants in the terrestrial environment; (6) radioecology of WOC and White Oak Lake; and (7) contaminant transport, distribution, and fate in the WOC embayment-Clinch River-Watts Bar Reservoir system. SAS data sets that have been incorporated into the RAP Numeric Data Base on these subjects are listed in Table 11. Many of the sampling sites are used for more than one study (Fig. 10). Thus, having these data in a common data base and format will allow information from one BMAP study to be easily related to another or with all data in the RAP Numeric Data Base.

2.8 TECHNOLOGY DEMONSTRATIONS

Descriptions of data sets associated with technology demonstration studies are presented in Table 12. These include the Shallow Land Burial (SLB) Closure demonstration and the In Situ Vitrification (ISV) study.

The purpose of the SLB Closure study is to demonstrate and evaluate stabilization and closure techniques at a low-level solid waste disposal site at ORNL. The techniques include dynamic compaction, in situ grouting, and covering for a group of waste disposal trenches at TARA in SWSA 6. Current data include construction information on wells installed in the area under investigation, associated water levels, water quality, and soil gas.

In situ vitrification is a potential technique for immobilization and closure of various ORNL contaminated sites. A 25-ton mass of vitrified material was produced in the field within a scale model of an old seepage

Table 11. SAS data sets on the Biological Monitoring and Abatement Program studies

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
ENVSCI.LDV25255.SAS.BMAP	Data from the Biological Monitoring and Abatement Program			
Population estimates and associated data				
HABITFLW	Habitat description of BMAP sampling sites: flow conditions	19MAY88 - 09JUN88	1,462	10
HABITSUB	Habitat description of BMAP sampling sites: substrate characteristics	10JUN88 - 02AUG88	648	31
WCCLS1	Taxonomic and ecological classifications for WOC benthic invertebrate data	--	232	10
WCBEN1A	WOC benthic invertebrate data from monthly samples	05MAY86 - 05OCT86	2,310	13
WCFLD1A	WOC benthic invertebrate data from monthly samples, including substrate conditions, water temperature, and stream stage	05MAY86 - 05OCT86	288	20
WCQL1A	WOC benthic invertebrate data from qualitative samples	01APR87	425	11
WC_CHM	WOC fish population study: water conditions	22MAY85 - 09DEC87	103	20
WC_SHK	WOC fish population study: collection specifics	22MAY85 - 09DEC87	244	21
WC_FSH	WOC fish population data: fish collected	22MAY85 - 09DEC87	16,899	16

Table 11. continued

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
WOLFISH	WOL fish population survey; estimation by species	07MAY87 - 13MAY87	3,552	10
W_FOWL	Record of waterfowl sightings in Oak Ridge area	16OCT87 - 12AUG88	3,809	7
Toxicity bioassay studies				
WOCCHEM	WOC toxicity bioassay results: water chemistry	20MAR86 - 25MAR87	1,260	15
WOCCD	WOC toxicity bioassay results: Ceriodaphnia survival and reproduction	21MAR86 - 25MAR87	192	19
WOCFHM	WOC toxicity bioassay results: fathead minnow survival and growth	27MAR86 - 26MAR87	768	12
CNTB_IND	Reference sites: physiological stress indicators	15JUN87 - 22JUN87	57	44
WOCB_IND	WOC fish: physiological stress indicators	19NOV86 - 15OCT87	160	48
CHLOROPL	WOC watershed chlorophyll-a and carbon uptake by periphyton	24OCT86 - 26OCT88	2,796	9
WOCORGS	Organic and mercury analyses in WOC watershed	26JAN87 - 23APR87	1,504	21
WOCSURWQ	WOC surface water quality related to periphyton studies	23JUL86 - 30NOV88	5,671	21
Contaminant concentrations in biological samples				
FISH_MET	Metal analyses of fish collected from WOC, Clinch River, and reference sites	25NOV86 - 23FEB87	60	13

Table 11. continued

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
FISH_ORG	Organic analyses of fish collected from WOC, Clinch River, and reference sites	25NOV86 - 23FEB87	50	11
FISH_PCB	PCB and ^{90}Sr analyses of fish collected from WOC, Clinch River, and reference site.	25NOV86 - 23FEB87	50	11
FISH_RAD	Radionuclide analyses of fish taken from WOL	07MAY87	280	20
CLAM_PCB	PCB concentrations in clams exposed for one month in WOC	15JUL87 - 17AUG87	20	11
SNAPPERS	Radionuclide, mercury, and DNA analyses of common snapping turtles	20APR88 - 12JUL88	21	11
TURTLES	Radionuclide, mercury, and DNA analyses of yellow-bellied sliders	27JUL87 - 18SEP87	24	32
COOT_RAD	Total strontium in American Coots trapped at WOL	27FEB88	6	21
MAMMALS	Radionuclides in small mammals (rats and mice) collected at East Fork Poplar Creek and SWSA 4	22MAY87 - 27SEP87	129	13
MACROPHY	Radionuclides and metals in emergent macrophytes in WOC watershed	08SEP87 - 23SEP88	1,242	27
Off-site/Watts Bar Reservoir and Clinch River studies				
CORESTP	Tennessee State Plane coordinates for sediment core samples	--	59	3

Table 11. continued

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
WB_FIELD	Sediment core sample IDs, dates, depths, and weights	22JUL86 - 25SEP87	1,100	8
WB_CORES	Radiological analyses of sediment core samples	22JUL86 - 25SEP87	17,584	12
SED_INV	^{137}Cs and ^{7}Be inventory in sediments estimated from core samples	--	204	15

[a]Definitions:

BMAP = Biological Monitoring and Abatement Program
WOC = White Oak Creek
WOL = White Oak Lake
PCB = Polychlorinated biphenyl
SWSA = Solid Waste Storage Area

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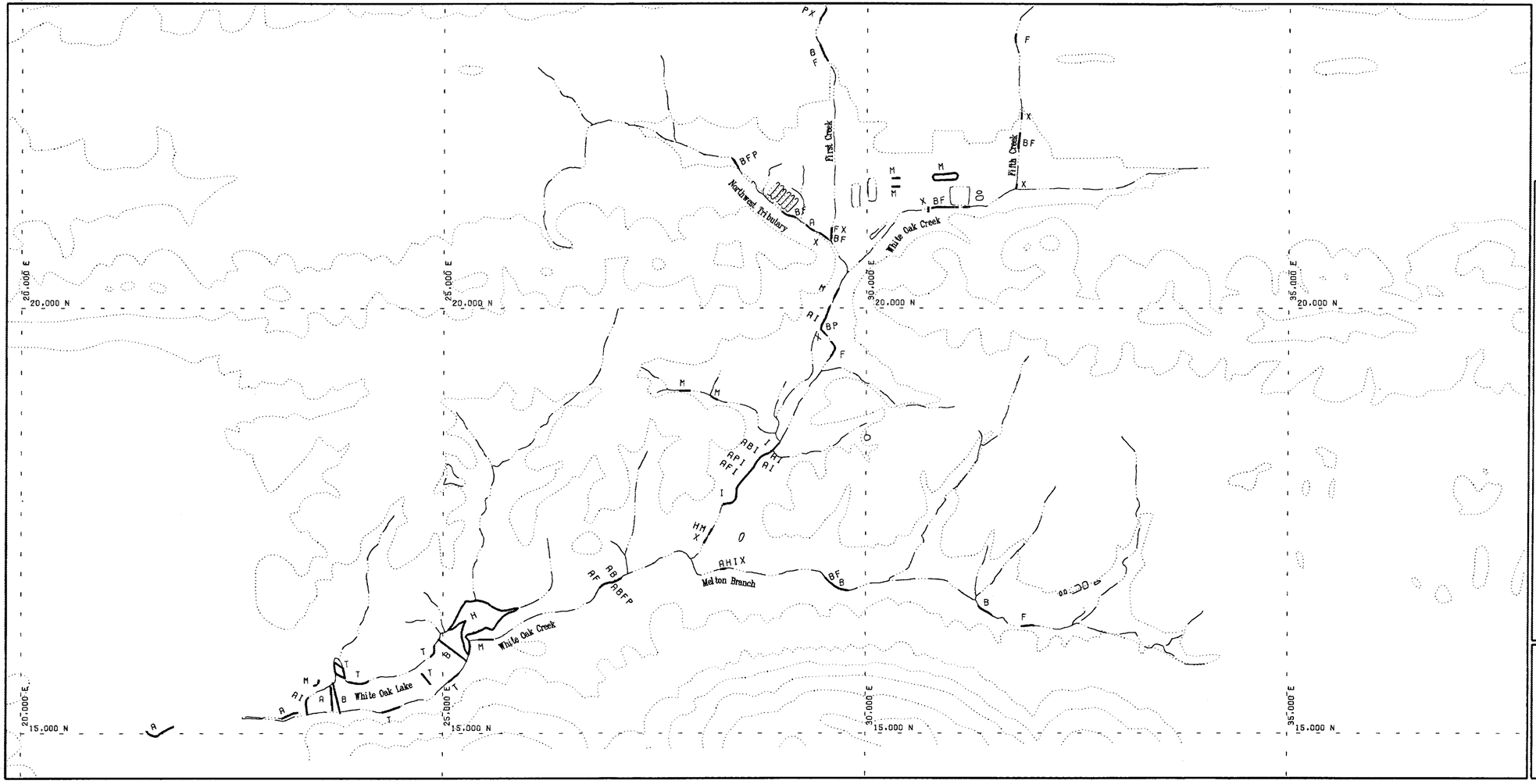

Legend

Monitoring Codes

A = Fish, bioaccumulation
B = Benthos
F = Fish
H = Macrophytes
I = Fish, bioindicators
M = Mammals
P = Periphyton
T = Turtles
X = Ambient toxicity

Lines

- - - X-10 Grid, 1000 ft interval
——— Creeks, Ponds, and Basins
····· Contours, 100 ft interval (approx)

Map Scale 1:12000
March 1989

Fig. 10.

Sampling Sites for the Biological Monitoring and Abatement Program Studies.

Table 12. SAS data sets on technology demonstration studies

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
ENVSCI.IJL25255.SAS.SLB	Data associated with the SLB Closure demonstration			
TARACONS	Construction data on wells used for the SLB demonstration	01JAN77 - 15APR87	15	32
WATEREL	Manual water-level measurements for the TARA wells	21MAY87 - 21JUN88	1,056	10
W_LEVELS	Continuous water-level measurements for the TARA wells	04MAR88 - 12OCT88	3,868	10
FIELD	Temperature, pH, dissolved oxygen, and conductivity for TARA wells	18NOV87 - 23NOV87	15	9
WELLWQ	Results of cation, anion, and organic analyses of water from the TARA wells	18NOV87 - 23NOV87	2,070	22
ORG_VAP	Soil organic vapor analyses of cores taken in the vicinity of TARA	03MAR88 - 12APR88	221	16
SOIL_ORG	Organic analyses of soil cores taken in the vicinity of TARA	08MAR88 - 11APR88	990	19
SOIL_RAD	Radiological analyses of soil cores taken in the vicinity of TARA	03MAR88 - 12APR88	681	18
ENVSCI.LDV25255.SAS.ISV	Data associated with the ISV demonstration			
OFFGAS	dissolved and total solids, total and soluble alpha and beta, and pH measured at various sample points in the off-gas scrubbing system	25JUN87 - 05AUG87	108	15

Table 12. continued

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
ACD_GAS	Chemical analysis of off-gas scrubbing solutions and filters	25JUN87 - 05AUG87	3,769	21
ACD_RCK	Elemental composition of the "wastes" before and after vitrification	--	1,493	21
ORNLOFFG	Temperatures, flow rates, CO and CO_2 concentrations at various points in the off-gas scrubbing system measured over time during the ISV field demonstration	14JUL87 - 19JUL87	240	15
TEMPC	Temperature measured at thermocouples at center of the ISV site	14JUL87 - 19JUL87	2,400	8
TEMP10	Temperature measured at thermocouples placed 10 ft from center of the ISV test site	14JUL87 - 28AUG87	11,712	8
TEMP7	Temperature measured at thermocouples placed 7 ft from center of the ISV test site	14JUL87 - 28AUG87	3,637	8
POWER	Electric power consumed during the demonstration	14JUL87 - 19JUL87	76	11

[a]Definitions:
SLB = Shallow Land Burial
TARA = Test Area for Remedial Action
ISV = In situ vitrification

trench to which stable strontium and cesium had been added as surrogates for ^{90}Sr and ^{137}Cs. Data were collected to analyze the performance of the test, and samples were taken to determine the leaching characteristics of the waste form produced in the field.

2.9 MISCELLANEOUS STUDIES/DATA SETS

Data sets which do not conveniently fit into any of the categories established for the RAP Numeric Data Base are listed in Table 13. These include regulatory standards, general information about the WAGs and Solid Waste Management Units (SWMUs), results of a study by Cerling to compare three extraction procedures, and an inventory of solid wastes disposed of in SWSAs 5 and 6.

2.10 FORMAT FILES

Although almost anything can be computerized in some kind of format, often it is not practical to maintain lengthy character fields in a data set that will be printed routinely. In such cases, codes are assigned to represent a data entry. For example, "04A" is the standard NPDES code for 4,6-dinitro-2-methylphenol. SAS format files have been added to the data base so that chemical names can be displayed in several ways: with ACD's abbreviation, the full name of the element or compound, the NPDES code, the Priority Pollutant code, or the Chemical Abstract Service number. Also, format files have been written to refer to the geologic unit of a core segment, to the pipe and screen materials used in the construction of the piezometer and water quality monitoring wells, and to the full order names of benthic invertebrates. These files are listed in Table 14.

2.11 GEOGRAPHIC INFORMATION SYSTEM DATA

Because several grid coordinate systems are used for the ORNL vicinity, a major concern in dealing with geographic data for RAP is that those who provide and/or receive such data know (1) which grid is used and

Table 13. SAS data sets on related miscellaneous studies

SAS library/ SAS data set	Description of library/data set[a]	Time period	Number of observations	Number of variables
ENVSCI.MJG25255.SAS.RAPDEM				
WAG_INFO	Descriptive information about the Waste Area Groupings and Solid Waste Management Units	--	253	9
ENVSCI.LDV25255.SAS.GWQUAL				
STAND	EPA Interim Primary Drinking Water Standards for analyses of water from RCRA wells. Parameters without standards are flagged	--	31	4
ENVSCI.LDV25255.SAS.CERLINGV	Comparison of three extraction procedures for streambed materials			
EXTRACT	Cations analyzed for comparison of extraction procedures	--	1,970	22
FIELD	Field data including sampling date and location, sample type, sample ID, etc.	--	768	16
PC-SAS DATA SETS				
SWSA5INV.SSD	Inventory of solid wastes disposed of in SWSA 5	06OCT70 - 06JUN88	7,986	23
SWSA6INV.SSD	Inventory of solid wastes disposed of in SWSA 6	01OCT68 - 06JUN88	16,708	23

[a]Definitions:
EPA = U.S. Environmental Protection Agency
RCRA = Resource Conservation and Recovery Act
SWSA = Solid Waste Storage Area

Table 14. Format files for defining data entries for selected variables

Data set	Member name	Description of file[a]
ENVSCI.LDV25255.SASFMTS	(PPFMT)	File for converting from NPDES to PP codes; can be used with ACD SAS data sets
	(CASFMT)	File for converting from NPDES to CAS codes; can be used with ACD SAS data sets
	(NAMEFMT)	File for converting from abbreviations to full chemical names; can be used with ACD SAS data sets
	(DETECT)	File defining detection limits for organic compounds; can be used with ACD SAS data sets
	(GFMT)	File for printing geounit when used with the WQCONS, PIEZCONS, and HHMSCONS SAS data sets
	(SFMT)	File for printing pipe material and screen material when used with the WQCONS and PIEZCONS SAS data sets
	(ORDER)	File for converting from abbreviations of taxonomic orders of aquatic macroinvertebrates to full order name; can be used with BMAP benthic invertebrate data

[a]Definitions:

NPDES = National Pollution Discharge Elimination System
PP = Priority Pollutants
ACD = Analytical Chemistry Division
CAS = Chemical Abstracts Service
WQCONS = Construction data for water quality wells
PIEZCONS = Construction data for piezometer wells
BMAP = Biological Monitoring and Abatement Program

(2) how to convert from one grid system to another. This topic is addressed in Sect. 2.11.1, followed by a discussion of the GIS data files developed for RAP (Sect. 2.11.2).

2.11.1 Grid Coordinate Systems

Several map coordinate systems may be applied to ORR including the ORNL (X-10) Grid, the Oak Ridge Y-12 Plant (Y-12) Grid, the Oak Ridge Gaseous Diffusion Plant (K-25) Grid, the Administrative Grid (AGS), Tennessee Lambert State Plane, and latitude/longitude (lat/long) coordinates. Conversion from one system to another is not a simple matter; the accuracy of the conversion depends in part on the number and accuracy of control points used in developing the transformation equations. In 1988 a new set of transformation relationships was developed by Geophysical Service, Inc. (1988), based on 43 reference points determined on the ORR with a Global Positioning System (GPS). This method of coordinate conversions has been adopted for the ORNL RAP, replacing those transformation procedures referred to in the 1987 Annual RAP Data Management Report (Voorhees et al. 1988).

All location data in the RAP Numeric Data Base are entered and retained in the original form. For example, if a location is surveyed in the X-10 Grid or if a sampling point is read off a map drawn in the Y-12 Grid, then these data are retained in the data set as X-10 and Y-12 grid coordinates, respectively. The conversion of location data from one grid system to another or from two grid systems into a third (such as lat/long coordinates) is done at the time it is needed.

2.11.2 Geographic Information System Data Sets

A data base of descriptions of the spatial characteristics of activities in RAP has been established in the ESD Geographic Information System (GIS). ESD's GIS operates on a VAX cluster and uses ARC/INFO software. The structure of the GIS data base for RAP is organized at two levels. The detailed level of organization is a collection of geographic features (e.g., points, lines, or polygons) and their associated attributes

(e.g., well ID, elevation, area) and is called a "coverage." A coverage typically has geographic features that represent some common theme such as roads, wells, or streams. For the GIS data developed for RAP, these coverages are further organized into VAX subdirectories that represent a common collection of themes. For example, all of the different types of wells associated with RAP are in one VAX subdirectory.

ARC/INFO has analytical capabilities to process spatial data in either larger or smaller aggregations of data than a single coverage. These aggregations of spatial data may be either temporary or permanent. The GIS software also has the ability to spatially interrelate the features from multiple coverages. This analytical flexibility has allowed the GIS data to be stored in aggregations that best suit the needs of the remainder of the RAP Numeric Data Base and the purposes of the program.

The RAP GIS data are grouped into the follow major themes:

- groundwater wells,
- biological and surface sampling locations,
- SWMUs,
- WAG boundaries,
- descriptive background features (roads, buildings, etc.), and
- off-site sampling locations.

Within each of these major themes, there are one or more subthemes stored as coverages. For example, within the groundwater wells, attributes of the piezometer and CERCLA wells are stored as separate coverages. The structure of the RAP GIS data base is summarized in Table 15. Details about the contents of each coverage are presented in Appendix C (Table C.1).

We recently received GIS data for the S-16A map, which covers several square miles around the ORNL site; the U.S. Department of Energy and Tennessee Valley Authority agreed to have RAP data management process these digital data for use by the USGS. BNI has digitized topography, roads, buildings, utilities, streams, and water bodies for the area under investigation by RAP. Copies of these data sets will also be transferred to the RAP Numeric Data Base.

Table 15. Overview of the Remedial Action Program Geographic Information System data base structure[a]

Vax subdirectory	Coverage name	Coverage theme[b]	Number of features[c]
U3:[RQM.RAP.CORE]	COREDD	Off-site RAP sediment samples	59
	CORESITES	Off-site RAP sediment samples	48
	CORESTP	Final off-site sediment samples	59
	LAKE	Draft Watts Bar Lake outline	0
	WBLAKESTP	Watts Bar Lake outline	31
U3:[RQM.RAP.NWELLS]	ACRE4	4-acre site wells	7
	ACRE4H	4-acre site wells near HF wells	7
	ACRE4P	4-acre site wells near PRAP wells	7
	CERCONS	RAP CERCLA wells	13
	HFLOC	Hydrofracture wells	89
	HFLOCWAG	Hydrofracture wells with WAGs	89
	HHLOC	Hydrostatic head monitoring wells	19
	HHLOCWAG	Hydrostatic head monitoring wells with WAGs	19
	HHMS88	Revised hydrostatic head monitoring wells	31
	HHMS88WAG	Revised hydrostatic head monitoring wells with WAGs	31
	PCIPLOC	Precipitation monitoring sites	20
	PCIPLOCWAG	Precipitation monitoring sites with WAGs	20
	PRLOC	PRAP wells	651
	PRLOCWAG	PRAP wells with WAGs	651
	PZDEC	RAP piezometer wells	331
	PZDECWAG	RAP piezometer wells with WAGs	331
	STDWELL	Stockdale wells	51
	STDWELLN	Stockdale wells nearest PRAP wells	51
	TARA	Test Area for Remedial Action wells	13
	UCONT	Continuous monitoring wells	93
	UWELLS	USGS continuous monitoring wells	28
	UCONT	USGS continuous monitoring wells with WAGs	26
	WQ88	Revised RAP RCRA water quality wells	77
	WQ88WAG	Revised RAP RCRA water quality wells with WAGs	77
	WQLOC	RAP RCRA water quality wells	22
	WQLOCWAG	RAP RCRA water quality wells with WAG	22
U3:[RQM.RAP.SAMPTS]	BIOA	Stream sampling - bioaccumulation	9
	BIOALL	Stream sampling for biological monitoring	72
	BIOB	Stream sampling - benthos	13
	BIOF	Stream sampling - fish	12
	BIOH	Stream sampling - macrophytes	3
	BIOI	Stream sampling - bioindicators	4
	BIOL1	Stream sampling - biological monitoring	67
	BIOL4	Revised stream sampling - biological monitoring	68
	BIOL4P	Stream sampling points - biological monitoring	68

Table 15. continued

Vax subdirectory	Coverage name	Coverage theme[b]	Number of features[c]
U3:[RQM.RAP.SAMPTS]	BIOM	Stream sampling - mammals	9
	BIOP	Stream sampling - periphyton	6
	BIOT	Stream sampling - turtles	6
	BIOX	Stream sampling - ambient toxicity	10
	CER1	Cerling data - 1985	327
	CER1WAG	Cerling data - 1985 with WAG	327
	CER2	Cerling data 1986-87	365
	CER2OG	Transformed Cerling data 1986-87	63
	CER2OGWAG	Transformed Cerling data with WAGs	63
	CER2WAG	Cerling 1986-87 data with WAGs	365
	SURDIS	Surface discharge monitoring sites	9
	SURDISWAG	Surface discharge monitoring sites with WAGs	9
U3:[RQM.RAP.SWMU]	SWMU	RAP SWMU locations	205
U3:[RQM.RAP.TUG]	BUILD1	Revised central ORNL buildings	39
	BUILDS	Central ORNL buildings	39
	CREEK5	White Oak Lake and Creek	98
	CREEKDEN	Densified White Oak Lake and Creek	98
	STREETLIN	Central ORNL streets	20
U3:[RQM.RAP.WAG]	MAPFR	Overlay boundaries for WAG map	6
	SWSA1T	Historical SWSA 1 boundary	1
	WAG11RX	Revised WAG 11 location	1
	WAGX10	WAG boundaries	27
	WAGX10B	Revised WAG boundaries	27
	X10GRD5K	1000-ft grid with labels	28
	X10GRDN	1000-ft grid with annotation	70
	XGRD5K	5000-ft grid with annotation	7

[a]Coverages sorted alphabetically by name within alphabetically-sorted VAX subdirectories.

[b]Definitions:

RAP = Remedial Action Program
HF = Hydrofracture
PRAP = Pre-Remedial Action Program
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
WAG = Waste Area Grouping
USGS = U.S. Geological Survey
SWMU = Solid Waste Management Unit
ORNL = Oak Ridge National Laboratory
SWSA = Solid Waste Storage Area

[c]Number of geographic elements (point, lines, or polygons) in the coverage.

2.12 SYNOPSIS OF THE DATA AND INFORMATION MANAGEMENT SYSTEM

For those individuals who wish to see more details about the data sets, we have prepared a synopsis of the RAP DIMS on IBM PC diskettes which are available by contacting

Larry D. Voorhees
Oak Ridge National Laboratory
Building 1505, MS-036
P. O. Box 2008
Oak Ridge, Tennessee 37831-6036

Telephone: 615/574-7309 or FTS 624-7309

2.12.1 System Description and Requirements

The synopsis was written using dBASE III Plus and compiled using the Clipper program developed by Nantucket Software. The dBASE software does not need to be installed on the PC used to execute the synopsis, nor does the user need to know how to operate dBASE. An IBM or IBM-compatible PC is required to operate the program. The PC must have a hard disk drive with 500 Kb (kilobytes) of available storage.

The following procedures describe how to install the programs and files onto the hard disk:

1. Insert RAP DATA INSTALLATION DISK # 1 into Drive A.
2. At the A: prompt, type **INSTALL**, press the Enter key, and follow the instructions on the screen. This creates needed subdirectories on the hard disk and copies files to these subdirectories; you will be instructed when to insert RAP DATA INSTALLATION DISK # 2.
3. A message appears, indicating that the installation procedure is complete.

To execute the RAP Synopsis do the following:

1. At the C: prompt, type **CD\RAPDB**, which changes the directory to the RAPDB subdirectory.
2. Type **RAP**.
3. When the "Welcome" screen appears (Fig. 11), follow the instructions on the screen.

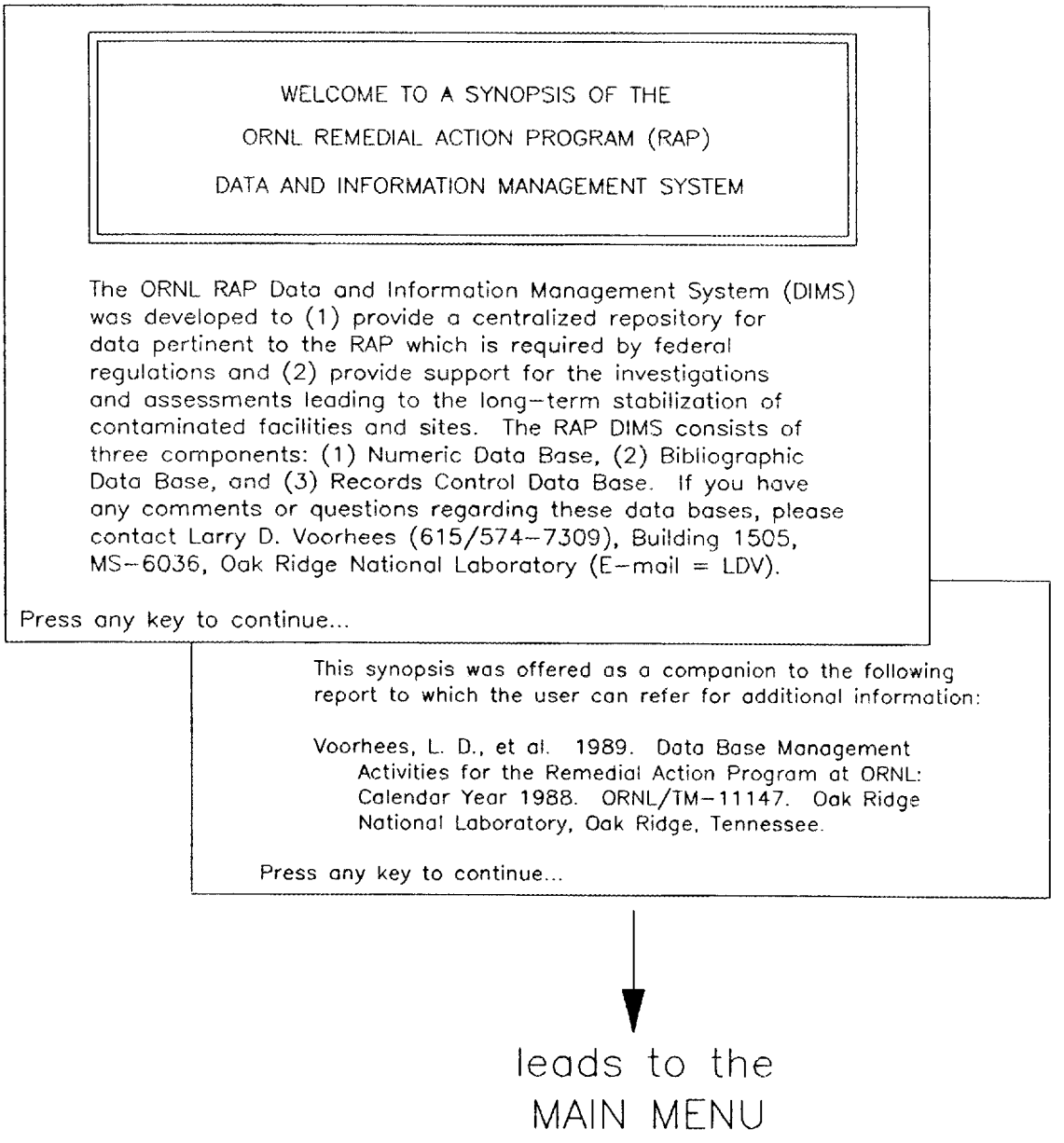

Fig. 11. First screen of the synopsis for the Data and Information Management System.

2.12.2 Synopsis Contents

A hierarchical structure was used to organize the synopsis, branching from introductory overviews to descriptions of the structure of specific data sets and partial listings of their contents. A series of menus allows the user to select a subsequent menu or return to the previous menu, ultimately returning to DOS, as illustrated in Fig. 12. After the introductory "Welcome" screen (Fig. 11) appears, the user can select the Bibliographic Data Base, the Records Control Data Base, or the Numeric Data Base from the Main Menu (Fig. 12, inset A). Objectives are presented for the Bibliographic and Record Control data bases, as well as listings of data field definitions and sample records (Fig. 12, insets B and C).

Like this document, the synopsis focuses on the Numeric Data Base. Figure 12 (insets D-H) also illustrates the menu selections for one branch of the synopsis (i.e., construction information for the piezometer wells installed by RAP). This illustration culminates with screens showing the contents of a data set (i.e., variable names, types, lengths, and labels) and a partial listing of the data set using selected variables. This synopsis has over 60 branches, most of which terminate as illustrated, except when initial data acquisition is still in progress.

As the RAP Numeric Data Base increases in size and complexity, this synopsis should prove very beneficial, not only to the occasional user of RAP data, but also to the RAP data management staff.

