DOE/ID-11116
Revision 0
April 2004

U.S. Department of Energy
Idaho Operations Office

Waste Area Group 10, Operable Unit 10-08, Remedial Investigation/Feasibility Study Annual Report for Fiscal Year 2003

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Revision 0
Project No. 23368

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Prepared for the
U.S. Department of Energy
DOE Idaho Operations Office

ABSTRACT

This Operable Unit 10-08 Remedial Investigation/Feasibility Study Annual Report for Fiscal Year 2003 provides a status of progress made on eleven tasks identified in the *Waste Area Group 10, Operable Unit 10-08, Remedial Investigation/Feasibility Study Work Plan (Final)*. Major accomplishments include three rounds of water quality sampling for groundwater wells, drilling of a deep core hole to 1653 ft and completion as a shallow monitoring well, evaluation of using minimum purge sampling on wells located within the Idaho National Engineering and Environmental Laboratory, and an update to the 1994 groundwater model using three-dimensional stratigraphy.

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ACRONYMS

AEC	Atomic Energy Commission
ARA	Auxiliary Reactor Area
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOE	U.S. Department of Energy
EDW	Environmental Data Warehouse
EPA	U.S. Environmental Protection Agency
ERIS	Environmental Restoration Information System
FFA/CO	Federal Facility Agreement and Consent Order
FY	fiscal year
GMS	Groundwater Modeling System
IEDMS	Integrated Environmental Data Management System
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
MCL	maximum contaminant level
MCP	management control procedure
NE-ID	Department of Energy Idaho Operations Office
NRF	Naval Reactors Facility
ORB	Operational Review Board
OU	Operable Unit
PLN	plan
RCRA	Resource Conservation and Recovery Act
RDX	cyclotrimethylene trinitroamine (Royal Demolition Explosive)
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SAM	Sample and Analysis Management

SMLTO	Surveillance, Monitoring, and Long-Term Operations
SRPA	Snake River Plain Aquifer
TAN	Test Area North
TNT	trinitrotoluene
TRA	Test Reactor Area
TSF	Technical Services Facility
USGS	United States Geological Survey
VOC	volatile organic compound
WAG	waste area group

Waste Area Group 10, Operable Unit 10-08, Remedial Investigation/Feasibility Study Annual Report for Fiscal Year 2003

1. INTRODUCTION

In accordance with the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991a) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC § 9601 et seq.), as amended by the Superfund Amendments and Reauthorization Act (SARA), Waste Area Group (WAG) 10 will ensure that the environmental impacts associated with releases or threatened releases of hazardous substances are thoroughly investigated and that appropriate actions are undertaken and completed as necessary to protect the public health and welfare, and to protect the environment. The Federal Facility Agreement and Consent Order (FFA/CO) (DOE-ID 1991a) specifies WAG 10 as comprising miscellaneous surface sites and liquid disposal areas throughout the Idaho National Engineering and Environmental Laboratory (INEEL) that are not included within other WAGs. The WAG 10, Operable Unit (OU) 10-8 includes the regional Snake River Plain Aquifer (SRPA) concerns related to the INEEL that cannot be addressed on a WAG-specific basis. Additionally, with concurrence by the U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), and Idaho Department of Health and Welfare (hereinafter collectively referred to as the "Agencies") WAG 10, OU 10-08 includes new sites discovered after the signature of Record of Decisions (RODs) for the other WAGs.

To reach consensus with the Agencies on extending the schedule for implementation of the OU 10-08 Remedial Investigation/Feasibility Study (RI/FS) to 2018, agreement was reached that an annual OU 10-08 status report would be issued detailing the progress being made toward the final RI/FS report. The OU 10-08 RI/FS will be built upon evaluations completed each year and summarized in the OU 10-08 Annual Reports. These annual reports are a compilation of historical groundwater data, each year's groundwater sample analysis results, and evaluation of those results for trends and data gaps. As data gaps are identified, agreement will be reached with the Agencies on how best to fill these gaps. Since OU 10-08 evaluates groundwater flow and contamination over the entire INEEL, and is impacted by the ongoing cleanup activities at other WAGs at the INEEL, development of sufficient quality data to evaluate in the RI/FS will require several years to complete.

The comprehensive nature and scope of OU 10-08 necessitates that monitoring data is collected over many years and a long-term integration is maintained among individual WAGs to ensure that all data needed are available for the comprehensive RI/FS. The large area of the OU 10-08 domain and the long groundwater travel times requires the monitoring of water quality and water levels over many years to correctly and adequately characterize the aquifer for risk assessment calculations. In addition, it is critical that the OU 10-08 numerical and conceptual model be calibrated and interfaced with the individual WAGs to create a synergistic and integrated understanding of the aquifer flow regime, contaminant source terms, and subsurface transport in the INEEL. An integrated understanding of the overall health of the aquifer beneath the INEEL is critical for communicating the impact of the INEEL to other users of groundwater along the SRPA. To this end, the tasks presented in this first annual report were designed to collect data over a period of years and develop an INEEL-wide understanding of contaminant flow and transport in the aquifer.

The work scope of the OU 10-08 RI/FS is based upon data gaps identified in the *Waste Area Group 10, Operable Unit 10-08, Remedial Investigation/Feasibility Study Work Plan (Final)* (DOE-ID 2002) (referred to in this document as the OU 10-8 RI/FS Work Plan). The activities in the work scope are necessary to characterize and assess Sitewide groundwater risks and will ultimately be used in the OU 10-08 ROD. It is important to note that many of the tasks performed under OU 10-08 support the RI/FS work scope for individual WAGs. For instance, the groundwater flow characteristics and INEEL scale subsurface stratigraphy are used as boundary conditions for the smaller "windows" in the aquifer studied by individual WAGs.

1.1 Description of Work Plan Tasks

The WAG 10, OU 10-08 RI/FS Work Plan (DOE-ID 2002) identifies eleven tasks to be performed during the RI/FS. These tasks are described below.

1.1.1 Task #1—Development of a Comprehensive Groundwater Sample Results Database

In order to adequately model, assess, and track the groundwater monitoring and groundwater impacts on a Sitewide basis, a comprehensive groundwater sample results database is needed to provide all the information necessary to adequately evaluate the groundwater information collected. Compiling groundwater analytical data into a single electronic database will allow data from Environmental Restoration Information System (ERIS), United States Geological Survey (USGS), individual WAG databases, Argonne National Laboratory-West, and other sources as available to be included for evaluation.

1.1.2 Task #2—Evaluate Groundwater Data

Evaluate groundwater data to identify if existing analytical data can demonstrate compliance now with maximum contaminate levels (MCLs), or other risk-based concentrations as appropriate, and provide recommendations for improving the data set through post ROD monitoring.

1.1.3 Task #3—Evaluate Alternative Groundwater Sampling and Purging Methodology

A significant cost and impact to the groundwater monitoring and sampling effort is the disposal of water that has been purged from the wells prior to sampling. This task will evaluate alternative groundwater well sampling and purging methodology to reduce the volume of purge water and to provide more discrete data from specific zones within the aquifer.

1.1.4 Task #4—Evaluate Potentially Commingled Plumes

This task will use current data from the database and data provided by the individual WAGs in an attempt to identify and plot areas where commingling of groundwater plumes may be taking place. The residual groundwater contaminants will be evaluated throughout the INEEL to ensure compliance with MCLs or other risk-based concentrations as appropriate.