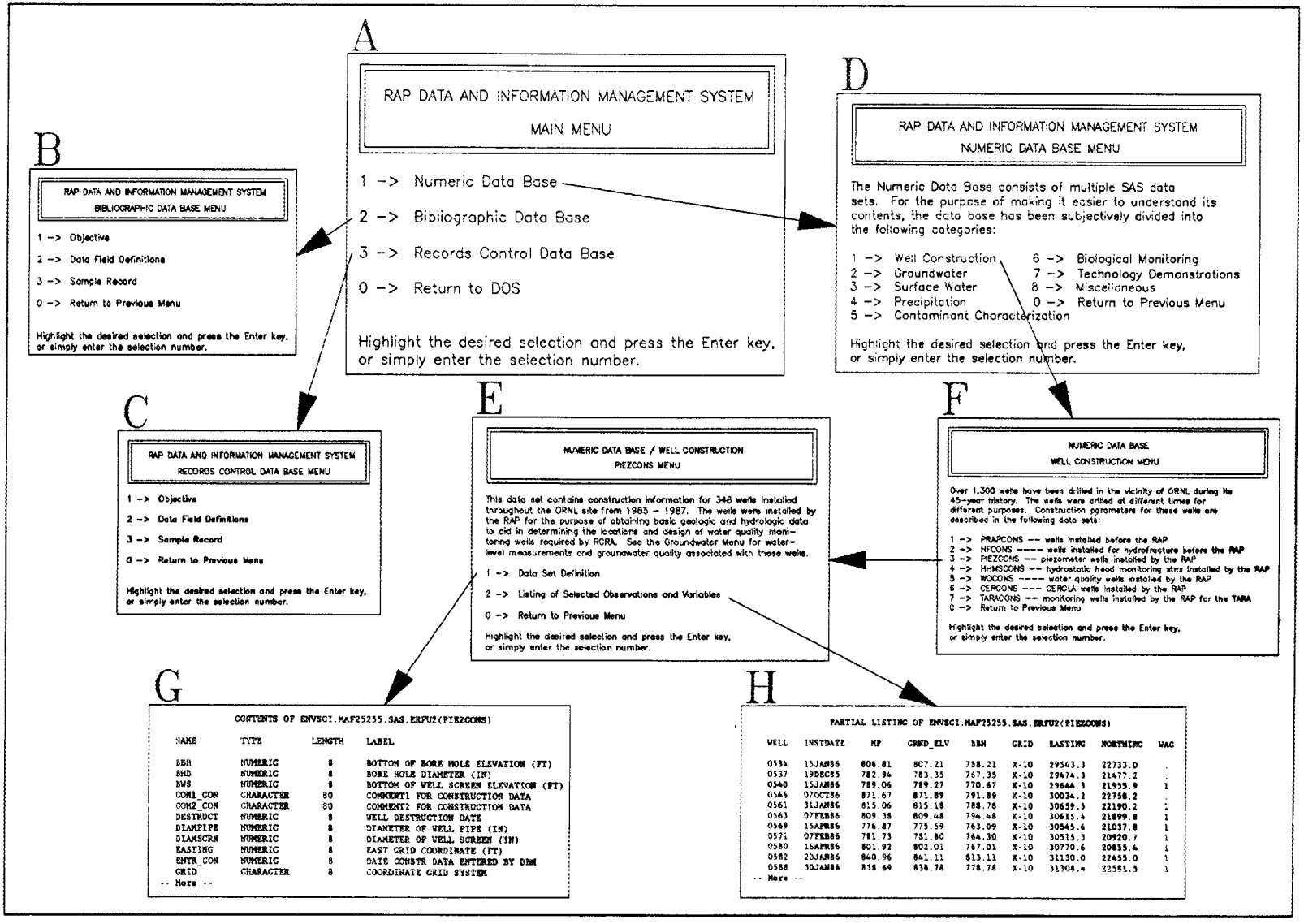

Fig. 12. The synopsis for the Data and Information Management System consists of a series of menus allowing the user to select one of several options.

3. BIBLIOGRAPHIC DATA BASE

In November 1986, work began on the development of a computerized, bibliographic data base to support the information needs of ORNL Remedial Action Program staff. The data base contains a bibliographic citation, an abstract, and various index terms and subject categories for published documents (e.g., reports, journal articles, conference papers, theses) that relate to the ORNL Remedial Action Program. In addition to the on-line data base, a resource collection containing a paper copy of each document cited is also maintained. Availability of these resources is presented in Sect. 6.1.

The Bibliographic Data Base and resource collection serve as a central resource for use by all ORNL Remedial Action Program and subcontractor staff to identify and access needed program documentation. The data base was designed to ensure (1) a quick and efficient retrieval of needed documents from the resource collection, (2) flexibility in creating a reference list for ORNL/RAP reports, and (3) the ability to machine-sort records according to any of the 32 data fields that comprise a record in the Bibliographic Data Base.

During calendar year 1988, 360 documents were added to the Bibliographic Data Base, and 2,126 modifications were made to existing data base records. At year's end, the data base contained approximately 5,800 records. A number of new data fields were developed during the year to permit a more efficient retrieval of needed information from the data base.

During the year, a report was prepared which contains a bibliographic citation and abstract for the more than 300 reports prepared by the ORNL Remedial Action Program. Indexes to six of the most frequently used data fields were also included to assist the user in locating particular reports of interest.

4. RECORDS CONTROL DATA BASE

Information associated with programs such as RAP which are regulatory controlled must be retained to support any future legal or administrative actions which may be taken. These actions may not occur for several years after the data have been collected. Thus, it is crucial that a system be developed and maintained for identifying, logging, and collating project records and for assisting in the search and retrieval of such information. The records must be sufficiently detailed to provide a complete and accurate history of the data-gathering process and the results obtained. The ORNL/RAP Records Control Data Base and archive was established in late 1987 to serve this need.

In accordance with EPA guidance for remedial investigations (EPA 1985), the Records Control Data Base and archive is capable of (1) receiving all data/information collected or generated; (2) processing, sorting, and entering all data/information into the storage file; (3) making data/information available to users; and (4) ensuring efficiency in data/information security and disclosure.

The Records Control Data Base was originally based on dBase III Plus software but was subsequently converted to operate on the ADSEP (Automated Data Set Editing Program) software installed on the IBM-3033 computers at ORNL. The data base serves as an index for retrieval of information generated by the program including correspondence, project plans, well logs, field notebooks, and chain-of-custody forms. The system, which was established for archival purposes, was developed in cooperation with BNI, RAP's prime subcontractor, so that records generated during BNI's investigations can be easily consolidated with those from ORNL. During calendar year 1988, which was the first year of operation, 687 documents were added to the ORNL/RAP Records Control Data Base.

The formats selected for the data fields developed for the data base were based on the following criteria: (1) accuracy and speed in retrieving needed records from the data base, (2) flexibility in creating customized reports (either tabular or textual), and (3) ability to sort the search

results and generate indexes on-line. A considerable number of changes have been made to the data base record format during the past year. Because the data base is still in the early developmental stages, it is anticipated that further changes will be made.

5. OTHER INFORMATION-RELATED RESOURCES

5.1 AERIAL PHOTOGRAPHS

Aerial photography has been used extensively in analyses of local and regional land-use changes. Studies of aerial photographs taken over a period of time can reveal not only how the land was used in the past but also how the many interrelated characteristics of the environment (including land cover, aquatic habitats, soils, geology, and hydrology) may have been affected by land-use practices. For this reason, a collection of aerial photographs of ORR has been amassed to support the RAP studies. Photographic information should be useful to RAP investigators studying contamination at historical waste disposal sites and in determining alternative approaches for corrective action. In addition, anyone requiring knowledge of historical land-use practices on the ORR should find this resource useful.

A total of 391 aerial photographs of ORR and its immediate vicinity were obtained from TVA for the following years: 1939, 1945, 1952, 1967, 1974, 1981, 1984, and 1985. For most years, considerable overlap of the photographs allows stereoscopic viewing. Specific information regarding dates of the photographs, scales of the prints, spatial coverage, and quality of the prints is presented in Table 16.

The photographs are available at the ESD branch of the ORNL library, in Building 1505. Because the photographs and their corresponding index maps are of varying sizes, they are specially stored. Users should request the information from the librarian.

5.2 EPA TREATABILITY DATA BASE

The U.S. Environmental Protection Agency (EPA) is developing a computerized data base containing information for treating chemicals found in various types of waters and wastewaters. The system is designed to be used as a guide to identify the effectiveness of treatment technologies for organic and inorganic compounds commonly found at hazardous-waste sites. EPA's Risk Reduction Engineering Laboratory, where the data base is being

Table 16. Descriptive information on aerial photographs of the Oak Ridge Reservation

Year	Month/Day	Scale	Number of photos	Comments
1939	November-December	Contact prints and 1" = 3,600'	26	Enlargements very poor quality; contact prints used to create index map
1945	April 5-13 August 9	Unknown	88 9	Coverage very spotty, limited to the vicinity of the Clinch River; unable to create an index map for this year
1952	April 30	1" = 3,600	20	Good prints
1967	Dates vary, primarily March 2	Primarily 1" = 2,000' but scale not uniform throughout series	38	Monoscopic coverage in Cave Creek quadrangle indicated in orange on the index map
1974	April 19	Originally 1" = 2,640', enlarged to 1" = 1,000'	19	Monoscopic coverage in Cave Creek quadrangle indicated in orange on the index map
1981	February 25	1" = 1,000'	87	No comments
1984	November 7	1" = 1,000'	56	Coverage available only for southern part of reservation
1985	March 18	1" = 1,000'	48	Coverage available only for northern part of reservation

developed, has put emphasis on the priority pollutant list, Appendix VIII of RCRA, and those compounds found at Superfund sites. Metals and other organics are expected to be added this year. Currently there are about 400 compounds in the data base with 1,500 sets of treatability data for approximately half of the compounds. We have acquired a copy of the Treatability Data Base and will retrieve information from it for specific compounds upon request.

5.3 ELECTRONIC BULLETIN BOARDS FOR HAZARDOUS MATERIALS INFORMATION

RAP data management is registered with two electronic bulletin boards which contain information related to hazardous materials. These are the Hazardous Materials Information Exchange (HMIX) and the Center for Hazardous Waste Management (CHWM). Retrieval of information from these resources, which are described briefly below, or assistance in accessing them is available upon request.

5.3.1 Hazardous Materials Information Exchange

The HMIX is a "hazardous materials (HAZMAT) information clearinghouse" and "exchange system" designed to provide Federal, state, local, and private-sector organizations with a means of sharing valuable and timely information about the prevention of, preparation for, and mitigation of hazardous materials emergencies. It is sponsored by the Federal Emergency Management Agency and the Research and Special Programs Administration of the U.S. Department of Transportation.

The HMIX consists of

- calendar of Federal training courses,
- public- and private-sector HAZMAT information,
- calendar of conferences,
- instructional material and literature listing,
- toll-free (800) numbers and on-line data bases,
- laws and regulations,
- contracts,
- Department of Transportation agency-specific information, and
- Federal Emergency Management agency-specific information.

In addition, there is a bulletin listing that provides current news. An example of this listing follows:

NEW BULLETINS AND ANNOUNCEMENTS

03/10/89	1	Case Studies from NETC's Learning Resource Center
03/09/89	2	Hazardous Substance Research Centers
03/09/89	3	Guide to Exercises in Chemical Emergency Preparedness Programs
03/09/89	4	"Seven Cardinal Rules of Risk Communication"
03/07/89	5	Hazardous Waste Operations and Emergency Response Final Rule - 54 FR 9294
03/06/89	6	NETC Hosts First National HAZMAT Training Conference
03/02/89	7	Revision of ERG - Notice of Public Meeting
02/23/89	8	USFA Awards Fire Safety Grants
02/23/89	9	NFA Sets 2-Semester Course Schedule
02/08/89	10	Designation of Extremely Hazardous Substances as CERCLA Hazardous Substances
02/03/89	11	Superfund Temporary Relocation Assistance
02/03/89	12	The National Exposure Registry
01/30/89	13	EPA: Superfund Programs; Regulations Governing Citizen Suits
01/24/89	14	OMB'S Request for Comments on the Reporting of Underground Storage Tanks Under Title III
01/04/89	15	NASTTPO Opens Membership to Focus on Title III

BULLETINS OF CONTINUING INTEREST TO OUR USERS

12/02/88	16	Public Notice Regarding Privacy and Other Legal Matters With Respect to the HMIX Electronic Bulletin Board
12/02/88	17	Rules and Guidelines for Users of the HMIX Bulletin Board
02/07/88	18	Private Sector Criteria - HMIX
02/09/89	19	HMIX Newsletter
02/27/89	20	Emergency Educational Network Schedule (EENET)
11/25/88	21	1989 Schedule of RRT Meetings
05/13/88	22	Information On Drug Law, Films and Literature
04/20/88	23	HMIX Table of Contents
04/11/88	24	Board Status (Help for downloading archived files)
03/02/88	25	Information on HMIX USER'S GUIDE
02/09/88	26	Information on the Emergency Response Guidebook and listing of State Coordinators

5.3.2 Center for Hazardous Waste Management

The CHWM, which is located at the Illinois Institute of Technology, Chicago, Illinois, operates a bulletin board with information on hazardous waste treatment methods, remediation, environmental and human health effects, waste minimization, and training. An excerpt of the bulletin's menu follows:

Bulletin Menu

1 - The Center for Hazardous Waste Management
2 - How to participate in this BBS
3 - Software to download
4 - Menus to download
5 - Conferences
6 - Hazardous waste RD&D Permit
7 - Superfund evaluation project

The following list of file categories for which information is available was also obtained from the CHWM:

Name	Description of file category
A	ALL FILES
SOFTWR	SOFTWARE AND COMPUTERS
MISC	MISCELLANEOUS
BROCHURE	HAZARDOUS WASTES SERVICES INFO
CONSULT	LISTING OF AVAILABLE ENVIRONMENTAL CONSULTANTS
REGULAT	EPA AND STATE HAZ WASTE REGULATIONS
TREAT	PROCESSES TO TREAT HAZARDOUS WASTE
TRAIN	TRAINING AND SHORT COURSES
HEALTH	HEALTH AND TOXICOLOGY EFFECTS OF HAZ WASTE
REMED	REMEDIAL ACTION METHODS AND CONCERNS
GROUND	GROUNDWATER PROBLEMS
MINIMIZ	WASTE MINIMIZATION
CITYW	MUNICIPAL WASTE DISPOSAL CONCERNS

The following edited list was extracted from the "ALL FILES" category as an example of the type of information that can be found on the system:

FILE NAME		SIZE	DATE	SUBJECT
USER2.LST		9216	03-12-89	USERS WILLING TO BE CONTACTED
GARBAGE.CIT	*	2561	10-17-88	INCINERATION VS RECYCLING IN CHICAGO
RCRACAS.NOS	*	16256	08-23-88	RCRA/SARA Substance Comparison W/CAS #'s
Z4TABLE.TXT	*	61696	07-19-88	Draft of OSHA Z-4 Hazardous Substances
ENVLAW.CLS	*	4224	07-09-88	Class syllabus for env'l law course
313LIST.TXT	*	15744	07-09-88	ASCII file of SARA Toxic Chemicals

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MANIFEST.ARC *  32256  07-01-88  HAZ WASTE MANIFEST TRACKING SYSTEM DB3+
TOPIC_1.TXT  *   1792  05-06-88  discussion problem re GW monitoring
STIFF25.ARC  *  22400  04-15-88  STIFF DIAG'MS FOR G'WATER ION ANALYSIS
RF.BRO       *   3248  04-01-88  RF PROCESS FOR IN-SITU SOIL DECONTAMINAT
OSHA23.REG   *   3997  03-12-88  OSHA EXTENDS RIGHT-TO-KNOW ALL INDUSTRS
PRIORITY.REG *   5558  02-08-88  ATSDR PRIORITY LIST OF 100 POLLUTANTS
SEMINARS     *   1280  01-28-88  ENVIRON ENGINEERING SEMINARS @ IIT
LISTU    REG *  20540  01-25-88  RCRA "U" LIST OF HAZARDOUS WASTES
LISTP    REG *   9559  01-25-88  RCRA "P" LIST OF HAZARDOUS WASTES
LISTS    REG *   3597  01-20-88  DISCUSSION OF HAZARDOUS WASTES LISTS
TRIBUNE.TOX  *   2030  01-15-88  EPA REASSESSES HAZ WASTE TOXICITY
BENZENE.HLT  *   4235  01-12-88  ATSDR TOXICOLOGY PROFILES: BENZENE
AIRBILL.REG  *   1171  01-12-88  CLEAN AIR ACT AMENDMENTS APPROVED
SURVEY2  TRT *   2809  01-03-88  ALTERNATIVE TREATMENT PROCESS SURVEYS
SURVEY1  TRT *   1208  01-03-88  TREATMENT PROCESSES SURVEY BOOKS
-------------------------------------------------------------------------
```

6. SERVICES AVAILABLE

Information in the RAP Data and Information Management System is available in a variety of formats depending upon the type of request and users' needs. As indicated in Sect. 4, the Records Control Data Base and archive was established primarily to organize and manage records that document the history of all programmatic actions and decisions. Because this system is not intended to be a working file, access to this information is limited to program management requests. Bibliographic information and numeric data, however, are often of use to RAP staff and their subcontractors as well as to other personnel conducting investigations on the ORR. Access to the information in these data bases is described below.

6.1 BIBLIOGRAPHIC DATA BASE

Services available pertaining to bibliographic information include

- performing topical searches of program-sponsored computerized data bases,
- performing computerized literature searches of commercially available data bases, and
- providing assistance in locating copies of needed documents.

During the year, 834 documents or information items were provided in response to requests from ORNL staff. An additional 927 informational items were provided to the RI/FS Subcontract Team, which includes Bechtel National, Inc. (BNI), CH2M Hill, EDGe/MCI, ECE, Lee Wan, etc. In order to disseminate information in a timely manner, an electronic bulletin continues to be sent weekly to approximately 130 program participants and other interested parties.

In addition to paper copy, which has been the most frequently used form of output, the user can request that the information be provided in electronic form. The obvious advantage to receiving output in digital form is the elimination of the need for re-entering the information when

preparing a bibliography or reference section for a report. The following options exist for receiving information in electronic form:

- electronic mail (E-mail) on the ORNL computer network,
- file transfer on the network, and
- PC diskette.

To obtain further information concerning the Bibliographic Data Base or services available, please contact

Park T. Owen
Oak Ridge National Laboratory
Building 2001, MS-6050
P. O. Box 2008
Oak Ridge, Tennessee 37831-6050

Telephone: 615/576-0568 or FTS 626-0568

6.2 NUMERIC DATA BASE

Printouts of raw and intermediate data sets, as well as computer access to the data, are provided routinely to principal investigators for information and data verification purposes (Voorhees 1988). Although data analyses are the responsibility of those who collect the data, data management staff assist in such analyses upon request. Summary statistics (e.g., minimum, maximum, mean, standard deviation), plots, graphs, and a wide variety of other outputs are available. In many cases, it is more efficient and cost effective to have RAP data management staff provide the needed statistics, assessments, tables, plots, etc., for reports prepared by RAP investigators. The RAP data management staff are familiar with the RAP Numeric Data Base as a whole and are able to provide analyses that integrate the data from various tasks within the program.

Assistance in the display and manipulation of spatial information can also be provided. For example, the GIS has been used to produce large-scale plots of the locations of piezometer and water quality wells drilled for RAP. These plots, required by state and Federal regulators, were scaled to existing topographic base maps and produced as Mylar overlays. Also, RAP GIS has the capability to convert data between several

other GIS formats, including the USGS Digital Line Graph, U.S. Bureau of the Census Geographic Base File, Autocad, Intergraph, and ORNL Geographic Data Systems.

A copy of the digital data used to create the S-16A map, which covers several square miles around the ORNL site, was recently obtained by RAP data management. As more base geographic data sets become available, the GIS will prove to be a valuable tool for analyzing and presenting site characterization and assessment data. These analyses will emphasize the spatial orientation of the data. For example, the GIS will allow an investigator to specify a spatially defined subset of data for groundwater wells whose locations can be plotted to any scale. Furthermore, using the GIS to draw maps to scale and checking the product against well-defined reference points has been and continues to be an effective means of verifying spatially oriented data.

The GIS can also be used to display simultaneously multiple classes of data such as well locations, WAG boundaries, and sampling transects. These analyses are particularly useful to multidisciplinary projects such as RAP.

Requests for data and related products are available in any of several formats including, but not limited to the following:

- direct read access to SAS data libraries;
- computer data tapes in specified format for export to another mainframe computer;
- copies of data sets on PC diskettes in Lotus 123, dBASE III PLUS, PC-SAS, or ASCII format;
- selected data in specified format for direct inclusion in reports;
- generic printouts of selected data;
- summary tables of precipitation or flow data for selected sites;
- plots of groundwater elevation (well hydrographs);
- maps of ORNL showing locations of various types of wells; and
- maps of ORNL showing sampling locations for a particular study.

More than 55 specific requests for data from the RAP Numeric Data Base, mostly from ORNL staff, were filled in 1988 (see Appendix D). Requests

originating outside ORNL (e.g., from EPA or Tennessee Department of Health and Environment) must have RAP management approval. To obtain further information concerning the Numeric Data Base or to request data or related products, please contact

Larry D. Voorhees
Oak Ridge National Laboratory
Building 1505, MS-6036
P. O. Box 2008
Oak Ridge, Tennessee 37831-6036

Telephone: 615/574-7309 or FTS 624-7309

7. REFERENCES

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Voorhees, L. D., L. A. Hook, M. J. Gentry, R. A. McCord, M. A. Faulkner, K. A. Newman, and P. T. Owen. 1988. Data base management activities for the Remedial Action Program at ORNL: Calendar year 1988. ORNL/TM-10694. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

APPENDIX A

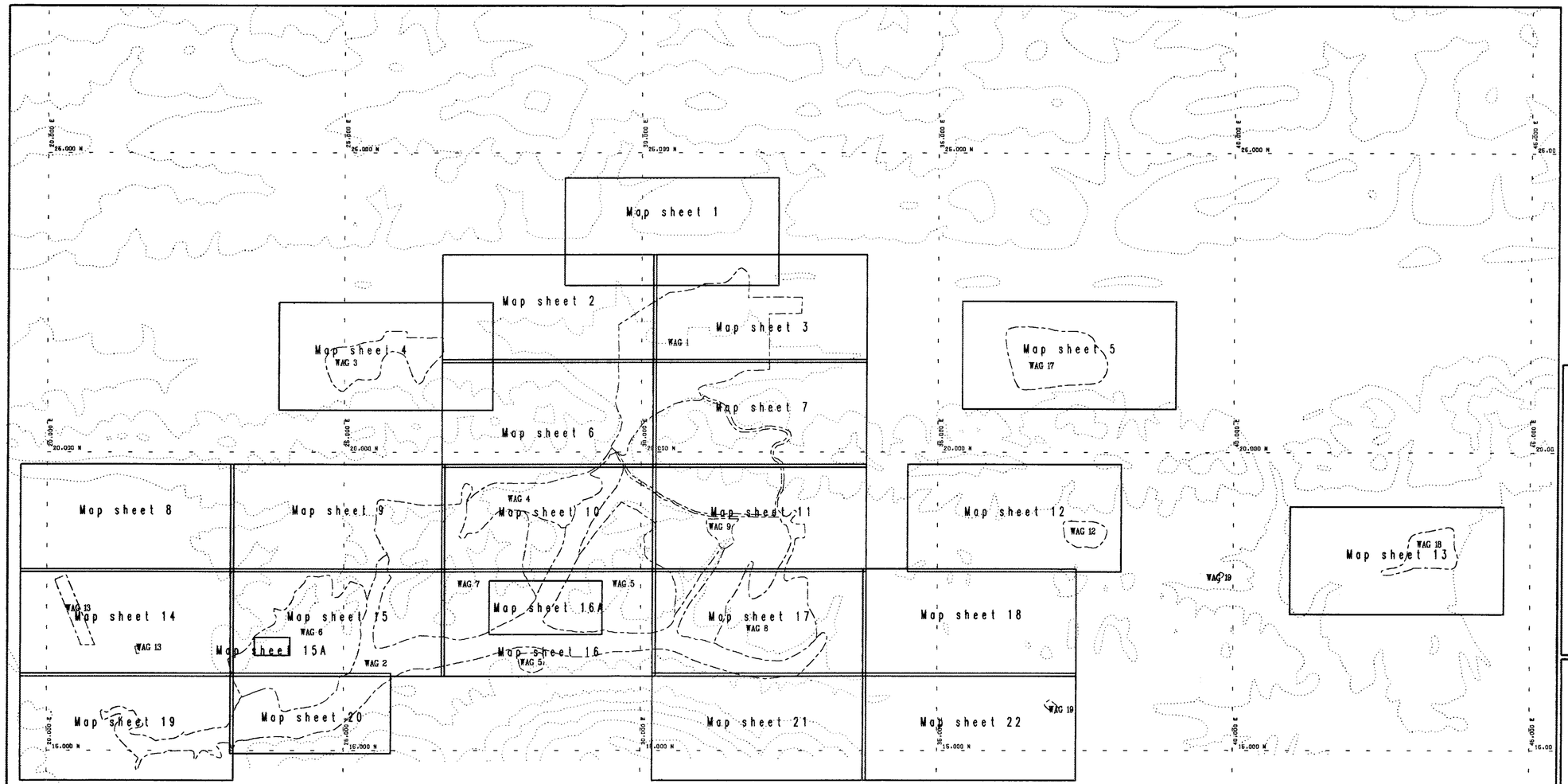
LOCATIONS OF WELLS IN THE VICINITY OF OAK RIDGE NATIONAL LABORATORY

The maps in Appendix A show the locations and well IDs for all wells in the RAP Numeric Data Base (See Table 1). Fig. A.1 is an index map showing the arrangement of the 24 map sheets (Figs. A.2-A.25) that show the detailed location of the wells in the ORNL area. The wells at WAG 11 (near K-25) are shown on a separate map (Fig. A.26).

Most of the map sheets have a 1:2400 scale (1" = 200'). Map sheet 20 has a scale of 1:1800 (1" = 150'). The index map shows that adjacent map sheets contain a 50-ft zone of overlap which is plotted on both maps. Map sheets 15 and 16 each contain areas with a high density of wells. Insets containing these areas are also mapped at a smaller scale on map sheets 15A and 16A with scales of 1:400 (1" = 33.3') and 1:800 (1" = 66.6'), respectively.

The legend on the maps explains the symbols used to show the different types of wells. All types of wells may not necessarily be present on each map sheet. In most cases, the well ID of a well is plotted at an angle above and to the right of the symbol for the well location. In cases where the wells are very close together, some of the well IDs are plotted below and to the left of the well location. Map sheets 10 and 20 each contain clusters of wells which are labelled by a range of well IDs.

ORNL-DWG 89-2089



Legend

Lines

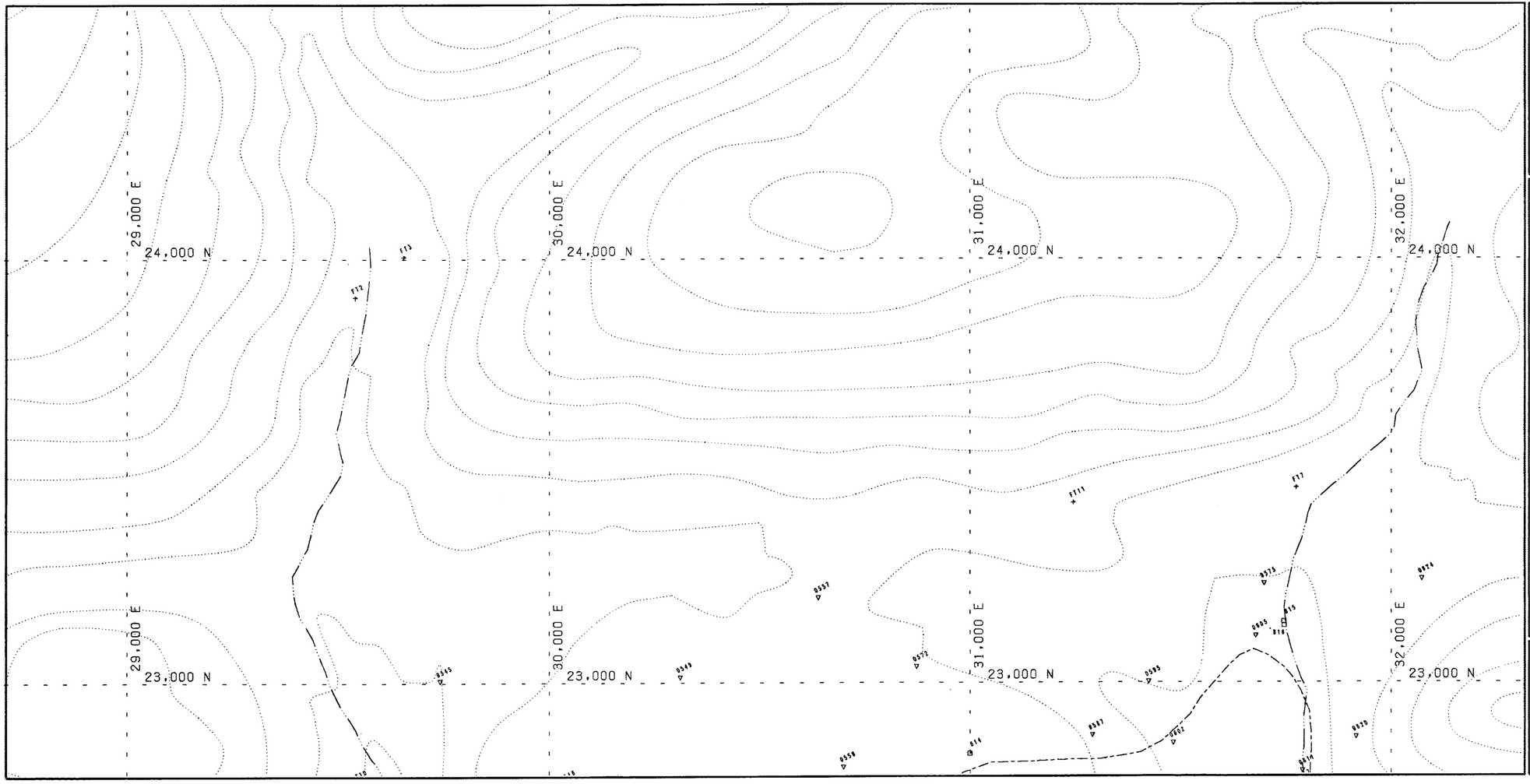
- Map Sheet Boundary
- X-10 Grid, 1000 ft Interval
- Creeks, Ponds, and Basins
- WAG Boundaries
- Contours, 100 ft Interval (approx)

Map Scale 1:17400
March 1989

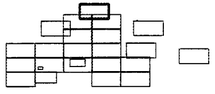
Fig. A.1.

Index Map of Wells in the Vicinity of Oak Ridge National Laboratory.

ORNL-DWG 89-2090



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

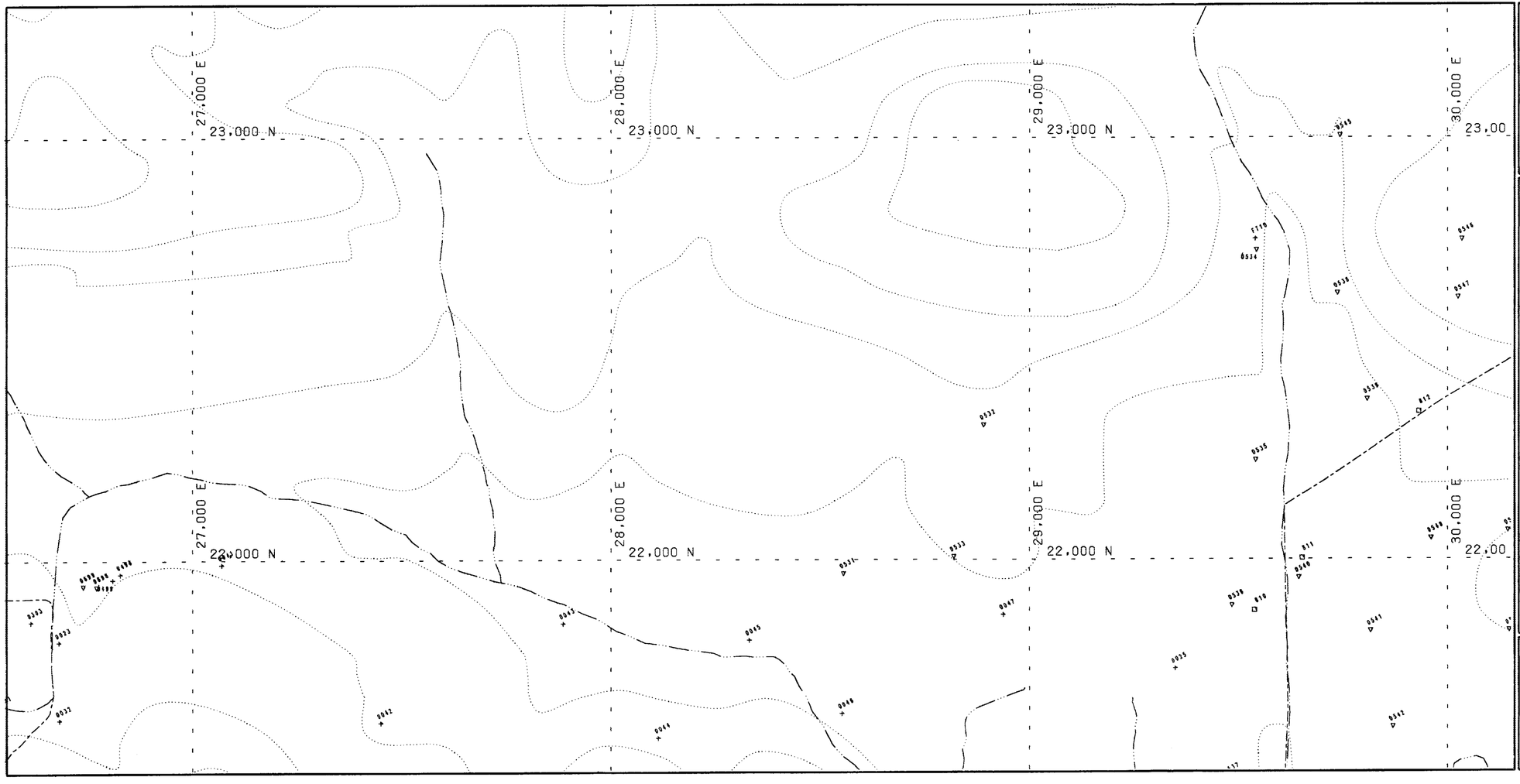
- X-10 Grid, 1000 ft interval
- Creeks, Ponds, and Basins
- WAG Boundaries
- Contours, 20 ft interval (approx)

Map Scale 1:2400
March 1989

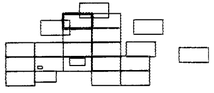
Fig. A.2.

Map sheet 1 of Fig. A.1.

ORNL-DWG 88-2091



Map Sheet Index



Legend

Wells

+ Pre-RAP
□ Water Quality - RCRA
▽ RAP Piezometer
△ Hydrostatic Head
× Hydrofracture
◇ USGS U-series
★ Test Area for RAP
* Water Quality - CERCLA

Lines

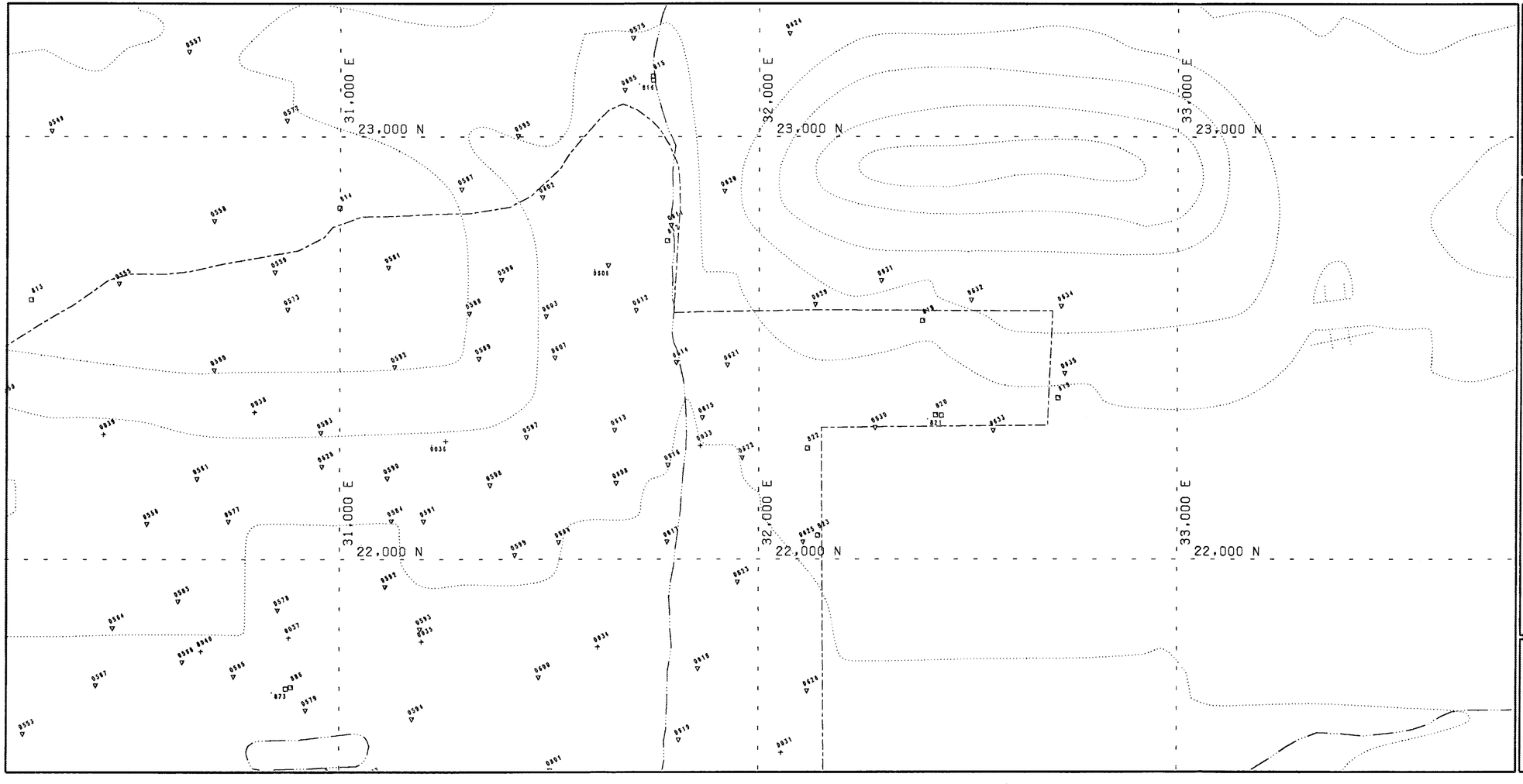
- - - X-10 Grid, 1000 ft Interval
——— Creeks, Ponds, and Basins
– – – WAG Boundaries
····· Contours, 20 ft Interval (approx)

Map Scale 1:2400
March 1989

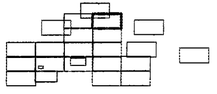
Fig. A.3.

Map sheet 2 of Fig. A.1.

ORNL-DWG 89-2092



Map Sheet Index



Legend

Wells

+ Pre-RAP
□ Water Quality - RCRA
▽ RAP Piezometer
△ Hydrostatic Head
× Hydrofracture
◇ USGS U-series
★ Test Area for RAP
* Water Quality - CERCLA

Lines

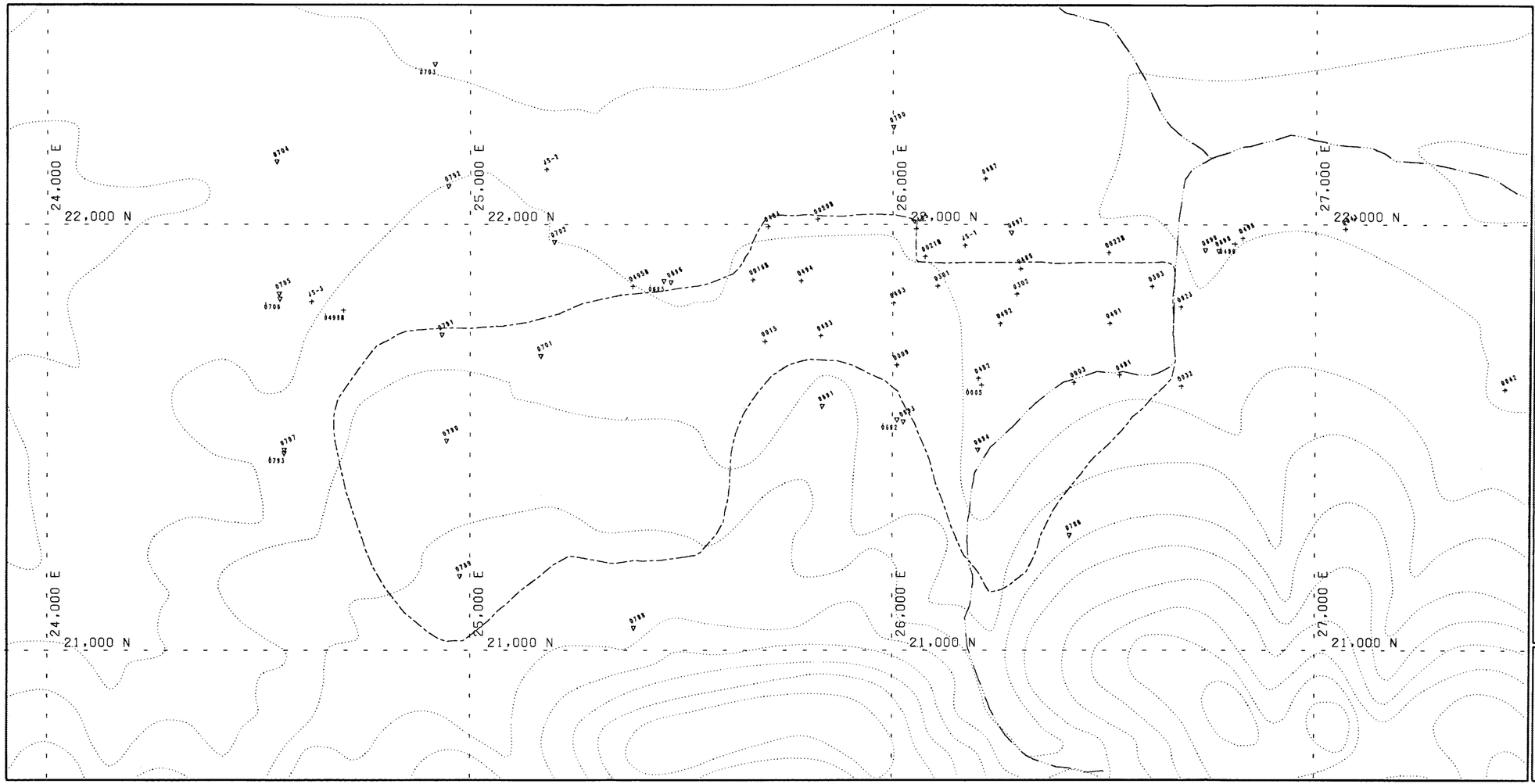
- - - X-10 Grid, 1000 ft interval
——— Creeks, Ponds, and Basins
- - - - - WAG Boundaries
..... Contours, 20 ft interval (approx)

Map Scale 1:2400
March 1989

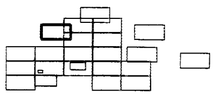
Fig. A.4.

Map sheet 3 of Fig. A.1.

ORNL-DWG 89-2093



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- * Test Area for RAP
- * Water Quality - CERCLA

Lines

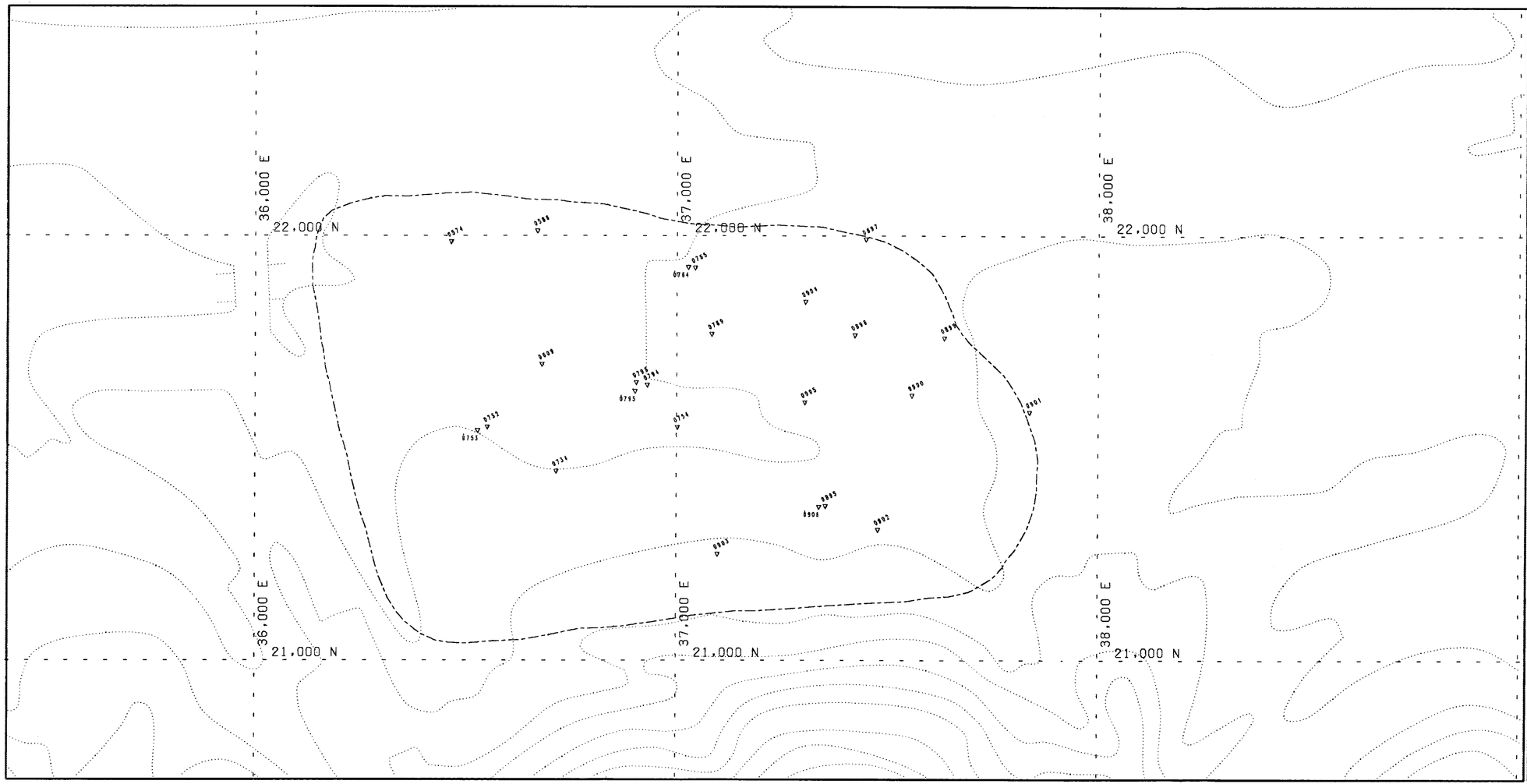
- - - - X-10 Grid, 1000 ft Interval
- ——— Creeks, Ponds, and Basins
- – – – – WAG Boundaries
- ····· Contours, 20 ft Interval (approx)

Map Scale 1:2400
March 1989

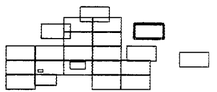
Fig. A.5.

Map sheet 4 of Fig. A.1.

ORNL-DWG 89-2094



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

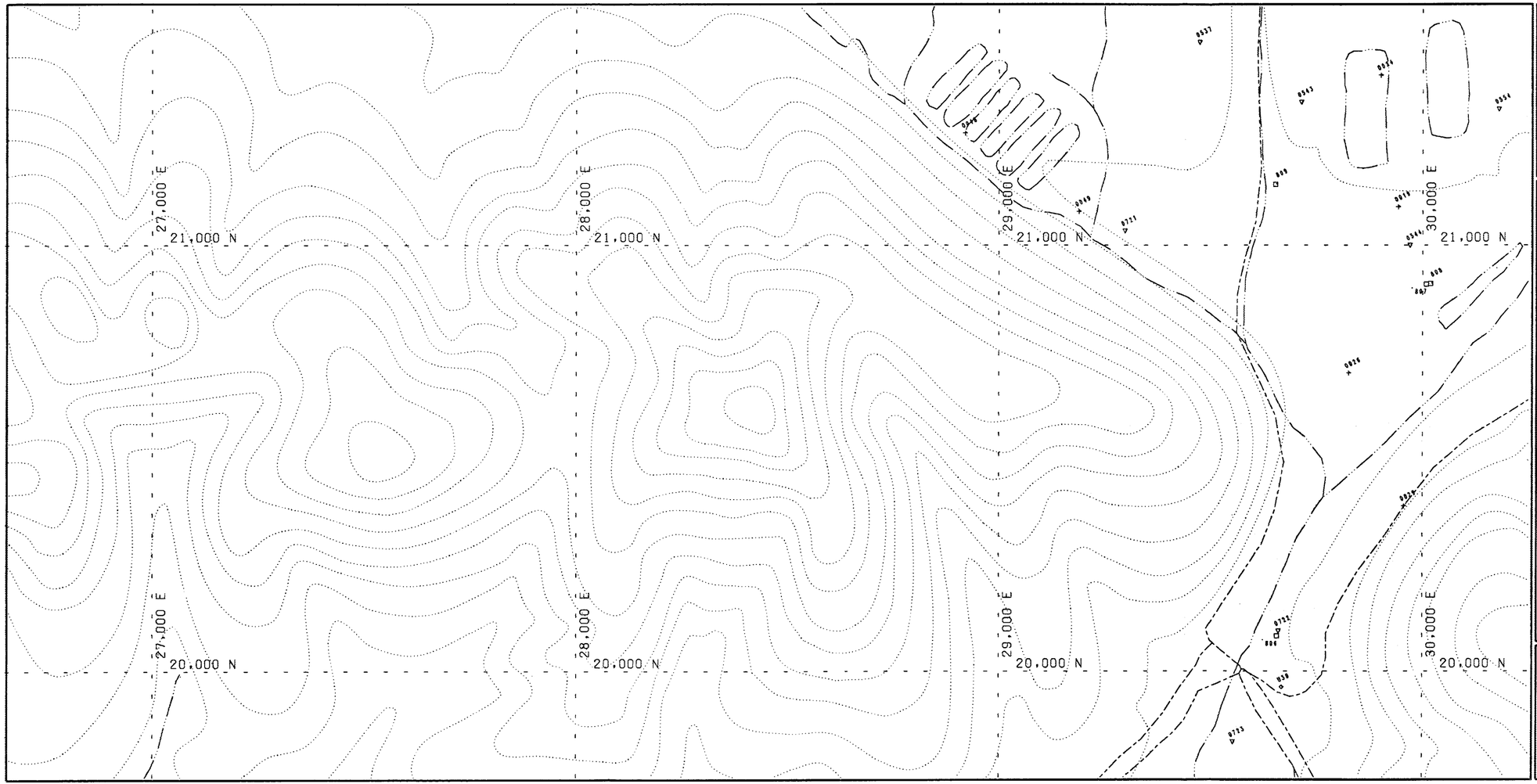
- - - - X-10 Grid, 1000 ft Interval
- ——— Creeks, Ponds, and Basins
- – – – – WAG Boundaries
- ····· Contours, 20 ft Interval (approx)

Map Scale 1:2400
March 1989

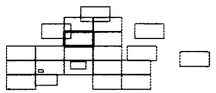
Fig. A.6.

Map sheet 5 of Fig. A.1.

ORNL-DWG 89-2085



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- * Test Area for RAP
- * Water Quality - CERCLA

Lines

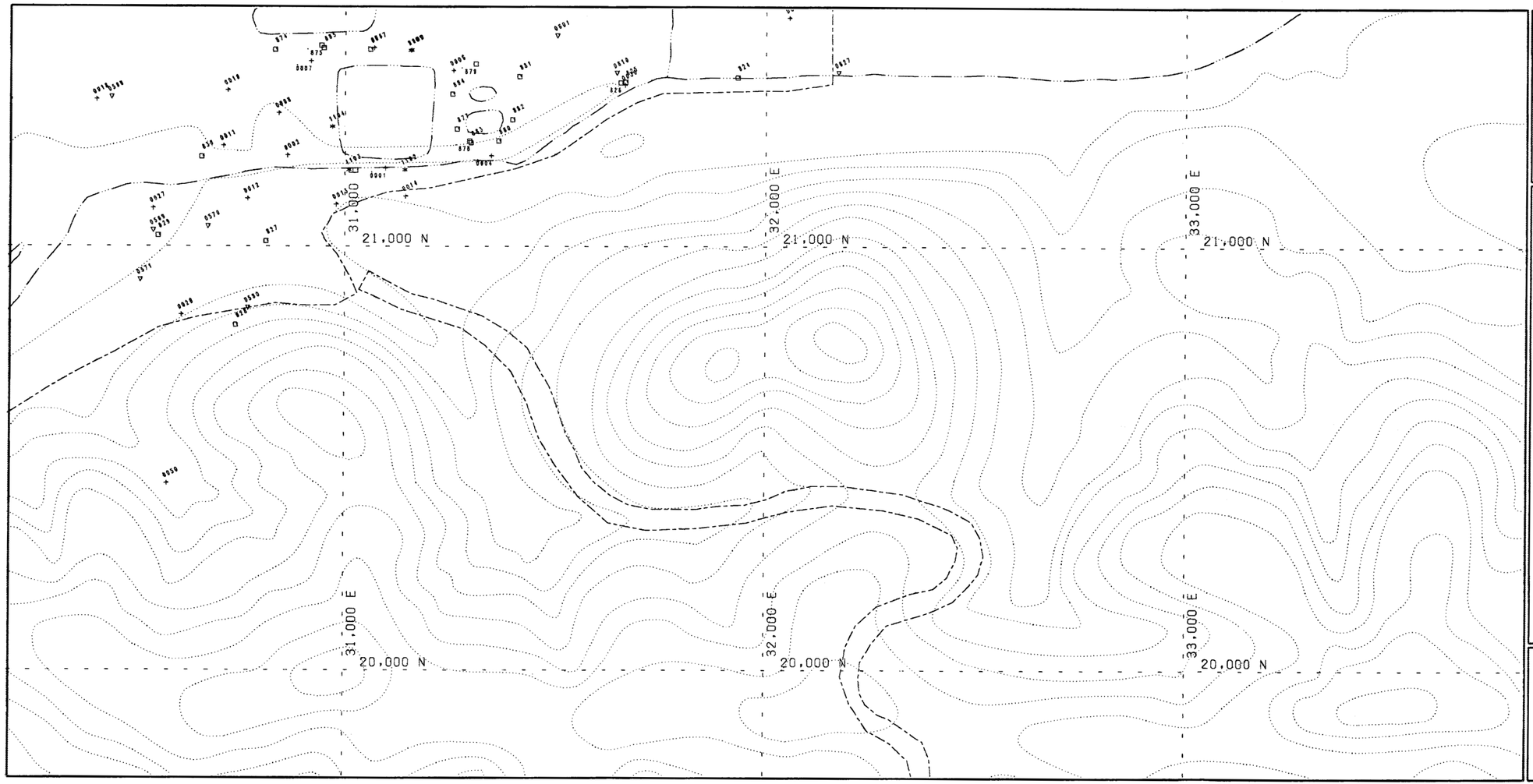
- - - - X-10 Grid, 1000 ft interval
- ——— Creeks, Ponds, and Basins
- – – – WAG Boundaries
- ····· Contours, 20 ft interval (approx)

Map Scale 1:2400
March 1989

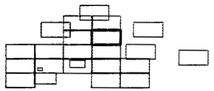
Fig. A.7.

Map sheet 6 of Fig. A.1.

ORNL-DWG 89-2096



Map Sheet Index



Legend

Wells

+ Pre-RAP
□ Water Quality - RCRA
▽ RAP Piezometer
△ Hydrostatic Head
× Hydrofracture
◇ USGS U-series
★ Test Area for RAP
✱ Water Quality - CERCLA

Lines

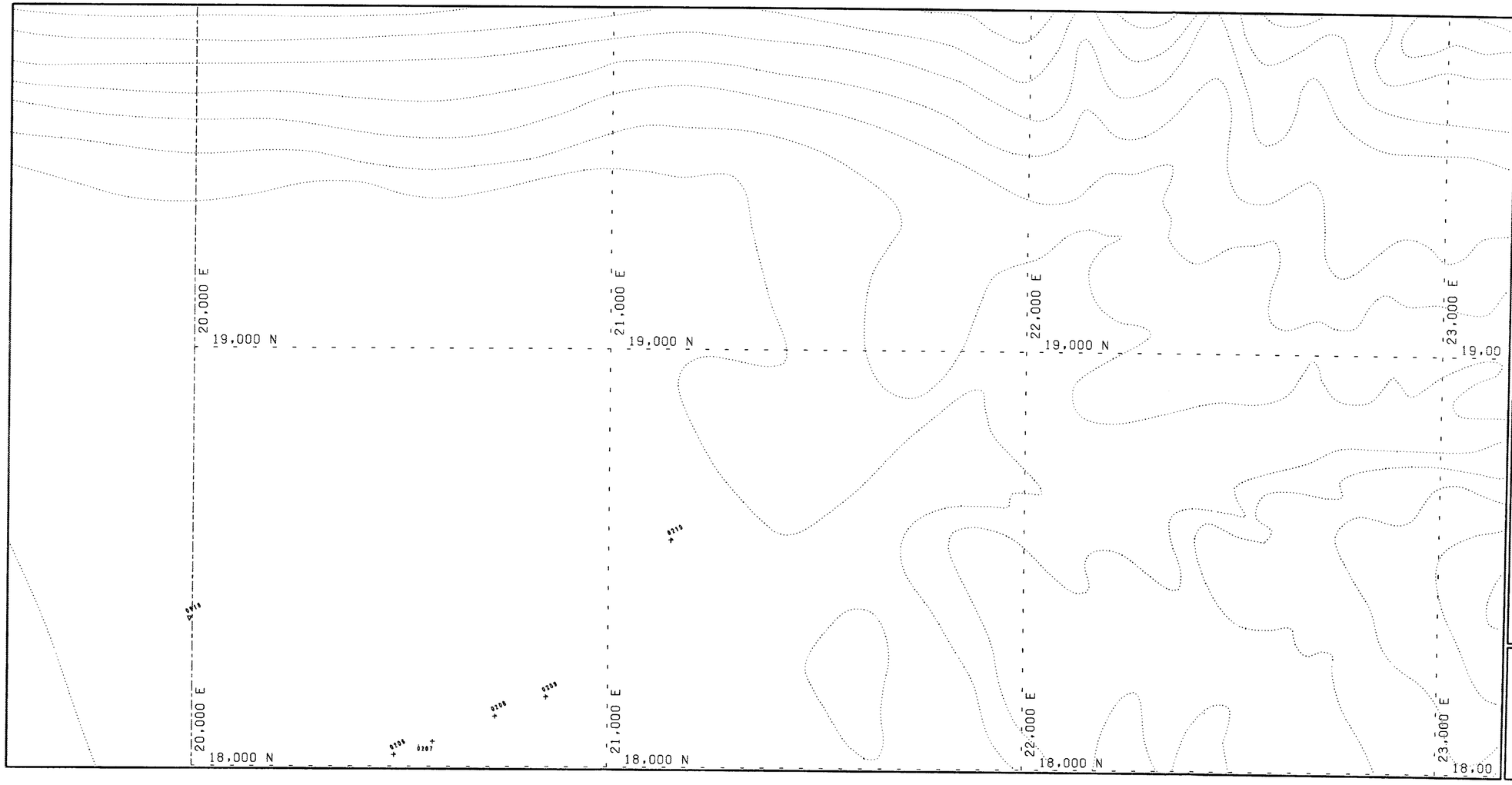
- - - X-10 Grid, 1000 ft interval
——·—— Creeks, Ponds, and Basins
—— —— WAG Boundaries
Contours, 20 ft Interval (approx)

Map Scale 1:2400
March 1989

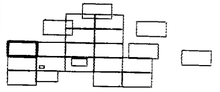
Fig. A.8.

Map sheet 7 of Fig. A.1.

ORNL-DWG 89-2097



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

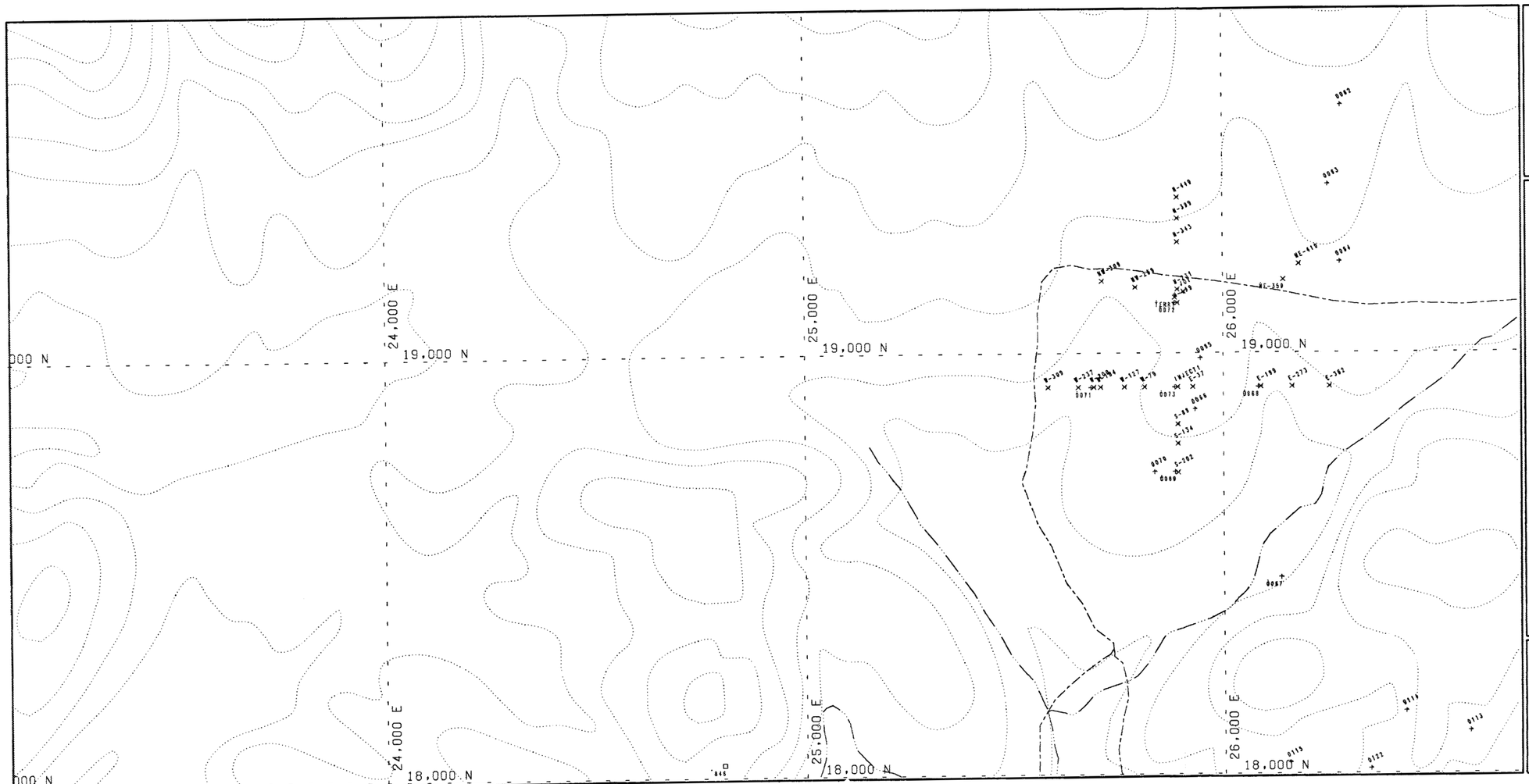
- - - - X-10 Grid, 1000 ft interval
- —·—·— Creeks, Ponds, and Basins
- — — — WAC Boundaries
- ····· Contours, 20 ft interval (approx)

Map Scale 1:2400
March 1989

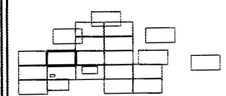
Fig. A.9.

Map sheet 8 of Fig. A.1.

ORNL-DWG 88-2098



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