1.1.5 Task #5—Evaluate Groundwater Quality for Current Compliance with Maximum Contaminant Levels or Other Risk-Based Concentrations

Evaluate Sitewide groundwater to assess compliance with the groundwater MCLs, or other risk-based concentrations, as appropriate, at the downgradient and perimeter boundary wells using current data. Waste Area Group 10's primary responsibility will be to interact with the other WAGs to monitor success of the individual WAG's remedial action to control groundwater contamination. However, if groundwater is found to be impacted above MCLs or other acceptable risk-based concentrations after the individual WAG groundwater monitoring is turned over to WAG 10, the remedial methods selected for the WAG in their original ROD would be reinstated after notification of the problem to, and with the concurrence of, the Agencies. If a new impact or new site is identified that becomes the responsibility of WAG 10, a decision process and evaluation of alternatives will be prepared for review and concurrence by the Agencies.

1.1.6 Task #6—Use of Selected Method to Incorporate New Sites into Waste Area Group 10, Operable Unit 10-08

As various WAG areas complete additional subsurface investigations; as deactivation, decontamination and decommissioning activities are being carried out on abandoned buildings; and as other Sitewide surface and subsurface surveys and investigations are completed, new and previously unknown sites may be found. Such new sites will be handled in accordance with instruction in Management Control Procedure (MCP) -3448, "Reporting Potentially Hazardous Sites."

1.1.7 Task #7—Evaluation of Phytoremediation of Mercury in Soil at Site TSF-08

This task will review the results of earlier investigations and evaluations of the mercury in the soil at TSF-08 and review available literature to (a) assess the viability of using phytoremediation for elemental mercury in desert gravels at this site and (b) to collect data to assess food crop uptake for the baseline risk assessment. The results of this review will provide recommendations for a path forward for phytoremediation at TSF-08.

1.1.8 Task #8—Revise Sitewide Groundwater Model

The WAG 10 modeling will complement the modeling studies of the individual facility-specific WAGs, but is not intended to reproduce their risk assessment calculations. Rather, WAG 10-08 will focus on updating the new WAG 10 scale advective velocity field through integration of new information developed from regional, sub-regional, facility-specific WAG and other studies. The advective flow velocity field will be used to estimate groundwater flow pathlines and velocities on the sub-regional scale, integrate smaller scale flow systems, obtain an INEEL scale groundwater flow balance, assure flow consistency in the other WAG models, and provide support for the other WAG models groundwater flow boundary conditions

1.1.9 Task #9—Develop and Implement Institutional Controls

Institutional controls are typically developed in combination with remedial action alternatives to help reduce exposure from residual contamination remaining after cleanup. Institutional controls may include long-term monitoring of activities associated with the site, visible access restrictions (such as signs), and control of land use, as determined to be appropriate. Institutional controls specific for OU 10-08 sites will be developed within an institutional control plan following the OU 10-08 ROD; however, the development of a comprehensive institutional control approach is part of the scope of the OU 10-04 remedial design/remedial action and will likely reside in the OU 10-04 Operations and Maintenance Plan.

The institutional control period, under DOE control, is assumed to extend for a 100-year period or until a transfer from DOE occurs, unless controls are discontinued based on the results of a 5-year review. However, institutional controls will be necessary as long as an unacceptable risk remains or until cleanup levels have been achieved. The development of institutional controls in OU 10-04 will also take into account current and future land use. Many of the WAG 10 sites fall within the industrialized areas of the INEEL. The remaining areas of WAG 10, which are largely undeveloped, are used for environmental research, ecological preservation, sociocultural preservation, grazing, and some forms of recreation.

Each WAG at the INEEL that has completed a ROD has also completed an institutional control plan. Within these plans, many site-specific institutional controls are common to many of the WAGs. Commonalities include: visible access restrictions, access controls, activity controls (procedural and work control measures), property lease and transfer requirements, and inclusion in the INEEL comprehensive facilities and land use plan (which provides site location boundaries). Operable unit-specific institutional controls will transition to Sitewide institutional controls following the first 5-year review. A comprehensive Sitewide institutional control plan for CERCLA sites will be developed as part of the OU 10-04 effort.

The development of a comprehensive institutional control plan under OU 10-04 will take into account the current and future land uses of the INEEL. A majority of sites in each WAG fall within the industrialized areas of the INEEL and will not be used for environmental research, ecological preservation, sociocultural preservation, grazing, or for recreation. Much of the INEEL is likely to continue as an industrial and research facility and these WAGs will maintain their current land uses.

1.1.10 Task #10—Risk Evaluation for Groundwater

The process for Sitewide groundwater risk assessment will be to identify contaminants and plumes of potential concern; their locations, including any overlapping portions; and contaminant peak times from the comprehensive groundwater risk assessments previously conducted at each facility. This includes identifying any changes in contaminant concentrations from remedial efforts performed by each WAG and incorporating all other groundwater modeling efforts. Criteria for screening of contaminants and plumes from the Sitewide evaluation will be outlined. Screening will be performed if appropriate risk-based criteria can be developed. The results of previous plume evaluations will be combined with newly collected data.

Although the risks posed by most individual contaminant sources have been evaluated, the individual evaluations are not necessarily consistent (with respect to conceptual models and assumptions) and, therefore, the risks cannot necessarily be accumulated to provide a cumulative risk. A process is being developed to model all the sources and provide comprehensive risk results. The process will use consistent conceptual models and modeling assumptions, as well as contaminant transport computational tools that have been used in past risk evaluations. Results of the modeling will include such information as the location of plumes and intersecting plumes (crossover areas) of contaminants of concern, and their resulting concentrations in time. At each of these locations, which are considered areas with maximum concentrations, it will be assumed that a groundwater drinking well is present, posing residential exposure. The pathways of concern will include ingestion of groundwater and homegrown produce (as a conservative measure). Contaminants of concern will be analyzed using the most recent risk assessment methodologies, MCLs, or other appropriate risk-based concentrations for drinking water. This assessment will address risk from multiple plumes and contaminants of concern across space and time.

1.1.11 Task #11—Verification of Water-Level Measuring Points

The correct water-level measuring points, casing stickups, and well surveys for all the wells utilized for Sitewide groundwater monitoring and sampling will be verified. Borehole deviation correction factors for all wells used for groundwater level monitoring will be compiled. In addition, all wells with known or suspected deviations will be checked using the current USGS digital gyroscopic instrument. In addition, wells that are part of the Sitewide groundwater monitoring and sampling but are not suspected to be highly deviated will be evaluated using the USGS digital gyroscopic instrument when the pump is pulled from the well for routine maintenance.

2. ACTIVITIES PERFORMED IN FISCAL YEAR 2003

2.1 Tasks Identified in the Work Plan

2.1.1 Task #1—Development of a Comprehensive Groundwater Sample Results Database

This activity is being performed as part of the Idaho Completion Project work scope under a collaborative activity with the Surveillance, Monitoring, and Long-Term Operations (SMLTO) group. As such, OU 10-08 is utilizing the output from the ongoing database effort.

The SMLTO group developed an Environmental Data Warehouse (EDW) to store analytical sampling data in a single, readily accessible database for the Idaho Completion Project and INEEL. After analyzing several information systems from other DOE labs and private industry, SMLTO developed a custom system to provide a common, user-friendly reporting interface, while meeting the business needs of the concerned organizations.