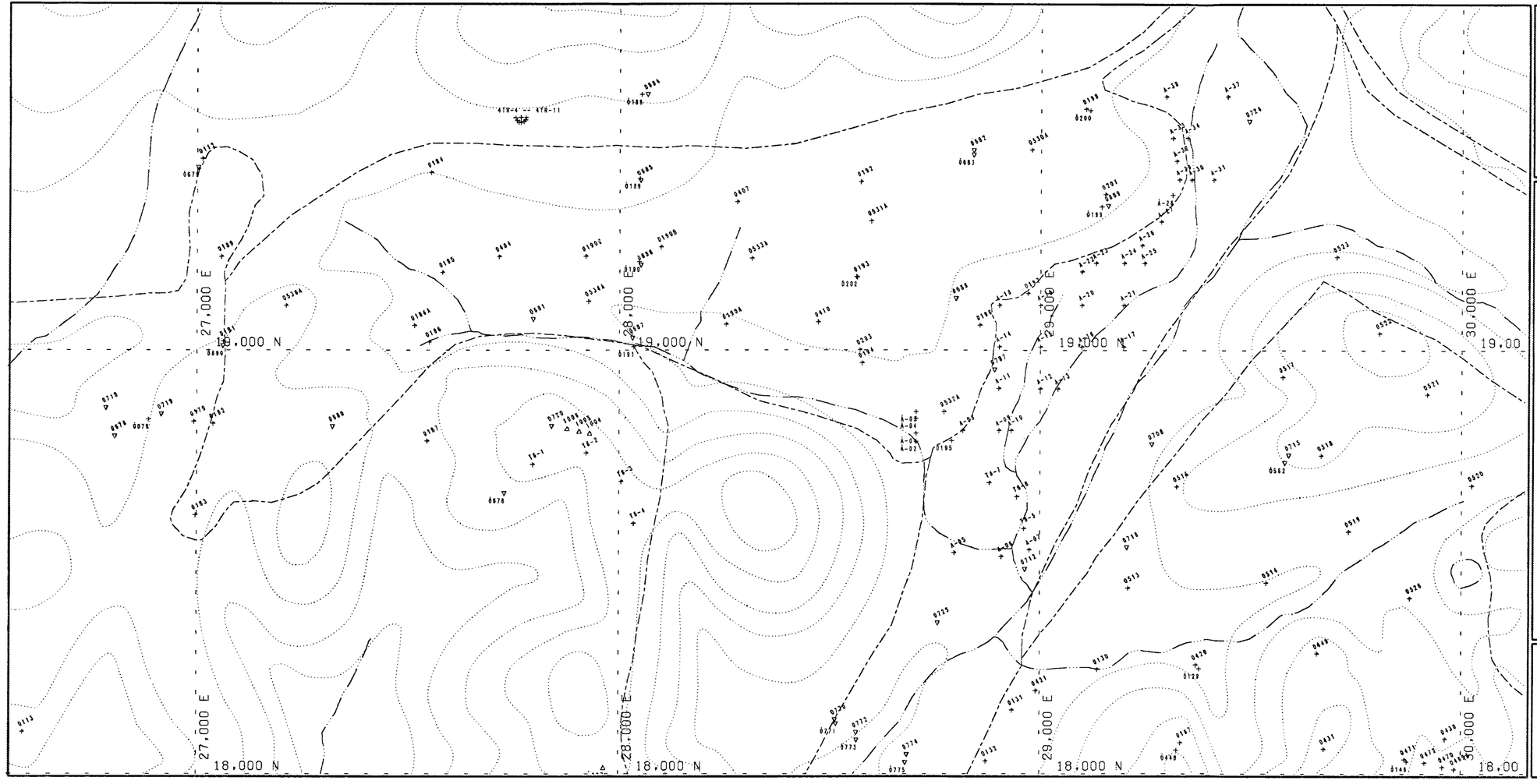
- - - - X-10 Grid, 1000 ft Interval
- ——— Creeks, Ponds, and Basins
- – – – WAG Boundaries
- ····· Contours, 20 ft Interval (approx)

Map Scale 1:2400
March 1989

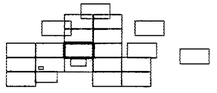
Fig. A.10.

Map sheet 9 of Fig. A.1.

ORNL-DWG 89-2099



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

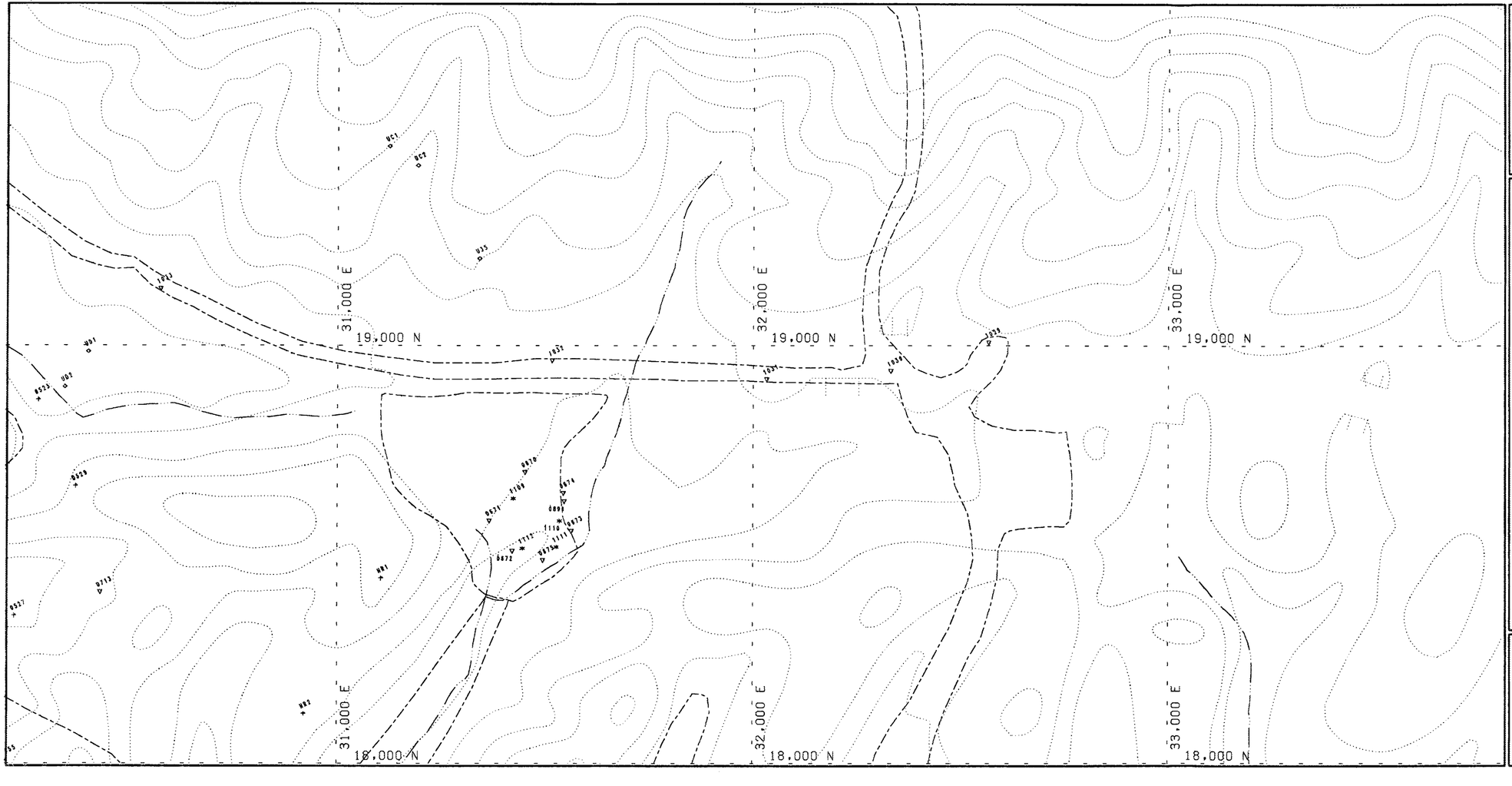
- - - - X-10 Grid, 1000 ft interval
- ——— Creeks, Ponds, and Basins
- – – – WAG Boundaries
- ····· Contours, 20 ft interval (approx)

Map Scale 1:2400
March 1989

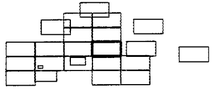
Fig. A.11.

Map sheet 10 of Fig. A.1.

ORNL-DWG 89-9351



Map Sheet Index



Legend

Wells

+ Pre-RAP
□ Water Quality - RCRA
▽ RAP Piezometer
△ Hydrostatic Head
× Hydrofracture
◇ USGS U-series
★ Test Area for RAP
* Water Quality - CERCLA

Lines

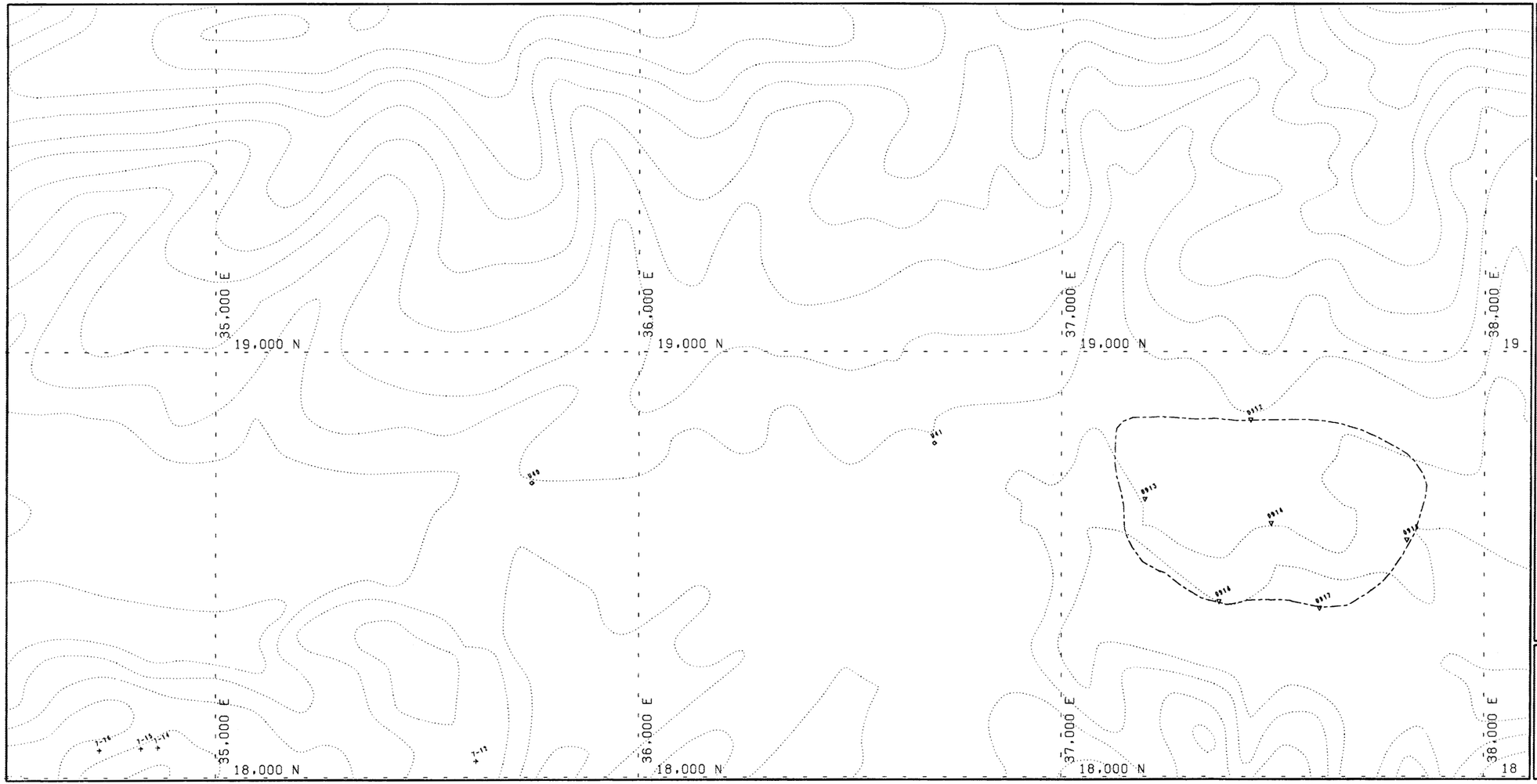
- - - X-10 Grid, 1000 ft interval
——— Creeks, Ponds, and Basins
– – – – WAG Boundaries
…… Contours, 20 ft interval (approx)

Map Scale 1:2400
March 1989

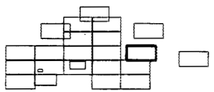
Fig. A.12.

Map sheet 11 of Fig. A.1.

ORNL-DWG 89-9352



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

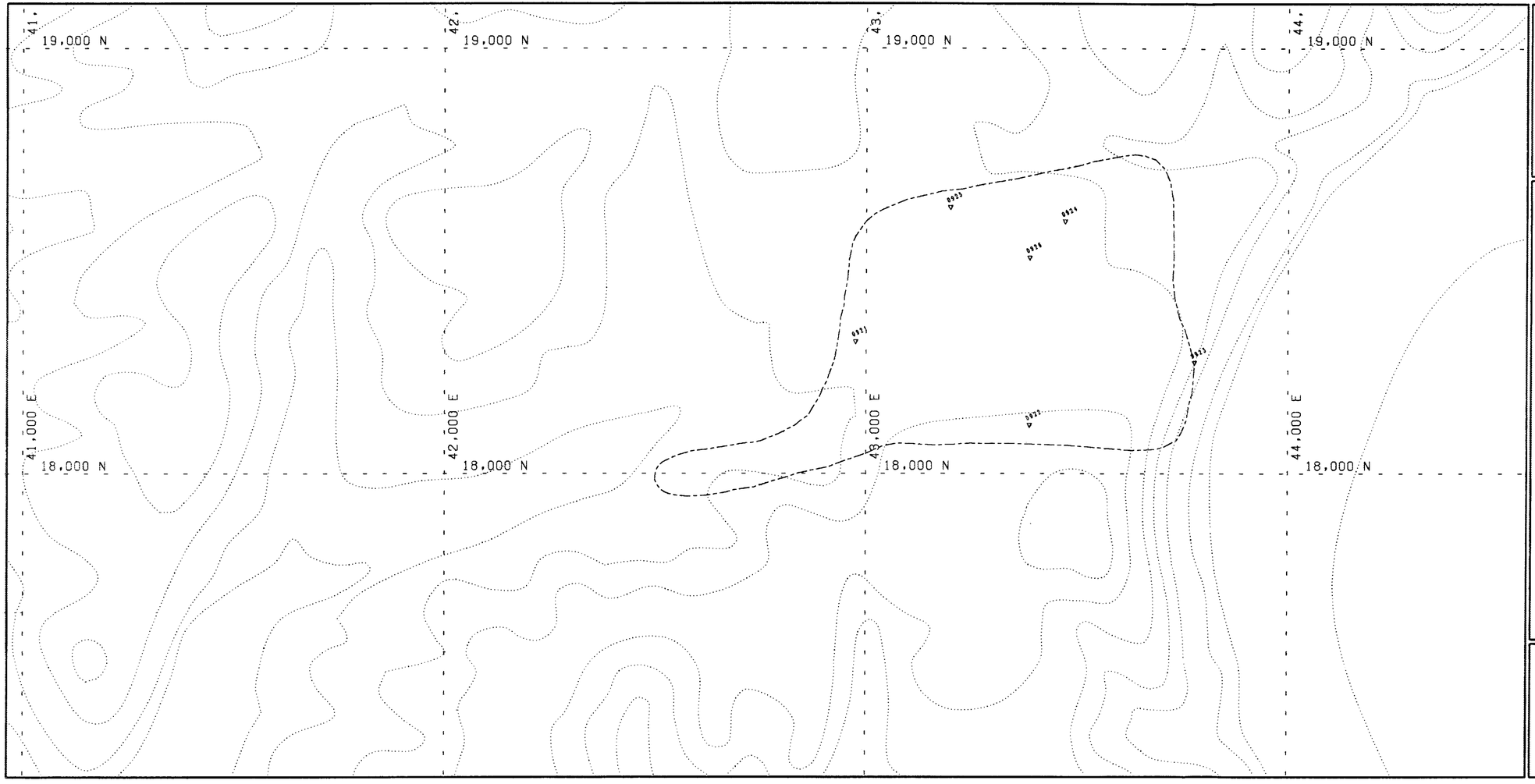
- - - - X-10 Grid, 1000 ft interval
- ——— Creeks, Ponds, and Basins
- – – – WAG Boundaries
- ····· Contours, 20 ft Interval (approx)

Map Scale 1:2400
March 1989

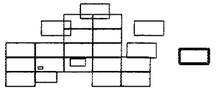
Fig. A.13.

Map sheet 12 of Fig. A.1.

ORNL-DWG 89-9353



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

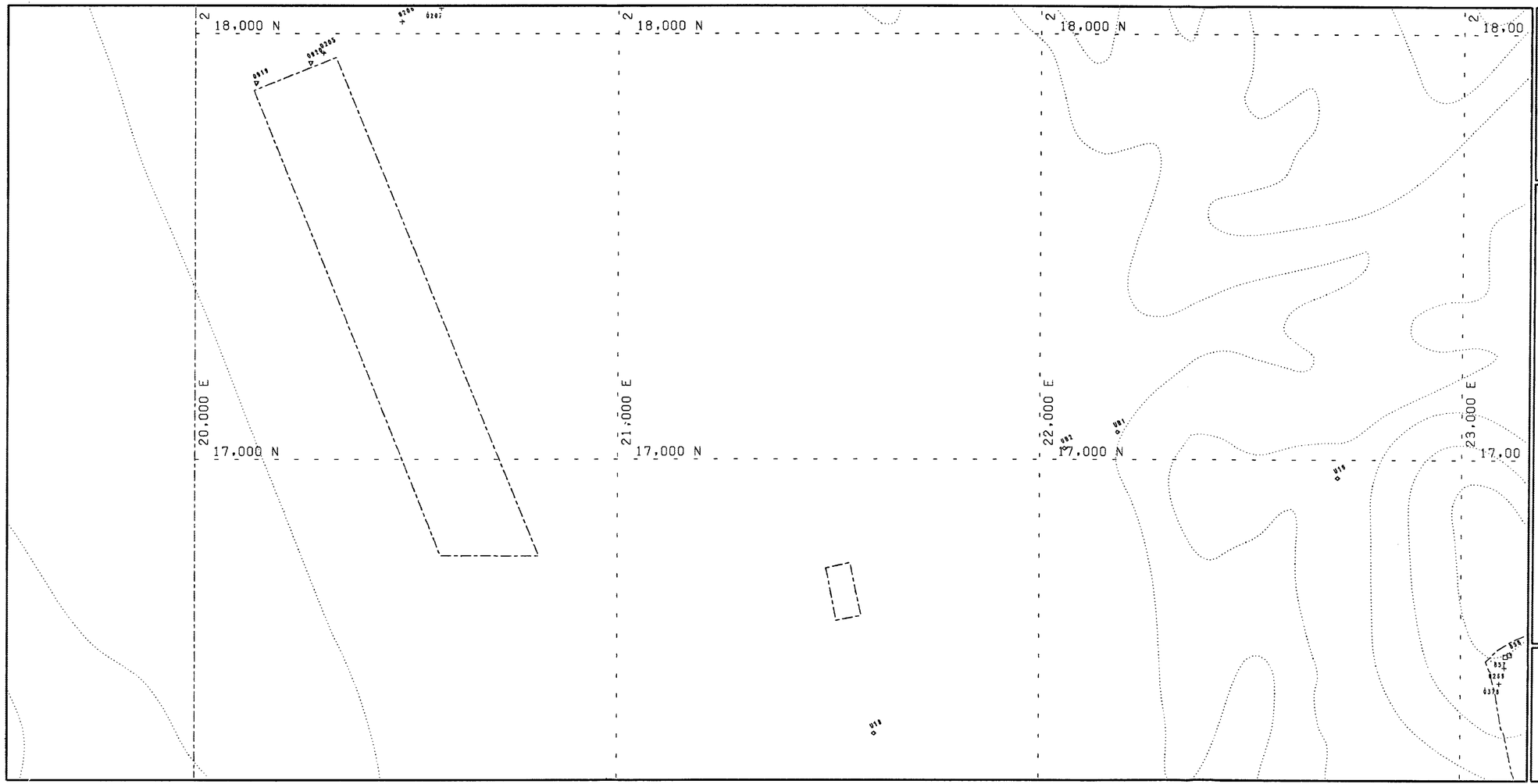
- - - - X-10 Grid, 1000 ft interval
- ——·—— Creeks, Ponds, and Basins
- – – – – WAG Boundaries
- ····· Contours, 20 ft Interval (approx)

Map Scale 1:2400
March 1989

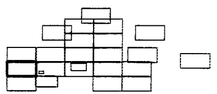
Fig. A.14.

Map sheet 13 of Fig. A.1.

ORNL-DWG 89-9354



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- * Test Area for RAP
- * Water Quality - CERCLA

Lines

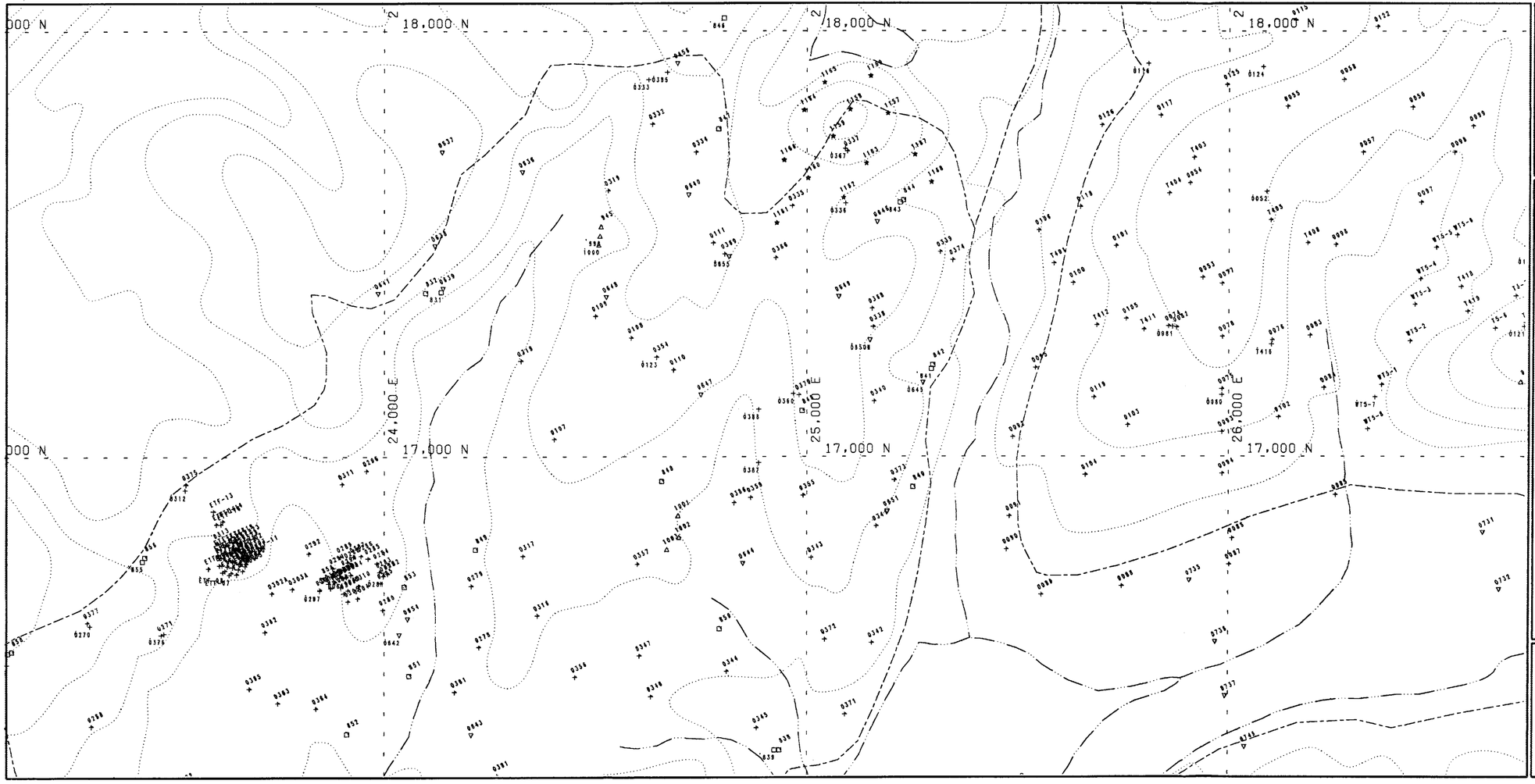
- - - - X-10 Grid, 1000 ft interval
- ——·—— Creeks, Ponds, and Basins
- — — — WAG Boundaries
- ····· Contours, 20 ft interval (approx)

Map Scale 1:2400
March 1989

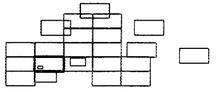
Fig. A.15.

Map sheet 14 of Fig. A.1.

ORNL-DWG 89-9355



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

- X-10 Grid, 1000 ft Interval
- Creeks, Ponds, and Basins
- WAG Boundaries
- Contours, 20 ft Interval (approx)

Map Scale 1:2400
March 1989

Fig. A.16.

Map sheet 15 of Fig. A.1.

(See Map Sheet 15A for Details)

ORNL-DWG 89-9356

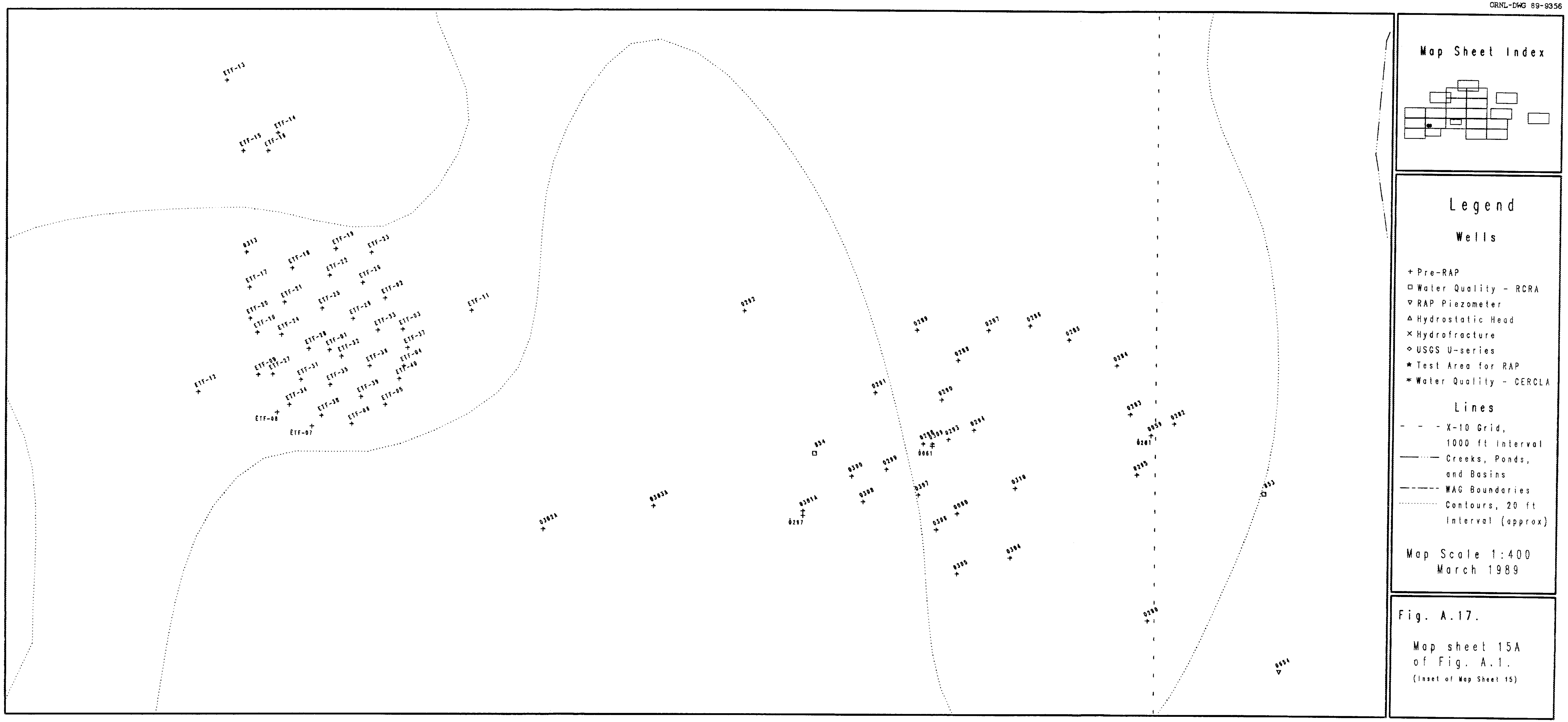
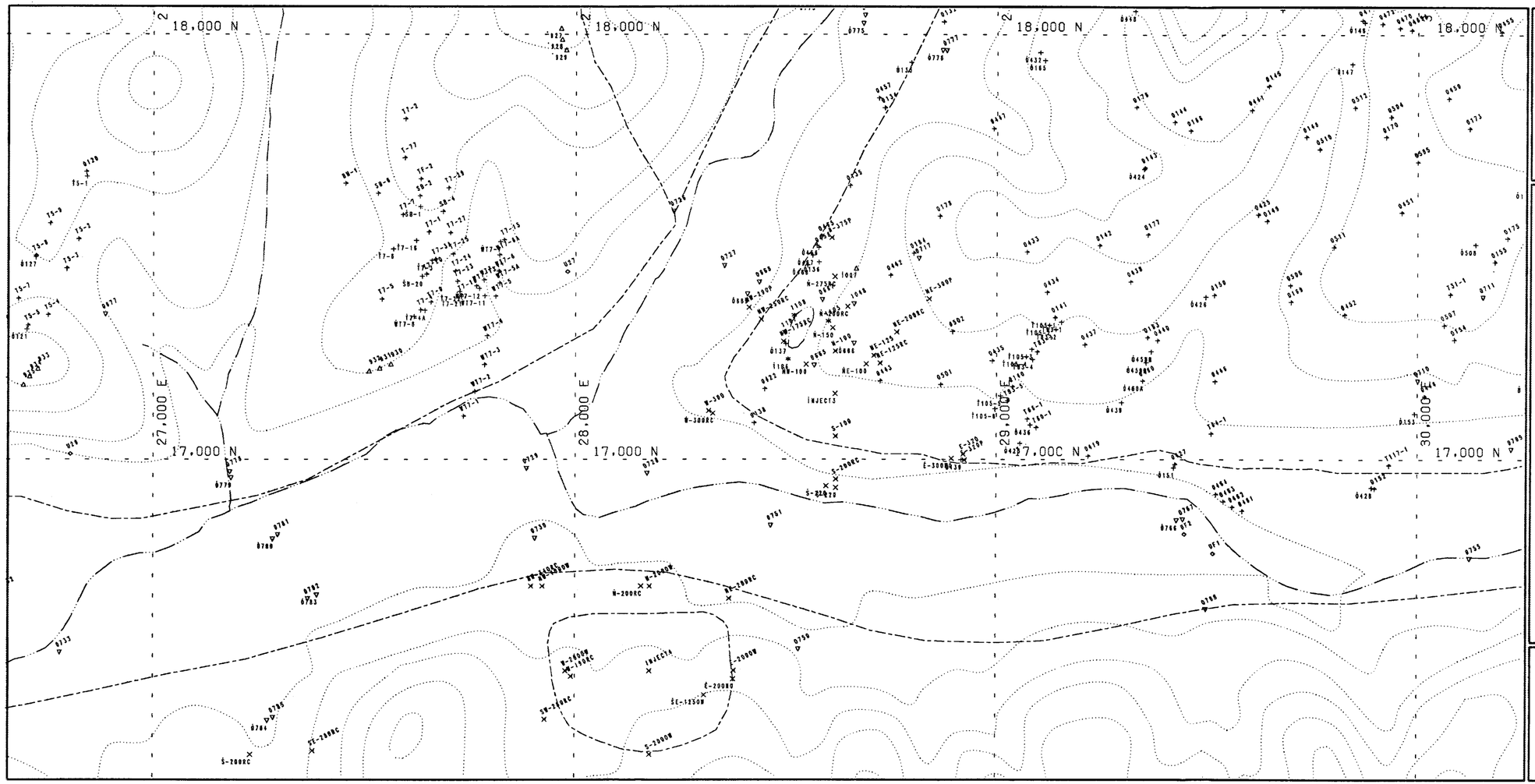


Fig. A.17.

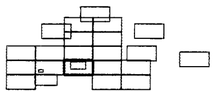
Map sheet 15A of Fig. A.1.

(Inset of Map Sheet 15)

ORNL-DWG 89-9357



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- * Test Area for RAP
- * Water Quality - CERCLA

Lines

- X-10 Grid, 1000 ft Interval
- Creeks, Ponds, and Basins
- WAG Boundaries
- Contours, 20 ft Interval (approx)

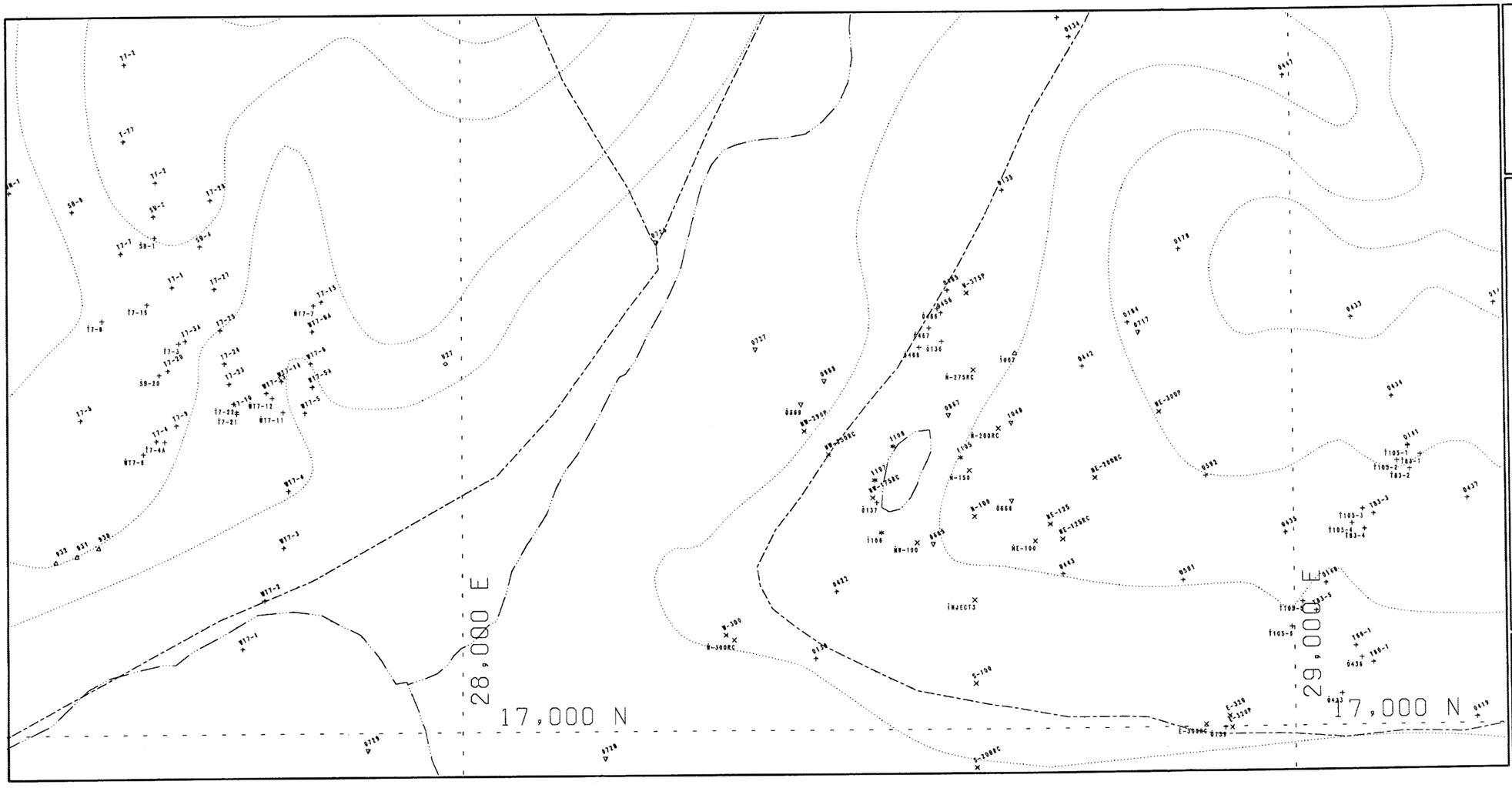
Map Scale 1:2400
March 1989

Fig. A.18.

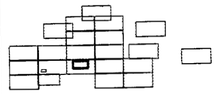
Map sheet 16 of Fig. A.1.

(See Map Sheet 16A for Details)

ORNL-DWG 89-9358



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

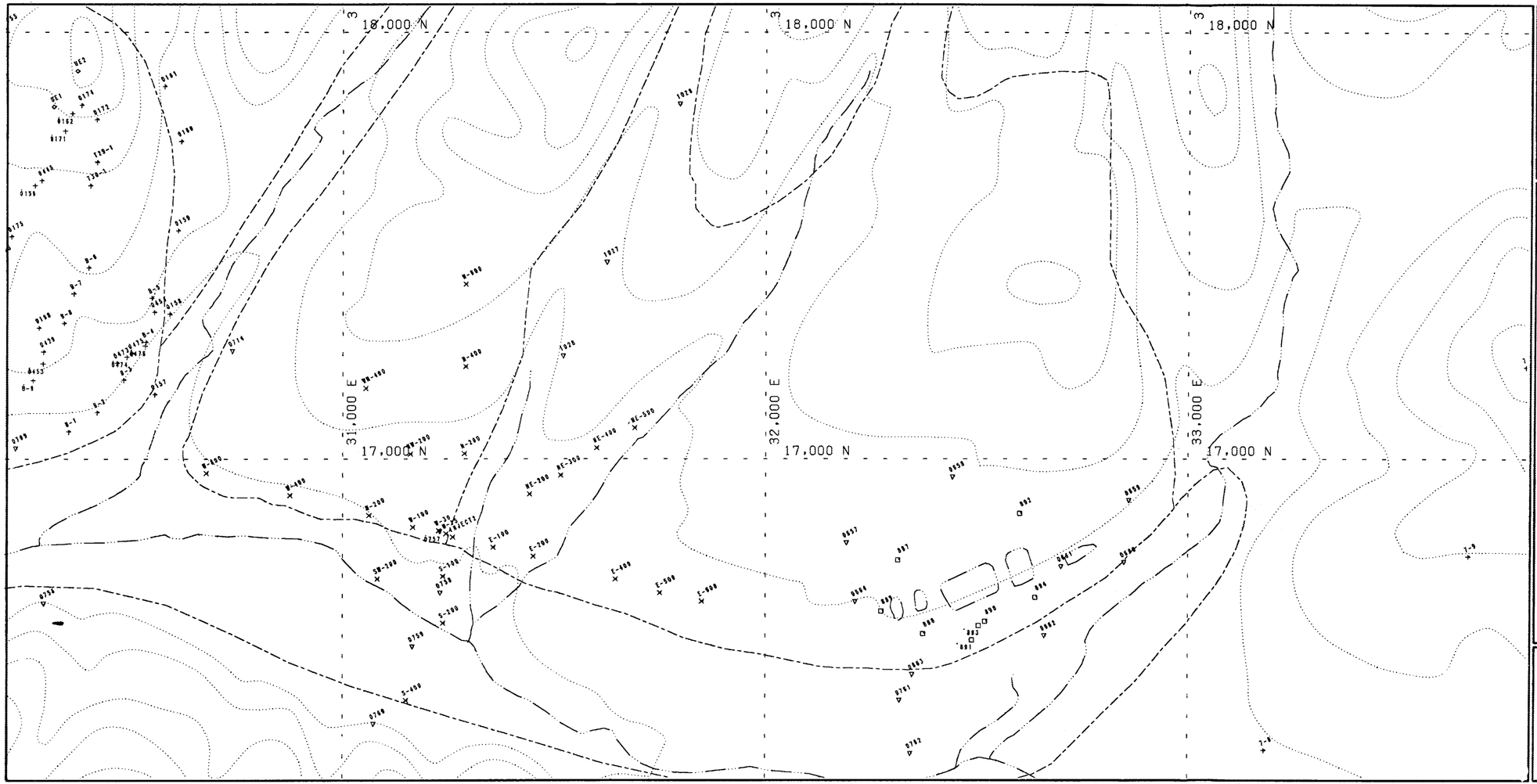
- - - - X-10 Grid, 1000 ft Interval
- ——— Creeks, Ponds, and Basins
- ——— WAG Boundaries
- ····· Contours, 20 ft Interval (approx)

Map Scale 1:1200
March 1989

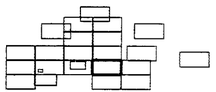
Fig. A.19.

Map sheet 16A of Fig. A.1.
(Inset of Map Sheet 16)

ORNL-DWG 89-9359



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

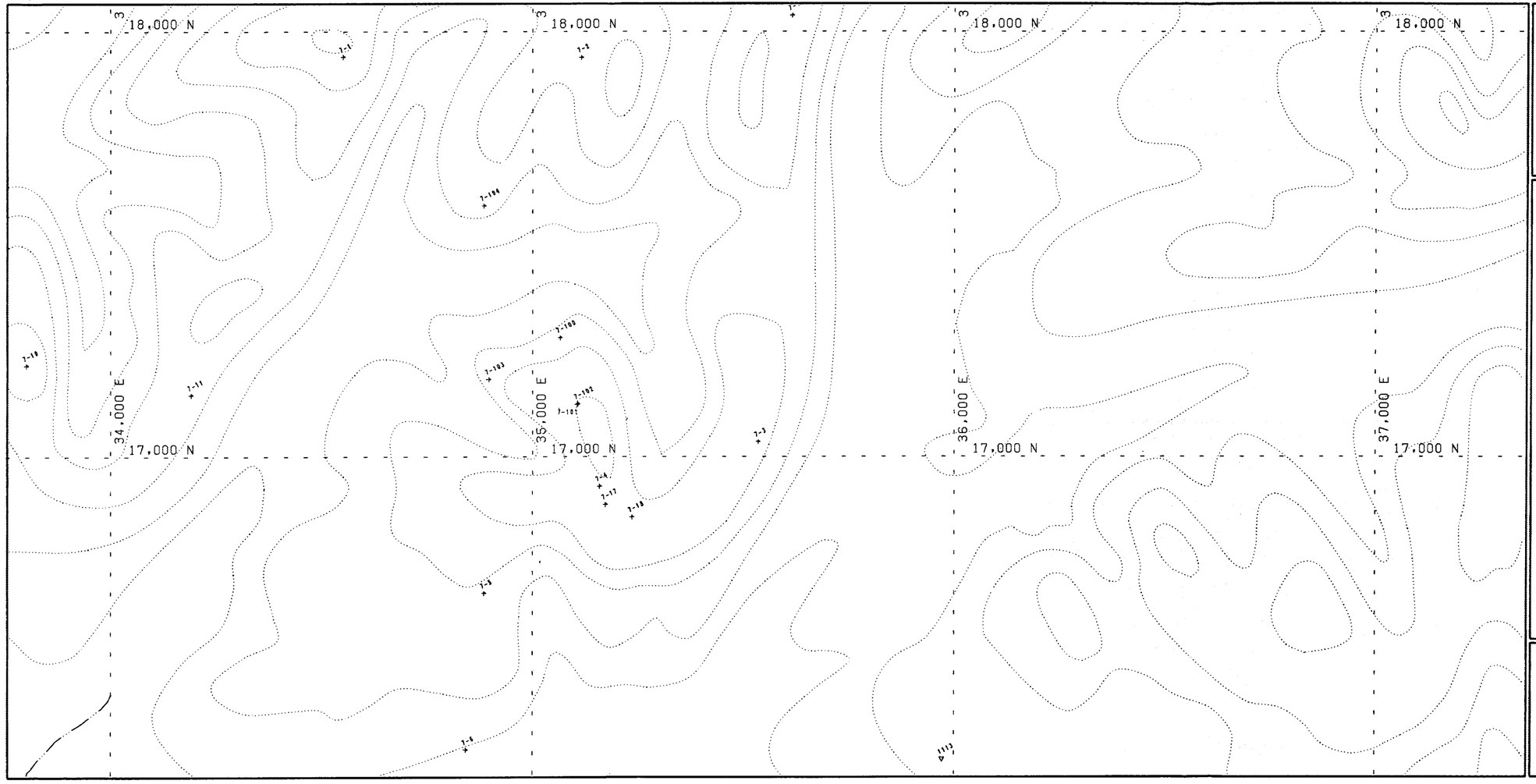
- X-10 Grid, 1000 ft Interval
- Creeks, Ponds, and Basins
- WAG Boundaries
- Contours, 20 ft Interval (approx)

Map Scale 1:2400
March 1989

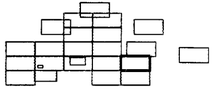
Fig. A.20.

Map sheet 17 of Fig. A.1.

ORNL-DWG 89-9360



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- * Test Area for RAP
- * Water Quality - CERCLA

Lines

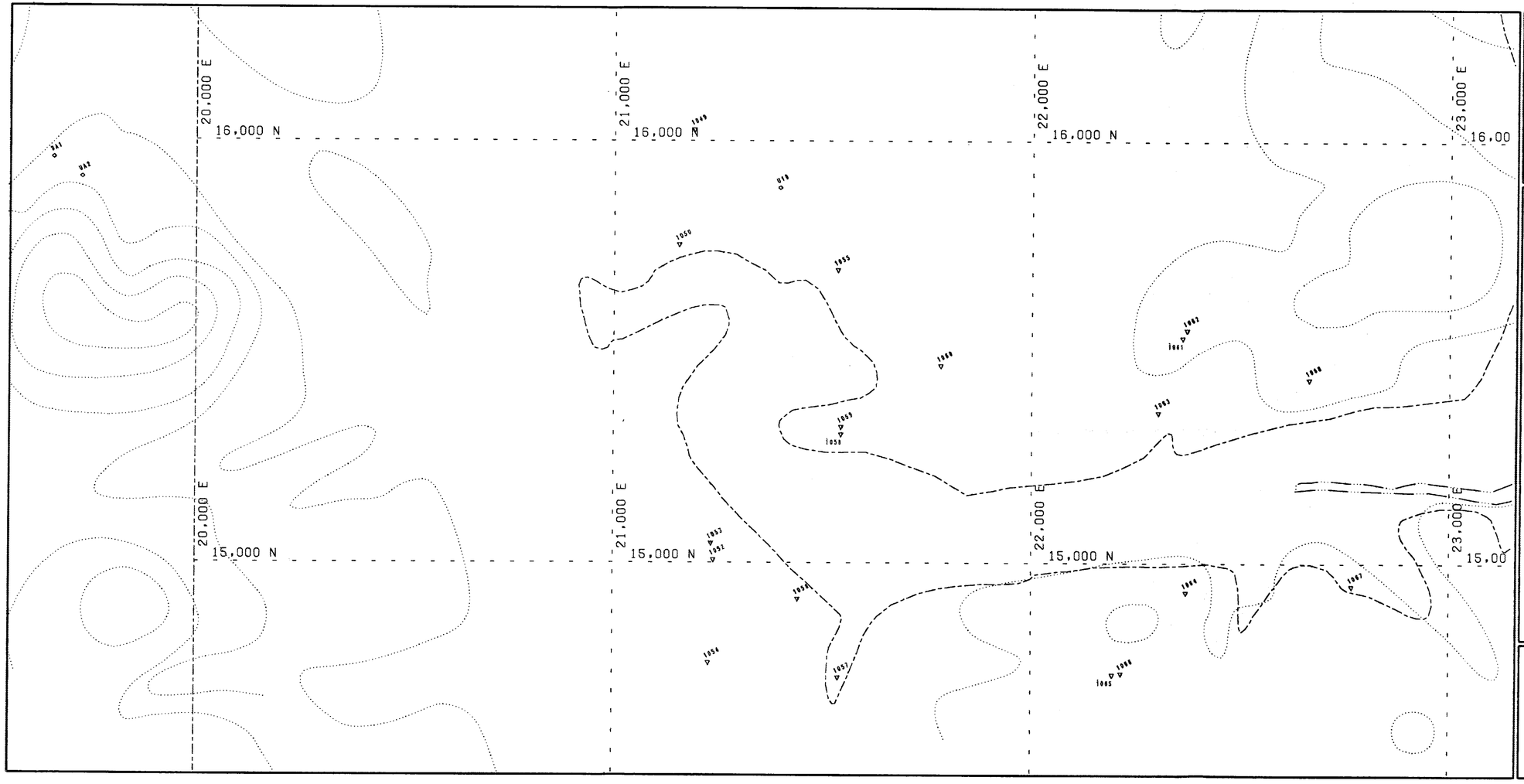
- X-10 Grid, 1000 ft Interval
- Creeks, Ponds, and Basins
- WAG Boundaries
- Contours, 20 ft Interval (approx)

Map Scale 1:2400
March 1989

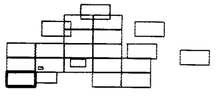
Fig. A.21.

Map sheet 18 of Fig. A.1.

ORNL-DWG 89-9361



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

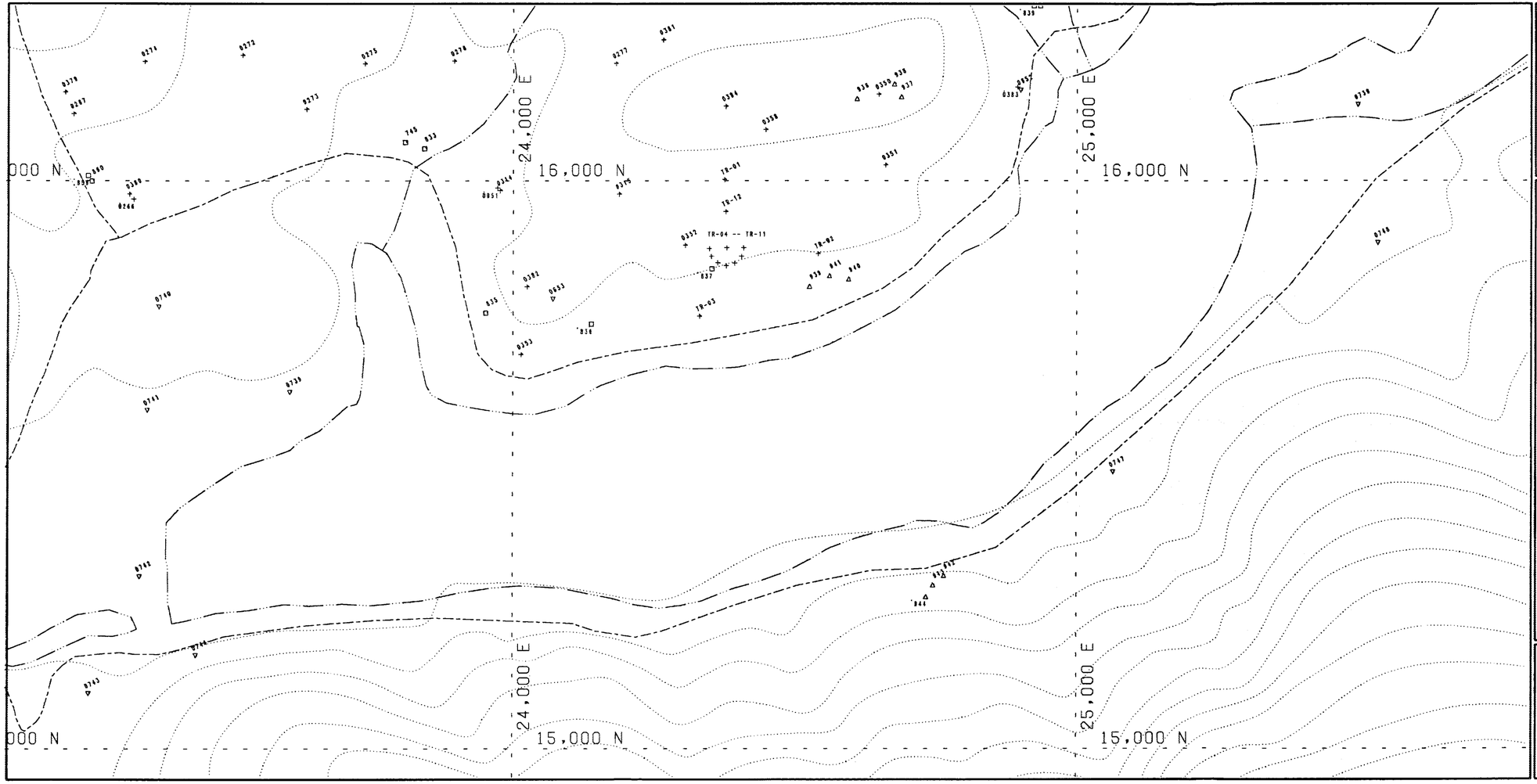
- - - - X-10 Grid, 1000 ft Interval
- ——— Creeks, Ponds, and Basins
- – – – WAG Boundaries
- ····· Contours, 20 ft Interval (approx)

Map Scale 1:2400
March 1989

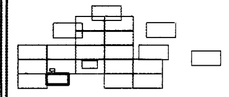
Fig. A.22.

Map sheet 19 of Fig. A.1.

ORNL-DWG 89-9362



Map Sheet Index



Legend

Wells

+ Pre-RAP
□ Water Quality - RCRA
▽ RAP Piezometer
△ Hydrostatic Head
× Hydrofracture
◇ USGS U-series
★ Test Area for RAP
* Water Quality - CERCLA

Lines

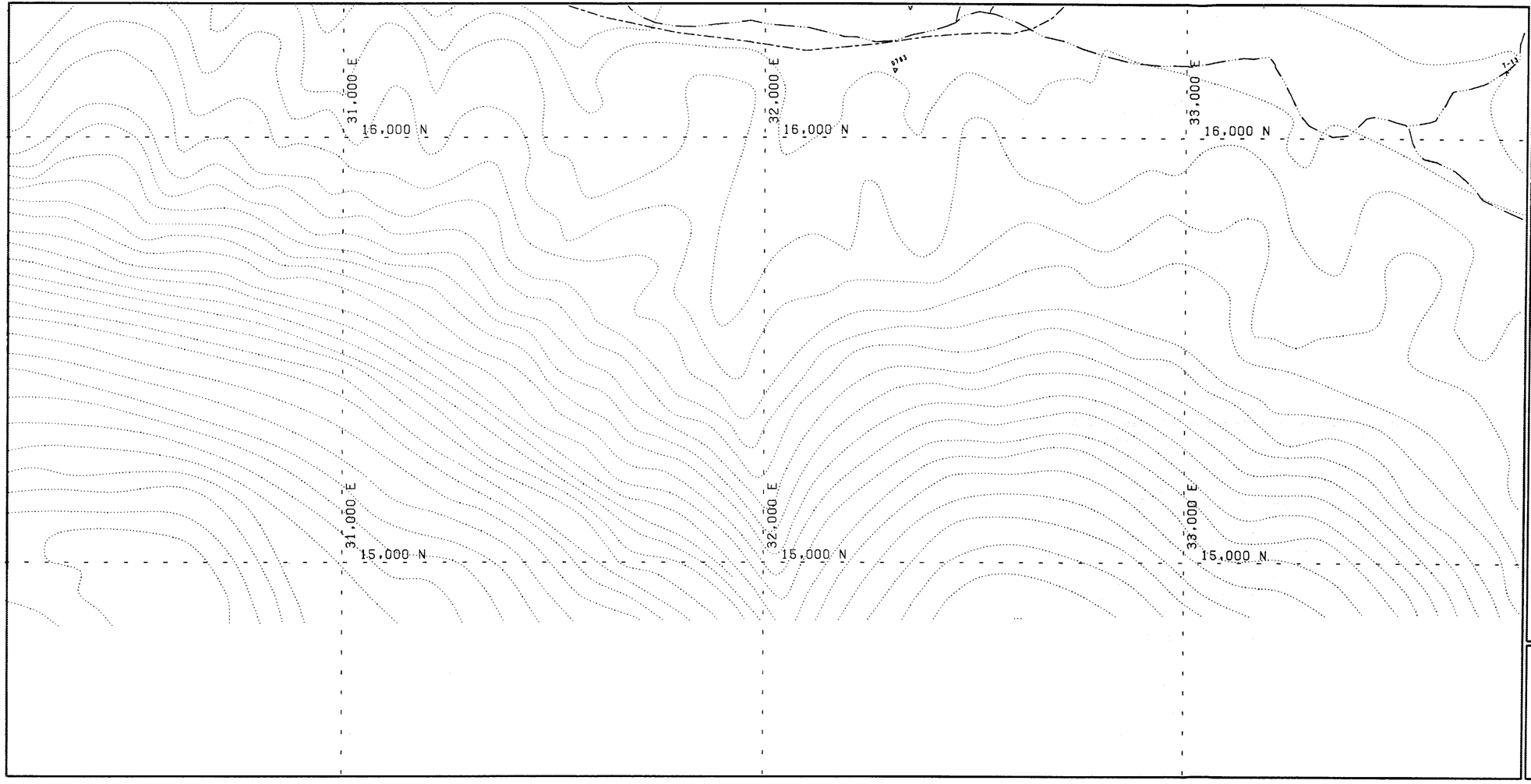
- - - X-10 Grid, 1000 ft interval
——— Creeks, Ponds, and Basins
– – – – WAG Boundaries
…… Contours, 20 ft Interval (approx)

Map Scale 1:1800
March 1989

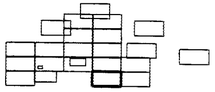
Fig. A.23.

Map sheet 20 of Fig. A.1.

ORNL-DWG 89-9363



Map Sheet Index



Legend

Wells

+ Pre-RAP
□ Water Quality - RCRA
▽ RAP Piezometer
△ Hydrostatic Head
× Hydrofracture
◇ USGS U-series
★ Test Area for RAP
* Water Quality - CERCLA

Lines

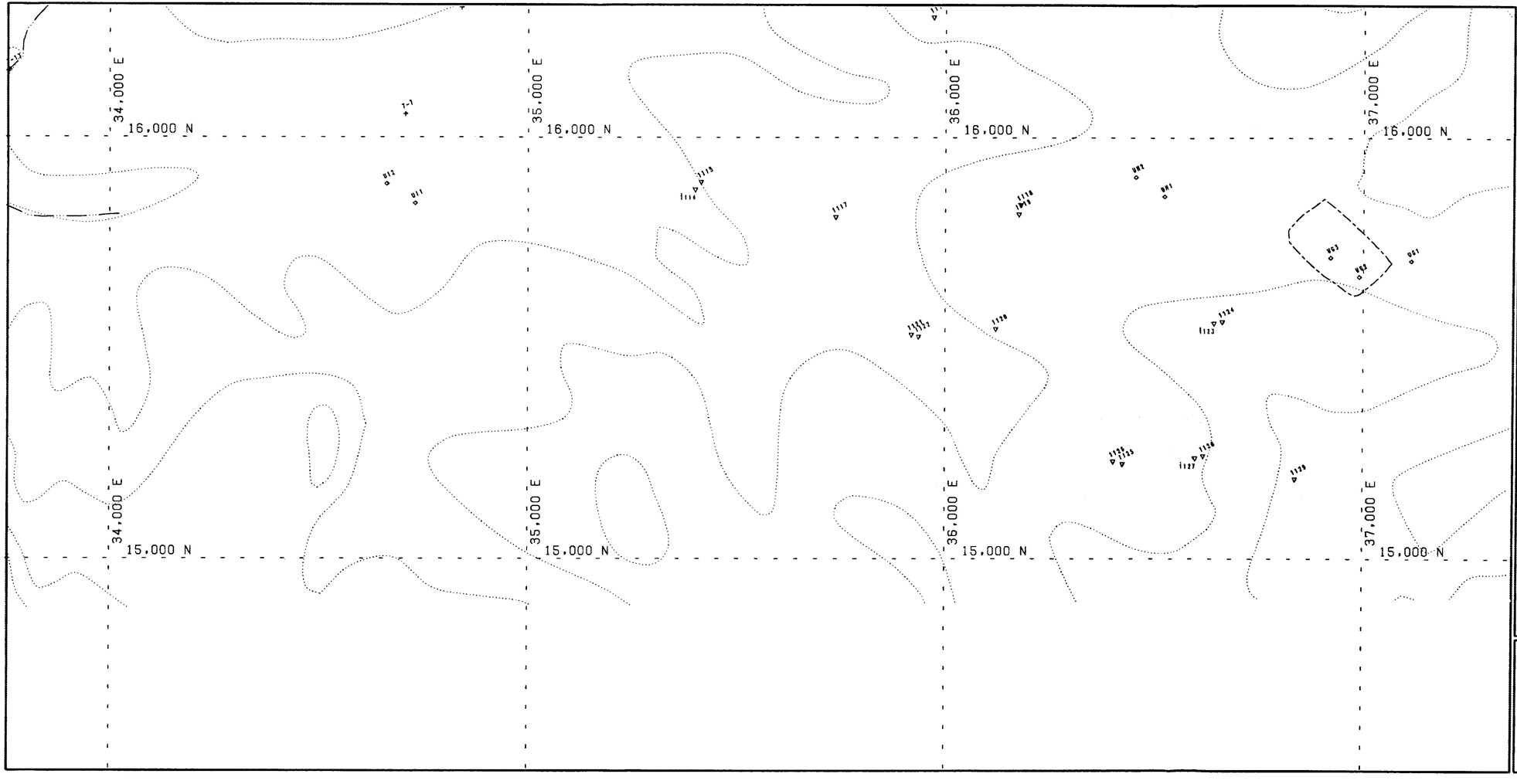
- - - X-10 Grid, 1000 ft interval
——·—— Creeks, Ponds, and Basins
—— —— WAG Boundaries
…… Contours, 20 ft interval (approx)

Map Scale 1:2400
March 1989

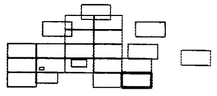
Fig. A.24.

Map sheet 21 of Fig. A.1.

ORNL-DWG 89-9364



Map Sheet Index



Legend

Wells

- + Pre-RAP
- □ Water Quality - RCRA
- ▽ RAP Piezometer
- △ Hydrostatic Head
- × Hydrofracture
- ◇ USGS U-series
- ★ Test Area for RAP
- * Water Quality - CERCLA

Lines

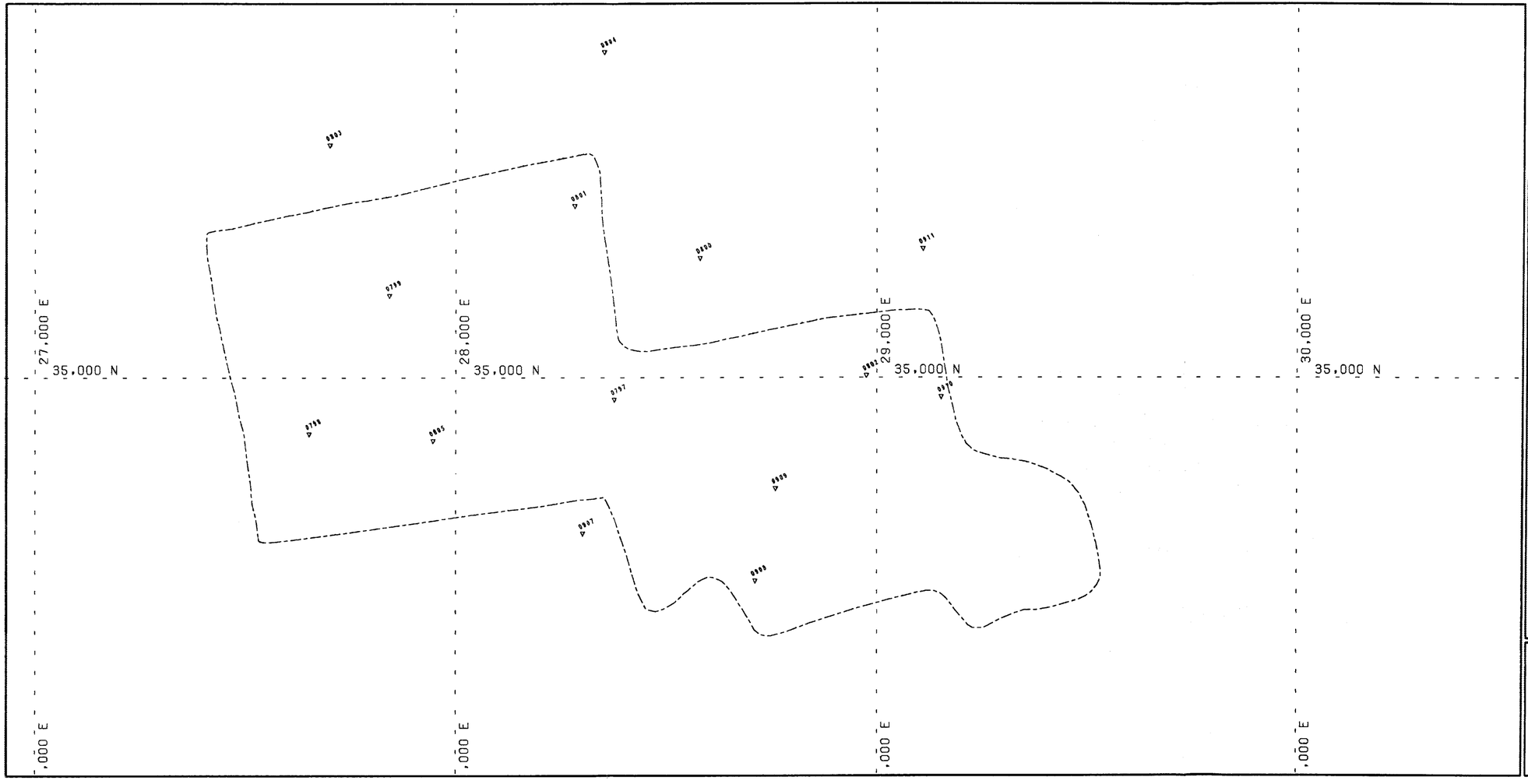
- - - - X-10 Grid, 1000 ft interval
- ——— Creeks, Ponds, and Basins
- – – – – WAG Boundaries
- ····· Contours, 20 ft interval (approx)

Map Scale 1:2400
March 1989

Fig. A.25.

Map sheet 22 of Fig. A.1.

ORNL-DWG 89-9365



Legend

Wells

+ Pre-RAP
□ Water Quality - RCRA
▽ RAP Piezometer
△ Hydrostatic Head
× Hydrofracture
◇ USGS U-series
★ Test Area for RAP
✱ Water Quality - CERCLA

Lines

- - - X-10 Grid, 1000 ft Interval
——·—— Creeks, Ponds, and Basins
——— WAG Boundaries

Map Scale 1:2400
March 1989

Fig. A.26.

Wells in the vicinity of WAG 11

APPENDIX B

WELL MONITORING ACTIVITIES RECORDED IN THE REMEDIAL ACTION PROGRAM NUMERIC DATA BASE

Table B.1. Number of periodic water-level measurements and indication if well has been sampled in scoping surveys

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
SB-1	04SEP86	13OCT87	31	-
SB-2	04SEP86	11JAN89	45	-
SB-20	04SEP86	29JUN88	40	-
SB-4	04SEP86	13OCT87	31	-
SB-6	04SEP86	13OCT87	31	-
T401	21JUL86	12OCT87	24	-
T403	21JUL86	12OCT87	24	-
T404	21JUL86	12OCT87	24	-
T405	21JUL86	29JUN88	33	-
T408	24JUL86	13OCT87	24	-
T411	21JUL86	12OCT87	24	-
T412	21JUL86	09JAN89	39	-
T416	24JUL86	12OCT87	24	-
T418	24JUL86	13OCT87	24	-
T419	22JUL86	09JAN89	39	-
T5-4	22JUL86	29JUN88	33	-
T6-1	21JUL86	28JUN88	33	-
T6-3	21JUL86	28JUN88	33	-
T7-10	04SEP86	29JUN88	40	-
T7-21	04SEP86	13OCT87	31	-
T7-22	04SEP86	13OCT87	31	-
T7-23	04SEP86	13OCT87	31	-
T7-24	04SEP86	13OCT87	31	-
T7-25	04SEP86	13OCT87	31	-
T7-26	04SEP86	13OCT87	30	-
T7-27	04SEP86	13OCT87	31	-
T7-29	04SEP86	13OCT87	31	-
T7-3	04SEP86	13OCT87	31	-
T7-4	04SEP86	13OCT87	31	-
T7-5	04SEP86	29JUN88	40	-
T7-6	04SEP86	13OCT87	31	-
T7-7	04SEP86	13OCT87	31	-
T7-9	04SEP86	13OCT87	31	-
WT5-1	22JUL86	19AUG86	3	-
WT5-3	22JUL86	13OCT87	24	-
WT5-5	22JUL86	13OCT87	24	-
WT5-8	22JUL86	29JUN88	33	-
WT7-2	04SEP86	13OCT87	31	-
WT7-3	12JUL86	11JAN89	39	-
WT7-4	04SEP86	29JUN88	40	-

Table B.1. continued

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
WT7-5	18JUL86	13OCT87	25	-
WT7-5A	04SEP86	13OCT87	31	-
WT7-6	04SEP86	13OCT87	31	-
WT7-6A	04SEP86	13OCT87	31	-
WT7-7	18JUL86	13OCT87	18	-
WT7-8	18JUL86	29JUN88	34	-
0064	18JUL86	29JUN88	33	-
0065	18JUL86	09JAN89	39	-
0066	18JUL86	12OCT87	24	-
0067	25JUL86	29JUN88	33	-
0070	18JUL86	12OCT87	24	-
0083	24JUL86	13OCT87	24	-
0084	24JUL86	09JAN89	39	-
0085	23JUL86	13OCT87	25	-
0086	23JUL86	13OCT87	25	-
0088	23JUL86	13OCT87	25	-
0090	23JUL86	29JUN88	34	-
0092	23JUL86	13OCT87	25	-
0093	21JUL86	29JUN88	33	-
0094	21JUL86	12OCT87	24	-
0095	25JUL86	13OCT87	24	-
0096	24JUL86	13OCT87	25	-
0097	22JUL86	29JUN88	32	-
0098	22JUL86	13OCT87	24	-
0099	22JUL86	13OCT87	24	-
0103	21JUL86	12OCT87	24	-
0104	21JUL86	12OCT87	24	-
0114	22JUL86	09JAN89	39	-
0124	21JUL86	12OCT87	24	-
0125	21JUL86	12OCT87	24	-
0126	21JUL86	29JUN88	34	-
0182	21JUL86	28JUN88	32	-
0183	21JUL86	29JUN88	33	-
0186	24JUL86	28JUN88	33	-
0187	21JUL86	28JUN88	34	-
0191	24JUL86	28JUN88	33	-
0201	17DEC86	28JUN88	25	-
0269	04OCT88	07NOV88	4	-
0276	04OCT88	02JAN89	12	-
0318	04OCT88	02JAN89	12	-
0345	02JAN89	02JAN89	1	-
0347	27DEC88	02JAN89	2	-

Table B.1. continued

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
0356	04OCT88	02JAN89	12	-
0358	27DEC88	02JAN89	2	-
0367	03JUN87	21JUN88	275	-
0368	02JAN89	02JAN89	1	-
0532	11FEB86	26OCT87	38	-
0533	11FEB86	03JAN89	52	X
0534	11FEB86	26OCT87	38	-
0535	16JUN86	26OCT87	28	-
0536	11FEB86	26OCT87	38	-
0537	11FEB86	26OCT87	37	-
0538	10MAR86	03JAN89	49	X
0539	22SEP86	26OCT87	21	X
0540	11FEB86	26OCT87	38	-
0541	11FEB86	26OCT87	38	-
0542	11FEB86	26OCT87	39	X
0543	11FEB86	26OCT87	38	-
0544	11FEB86	26OCT87	39	X
0545	16JUN86	26OCT87	28	-
0546	28SEP87	29JUN88	10	-
0547	11FEB86	26OCT87	38	-
0548	11FEB86	26OCT87	39	X
0549	28SEP87	29JUN88	10	-
0550	11FEB86	26OCT87	39	X
0551	11FEB86	29JUN88	46	-
0552	20OCT86	26OCT87	19	-
0553	11FEB86	29JUN88	46	-
0554	11FEB86	26OCT87	39	X
0555	09APR86	26OCT87	33	-
0556	11FEB86	26OCT87	38	-
0557	11FEB86	26OCT87	38	X
0558	11FEB86	03JAN89	51	X
0559	10MAR86	13APR87	29	-
0560	10MAR86	26OCT87	48	X
0561	11FEB86	26OCT87	41	X
0562	14OCT87	28JUN88	10	-
0563	10MAR86	27OCT87	36	X
0564	23JUL87	27OCT87	4	-
0565	27MAY86	16MAR87	9	X
0566	24SEP86	27OCT87	20	-
0567	09APR86	27OCT87	33	X
0568	11FEB86	26OCT87	39	X
0569	22SEP86	03JAN89	34	-

Table B.1. continued

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
0570	16JUN86	26OCT87	29	X
0571	16APR86	26OCT87	29	X
0572	10MAR86	26OCT87	36	-
0573	10MAR86	26OCT87	46	X
0574	15APR87	29JUN88	16	-
0575	20OCT86	03JAN89	31	-
0577	09APR86	26OCT87	34	X
0578	28JUL86	27OCT87	24	-
0579	11FEB86	29JUN88	46	X
0580	16JUN86	21SEP87	28	X
0581	10MAR86	26OCT87	36	-
0582	10MAR86	26OCT87	46	-
0583	11FEB86	27OCT87	37	-
0584	09APR86	27OCT87	32	-
0586	15APR87	29JUN88	16	-
0587	18NOV86	27OCT87	16	-
0588	10MAR86	26OCT87	45	-
0589	17NOV86	26OCT87	17	-
0590	10MAR86	29JUN88	46	X
0591	09APR86	27OCT87	32	-
0592	09APR86	27OCT87	32	-
0593	09APR86	27OCT87	33	X
0594	09APR86	27OCT87	33	X
0595	11FEB86	26OCT87	38	X
0596	10MAR86	26OCT87	46	X
0597	09APR86	27OCT87	33	X
0598	22SEP86	27OCT87	20	-
0599	11FEB86	29JUN88	46	X
0600	21OCT86	27OCT87	18	X
0601	07OCT86	27OCT87	19	-
0602	11FEB86	26OCT87	38	X
0603	17NOV86	29JUN88	25	-
0604	11FEB86	27OCT87	38	X
0605	11FEB86	25FEB86	2	-
0606	09APR86	13APR87	26	-
0607	17NOV86	26OCT87	17	-
0608	10MAR86	27OCT87	36	X
0609	15APR87	03JAN89	21	-
0610	11FEB86	27OCT87	38	X
0611	11FEB86	26OCT87	41	X
0612	11FEB86	26OCT87	40	X
0613	10MAR86	27OCT87	36	X

Table B.1. continued

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
0614	11FEB86	26OCT87	38	X
0615	11FEB86	27OCT87	38	X
0616	04APR86	27OCT87	35	X
0617	10MAR86	29JUN88	44	X
0618	09APR86	27OCT87	33	X
0619	25FEB86	14APR87	29	-
0620	11FEB86	26OCT87	37	-
0621	25FEB86	26OCT87	37	X
0622	11FEB86	27OCT87	38	X
0623	11FEB86	27OCT87	38	X
0624	11FEB86	26OCT87	37	-
0625	11FEB86	27OCT87	37	-
0626	11FEB86	27OCT87	38	X
0627	11FEB86	03JAN89	51	X
0628	10MAR86	27OCT87	36	X
0629	04MAR87	06JUL88	18	-
0630	01JUL86	03JAN89	35	X
0631	22OCT86	06JUL88	27	-
0632	18NOV86	06JUL88	25	-
0633	02JUL86	03JAN89	35	X
0634	04MAR87	06JUL88	18	-
0635	22OCT86	06JUL88	27	-
0636	17JUN86	05JAN89	61	-
0637	17JUN86	05JAN89	49	-
0638	17JUN86	05JAN89	49	-
0639	08OCT86	05JAN89	41	-
0640	24SEP86	06JAN89	54	-
0641	17JUN86	05JAN89	49	-
0642	17JUN86	06JAN89	60	-
0643	17JUN86	05NOV86	11	-
0644	17JUN86	06JAN89	49	-
0645	24SEP86	11JAN89	54	-
0646	24SEP86	11JAN89	221	-
0647	04OCT88	02JAN89	12	-
0648	04OCT88	02JAN89	12	-
0649	17JUN86	02JAN89	54	-
0650A	04OCT88	02JAN89	12	-
0650B	08OCT86	02JAN89	42	-
0651	08OCT86	06JAN89	41	-
0652	08OCT86	06JAN89	41	-
0653	08OCT86	06JAN89	41	-
0654	24SEP86	06JAN89	53	-

Table B.1. continued

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
0655	23SEP86	06JAN89	54	-
0656	23SEP86	05JAN89	54	-
0657	09OCT86	28JUN88	29	-
0658	24SEP86	09JAN89	36	-