The EDW database contains both Environmental Restoration Information System (ERIS) and USGS radiological data. The EDW team has loaded current data from IEDMS and is loading ongoing data from laboratories and data validators. Historical data will soon be migrated from IEDMS. The EDW was built in accordance with MCP-550, "Software Management," and all operations, including data cleanup, are now being performed in accordance with the approved Plan (PLN) -1385, "Environmental Data Warehouse Software Configuration Management Plan"; PLN-1387, "Data Management Plan for the Idaho Completion Project Environmental Data Warehouse"; and PLN-1401, "Transferring Integrated Environmental Data Management System Data to the Environmental Data Warehouse."

The EDW team has added a geographical information system (GIS) front end that greatly facilitates access to the well data. This portion of the EDW is running in a beta version.

2.1.2 Task #2—Evaluate Groundwater Data

Evaluating groundwater data involves the tasks described in the following subsections.

2.1.2.1 Review and Compilation of Existing Data for Operable Unit 10-08 Monitoring Wells. Activities for this task included gathering, reviewing, and organizing all available water quality data and well construction for the 23 wells currently being monitored annually by OU 10-08. These data will be used to establish a more complete record for each well and for preparation of parameter trends.

2.1.2.1.1 Evaluation of Water Quality Data—Analytical data was thoroughly reviewed for errors and omissions. Tabular data were collected from the ERIS and Sample and Analysis Management (SAM) systems for all analytes for each of the WAG 10 wells and wells sampled to satisfy the OU 10-04 explosives sampling requirements. All data collected and reviewed is located in Appendix A (see enclosed CD for all appendixes). Data were reviewed to ensure that proper units were listed, and that all tabular information was correctly entered. Data were verified against similar records for each well and analyte. Data were then separated by well set group (i.e., guard, baseline, boundary) and then by analyte. Graphs were made for select analytes with levels above nondetects and with data from more than three sampling events. The locations of the guard, baseline, and boundary wells are plotted in Figures 2-1, 2-2, and 2-3, respectively.

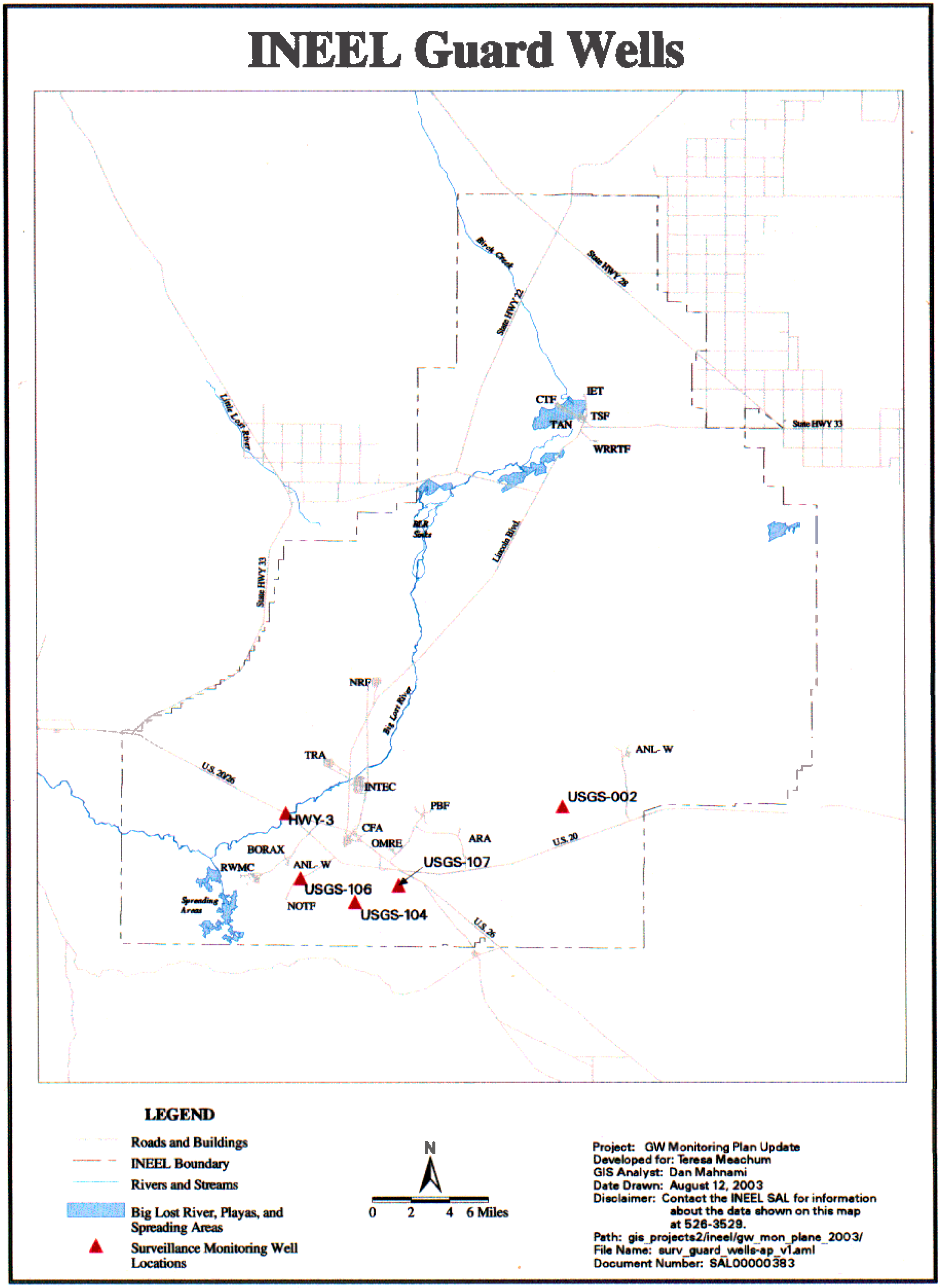

Figure 2-1. Location of guard wells at the Idaho National Engineering and Environmental Laboratory.

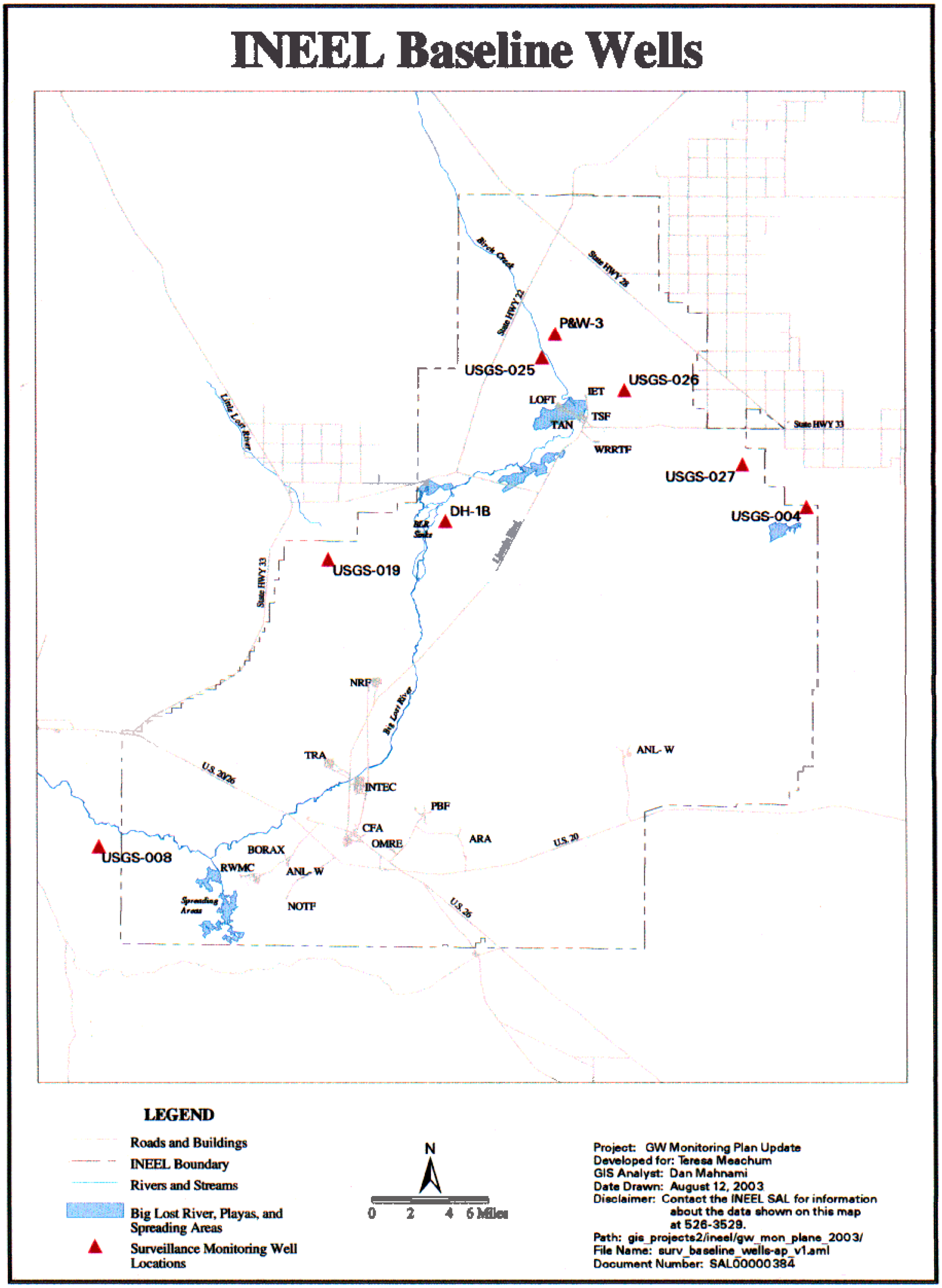

Figure 2-2. Location of baseline wells at the Idaho National Engineering and Environmental Laboratory.

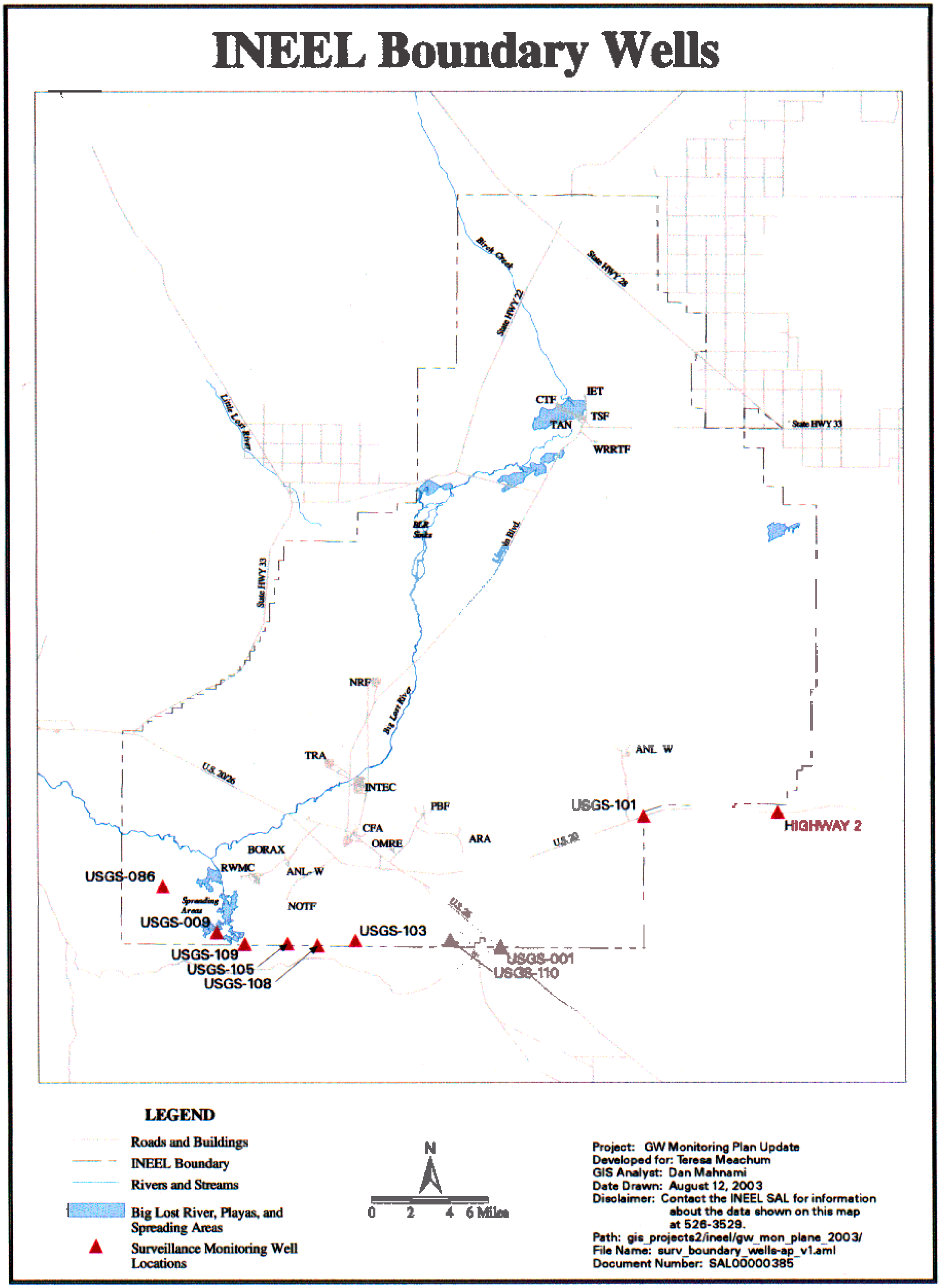

Figure 2-3. Location of boundary wells at the Idaho National Engineering and Environmental Laboratory.

2.1.2.1.2 Well Construction—The available data pertaining to the construction, completion and stratigraphy for the 23 wells currently monitored by OU 10-08 were reviewed to ensure that the completions were documented and that no problems or alterations had occurred during regular well surveillance or maintenance. The only noted differences between the initial well completions recorded during construction and the current configurations are in pump placement. Pump placements in several wells have changed slightly. Current well completion information is recorded in Table 2-1. Well construction diagrams, lithologies, and geophysical logs (as available) are included in Appendix B.

2.1.2.2 Water Quality Sampling. Three water quality sampling events were performed in Fiscal Year (FY) 2003. Two events performed in November 2002, and June 2003, were the standard suite of guard, baseline, and boundary wells identified in the OU 10-08 Groundwater Monitoring Plan. The March 2003 event sampled nine wells for explosives to satisfy the requirements of the OU 10-04 ROD.