0659	24SEP86	28JUN88	30	-
0660	10NOV87	28JUN88	9	-
0661	24SEP86	09JAN89	36	-
0662	10NOV87	28JUN88	9	-
0663	10NOV87	28JUN88	9	-
0664	24SEP86	27JUN88	30	-
0665	24SEP86	28JUN88	30	-
0666	24SEP86	28JUN88	30	-
0667	24SEP86	28JUN88	30	-
0668	14OCT87	28JUN88	10	-
0669	14OCT87	09JAN89	16	-
0670	24SEP87	06DEC88	15	-
0671	24SEP87	28JUN88	11	-
0672	24SEP87	28JUN88	11	-
0673	24SEP87	28JUN88	11	-
0674	24SEP87	28JUN88	11	-
0675	24SEP87	06DEC88	15	-
0676	21JUL86	28JUN88	33	-
0678	16OCT87	09JAN89	16	-
0679	24JUL86	12OCT87	24	-
0680	24JUL86	28JUN88	33	-
0682	17JUN86	28JUN88	38	-
0683	23SEP86	28JUN88	31	-
0684	10MAR87	09JAN89	26	-
0685	17JUN86	09JAN89	44	-
0686	17JUN86	09JAN89	44	-
0687	23SEP86	09JAN89	33	-
0688	17JUN86	28JUN88	38	-
0689	17JUN86	28JUN88	38	-
0690	17JUN86	28JUN88	37	-
0691	23SEP86	30JUN88	29	-
0692	22OCT86	30JUN88	27	-
0693	22OCT86	30JUN88	27	-
0694	22OCT86	30JUN88	27	-
0695	23SEP86	30JUN88	29	-
0696	07AUG86	30JUN88	30	X
0697	22OCT86	30JUN88	27	-
0698	22OCT86	04JAN89	33	-

Table B.1. continued

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
0699	22OCT86	30JUN88	27	-
0701	18NOV86	30JUN88	25	-
0702	23SEP86	30JUN88	30	-
0703	23SEP86	30JUN88	30	-
0704	23JUL86	30JUN88	31	X
0705	23JUL86	04JAN89	37	X
0706	30JUL86	30JUN88	31	X
0707	23SEP86	30JUN88	30	-
0709	24SEP86	28JUN88	30	-
0710	24SEP86	09JAN89	36	-
0711	24SEP86	28JUN88	28	-
0712	09SEP87	28JUN88	11	X
0714	24SEP86	28JUN88	29	-
0715	24SEP86	09JAN89	36	-
0716	09JUL87	09JAN89	19	-
0718	15SEP86	09JAN89	37	-
0719	21JUL86	28JUN88	33	-
0720	16OCT87	28JUN88	10	-
0721	11MAR87	09JAN89	24	-
0723	11AUG87	09JAN89	18	-
0726	11AUG87	28JUN88	12	-
0727	14OCT87	28JUN88	10	-
0728	06MAY87	28JUN88	15	X
0729	14OCT87	28JUN88	10	-
0730	10NOV87	28JUN88	9	X
0731	11MAR87	28JUN88	19	X
0732	10NOV87	28JUN88	9	-
0733	16OCT87	28JUN88	10	X
0734	15APR87	29JUN88	16	-
0735	02JUN87	28JUN88	14	X
0736	02JUN87	28JUN88	14	-
0737	02JUN87	28JUN88	14	X
0738	09SEP87	28JUN88	11	X
0739	24SEP86	10JAN89	35	X
0740	23SEP86	10JAN89	36	-
0741	24SEP86	10JAN89	36	-
0742	11AUG87	10JAN89	18	-
0743	23SEP86	10JAN89	36	-
0744	24SEP86	10JAN89	36	X
0747	11MAR87	28JUN88	19	X
0748	14OCT87	28JUN88	10	-
0749	11MAY87	28JUN88	15	-

Table B.1. continued

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
0750	11AUG87	11JUL88	12	-
0751	14OCT87	28JUN88	10	-
0752	15APR87	29JUN88	16	-
0753	04MAR87	29JUN88	18	-
0754	04MAR87	29JUN88	18	-
0755	14OCT87	28JUN88	10	X
0756	14OCT87	28JUN88	10	-
0757	11MAY87	28JUN88	15	-
0758	11MAY87	09JAN89	21	-
0759	11MAY87	28JUN88	15	X
0760	11MAY87	28JUN88	15	-
0761	09JUL87	28JUN88	13	X
0762	09JUL87	09JAN89	19	-
0763	11MAR87	28JUN88	19	-
0764	15APR87	03JAN89	21	-
0765	23SEP87	29JUN88	10	-
0766	17DEC86	09JAN89	30	X
0767	14OCT87	09JAN89	16	-
0768	14OCT87	28JUN88	10	-
0769	23SEP87	29JUN88	10	-
0770	02OCT87	06JAN89	11	-
0771	02OCT87	06JAN89	11	-
0772	02OCT87	06JAN89	11	X
0773	02OCT87	06JAN89	11	X
0774	02OCT87	06JAN89	11	X
0775	02OCT87	06JAN89	11	X
0776	02OCT87	06JAN89	11	-
0777	02OCT87	06JAN89	11	-
0778	11MAY87	10JAN89	21	X
0779	11MAY87	10JAN89	21	X
0780	11MAY87	10JAN89	21	X
0781	11MAY87	10JAN89	21	X
0782	11MAY87	10JAN89	21	X
0783	11MAY87	10JAN89	21	-
0784	04JUN87	10JAN89	20	-
0785	04JUN87	10JAN89	20	-
0786	23SEP86	30JUN88	29	-
0787	08SEP87	28JUN88	11	X
0788	23SEP86	30JUN88	30	-
0789	30JUL86	30JUN88	32	X
0790	23SEP86	04JAN89	36	-
0791	23SEP86	30JUN88	30	-

Table B.1. continued

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
0792	23SEP86	30JUN88	30	-
0793	15APR87	04JAN89	23	-
0794	23SEP86	29JUN88	29	-
0795	23SEP86	07DEC88	33	-
0796	23SEP86	29JUN88	29	-
0797	29JAN87	04JAN89	28	-
0798	29JAN87	06JUL88	22	-
0799	29JAN87	04JAN89	28	-
0800	29JAN87	04JAN89	28	-
0801	29JAN87	06JUL88	22	-
0802	29JAN87	06JUL88	22	-
0803	29JAN87	06JUL88	22	-
0804	29JAN87	06JUL88	22	-
0805	20MAY87	06JUL88	16	-
0895	04MAR87	29JUN88	18	-
0896	28OCT87	29JUN88	9	-
0897	04MAR87	29JUN88	18	-
0898	24SEP87	28JUN88	11	-
0899	04MAR87	29JUN88	18	-
0900	15APR87	29JUN88	16	-
0901	15APR87	29JUN88	16	-
0902	04MAR87	29JUN88	18	-
0903	15APR87	29JUN88	16	-
0904	28OCT87	29JUN88	9	-
0905	04MAR87	03JAN89	23	-
0906	23SEP87	29JUN88	10	-
0907	25SEP87	06JUL88	12	-
0908	20MAY87	06JUL88	16	-
0909	20MAY87	06JUL88	16	-
0910	20MAY87	06JUL88	16	-
0911	25SEP87	06JUL88	12	-
0912	19MAY87	03JAN89	20	-
0913	19MAY87	05JUL88	15	-
0914	24SEP87	05JUL88	11	-
0915	15APR87	05JUL88	17	-
0916	19MAY87	03JAN89	20	-
0917	24SEP87	05JUL88	11	-
0918	21MAY87	05JUL88	15	-
0919	21MAY87	04JAN89	21	-
0920	21MAY87	05JUL88	15	-
0921	24SEP87	02NOV88	14	-
0922	24SEP87	02NOV88	14	-

Table B.1. continued

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
0923	24SEP87	02NOV88	14	-
0924	24SEP87	02NOV88	14	-
0925	24SEP87	02NOV88	14	-
0926	24SEP87	05JUL88	11	-
1026	11MAY87	27JUN88	15	-
1027	11MAY87	09JAN89	21	-
1028	11MAY87	28JUN88	15	-
1029	11MAY87	28JUN88	15	-
1030	11MAY87	09JAN89	21	-
1031	11MAY87	28JUN88	15	-
1033	11MAY87	09JAN89	21	-
1048	11AUG87	28JUN88	12	-
1049	17NOV87	05JAN89	16	-
1050	17NOV87	05JAN89	16	-
1052	10SEP87	10JAN89	16	-
1053	14OCT87	10JAN89	16	-
1054	10SEP87	10JAN89	17	-
1055	17NOV87	05JAN89	16	-
1056	10SEP87	10JAN89	17	-
1057	10SEP87	10JAN89	17	-
1058	17NOV87	05JAN89	16	-
1059	17NOV87	05JAN89	16	-
1060	17NOV87	05JAN89	16	-
1061	17NOV87	05JAN89	16	-
1062	17NOV87	05JAN89	16	-
1063	17NOV87	05JAN89	16	-
1064	10SEP87	10JAN89	17	-
1065	10SEP87	10JAN89	17	-
1066	10SEP87	10JAN89	17	-
1067	14OCT87	10JAN89	16	-
1068	17NOV87	05JAN89	16	-
1100	06FEB85	16DEC85	7	-
1101	06FEB85	16DEC85	7	-
1102	06FEB85	16DEC85	7	-
1103	06FEB85	16DEC85	7	-
1104	06FEB85	16DEC85	7	-
1105	08APR85	06JAN86	7	-
1106	08APR85	06JAN86	7	-
1107	08APR85	06JAN86	7	-
1108	08APR85	06JAN86	7	-
1109	08APR85	13JAN86	6	-
1110	08APR85	13JAN86	6	-

Table B.1. continued

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
1111	08APR85	13JAN86	5	-
1112	08APR85	13JAN86	6	-
1113	15OCT87	10OCT88	12	-
1114	15OCT87	10JAN89	16	-
1115	15OCT87	10JAN89	16	-
1117	15OCT87	10OCT88	13	-
1118	15OCT87	10OCT88	13	-
1119	15OCT87	10OCT88	13	-
1120	15OCT87	10OCT88	13	-
1121	15OCT87	10OCT88	13	-
1122	15OCT87	10OCT88	13	-
1123	15OCT87	10OCT88	13	-
1124	15OCT87	10OCT88	13	-
1125	15OCT87	10OCT88	13	-
1126	15OCT87	10OCT88	13	-
1127	15OCT87	10OCT88	13	-
1128	15OCT87	10OCT88	13	-
1129	15OCT87	10JAN89	16	-
1157	22MAY87	21JUN88	178	-
1158	22MAY87	21JUN88	298	-
1159	03JUN87	21JUN88	298	-
1160	03JUN87	21JUN88	169	-
1161	03JUN87	21JUN88	167	-
1162	04JUN87	21JUN88	170	-
1163	04JUN87	21JUN88	190	-
1164	21MAY87	21JUN88	261	-
1165	21MAY87	21JUN88	286	-
1166	21MAY87	21JUN88	165	-
1167	22MAY87	21JUN88	166	-
1168	22MAY87	21JUN88	165	-
1169	21MAY87	21JUN88	259	-
7-1	29AUG86	28JUN88	46	-
7-10	29AUG86	28JUN88	46	-
7-100	29AUG86	28JUN88	46	-
7-101	29AUG86	28JUN88	46	-
7-102	29AUG86	28JUN88	46	-
7-103	29AUG86	28JUN88	46	-
7-104	29AUG86	28JUN88	46	-
7-11	24AUG86	28JUN88	46	-
7-12	29AUG86	04JAN89	51	-
7-13	29AUG86	04JAN89	51	-
7-14	29AUG86	28JUN88	46	-

Table B.1. continued

Well ID	Water-level observations			Sampled in scoping survey (X = sampled)
	First	Most recent	Number	
7-15	29AUG86	04JAN89	51	-
7-16	29AUG86	28JUN88	46	-
7-17	29AUG86	04JAN89	51	-
7-18	29AUG86	28JUN88	46	-
7-2	29AUG86	28JUN88	46	-
7-3	29AUG86	28JUN88	46	-
7-4	29AUG86	28JUN88	46	-
7-5	28AUG85	28JUN88	46	-
7-6	29AUG86	28JUN88	46	-
7-7	29AUG86	28JUN88	46	-
7-8	29AUG86	28JUN88	46	-
7-9	29AUG86	28JUN88	46	-

Table B.2. Number of daily mean water-level values in the Remedial Action Program Numeric Data Base for wells equipped with continuous recorders

ORNL well ID	USGS local well ID	Number of observations by year			
		1985	1986	1987	1988
0927	RN:M-1A ORNL	-	47	260	306
0928	RN:M-1B ORNL	-	146	299	301
0929	RN:M-1C ORNL	-	133	282	257
0930	RN:M-2A ORNL	-	146	270	301
0931	RN:M-2B ORNL	-	147	300	305
0932	RN:M-2C ORNL	-	147	300	304
0933	RN:M-3A ORNL	-	4	276	303
0934	RN:M-3B ORNL	-	150	289	303
0935	RN:M-3C ORNL	-	139	266	302
0936	RN:M-4A ORNL	-	-	149	195
0937	RN:M-4B ORNL	-	-	164	214
0938	RN:M-4C ORNL	-	-	180	214
0939	RN:M-5A ORNL	-	-	71	270
0940	RN:M-5B ORNL	-	-	174	284
0941	RN:M-5C ORNL	-	-	174	251
0942	RN:M-6A ORNL	-	-	195	289
0943	RN:M-6B ORNL	-	-	195	289
0944	RN:M-6C ORNL	-	-	197	288
0945	RN:M-7A ORNL	-	-	194	288
0003	RN:M-3-3 ORNL	92	365	365	263
0015	RN:M-3-15 ORNL	92	365	363	248
0023	RN:M-3-23 ORNL	17	-	-	-
0433	RN:M-5-433 ORNL	36	106	-	-
0439	RN:M-5-439 ORNL	92	333	345	271
0440	RN:M-5-440 ORNL	92	365	124	-
0441	RN:M-5-441 ORNL	92	211	-	-
0444	RN:M-5-444 ORNL	92	327	87	-
0451	RN:M-5-451 ORNL	92	190	-	-
0452	RN:M-5-452 ORNL	81	192	-	-
0458	RN:M-5-458 ORNL	92	365	122	-
0459	RN:M-5-459 ORNL	92	365	124	-
0460	RN:M-5-460 ORNL	92	365	124	-
0461	RN:M-5-461 ORNL	92	360	355	298
0462	RN:M-5-462 ORNL	92	365	358	298
0463	RN:M-5-463 ORNL	92	365	364	298
0464	RN:M-5-464 ORNL	92	365	363	298
0466	RN:M-5-466 ORNL	92	365	365	299
0467	RN:M-5-467 ORNL	91	365	365	289
0468	RN:M-5-468 ORNL	92	365	365	289
0469A	RN:M-5-469A ORNL	92	360	363	297

Table B.2. continued

ORNL well ID	USGS local well ID	Number of observations by year			
		1985	1986	1987	1988
0470	RN:M-5-470 ORNL	92	317	360	242
0471	RN:M-5-471 ORNL	92	365	361	297
0472	RN:M-5-472 ORNL	92	365	362	242
0473	RN:M-5-473 ORNL	92	293	124	-
0474	RN:M-5-474 ORNL	92	318	124	-
0475	RN:M-5-475 ORNL	84	365	124	-
0476	RN:M-5-476 ORNL	92	365	124	-
0482	RN:M-3-482 ORNL	92	365	365	286
0483	RN:M-3-483 ORNL	92	365	365	299
0484	RN:M-3-484 ORNL	92	365	365	298
0485	RN:M-3-485 ORNL	92	365	120	-
0486	RN:M-3-486 ORNL	92	365	131	-
0491	RN:M-3-491 ORNL	92	365	153	-
0492	RN:M-3-492 ORNL	92	365	345	299
0493	RN:M-3-493 ORNL	92	365	131	-
0494	RN:M-3-494 ORNL	92	365	67	-
0496	RN:M-3-496 ORNL	92	177	-	-
JS-2	RN:M-3-JS-02 ORNL	90	206	-	-
T105-5	RN:M-5-T105-5 ORNL	43	311	328	279
T60-1	RN:M-5-T60-1 ORNL	92	331	340	298
T66-1	RN:M-5-T66-1 ORNL	92	322	365	298
T83-5	RN:M-5-T83-5 ORNL	89	192	-	-
UA1	RN:M-UA1 ORNL	-	-	247	302
UA2	RN:M-UA2 ORNL	-	6	338	303
UB1	RN:M-UB1 ORNL	-	-	275	303
UB2	RN:M-UB2 ORNL	-	-	244	256
UC1	RN:M-UC1 ORNL	-	-	265	305
UC2	RN:M-UC2 ORNL	-	-	267	305
UD1	RN:M-UD1 ORNL	-	-	275	304
UD2	RN:M-UD2 ORNL	-	-	285	303
UE1	RN:M-UE1 ORNL	-	-	270	283
UE2	RN:M-UE2 ORNL	-	-	282	293
UF1	RN:M-UF1 ORNL	-	-	276	304
UF2	RN:M-UF2 ORNL	-	-	281	305
UG1	RN:M-UG1 ORNL	-	-	275	258
UG2	RN:M-UG2 ORNL	-	-	278	352
UG3	RN:M-UG3 ORNL	-	-	240	305
UH1	RN:M-UH1 ORNL	-	-	278	297
UH2	RN:M-UH2 ORNL	-	-	219	364
UI1	RN:M-UI1 ORNL	-	-	276	305
UI2	RN:M-UI2 ORNL	-	-	273	33

Table B.2. continued

ORNL well ID	USGS local well ID	Number of observations by year			
		1985	1986	1987	1988
U16	RN:M-U16 ORNL	-	356	304	299
U18	RN:M-U18 ORNL	16	365	363	304
U19	RN:M-U19 ORNL	1	312	331	304
U26	RN:M-U26 ORNL	21	365	327	294
U27	RN:M-U27 ORNL	1	357	365	299
U30	RN:M-U30 ORNL	22	365	365	299
U35	RN:M-U35 ORNL	-	337	365	299
U40	RN:M-U40 ORNL	22	365	131	-
U41	RN:M-U41 ORNL	-	345	329	299

Table B.3. Number of periodic water-level measurements made by the U.S. Geological Survey (primarily historical data)

	Water-level observations		
Well ID	First	Most recent	Number
A-1	22APR75	22OCT75	2
A-10	22APR75	22OCT75	2
A-11	22APR75	23MAR84	74
A-12	22APR75	22OCT75	2
A-13	22APR75	22OCT75	2
A-14	22APR75	22OCT75	2
A-15	22APR75	22OCT75	2
A-16	22APR75	22OCT75	2
A-17	22APR75	22OCT75	2
A-18	22APR75	22OCT75	2
A-19	22APR75	22OCT75	2
A-2	22APR75	22OCT75	2
A-20	22APR75	22OCT75	2
A-21	22APR75	22OCT75	2
A-22	22APR75	22OCT75	2
A-23	22APR75	22OCT75	2
A-24	22APR75	19MAR86	75
A-25	22APR75	22OCT75	2
A-26	22APR75	22OCT75	2
A-27	22APR75	22OCT75	2
A-28	22APR75	22OCT75	2
A-29	22APR75	22OCT75	2
A-3	22APR75	22OCT75	2
A-30	22APR75	22OCT75	2
A-31	22APR75	22OCT75	2
A-32	22APR75	22OCT75	2
A-33	22APR75	22OCT75	2
A-34	22APR75	22OCT75	2
A-35	22APR75	19MAR86	75
A-36	22APR75	22OCT75	2
A-37	22APR75	22OCT75	2
A-4	22APR75	22OCT75	2
A-5	22APR75	22OCT75	2
A-6	22APR75	22OCT75	2
A-7	22APR75	22OCT75	2
A-8	22APR75	22OCT75	2
A-9	22APR75	22OCT75	2
JS-1	31OCT80	16APR87	20
JS-2	24APR81	28JUN88	26
JS-3	31OCT80	28JUN88	22
TR-1	24MAY77	23MAY83	56

Table B.3. continued

Well ID	Water-level observations		
	First	Most recent	Number
TR-10	14MAR77	26MAY81	184
TR-11	14MAR77	26MAY81	175
TR-12	13MAY77	29JUN81	71
TR-2	24MAY77	18MAR86	59
TR-3	24MAY77	28JUN88	60
TR-4	14MAR77	26MAY81	182
TR-5	14MAR77	26MAY81	172
TR-6	14MAR77	26MAY81	172
TR-7	14MAR77	26MAY81	174
TR-8	14MAR77	26MAY81	174
TR-9	14MAR77	26MAY81	174
T105-1	05NOV75	28JUN88	102
T105-2	05NOV75	28JUN88	101
T105-3	05NOV75	28JUN88	102
T105-4	05NOV75	28JUN88	102
T105-5	05NOV75	23NOV83	95
T105-6	05NOV75	21OCT87	100
T117-1	01MAR77	28JUN88	82
T29-1	08APR75	28JUN88	110
T30-1	21OCT75	28JUN88	108
T31-1	16FEB77	24JUL79	41
T60-1	24JUN76	14JUL83	77
T64-1	14MAR77	28JUN88	78
T66-1	24JUN76	14JUL83	83
T83-1	05NOV75	28JUN88	99
T83-2	05NOV75	28JUN88	97
T83-3	05NOV75	28JUN88	98
T83-4	05NOV75	28JUN88	99
T83-5	05NOV75	28JUN88	101
UI2	06MAR88	13JUN88	14
U40	14JUL87	28JUN88	3