Sampling was conducted at all WAG 10 wells in accordance with the *Field Sampling Plan for Groundwater Monitoring Under Operable Unit 10-08 for Fiscal Years 2002, 2003, and 2004* (INEEL 2003a). Wells were sampled for the listed analytes located on the Sampling and Analysis Tables in Appendix A of that document. Full analytical results for each well are located in Appendix A of this report.

Review of the WAG 10 boundary, baseline, and guard wells indicates that all analytes are below the required MCLs listed in the *Field Sampling Plan for Groundwater Monitoring Under Operable Unit 10-08 for Fiscal Years 2002, 2003, and 2004*. Further review of the analytes indicated that the levels of thallium in USGS-104 and USGS-106 are currently above the EPA MCL of 2 μg/L. However, thallium was not determined using the low detection limit method for the samples collected from USGS-104 and USGS-106 in April 2003. In the previous low-level detection limit sampling performed in December 2002, thallium was less than 0.15 μg/L in these wells. In addition, the source of the high zinc and iron concentrations in the groundwater samples from USGS-103, -104, -108, and the Highway 3 Well is the result of rusting carbon-steel casing and galvanized discharge /riser pipe used in these groundwater-monitoring wells.

Historical land uses at the INEEL have included munitions and explosives testing. Potential contamination of the soil and groundwater due to the chemical compounds used in these explosives led to the March 2003, OU 10-08 sampling event. Sampling was conducted for explosive compounds and their degradation products to satisfy OU 10-04 requirements concerning potential contamination in the aquifer. Sampling was conducted in a selected well set proximal to potential contamination sources. The wells were sampled for trinitrotoluene (TNT), cyclotrimethylene trinitroamine (Royal Demolition Explosive [RDX]), 1,3,5-trinitrobenzene, 4-amino-2, 6-dinitrotoluene, 2,4-dinitrotoluene, and 2,6-dinitrotoluene. Analytical results from samples collected in April 2003 showed all compounds were below detectable levels in the aquifer. Full analytical results are located in Appendix A, organized by "Explosives Results."

2.1.3 Task #3—Evaluate Alternative Groundwater Sampling and Purging Methodology

An in-depth study was performed to evaluate the possibility of commencing a low-flow groundwater monitoring well purging program for OU 10-08. The full report for this study can be found in Appendix C, where studies conducted at the INEEL assessing low-flow purging are described, as well as many studies found in the literature of low-flow purging. These studies comprise a vast foundation of scientific inquiry into the application of low-flow purging of groundwater monitoring wells. The report presents the advantages and disadvantages of applying the technique to OU 10-08 and makes recommendations. The report describes scientific research supporting low-flow purging as a cost-efficient

.

Table 2-1. Well construction summary.

Well Name	Year Drilled	Hole Diameter and Interval (ft)	Casing Size and Interval (ft)	Screened Interval(s) (ft)	Screen Material	Filter Pack Interval (ft)	Depth to Water (ft)	Pump Depth (ft)	Total Depth
				Guard Wells					
Highway 3	1967	12 in. (0–335) 10 in. (335–681) 8 in. (681–750)	8 in. (-1.4–680)	680–750	Open hole	NA	537.83	567	750
USGS-002	1949	>6.25 in. (0–434) 5 in. (434–704)	6.25 (-1.90–434) 5 in. (427–675) 5 in. (696–704)	675–696	Steel, perforated	NA	663.53	683	704
USGS-104	1980	16 in. (0–10) 10 in. (10–550) 8 in. (550–700)	12 in. (0–10) 8 in. (0–550)	550–700	Open hole	NA	558.87	592	700
USGS-106	1980	16 in. (0–10) 10 in. (10–605) 8 in. (605–760)	12 in. (-0.2–10) 8 in. (-1.5–400)	400–605 605–760	Open hole Open hole	NA	590.95	609	760
USGS-107	1980	16 in. (0–10) 10 in. (10–200) 8 in. (200–690)	12 in. (0–10) 8 in. (0–200) 6 in. (0–270)	270–690	Open hole	NA	482.32	531	690
				Baseline Wells					
DH-1B	1984	8 in. (0–10) 6 in. (10–400)	8 in. (-0.6–10) 6 in. (-1.4–380)	380–400	Open hole	NA	275.21	No Pump	400
P&W-3	1957	16 in. (0408.26	10 in. (-2–322.34) 10 in. (401.26–406.26)	322.34–401.26	Steel, perforated	288-402.84	307.1	No Pump	408.26
USGS-004	1950	6.25 in. (0–322) 4 in. (322–553)	6.25 (-1.76–285)	285–315 322–553	Steel, perforated, Open hole	NA	270.37	303	553
USGS-008	?	>6.25 (0–832)?	6.25 in (0–780)	780–832	Steel, perforated, Open hole	NA	769.81	801	832
USGS-019	1951	6 in. (0–401)	6 in. (-1.83–284.86) 6 in. (305.86–399.19)	284.86–305.86	Steel-perforated	NA	280.16	322	401
USGS-026	1952	8 in. (0–266.5)	6.25 in. (-1.0–232)	232–266.5	Steel, perforated	NA	214.95	255	266.5
USGS-027	1952	12 in. (0–137) 8 in. (137–312)	6.25 in. (-2.0–250) 6.25 in (260–298) 6.25 in. (308–312)	250–260 298–308	Steel, perforated Steel, perforated	NA	230.44	262	312
USGS-126B	2000	9 7/8 in. (0–408) 6 in. (408–452)	6 in. (-1.1–408)	408–452	Open hole	NA	417.03	420	452

Table 2-1. (continued).

Well Name	Year Drilled	Hole Diameter and Interval (ft)	Casing Size and Interval (ft)	Screened Interval(s) (ft)	Screen Material	Filter Pack Interval (ft)	Depth to Water (ft)	Pump Depth (ft)	Total Depth
Boundary Wells									
USGS-001	1949	6 in. (0–433) 5 in. (433–636)	6 in. (-1.49–433) 5 in. (423–600) 5 in. (630–634)	600–630	Steel-perforated	NA	590.97	612	635.7
USGS-103	1980	16 in. (0–10) 10 in. (10–575) 8 in. (575–760)	12 in. (0–10) 8 in. (0–575)	575–760	Open hole	NA	586.67	628.67	760
USGS-009	1951	8 in. (0–242.95) 6.25 (242.95–456.26) 6 in. (456.26–654.14)	8 in. (-0.78–242.95) 6.25 in. (236.35–456.26) 6 in. (456.26–620.14) 6 in. (650.14–654.14)	620.14–650.14	Steel-perforated	NA	610.46	635	654.14
USGS-086	1966	8 in. (0–691)	8 in. (0–48)	48–691	Open hole	NA	652.48	678	691
USGS-101	1974	10 in. (0–30) 8 in. (30–774) 6 in. (774–865)	8 in. (0–29) 6 in. (-1.0–774)	750–865	Steel-perforated	NA	774.8	790	865
USGS-105	1980	16 in. (0–10) 10 in. (10–400) 8 in. (400–800)	12 in. (0–10) 8 in. (0–400)	400–800	Open hole	NA	672.97	700	800
USGS-108	1980	16 in. (0–10) 10 in. (10–400) 8 in. (400–760)	12 in. (0–10) 8 in. (0–400)	400–760	Open hole	NA	609.51	637	760
USGS-109	1980	16 in. (0–10) 10 in. (10–175) 8 in. (175–340) 6 in. (340–800)	12 in. (0–10) 8 in. (0–175) 6 in. (175-340) 4 in. (0–600)	600–800	Steel-perforated	NA	624.15	656	800
USGS-110	1980	16 in. (0–5) 10 in. (5–350) 8 in. (350–780)	12 in. (0–5) 8 in. (0–350) 6 in. (0–580)	580–780	Steel-perforated	NA	567.01	612	780

NA = not applicable

means of collecting decision quality groundwater data. However, researchers stress the importance of the proper application of relatively new groundwater sampling techniques at various sites. The advantages of better quality data, increased efficiency, and cost savings provide motivation to evaluate the use of low-flow purging at OU 10-08 wells.

An important consideration in the implementation of a low-flow purging program is the extreme groundwater depths (e.g., >500 ft below ground surface [bgs]) found in OU 10-08 wells, which may present a practical limitation for using the technique. The single most important problem is achieving low flow rates while lifting groundwater upwards from these great depths. No study presented in the literature has addressed the problem of achieving minimal drawdown in groundwater wells penetrating deep aquifers. A possible exception is the USGS study in which purge flow rates averaged 11 gal/min (Bartholomay 1993). Given the high transmissivity of the SRPA, these flow rates may result in little to no drawdown in the wells during purging. However, water levels were not monitored to assess drawdown in the wells during purging in the study.

Groundwater pumping technology does exist that will achieve low flow rates at greater depths. These pumps, as reported by the manufacturer, are capable of lifting groundwater from 524-ft bgs at flow rates ranging from 100 mL/min to 50 gal/min. The highly transmissive Snake River basalts can typically produce much more water with minimal drawdown than a typical clastic aquifer. Thus, using the commonly cited maximum flow rate of less than 1 L/min may not be required to achieve minimal drawdown in INEEL wells. Today’s technology may support low-flow purging of groundwater in these deeper wells.

As mentioned above, no studies evaluating the effectiveness of low-flow purging in deep monitoring wells have been conducted at the INEEL. This type of evaluation may not be appropriate for WAG 10 due to the paucity of historical contaminant data (WAG 10 does not include large areas of contamination). Rather, after a favorable cost-to-benefit analysis and with Agency concurrence, it is recommended that an evaluation be conducted at WAGs where groundwater contamination exists, and therefore, a historical database exists to provide comparison of traditional purging to low-flow purging techniques. If an evaluation of low-flow purging at WAGs with contaminated groundwater proves effective, then implementation of such a program at WAG 10 would be supported. If purging directly to the ground is allowed (i.e., no listed waste issues) then low flow purging would not be cost effective.

2.1.4 Task #4—Evaluate Potentially Commingled Plumes

The bulk of this task will be performed near the end of the OU 10-08 process. Currently, the program is tracking the predicted extent of contaminant plumes for all WAGs on a single map. Modeled plume geometries are subject to change as the input for the predictions are altered based upon new data and remedial actions. Interaction with the individual WAGs is critical for maintaining an institutional memory of the various assumptions and approaches used by each WAG during the RI/FS process.

2.1.5 Task #5—Evaluate Groundwater Quality for Current Compliance with Maximum Contaminant Levels or Other Risk-Based Concentrations

Monitoring analysis results, which are being sampled currently by WAG 10, are evaluated against MCLs and other risk-based limits. Wells sampled by individual WAGs are presently reviewed for compliance to MCLs by the individual WAGs. This task is a long-term responsibility for WAG 10, and as such will not be required on a Sitewide basis until the transition from the individual WAG RODs to OU 10-08 RI/FS is complete.

2.1.6 Task #6—Use of Selected Method to Incorporate New Sites into Waste Area Group 10, Operable Unit 10-08

The OU 10-04 responsibilities discussed in the FFA/CO were modified by the inclusion of OU 10-08. Now OU 10-08 includes the evaluation of new sites that are passed to WAG 10 by other WAGs. This can include any newly identified sites in WAGs 1, 2, 3, 4, 5, 6, 7, and 10 that require investigation and/or remediation other than the remedy selected in the WAG-specific ROD. If site-specific factors warrant addressing a new site under another OU, the Agencies may elect to investigate the new site (on a case by case basis) under an OU other than OU 10-08.

The FFA/CO Action Plan established process (DOE-ID 1991b) will continue to be followed for evaluating new sites. As new potentially hazardous sites are discovered, a new site form will be filled out and transmitted to the Agencies within 30 days of discovery. Characterization of these sites will follow the process specified in MCP-3448, "Reporting Potentially Hazardous Sites." Sites evaluated with significant potential risk will be ranked higher and given priority over less hazardous sites.

2.1.7 Task #7—Evaluation of Phytoremediation of Mercury in Soil at Site TSF-08

The TSF-08 mercury spill area is a section of railroad bed near the southwest corner of the TAN-607 building. In 1958, the area was contaminated by a large mercury spill from the Heat Transfer Reactor Experiment-III engine. A removal action was performed in 1994, and the area was backfilled with clean gravel. Post-removal sampling showed low levels of mercury at least 0.76 m (2.5 ft) bgs. The site is approximately 3 × 12 m (10 × 40 ft).

No remedy was selected in the *Final Record of Decision for Test Area North, Operable Unit 1-10, Idaho National Engineering and Environmental Laboratory* (DOE-ID 1999) for the TSF-08 mercury spill area. A paper study is planned for FY-04 to evaluate specific plant uptake factors and rates for the appropriate future land-use scenarios. A determination will be made regarding subsequent action, based on the results of this study.

2.1.8 Task #8—Revise Sitewide Groundwater Model

The WAG 10 OU 10-08 Sitewide groundwater model is a three-dimensional, saturated zone model based on the U.S. Geological Survey's MODFLOW 2000 code, and developed with a novel interface tool (the Department of Defense's Groundwater Modeling System [GMS]). The model is being developed as a tool for evaluating regional groundwater flow in the vicinity of the INEEL and maintaining consistency in individual WAG fate and transport models, with respect to the regional flow field. In particular, the model will maintain consistency in the assumed flow directions and water fluxes through the individual WAG domains.

2.1.8.1 Revise INEEL-wide Three-Dimensional Stratigraphic Model. The FY-03 groundwater modeling tasks identified in the OU 10-8 RI/FS Work Plan (DOE-ID 2002) included initiating the revision of the 1994 WAG 10 groundwater model, beginning with the completion of a new 3-D stratigraphic model. This initial model development task has been completed. A new 3-D stratigraphic model was created and a finite-difference grid prepared from it. The solid 3-D stratigraphic model was created using a GMS "horizons" approach that allowed development of the model in a fashion similar to the natural structure of the SRPA in the vicinity of the INEEL—that is, horizontal layers containing several differing material types.

The Department of Defense GMS is a comprehensive graphical user environment for performing groundwater simulations. Tools are provided for site characterization, model conceptualization, grid generation, and post-processing of simulation results. The GMS allows easy updates to the conceptual model and incorporation of these changes in MODFLOW 2000. MODFLOW 2000 is the current version of the widely accepted USGS-developed modular three-dimensional finite-difference groundwater flow model. It provides a simplified but robust means of simulating groundwater flow in the saturated zone.

The model domain includes the INEEL and extends from a southern constant head boundary some 140 km north to the southern margin of Mud Lake and 80 km from the western boundary at the mouths of tributary valleys (e.g., Big Lost River, Little Lost River, Birch Creek valleys) to an eastern boundary along a no-flow condition. The domain boundaries are depicted relative to INEEL boundaries in Figure 2-4. Important surface water features are shown in Figure 2-5.