0003	20JUN50	20OCT83	81
0009	20JUN50	28JUN88	92
0015	20JUN50	20OCT83	87
0016	20JUN50	16JUN82	74
0016-B	15OCT82	06APR83	15
0016-C	15OCT82	06APR83	17
0016-D	15OCT82	06APR83	17
0020	20JUN50	28JUN88	85
0020-B	07FEB83	08SEP83	10
0020-C	07FEB83	08SEP83	10
0021	20JUN50	16SEP82	76

Table B.3. continued

Well ID	Water-level observations		
	First	Most recent	Number
0021-B	18OCT82	20SEP83	24
0021-C	03DEC82	20SEP83	15
0021-D	15OCT82	20SEP83	25
0022	20JUN50	16JUN82	75
0022-B	15OCT82	08SEP83	21
0022-C	15OCT82	08SEP83	21
0022-D	15OCT82	08SEP83	21
0023	20JUN50	16APR87	89
0032	20JUN50	28JUN88	92
0041	20JUN50	28JUN88	90
0042	20JUN50	28JUN88	92
0043	20JUN50	28JUN88	92
0044	20JUN50	28JUN88	90
0045	20JUN50	28JUN88	90
0046	20JUN50	28JUN88	91
0049	20JUN50	13OCT81	67
0107	16APR75	28JUN88	91
0108	21APR75	28JUN88	90
0109	16APR75	28JUN88	93
0110	16APR75	28JUN88	93
0112	22APR75	28JUN88	81
0129	29APR58	02JUL59	54
0130	29APR58	28JUN88	158
0131	29APR58	18JUN59	51
0132	30APR58	28JUN88	157
0133	29APR58	28JUN88	87
0134	29APR58	20AUG76	77
0135	29APR58	02JUL59	52
0136	29APR58	16APR87	81
0137	29APR58	02JUL59	52
0138	30APR58	02JUL59	53
0139	30APR58	02JUL59	53
0140	30APR58	02JUL59	53
0141	30APR58	02JUL59	28
0142	29APR58	19MAR59	40
0143	30APR58	16OCT81	140
0144	30APR58	09MAY83	61
0145	30APR58	28JUN88	161
0146	30APR58	03SEP75	55
0147	30APR58	17MAR86	163
0148	30APR58	02JUL59	52
0149	30APR58	16APR87	159

Table B.3. continued

Well ID	Water-level observations		
	First	Most recent	Number
0150	08MAY58	02JUL59	51
0151	30APR58	18JUN59	51
0152	30APR58	02JUL59	52
0153	30APR58	02JUL59	51
0154	30APR58	02JUL59	56
0155	30APR58	02JUL59	52
0156	30APR58	02JUL59	52
0157	30APR58	16APR87	160
0158	30APR58	02JUL59	52
0159	30APR58	16APR87	157
0160	30APR58	28JUN88	159
0161	30APR58	16APR87	157
0162	08MAY58	09MAY83	57
0163	08OCT58	02JUL59	28
0164	08OCT58	02JUL59	29
0165	08OCT58	28JUN88	127
0166	08OCT58	02JUL59	30
0167	08OCT58	28JUN88	126
0168	08OCT58	02JUL59	28
0169	08OCT58	28JUN88	135
0170	07OCT58	02JUL59	28
0171	08OCT58	02JUL59	30
0172	08OCT58	28JUN88	38
0173	08OCT58	28JUN88	123
0174	08APR75	28JUN88	119
0174-B	22JUL81	27JUL81	3
0174-C	21JUL81	27JUL81	4
0174-D	28JUL81	04AUG81	4
0174-E	28JUL81	04AUG81	4
0174-F	05AUG81	10AUG81	3
0174-G	05AUG81	10AUG81	3
0174-H	11AUG81	28MAR83	111
0174-I	11AUG81	28MAR83	110
0175	08APR75	28JUN88	120
0175-B	06AUG79	20AUG79	11
0175-C	06AUG79	20AUG79	11
0175-D	21AUG79	24AUG79	4
0175-E	21AUG79	24AUG79	4
0175-F	24AUG79	29AUG79	6
0175-G	24AUG79	29AUG79	6
0175-H	30AUG79	03SEP79	4
0175-I	30AUG79	03SEP79	4

Table B.3. continued

Well ID	Water-level observations		
	First	Most recent	Number
0175-J	11AUG81	07MAR83	104
0175-K	12AUG81	07MAR83	102
0176	08APR75	28JUN88	226
0176-B	30MAR80	06MAY80	20
0176-C	30MAR80	06MAY80	20
0176-D	07MAY80	13JUN80	19
0176-E	07MAY80	13JUN80	19
0176-F	15JUN80	29SEP80	20
0176-G	15JUN80	29SEP80	20
0176-H	27JUL80	04SEP80	9
0176-I	27JUL80	04SEP80	9
0176-J	10AUG82	04APR83	36
0176-K	10AUG82	04APR83	36
0177	08APR75	28JUN88	117
0177-B	20JUL79	30JUL79	3
0177-C	20JUL79	30JUL79	3
0177-D	30JUL79	06AUG79	6
0177-E	30JUL79	06AUG79	6
0177-F	22SEP81	04APR83	84
0177-G	22SEP81	04APR83	84
0178	08APR75	28JUN88	115
0178-B	15APR82	04APR83	46
0178-C	15APR82	04APR83	46
0179	22APR75	28JUN88	81
0180	22APR75	28JUN88	81
0181	22APR75	28JUN88	80
0182	22APR75	28JUN88	82
0183	22APR75	16APR87	75
0184	22APR75	22DEC86	78
0186	22APR75	19MAR86	76
0186-A	22APR75	28JUN88	81
0187	22APR75	28JUN88	82
0188	22APR75	28JUN88	83
0189	22APR75	28JUN88	83
0190	22APR75	28JUN88	82
0190-A	22APR75	28JUN88	81
0190-B	22APR75	28JUN88	81
0190-C	22APR75	28JUN88	81
0191	22APR75	19MAR86	77
0192	22OCT75	28JUN88	80
0195	22APR75	19MAR86	76
0196	22APR75	19MAR86	75

Table B.3. continued

Well ID	Water-level observations		
	First	Most recent	Number
0197	22APR75	19MAR86	76
0200	11JUL77	28JUN88	55
0201	27JUL77	28JUN88	55
0202	27JUL77	28JUN88	55
0203	27JUL77	28JUN88	54
0266	16APR75	23AUG76	16
0267	16APR75	16APR87	88
0268	16APR75	23MAY83	84
0269	16APR75	28JUN88	88
0270	16APR75	23MAY83	44
0271	16APR75	11JUN76	12
0272	16APR75	28JUN88	90
0273	16APR75	02NOV78	66
0274	16APR75	28JUN88	91
0275	16APR75	02NOV78	66
0276	16APR75	28JUN88	91
0277	16APR75	16APR87	90
0278	16APR75	28JUN88	93
0279	16APR75	28JUN88	91
0280	16APR75	16APR75	1
0281	16APR75	16APR75	1
0282	16APR75	16APR75	1
0283	16APR75	16APR75	1
0284	16APR75	28JUN88	91
0285	16APR75	16APR75	1
0286	16APR75	16APR75	1
0287	16APR75	16APR75	1
0288	16APR75	16APR75	1
0289	16APR75	16APR75	1
0290	18APR75	18APR75	1
0291	16APR75	16APR75	1
0292	16APR75	26MAY76	10
0293	16APR75	16APR75	1
0294	16APR75	16APR75	1
0295	16APR75	28JUN88	76
0296	16APR75	16APR75	1
0298	16APR75	16APR75	1
0299	16APR75	16APR75	1
0300	16APR75	16APR75	1
0301	16APR75	28JUN88	106
0302	16APR75	28JUN88	114
0303	16APR75	28JUN88	175

Table B.3. continued

Well ID	Water-level observations		
	First	Most recent	Number
0304	16APR75	16APR75	1
0305	16APR75	16APR75	1
0306	16APR75	16APR75	1
0307	16APR75	16APR75	1
0308	16APR75	16APR75	1
0309	16APR75	16APR75	1
0310	16APR75	16APR75	1
0311	16APR75	16AUG78	59
0312	16APR75	23MAY83	46
0313	16APR75	28JUN88	90
0315	16APR75	23MAY83	84
0317	16APR75	28JUN88	92
0318	12JAN76	28JUN88	89
0337	16APR75	17APR87	16
0338	16APR75	18JUL79	79
0341	16APR75	18JUL79	72
0342	16APR75	03AUG78	54
0343	16APR75	16APR87	87
0344	16APR75	18JUL79	81
0345	16APR75	28JUN88	92
0346	16APR75	23MAY83	86
0347	16APR75	26MAR84	87
0350	16APR75	22MAY81	75
0351	16APR75	28JUN88	84
0352	16APR75	26MAY81	32
0355	16APR75	18MAR86	86
0356	16APR75	28JUN88	88
0357	16APR75	18JUL79	80
0358	16APR75	28JUN88	89
0359	16APR75	14OCT81	82
0360	16APR75	28MAR77	25
0361	16APR75	14OCT81	85
0362	16APR75	28JUN88	87
0363	16APR75	28JUN88	90
0364	16APR75	23MAY83	82
0365	16APR75	28JUN88	91
0366	31OCT75	26MAR84	84
0367	12APR77	28JUN88	65
0368	12APR77	23MAY83	56
0369	12APR77	28JUN88	65
0370	12APR77	28JUN88	64
0371	12APR77	28JUN88	64

Table B.3. continued

Well ID	Water-level observations		
	First	Most recent	Number
0372	26APR77	26MAR84	58
0373	12MAY77	28JUN88	61
0374	12MAY77	28JUN88	63
0375	12MAY77	28JUN88	61
0376	12MAY77	28JUN88	62
0377	12MAY77	28JUN88	62
0378	24MAY77	28JUN88	58
0379	24MAY77	28JUN88	62
0380	12MAY77	28JUN88	63
0381	12MAY77	28JUN88	62
0382	24MAY77	28JUN88	62
0383	24MAY77	28JUN88	63
0384	24MAY77	26MAR84	57
0385	12MAY77	28JUN88	61
0386	16AUG78	16APR87	31
0387	16AUG78	26MAR84	28
0388	28APR81	28JUN88	11
0402	22APR75	12JUL76	7
0404	16FEB77	12APR82	50
0407	22APR75	28JUN88	81
0410	22APR75	28JUN88	81
0419	05DEC75	29MAR84	100
0420	30APR58	16APR87	148
0421	05DEC75	17MAR86	89
0422	05DEC75	28JUN88	104
0423	05DEC75	28JUN88	102
0424	01MAR76	23NOV83	90
0425	05DEC75	16APR87	96
0426	30APR58	21APR87	149
0427	05DEC75	16APR87	100
0428	20NOV75	16APR87	99
0429	21OCT75	28JUN88	96
0430	02APR76	17MAR86	99
0431	20APR76	16OCT81	89
0432	20APR76	28JUN88	99
0433	24MAY76	28JUN88	92
0434	24JUN76	29MAR84	84
0435	24JUN76	17MAR86	86
0436	24JUN76	28JUN88	89
0437	24JUN76	28JUN88	90
0438	24JUN76	28JUN88	91
0439	24JUN76	23NOV83	137

Table B.3. continued

Well ID	Water-level observations		
	First	Most recent	Number
0440	09JUL76	28JUN88	141
0441	29JUL76	28JUN88	93
0442	27OCT76	29MAR84	80
0443	27OCT76	28JUN88	88
0444	27OCT76	28JUN88	89
0445	16DEC76	28JUN88	159
0446	16DEC76	28JUN88	85
0447	24NOV76	23NOV83	75
0448	24NOV76	28JUN88	85
0449	16DEC76	28JUN88	80
0450	16DEC76	28JUN88	84
0451	16DEC76	28JUN88	85
0452	04JAN77	28JUN88	83
0453	01MAR77	16APR87	76
0454	30APR58	28JUN88	131
0455	14MAR77	28JUN88	79
0456	05APR77	29MAR84	64
0457	10MAY77	28JUN88	65
0458	29MAR84	28JUN88	6
0458-A	12DEC77	14AUG78	36
0458-B	05SEP78	27NOV78	12
0459	29MAR84	28JUN88	6
0459-A	12DEC77	14AUG78	36
0459-B	11SEP78	04DEC78	13
0460	29MAR84	28JUN88	6
0460-A	12DEC77	04DEC78	52
0461	21OCT82	20FEB85	35
0462	21OCT82	20FEB85	25
0463	21OCT82	20FEB85	25
0464	11FEB82	23NOV83	39
0465	21OCT82	23NOV83	40
0466	21OCT82	23NOV83	24
0467	07JUL82	23NOV83	32
0468	12FEB82	23NOV83	37
0469-A	21OCT82	14JUL83	22
0470	28OCT82	23NOV83	26
0471	15JUL82	23NOV83	27
0472	12FEB82	04APR83	40
0473	21OCT82	28JUN88	40
0474	21OCT82	28JUN88	30
0475	21OCT82	28JUN88	31
0476	10FEB82	28JUN88	47

Table B.3. continued

Well ID	Water-level observations		
	First	Most recent	Number
0481	24APR81	28JUN88	19
0482	24APR81	20OCT83	21
0483	24APR81	20OCT83	22
0484	24APR81	20OCT83	22
0485	24APR81	28JUN88	26
0486	24APR81	28JUN88	26
0487	24APR81	28JUN88	26
0491	25NOV81	28JUN88	22
0492	25NOV81	20OCT83	17
0493	25NOV81	28JUN88	20
0494	25MAY82	28JUN88	18
0495	04MAR82	25MAY82	3
0495-B	15OCT82	08SEP83	23
0495-C	15OCT82	08SEP83	22
0495-D	15OCT82	08SEP83	23
0496	04MAR82	28JUN88	15
0498	04MAR82	16JUN82	4
0498-B	15OCT82	04AUG83	18
0498-C	15OCT82	08SEP83	23
0498-D	15OCT82	20SEP83	23
0499	15OCT82	08SEP83	26
0499-B	26OCT82	08SEP83	7
0499-C	26OCT82	21FEB83	10
0499-D	26OCT82	21FEB83	9
0499-E	15OCT82	08SEP83	15
0501	08APR75	28JUN88	109
0502	08APR75	28JUN88	102
0504	08APR75	29MAR84	97
0506	08APR75	28JUN88	107
0507	08APR75	11JUL78	75
0508	08APR75	11JUL78	69
0510	02APR76	16APR87	91
0511	08APR75	28JUN88	101
0512	07OCT58	16APR87	120
0513	20DEC82	28JUN88	32
0514	01FEB83	28JUN88	33
0516	20DEC82	28JUN88	33
0517	20DEC82	28JUN88	35
0518	20DEC82	28JUN88	33
0519	20DEC82	28JUN88	34
0520	01FEB83	28JUN88	33
0521	20DEC82	28JUN88	33

Table B.3. continued

Well ID	Water-level observations		
	First	Most recent	Number
0522	20DEC82	28JUN88	33
0523	20DEC82	28JUN88	33
0524	20DEC82	28JUN88	33
0525	20DEC82	28JUN88	33
0526	20DEC82	21OCT87	32
0527	20DEC82	28JUN88	33
0528	20DEC82	28JUN88	33
0529	20DEC82	28JUN88	33
0530	23MAR84	28JUN88	4
0531	22MAR84	28JUN88	3
0532	19MAR86	16APR87	2
0533	19MAR86	28JUN88	4
0534	19MAR86	16APR87	3
0536	19MAR86	28JUN88	3

Table B.4. Sampling events for water quality monitoring wells

		1985		1986				1987		1988	
WAG	Well ID	Qrt 3	Qrt 4	Qrt 1	Qrt 2	Qrt 3	Qrt 4	Qrt 1	Qrt 4	Qrt 3	Qrt 4
1	0806	-	-	-	-	-	-	-	-	-	X
1	0807	-	-	-	-	-	-	-	-	-	X
1	0808	-	-	-	-	-	-	-	-	-	X
1	0809	-	-	-	-	-	-	-	-	-	X
1	0810	-	-	-	-	-	-	-	-	-	X
1	0811	-	-	-	-	-	-	-	-	-	X
1	0812	-	-	-	-	-	-	-	-	-	X
1	0813	-	-	-	-	-	-	-	-	-	X
1	0814	-	-	-	-	-	-	-	-	-	X
1	0815	-	-	-	-	-	-	-	-	-	X
1	0816	-	-	-	-	-	-	-	-	-	X
1	0817	-	-	-	-	-	-	-	-	-	X
1	0818	-	-	-	-	-	-	-	-	-	X
1	0819	-	-	-	-	-	-	-	-	-	X
1	0820	-	-	-	-	-	-	-	-	-	X
1	0821	-	-	-	-	-	-	-	-	-	X
1	0822	-	-	-	-	-	-	-	-	-	X
1	0823	-	-	-	-	-	-	-	-	-	X
1	0824	-	-	-	-	-	-	-	-	-	X
1	0825	-	-	-	-	-	-	-	-	-	X
1	0826	-	-	-	-	-	-	-	-	-	X
1	0827	-	-	-	-	-	-	-	-	-	X
1	0828	-	-	-	-	-	-	-	-	-	X
1	0829	-	-	-	-	-	-	-	-	-	X
1	0830	-	-	-	-	-	-	-	-	-	X
1	0873	X	X	X	-	-	-	X	X	-	-
1	0874	X	X	X	-	-	-	X	X	-	-
1	0875	X	X	X	-	-	-	X	X	-	-
1	0876	X	X	-	X	-	-	X	X	-	-
1	0877	X	X	X	X	-	-	X	X	-	-
1	0878	X	X	X	X	-	-	X	X	-	-
1	0879	X	X	X	X	-	-	X	X	-	-
1	0880	X	X	X	X	-	-	X	X	-	-
1	0881	X	X	X	-	-	-	X	X	-	-
1	0882	X	X	X	-	-	-	X	X	-	-
1	0883	-	-	X	X	X	X	-	-	-	-
1	0884	X	X	-	-	-	-	X	X	-	-
1	0885	-	-	X	X	X	X	X	X	-	-
1	0886	-	-	X	X	X	X	X	X	-	-
6	0745	-	-	-	-	-	-	-	-	X	X
6	0831	-	-	-	-	-	-	-	-	X	-
6	0832	-	-	-	-	-	-	-	-	X	X

Table B.4. continued

WAG	Well ID	1985		1986				1987		1988	
		Qrt 3	Qrt 4	Qrt 1	Qrt 2	Qrt 3	Qrt 4	Qrt 1	Qrt 4	Qrt 3	Qrt 4
6	0833	-	-	-	-	-	-	-	-	X	X
6	0835	-	-	-	-	-	-	-	-	X	X
6	0836	-	-	-	-	-	-	-	-	X	X
6	0838	-	-	-	-	-	-	-	-	X	X
6	0839	-	-	-	-	-	-	-	-	X	X
6	0840	-	-	-	-	-	-	-	-	X	X
6	0841	-	-	-	-	-	-	-	-	X	X
6	0842	-	-	-	-	-	-	-	-	X	-
6	0843	-	-	-	-	-	-	-	-	X	X
6	0844	-	-	-	-	-	-	-	-	X	X
6	0845	-	-	-	-	-	-	-	-	X	X
6	0846	-	-	-	-	-	-	-	-	X	X
6	0847	-	-	-	-	-	-	-	-	X	X
6	0848	-	-	-	-	-	-	-	-	X	X
6	0849	-	-	-	-	-	-	-	-	X	X
6	0850	-	-	-	-	-	-	-	-	X	X
6	0851	-	-	-	-	-	-	-	-	X	X
6	0852	-	-	-	-	-	-	-	-	X	X
6	0853	-	-	-	-	-	-	-	-	X	X
6	0854	-	-	-	-	-	-	-	-	X	X
6	0855	-	-	-	-	-	-	-	-	X	X
6	0856	-	-	-	-	-	-	-	-	X	X
6	0857	-	-	-	-	-	-	-	-	X	X
6	0858	-	-	-	-	-	-	-	-	X	X
6	0860	-	-	-	-	-	-	-	-	X	X
8	0887	X	X	X	X	-	-	X	X	-	-
8	0888	X	X	X	X	-	-	X	X	-	-
8	0889	X	X	X	X	-	-	X	X	-	-
8	0890	-	-	X	X	X	X	X	X	-	-
8	0891	X	X	X	X	-	-	X	X	-	-
8	0892	X	X	X	X	-	-	X	X	-	-
8	0893	X	X	X	X	-	-	X	X	-	-
8	0894	X	X	X	X	-	-	X	X	-	-

APPENDIX C

OAK RIDGE NATIONAL LABORATORY
REMEDIAL ACTION PROGRAM
GEOGRAPHIC INFORMATION SYSTEM COVERAGES

Table C.1. Detailed description of Remedial Action Program Geographic Information System coverages[a]

Off-site RAP
VAX subdirectory: U3:[RQM.RAP.CORE]

Name: COREDD **Description:** draft off-site RAP sediment sampling sites
Source: TVA field map **Status:**[b] ARCHIVED **Revision Date:**[c] DEC88
Feature Type:[d] POINT **Number of Features:**[e] 59
Feature Attributes:[f] sampling core id

Name: CORESITES **Description:** raw off-site RAP sediment sampling sites
Source: DIGITIZED[g] field map **Status:** ARCHIVED **Revision Date:** DEC88
Feature Type: POINT **Number of Features:** 48
Feature Attributes: sampling core id

Name: CORESTP **Description:** off-site RAP sediment sample sites