The upper surface of this model is defined by the water table. The hydraulic head values from Spring 1999 (March–May) measurements of over 300 aquifer wells on or near the INEEL were used to interpolate a regularly gridded upper boundary surface for the model. The lower boundary of the model domain incorporates recent aquifer thickness interpretation that is based on borehole temperature and resistivity data. This interpretation (Smith 2002) is shown in Figure 2-4 and was used to prepare aquifer depth contours that established the position of interpolated borehole information along these contours (see Figure 2-5).

The stratigraphic layer thickness and top elevation of various model layers were determined at each interpreted borehole using available lithographic information from boreholes across the site. The model consists of six saturated layers containing up to four different material types. These material types include deep basalts (lowest layer), dense basalts (comparable to the USGS "composite layer No. 7"), fractured basalts (highest conductivity), and sediments appearing in the uppermost layer (see Figure 2-6).

The model incorporates the results of USGS modeling in the Mud Lake area northeast of the INEEL boundary (Spinazola 1994). This area is a known anomalous hydraulic conductivity regime resulting from lacustrine deposition of sediment. The model's sediment distribution contours were used to establish sedimentary thickness in the WAG 10 Sitewide model.

The current stratigraphic conceptual model has been developed into a numerical grid model using features in GMS. The resulting numerical grid consists of six layers, 143 rows, and 81 columns for a total of 69,498 nodes. A graphical three-dimensional depiction of the modeled domain is presented in Figure 2-7.

2.1.8.2 Interface with Waste Area Groups for Model Calibration. A number of opportunities have occurred for interfacing with developers of individual WAG fate-and-transport models for CERCLA activities. Specific hydraulic features of several WAGs (2, 4, 5, and 7) were examined in detail in FY-03. The WAG 10 model is a source of feedback for individual WAG models that will allow a consistent regional approach to INEEL CERCLA-mandated groundwater activities.

Measurements of hydraulic head have been ongoing at the INEEL for many years and represent one of the largest data sets for analyzing aquifer behavior. A key finding of these studies is the scale dependence of the interpretation of the flow field based on hydraulic head distributions. These hydraulic head distributions establish the potential energy gradient responsible for the movement of groundwater in the aquifer. Interpretation of this data can be made in several ways. Figure 2-8 presents a summary of calculated hydraulic gradient at WAGs 5 and 7. This figure demonstrates how the calculated hydraulic gradient is influenced by the scale of observation. Below a certain threshold scale (~5 mi^2), the flow field shows a wide range of calculated gradient directions with large variance; above this threshold, the flow becomes uniform in a direction of about 190 degrees and variance falls to a minimum.

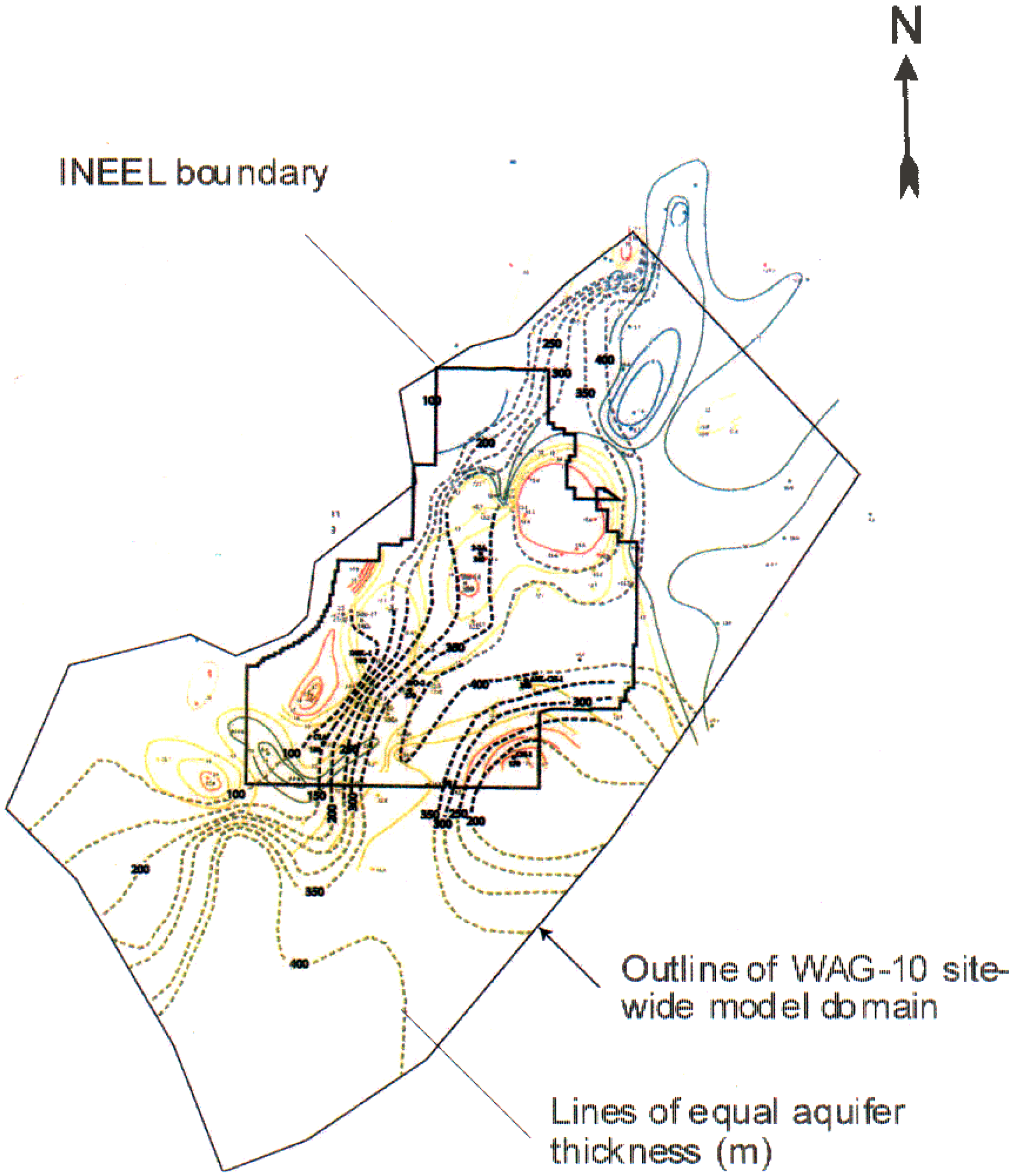

Figure 2-4. Waste Area Group 10 Sitewide groundwater model domain and aquifer thickness contours, as interpreted by Smith (2002).