Source: revised[h] CORESITES **Status:** FINAL **Revision Date:** DEC88
Feature Type: POINT **Number of Features:** 59
Feature Attributes: core id, TN st. plane E, TN st. plane N

Name: LAKE **Description:** Watts Bar Lake outline with islands
Source: raw DIGITIZED data **Status:** ARCHIVED **Revision Date:** DEC88
Feature Type: POLYGON **Number of Features:** 0
Feature Attributes: none

Name: WBLAKESTP **Description:** Watts Bar Lake outline with islands
Source: revised LAKE **Status:** FINAL **Revision Date:** DEC88
Feature Type: POLYGON **Number of Features:** 31
Feature Attributes: none

Groundwater Wells
VAX subdirectory U3:[RQM.RAP.NWELLS]

Name: ACRE4 **Description:** 4-acre site wells, historic locations
Source: Boegly[i] data file **Status:** FINAL **Revision Date:** AUG88
Feature Type: POINT **Number of Features:** 7
Feature Attributes: well id X-n type format

Name: ACRE4H **Description:** 4-acre site wells with nearest HF well
Source: ACRE4 NEAR[j] HFLOC **Status:** FINAL **Revision Date:** AUG88
Feature Type: POINT **Number of Features:** 7
Feature Attributes: well id, HFLOC rec. num., HFLOC well distance

Table C.1. continued

Groundwater Wells (continued)
VAX subdirectory: U3:[RQM.RAP.NWELLS]

Name: ACRE4P **Description:** 4-acre site wells with nearest PRLOC well
Source: ACRE4 NEAR PRLOC **Status:** FINAL **Revision Date:** AUG88
Feature Type: POINT **Number of Features:** 7
Feature Attributes: well id, PRLOC rec. no., PRLOC well distance

Name: CERCONS **Description:** RAP CERCLA wells
Source: RAP SAS data base **Status:** FINAL **Revision Date:** FEB88
Feature Type: POINT **Number of Features:** 13
Feature Attributes: ORNL well number, easting, northing

Name: HFLOC **Description:** Hydrofracture wells
Source: RAP SAS data base **Status:** FINAL **Revision Date:** AUG87
Feature Type: POINT **Number of Features:** 89
Feature Attributes: well id mixed format, easting, northing

Name: HFLOCWAG **Description:** Hydrofracture wells with WAG number
Source: IDENTITY[k] WAGX10B **Status:** FINAL **Revision Date:** AUG87
Feature Type: POINT **Number of Features:** 89
Feature Attributes: well id mixed format, WAG (sub)number[l]

Name: HHLOC **Description:** Hydrostatic Head Monitoring Station wells
Source: RAP SAS data base **Status:** ARCHIVED **Revision Date:** AUG87
Feature Type: POINT **Number of Features:** 19
Feature Attributes: ORNL well number

Name: HHLOCWAG **Description:** Hydro. Head Mon. Sta. wells with WAG
Source: IDENTITY WAGX10B **Status:** ARCHIVED **Revision Date:** AUG87
Feature Type: POINT **Number of Features:** 19
Feature Attributes: ORNL well number, WAG (sub)number

Name: HHMS88 **Description:** Hydrostatic Head Monitoring Station wells
Source: RAP SAS data base **Status:** FINAL **Revision Date:** AUG88
Feature Type: POINT **Number of Features:** 31
Feature Attributes: ORNL well number, easting, northing

Name: HHMS88WAG **Description:** Hydro. Head Mon. Sta. wells with WAG
Source: IDENTITY WAGX10B **Status:** FINAL **Revision Date:** SEP88
Feature Type: POINT **Number of Features:** 31
Feature Attributes: ORNL well number, WAG (sub)number

Table C.1. continued

Groundwater Wells (continued)
VAX subdirectory: U3:[RQM.RAP.NWELLS]

Name: PRLOC Description: Pre-RAP groundwater wells
Source: RAP SAS data base Status: FINAL Revision Date: AUG87
Feature Type: POINT Number of Features: 651
Feature Attributes: ORNL well no., sample(0 1), easting, northing

Name: PRLOCWAG Description: Pre-RAP wells with WAG number
Source: IDENTITY WAGX10B Status: FINAL Revision Date: AUG87
Feature Type: POINT Number of Features: 651
Feature Attributes: ORNL well no., sample(0 1), WAG (sub)number

Name: PZDEC Description: RAP Piezometer wells
Source: RAP SAS data base Status: FINAL Revision Date: DEC87
Feature Type: POINT Number of Features: 331
Feature Attributes: ORNL well no., sample(0 1), easting, northing

Name: PZDECWAG Description: RAP Piezometer wells with WAG number
Source: IDENTITY WAGX10B Status: FINAL Revision Date: DEC87
Feature Type: POINT Number of Features: 331
Feature Attributes: ORNL well number, WAG (sub)number

Name: STDWELL Description: Stockdale wells, from historic locations file
Source: RAP SAS data base Status: FINAL Revision Date: APR88
Feature Type: POINT Number of Features: 51
Feature Attributes: well number (1-51)

Name: STDWELLN Description: Stockdale wells with nearest Pre-RAP wells
Source: STDWELL NEAR PRLOC Status: FINAL Revision Date: AUG88
Feature Type: POINT Number of Features: 51
Feature Attributes: well id 1-51, PRLOC rec. no., PRLOC distance

Name: TARA Description: test area wells - Remedial Action study area
Source: RAP SAS data base Status: FINAL Revision Date: FEB88
Feature Type: POINT Number of Features: 13
Feature Attributes: ORNL well number, easting, northing

Name: UCONT Description: continuous monitoring wells
Source: UWELLS, PRLOC, HHMS Status: FINAL Revision Date: OCT87
Feature Type: POINT Number of Features: 93
Feature Attributes: misc. well id formats, easting, northing

Table C.1. continued

Groundwater Wells (continued)
VAX subdirectory: U3:[RQM.RAP.NWELLS]

Name: UWELLS Description: USGS continuous monitoring wells
Source: RAP SAS data base Status: FINAL Revision Date: AUG87
Feature Type: POINT Number of Features: 28
Feature Attributes: well id (USGS), elevation (ft)

Name: UWELLSWAG Description: USGS continuous mon. wells with WAG number
Source: IDENTITY WAGX10B Status: FINAL Revision Date: AUG87
Feature Type: POINT Number of Features: 26
Feature Attributes: well id(USGS), elevation(ft), WAG (sub)number

Name: WQ88 Description: RAP water quality wells (RCRA)
Source: RAP SAS data base Status: FINAL Revision Date: AUG88
Feature Type: POINT Number of Features: 77
Feature Attributes: ORNL well number, easting, northing

Name: WQ88WAG Description: RAP water quality wells with WAG number
Source: IDENTITY WAGX10B Status: FINAL Revision Date: SEP88
Feature Type: POINT Number of Features: 77
Feature Attributes: ORNL well number, WAG (sub)number

Name: WQLOC Description: RAP water quality wells (RCRA)
Source: RAP SAS data base Status: ARCHIVED Revision Date: AUG87
Feature Type: POINT Number of Features: 22
Feature Attributes: ORNL well number

Name: WQLOCWAG Description: RAP water quality wells with WAG number
Source: IDENTITY WAGX10B Status: ARCHIVED Revision Date: AUG87
Feature Type: POINT Number of Features: 22
Feature Attributes: ORNL well number, WAG (sub)number

Sampling Locations
VAX subdirectory: U3:[RQM.RAP.SAMPTS]

Name: BIOA Description: stream sampling end pts for bioaccumulation
Source: subset from BIOALL Status: FINAL Revision Date: AUG88
Feature Type: LINE Number of Features: 9
Feature Attributes: top node number, site id, sample type (a)

Table C.1. continued

Sampling Locations (continued)
VAX subdirectory: U3:[RQM.RAP.SAMPTS]

Name: BIOALL **Description:** stream sampling end pts for biological samp.
Source: NODEPOINTS[m] BIOL4P **Status:** FINAL **Revision Date:** AUG88
Feature Type: LINE **Number of Features:** 72
Feature Attributes: node no., site id, samp. type a b f h i m p t x

Name: BIOB **Description:** stream sampling end pts for benthos
Source: subset from BIOALL **Status:** FINAL **Revision Date:** AUG88
Feature Type: LINE **Number of Features:** 13
Feature Attributes: top node number, site id, sample type (b)

Name: BIOF **Description:** stream sampling end pts for fish
Source: subset from BIOALL **Status:** FINAL **Revision Date:** AUG88
Feature Type: LINE **Number of Features:** 12
Feature Attributes: top node number, site id, sample type (f)

Name: BIOH **Description:** stream sampling end pts for macrophytes
Source: subset from BIOALL **Status:** FINAL **Revision Date:** AUG88
Feature Type: LINE **Number of Features:** 3
Feature Attributes: top node number, site id, sample type (h)

Name: BIOI **Description:** stream sampling end pts for bioindicators
Source: subset from BIOALL **Status:** FINAL **Revision Date:** AUG88
Feature Type: LINE **Number of Features:** 4
Feature Attributes: top node number, site id, sample type (i)

Name: BIOL1 **Description:** biological samp. segments, multi-sample code
Source: 1:2400 field map **Status:** FINAL **Revision Date:** APR88
Feature Type: LINE **Number of Features:** 67
Feature Attributes: concatenated sample code a b f h i m p t x

Name: BIOL4 **Description:** biological sampling segments with sample code
Source: revised BIOL1 **Status:** FINAL **Revision Date:** AUG88
Feature Type: LINE **Number of Features:** 68
Feature Attributes: concatenated sample code a b f h i m p t x[n]

Name: BIOL4P **Description:** stream sampling segment end pts
Source: NODEPOINT from BIOL4 **Status:** FINAL **Revision Date:** AUG88
Feature Type: POINT **Number of Features:** 68
Feature Attributes: top no., bottom no., sample type, site id

Table C.1. continued

Sampling Locations (continued)
VAX subdirectory: U3:[RQM.RAP.SAMPTS]

Name: BIOM Description: stream sampling end pts for mammals
Source: subset from BIOALL Status: FINAL Revision Date: AUG88
Feature Type: LINE Number of Features: 9
Feature Attributes: top node number, site id, sample type (m)

Name: BIOP Description: stream sampling end pts for periphyton
Source: subset from BIOALL Status: FINAL Revision Date: AUG88
Feature Type: LINE Number of Features: 6
Feature Attributes: top node number, site id, sample type (p)

Name: BIOT Description: stream sampling end pts for turtles
Source: subset from BIOALL Status: FINAL Revision Date: AUG88
Feature Type: LINE Number of Features: 6
Feature Attributes: top node number, site id, sample type (t)

Name: BIOX Description: stream sampling end pts for toxicity accum.
Source: subset from BIOALL Status: FINAL Revision Date: AUG88
Feature Type: LINE Number of Features: 10
Feature Attributes: top node number, site id, sample type (x)

Name: CER1 Description: sample locations for 1985 Cerling data
Source: RAP SAS data base Status: UNDER REVIEW Revision Date: JUL87
Feature Type: POINT Number of Features: 327
Feature Attributes: site name, sample id (no.)

Name: CER1WAG Description: CER1 sample locations with WAG number
Source: IDENTITY WAGX10B Status: UNDER REVIEW Revision Date: OCT88
Feature Type: POINT Number of Features: 327
Feature Attributes: site name, sample id, WAG (sub)number

Name: CER2 Description: sample locations for 1986-87 Cerling data
Source: RAP SAS data base Status: UNDER REVIEW Revision Date: JUL87
Feature Type: POINT Number of Features: 365
Feature Attributes: site name, sample id (no.)

Name: CER2OG Description: sample locations 1986-87 Cerling, transformed
Source: RAP SAS data base Status: UNDER REVIEW Revision Date: JUL87
Feature Type: POINT Number of Features: 63
Feature Attributes: site name, sample id (no.)

Table C.1. continued

Sampling Locations (continued)
VAX subdirectory: U3:[RQM.RAP.SAMPTS]

Name: CER2OGWAG **Description:** CER2OG sample locations with WAG number
Source: IDENTITY WAGX10B **Status:** UNDER REVIEW **Revision Date:** NOV88
Feature Type: POINT **Number of Features:** 63
Feature Attributes: site name, sample id (no.), WAG (sub)number

Name: CER2WAG **Description:** CER2 sample locations with WAG number
Source: IDENTITY WAGX10B **Status:** UNDER REVIEW **Revision Date:** OCT88
Feature Type: POINT **Number of Features:** 365
Feature Attributes: site name, sample id (no.), WAG (sub)number

Name: SURDIS **Description:** surface discharge monitoring sites
Source: RAP SAS data base **Status:** FINAL **Revision Date:** AUG87
Feature Type: POINT **Number of Features:** 9
Feature Attributes: site id (ORNL,EMC,USGS)

Name: SURDISWAG **Description:** surface discharge sites with WAG number
Source: IDENTITY WAGX10B **Status:** FINAL **Revision Date:** AUG87
Feature Type: POINT **Number of Features:** 9
Feature Attributes: site id (ORNL,EMC,USGS), WAG (sub)number

Name: PCIPLOC **Description:** Precipitation monitoring sites
Source: RAP SAS data base **Status:** FINAL **Revision Date:** AUG87
Feature Type: POINT **Number of Features:** 20
Feature Attributes: monitoring site id

Name: PCIPLOCWAG **Description:** Precipitation monitoring sites with WAG
Source: IDENTITY WAGX10B **Status:** FINAL **Revision Date:** AUG87
Feature Type: POINT **Number of Features:** 20
Feature Attributes: monitoring site id, WAG (sub)number

SWMU Locations
VAX subdirectory: U3:[RQM.RAP.SWMU]

Name: SWMU **Description:** RAP SWMU locations
Source: RAP SAS data base **Status:** FINAL **Revision Date:** JUL87
Feature Type: POINT **Number of Features:** 205
Feature Attributes: SWMU number

Table C.1. continued

Background Information
VAX subdirectory: u3:[RQM.RAP.TUG]

Name: BUILD1 **Description:** building outlines of central ORNL
Source: revised Tuggle[o] data **Status:** FINAL **Revision Date:** JUL87
Feature Type: POLY **Number of Features:** 39
Feature Attributes: ORNL building number

Name: BUILDS **Description:** building outlines of central ORNL
Source: raw Tuggle data **Status:** ARCHIVED **Revision Date:** JUL87
Feature Type: POLY **Number of Features:** 39
Feature Attributes: NONE

Name: CREEK5 **Description:** White Oak Lake and Creek with tributaries
Source: 1:2400 ORNL maps **Status:** FINAL **Revision Date:** AUG87
Feature Type: LINE **Number of Features:** 98
Feature Attributes: NONE

Name: CREEKDEN **Description:** densified CREEK5 for snapping BIOL4
Source: CREEK5 den. at 8 ft **Status:** ARCHIVED **Revision Date:** AUG88
Feature Type: LINE **Number of Features:** 98
Feature Attributes: NONE

Name: STREETLIN **Description:** streets in central ORNL
Source: revised Tuggle data **Status:** FINAL **Revision Date:** JUL87
Feature Type: LINE **Number of Features:** 20
Feature Attributes: size class code for ARCLINES

WAG Boundaries and Grids
VAX subdirectory: U3:[RQM.RAP.WAG]

Name: MAPFR **Description:** boundaries for 6 overlay sheets for WAG plots
Source: SAS GENERATE input[p] **Status:** FINAL **Revision Date:** JUL87
Feature Type: LINE,POINT **Number of Features:** 6
Feature Attributes: map label name

Name: SWSA1T **Description:** historical SWSA1 boundary
Source: map from Boegly **Status:** FINAL **Revision Date:** SEP87
Feature Type: POLYGON **Number of Features:** 1
Feature Attributes: NONE

Name: WAG11RX **Description:** revised WAG 11 location
Source: map from Boegly **Status:** FINAL **Revision Date:** AUG88
Feature Type: POLYGON **Number of Features:** 1
Feature Attributes: WAG number

Table C.1. continued

WAG Boundaries and Grids (continued)
VAX subdirectory: u3:[RQM.RAP.TUG]

Name: WAGX10 **Description:** original WAG boundaries, with large polygon
Source: 1:2400 ORNL maps **Status:** ARCHIVED **Revision Date:** MAY87
Feature Type: POLYGON **Number of Features:** 27
Feature Attributes: wag (sub)number

Name: WAGX10B **Description:** revised ORNL RAP WAGs, Changes in WAG 2, 5, 9
Source: revision of WAGX10 **Status:** FINAL **Revision Date:** AUG88
Feature Type: POLYGON **Number of Features:** 27
Feature Attributes: WAG no.; -1=large polygon, >20=#sub part

Name: X10GRD5K **Description:** 1000 ft grid lines with line labels
Source: SAS GENERATE input **Status:** FINAL **Revision Date:** AUG87
Feature Type: LINE,POINT **Number of Features:** 28
Feature Attributes: coordinate label string, N or E

Name: X10GRDN **Description:** 1000 ft grid with 3 level ANNO[q] 1:5k,2:2k;3:1K
Source: SAS GENERATE input **Status:** FINAL **Revision Date:** NOV88
Feature Type: LINE **Number of Features:** 70
Feature Attributes: level2=1 for 2k lines, level5=1 for 5k lines

Name: XGRD5K **Description:** 5000 ft grid lines with annotation
Source: SAS GENERATE input **Status:** FINAL **Revision Date:** AUG87
Feature Type: LINE **Number of Features:** 7
Feature Attributes: NONE

[a]Sorted alphabetically by coverage names within alphabetically sorted VAX subdirectories.
[b]Status: The status of a coverage is one of the following:
UNDER REVIEW - processing to finalize this coverage is still pending,
FINAL - the coverage is current and complete, or
ARCHIVED - the coverage is outdated or a working intermediate and has been moved off-line to a tape data set.
[c]Revision date: The month when the coverage was last revised.
[d]Feature type: The types of features for a coverage can be either points, lines, or polygons.
[e]Number of features: The number of features (points, lines, or polygons) in the coverage.
[f]Feature attributes: The variables or characteristics contained in the GIS that can be associated with specific geographic features (points, lines, or polygons). Multiple features descriptions are separated by commas.

Table C.1. continued

[g]DIGITIZED: Indicates geographic data that originated from a source map and was processed with the digitizer.

[h]Revised refers to the revision of another described coverage.

[i]W. J. Boegly, Jr. (staff member of ESD/ORNL) provided the digital data.

[j]NEAR refers to an ARC/INFO procedure that identifies the geographic features from one coverage that are nearest to a feature in another coverage.

[k]IDENTITY is an ARC/INFO procedure that determines which polygon contains each point when points are spatially compared with polygons.

[l](sub)number indicates that the WAG number and sub part are encoded into one numeric value. The value can be decoded as follows:

If WAG (sub)number <= 20 then the WAG number = the value;

If WAG (sub)number > 20 then the WAG number = integer(value/10).

For example, if WAG (sub)number = 52 then WAG number = 5 and sub polygon = 2. An arbitrary polygon bounding all of the WAG was defined with a WAG (sub)number of -1. This values allowed for the identification of points whose location indicated they were in the general vicinity of the WAGs from other points whose location indicated they were far away from the WAGs.

[m]NODEPOINTS is a specific procedure in ARC/INFO which converts only the end points of each line into a point coverage. BIOALL was actually generated from a reorganized version of these points so that each line contained the end points of the sampling zone for each study type.

[n]The concatenated sample code represents all of the sample types that were collected for each study. A single study site frequently has partially overlapping study zones which are represented by several line segments, one segment for each combination of sample types.

[o]J. G. Tuggle, Jr. (staff member of Energy Division, ORNL) provided the digital data.

[p]GENERATE input is digital data written by SAS programs in an input format for ARC/INFO. This class of data usually defines regular grids, map frames, etc., and originates from the structure of the program.

[q]ANNO is an ARC/INFO annotation, which is a text feature that can be optionally specified for inclusion in graphical output.

APPENDIX D

LOG OF REQUESTS FOR INFORMATION
FROM THE NUMERIC DATA BASE OF THE REMEDIAL ACTION PROGRAM

Table D.1. Log of requests for information from the Remedial Action Program Numeric Data Base

Req. no.	Requester	Affiliation[a]	Request[a,b]	Product supplied	Date filled
86	Taylor	ORNL/ESD	1987 precipitation data for Burial Ground 5	Printout/plot/data set	01/05/88
87	Moore	ORNL/ESD	Summary information on piezometer program	Printout	01/08/88
88	Mohrbacher	UT/ESD	Listing of NPDES data for 1987	Printout	01/18/88
89	Dreier	ORNL/ESD	Update of HHMS water-level data	Data file	01/22/88
90	Loar	ORNL/ESD	Tables of minimum, maximum daily flow values at specified sites, 1987	Printout	02/23/88
91	Turner	ORNL/ESD	Listing of 1987 precipitation data for specified sites	Printout	02/08/88
92	Turner	ORNL/ESD	Precipitation data for Bear Creek	Data file	02/12/88
93	Ketelle	ORNL/ENERGY	Well construction and water-level data	Data file/printout	02/24/88
94	Boegly	ORNL/ESD	Grid coordinates calculated for ORNL/K-25/Y-12/ADMIN grids	Listing	02/22/88
95	Clapp	ORNL/ESD	Construction and depth-to-water data for selected wells	Data file/printouts	03/01/88
96	Baldwin	ORNL/EHPD	Coordinates of HF wells	Printout/map	03/02/88
97	Gray	ORNL/EMC	Maps of ORNL wells	Maps	03/02/88
98	Moore	ORNL/ESD	File of digitized geophysical logs of USGS well #UC2	Data file	03/04/88
99	McCullough	ORNL/EMC	Well construction data for water quality wells in SWSA 6	Read privilege	03/14/88

Table D.1. continued

Req. no.	Requester	Affiliation[a]	Request[a,b]	Product supplied	Date filled
100	Ketelle	ORNL/ENERGY	Water-level data for selected wells	Data file	03/15/88
101	Craig	ECE	Well location and construction data for WAG 6	Data file	03/17/88
102	Folden	ORNL/ENG	PRAPCONS, TARACONS data for SWSA 6	Printout	03/22/88
103	Mohrbacher	UT/ESD	NPDES surface water chemistry data	Printout	03/23/88
104	Kornegay	ORNL/ENERGY	Annual precipitation totals in inches for 1951-1987 for site ATDD	Listing (E-Mail)	03/31/88
105	Moore	ORNL/ESD	Hydraulic conductivity values for WQ wells	Printout	04/04/88
106	Saylor	ORNL/ENERGY	Precipitation and surface discharge tables for SWSA 7 & Bear Creek	Data file	05/25/88
107	Toran	ORNL/ESD	Update of precipitation data and HHMS water level data	Data files	04/29/88
108	Bogle	ORNL/ESD	Precipitation data for specified sites for 1988	Printout	04/08/88
109	Clapp	ORNL/ESD	Precipitation data for SWSA 7	Data files	05/05/88
110	Turner	ORNL/ESD	Surface discharge data for specified site	Printout	05/13/88
111	Clapp	ORNL/ESD	Water-level data for piezometer wells in SWSA 7	Data set	05/18/88
112	Ketelle	ORNL/ENERGY	Water-level data for selected wells and precipitation data for SWSA 6	Data file	05/31/88

Table D.1. continued

Req. no.	Requester	Affiliation[a]	Request[a,b]	Product supplied	Date filled
113	Mohrbacher	UT/ESD	NPDES water quality data	Printout	05/26/88
114	Huff	ORNL/ESD	Water-level data for specified piezometer wells	Printout	05/26/88
115	Clapp	ORNL/ESD	Precipitation and surface discharge data for SWSA 7 and Bear Creek	Data files	06/21/88
116	Moore	ORNL/ESD	Table of precipitation data for SWSA 5 for 1987-88	Printout	06/16/88
117	Zehner	USGS/Knoxville	Well construction/water-level update for specified wells	Printout/data file	07/21/88
118	Zehner	USGS/Knoxville	Well construction data for all wells at ORNL	Data file	09/12/88
119	Mulholland	ORNL/ESD	Precipitation data for Walker Branch watershed, April 1987	Printout/map	08/04/88
120	Craig	ECE	Well construction, water levels for wells in SWSA 6	Data file	08/22/88
121	Watts	ORNL/ESD	Hydrographs for specified wells	Graphics	08/22/88
122	Voorhees	ORNL/ESD	Well locations for water quality & HHMS wells	Data file	08/16/88
123	Ketelle	ORNL/ENERGY	Water-level data for SWSA 6	Data file	08/16/88
124	Craig	ECE	Precipitation, well location, construction and water-level data for WAG 1	Data files/printout	08/31/88
125	Lee	ORNL/ENERGY	Northings, eastings for specified wells	Printout	08/23/88

Table D.1. continued

Req. no.	Requester	Affiliation[a]	Request[a,b]	Product supplied	Date filled
126	Wickliff	ORNL/ESD	Well construction data for specified wells	Printout	09/14/88
127	Kimbrough	ENV MGMT, Y-12	Precipitation data for Bear Creek Valley	Data file	09/26/88
128	Jones	ORNL/ESD	Precipitation tables for Bear Creek Burial Ground, 1985-present	Data file	09/28/88
129	Ketelle	ORNL/ENERGY	Precipitation data for Bear Creek Burial Ground	Data files	09/30/88
130	Gregory	ORNL/ESD	HHMS water-level data for January 1988	Data file	10/12/88
131	McMaster	UT/ESD	Water-level data for all wells at ORNL	Printout	10/24/88
132	Watts	ORNL/ESD	Daily surface discharge from USGS Bear Creek gages	Printout/data files	10/18/88
133	Michaud	ORNL/EHPD	Well construction data for all wells at ORNL	Data files	10/18/88
134	Boegly	ORNL/ESD	Results of analyses of samples from WQ well drill cuttings from WAG 1	Printout	10/27/88
135	Watts	ORNL/ESD	Update of USGS surface discharge data from Bear Creek gages	Data files	11/08/88
136	Baldwin	ORNL/EHPD	Analytical data, well logs for specified wells	Printout	11/11/88
137	Moore	ORNL/ESD	Regression analysis on water level data	Graphics	12/07/88
138	Moore	ORNL/ESD	Well construction information	Printout	11/29/88

Table D.1. continued

Req. no.	Requester	Affiliation[a]	Request[a,b]	Product supplied	Date filled
139	Miller	ECE	Construction data, water level on specified wells in SWSA 6	Printout/data file	11/22/88
140	Collins	Y-12	Precipitation data for Bear Creek Valley	Data files	12/05/88
141	Huff	ORNL/ESD	Water-level data for specified piezometer wells	Printout	12/07/88
142	Ketelle	ORNL/ENERGY	Depth-to-water measurements for specified wells	Verbal information	12/13/88

[a]Definitions:

ECE = Environmental Consulting Engineers, Inc.
EHPD = Environmental and Health Protection Division
EMC = Environmental Monitoring and Compliance
ENERGY = Energy Division
ENG = Engineering Division
ENV MGMT = Environmental Management
ESD = Environmental Sciences Division
ORNL = Oak Ridge National Laboratory
USGS = U.S. Geological Survey
UT = University of Tennessee
Y-12 = Oak Ridge Y-12 Plant

[b]Definitions:

ADMIN = Administration
ATDD = Atmospheric Turbulence and Diffusion
HHMS = Hydrostatic head monitoring station
HF = Hydrofracture
K-25 = Oak Ridge Gaseous Diffusion Plant
NPDES = National Pollutant Discharge Elimination System
PRAPCONS = Construction data for wells constructed before the Remedial Action Program
SWSA = Solid Waste Storage Area
TARACONS = Construction data for wells in the Test Area for Remedial Action
WAG = Waste Area Grouping
WQ = Water Quality

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