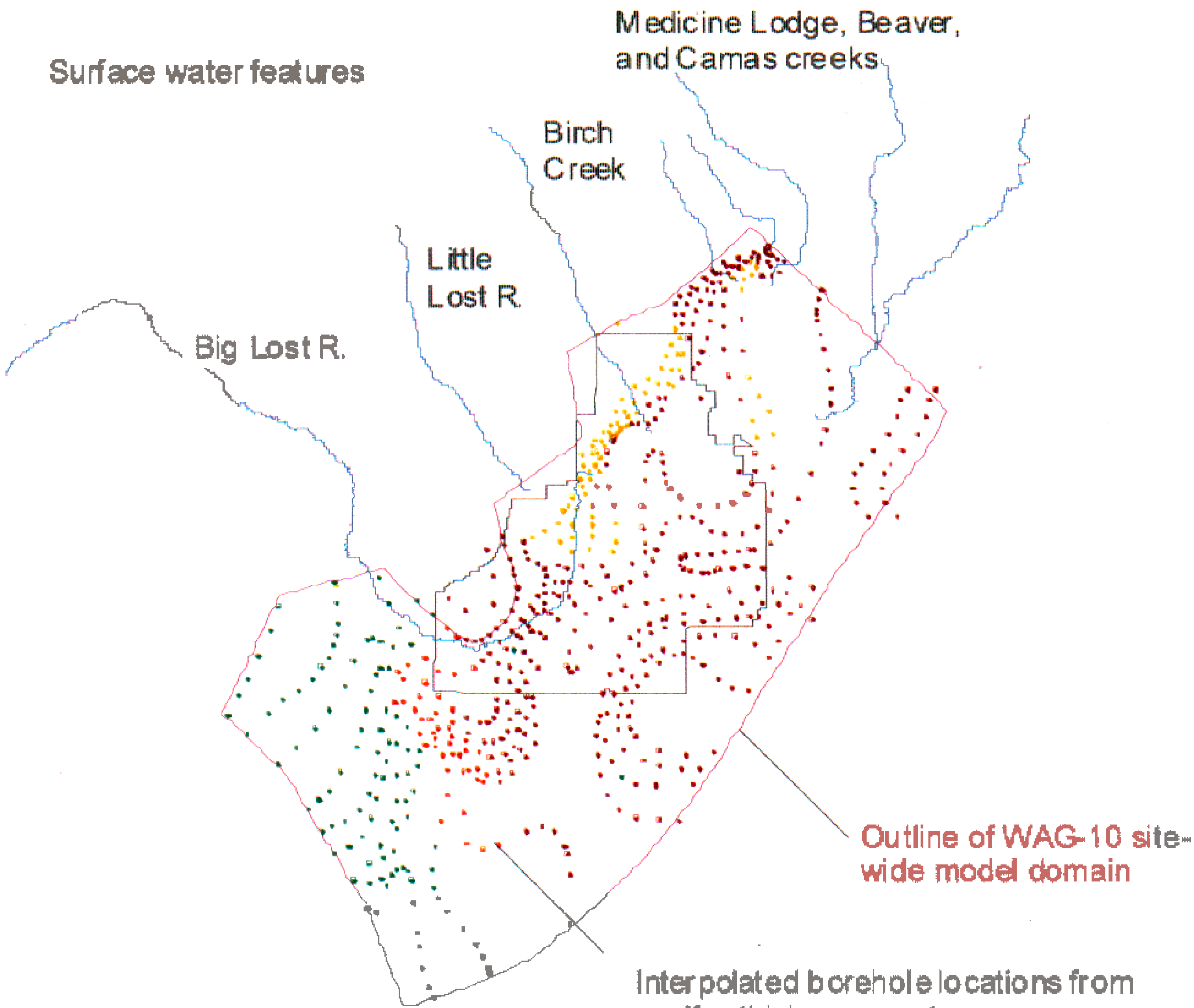

Figure 2-5. Important surface water features at the INEEL and the Sitewide groundwater model's interpolated borehole locations based on aquifer thickness contours.

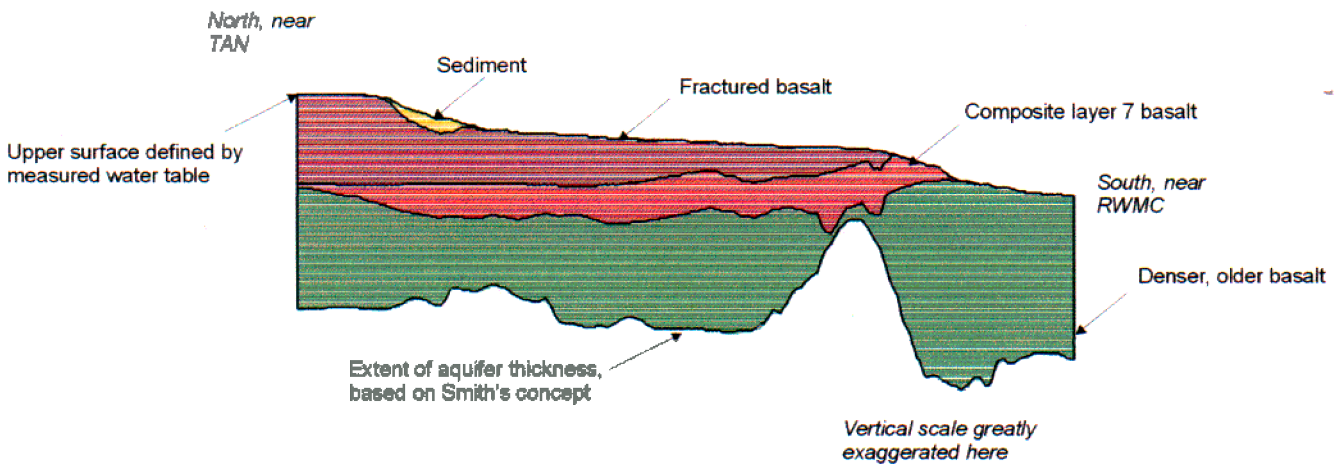

Figure 2-6. Cross-section of preliminary Waste Area Group 10 stratigraphic model.

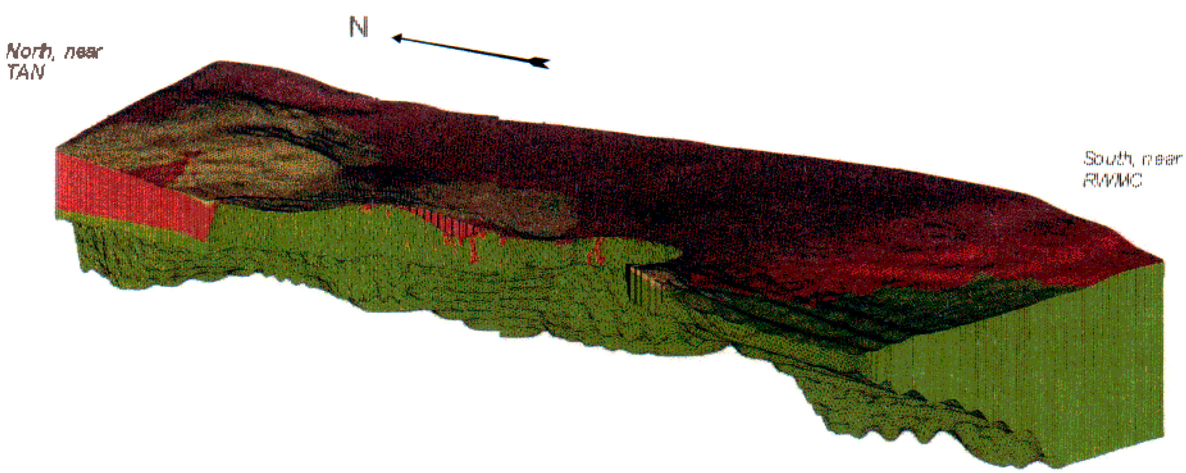

Figure 2-7. Three-dimensional depiction of Waste Area Group 10 Sitewide groundwater model domain (view from southwest looking northeast).

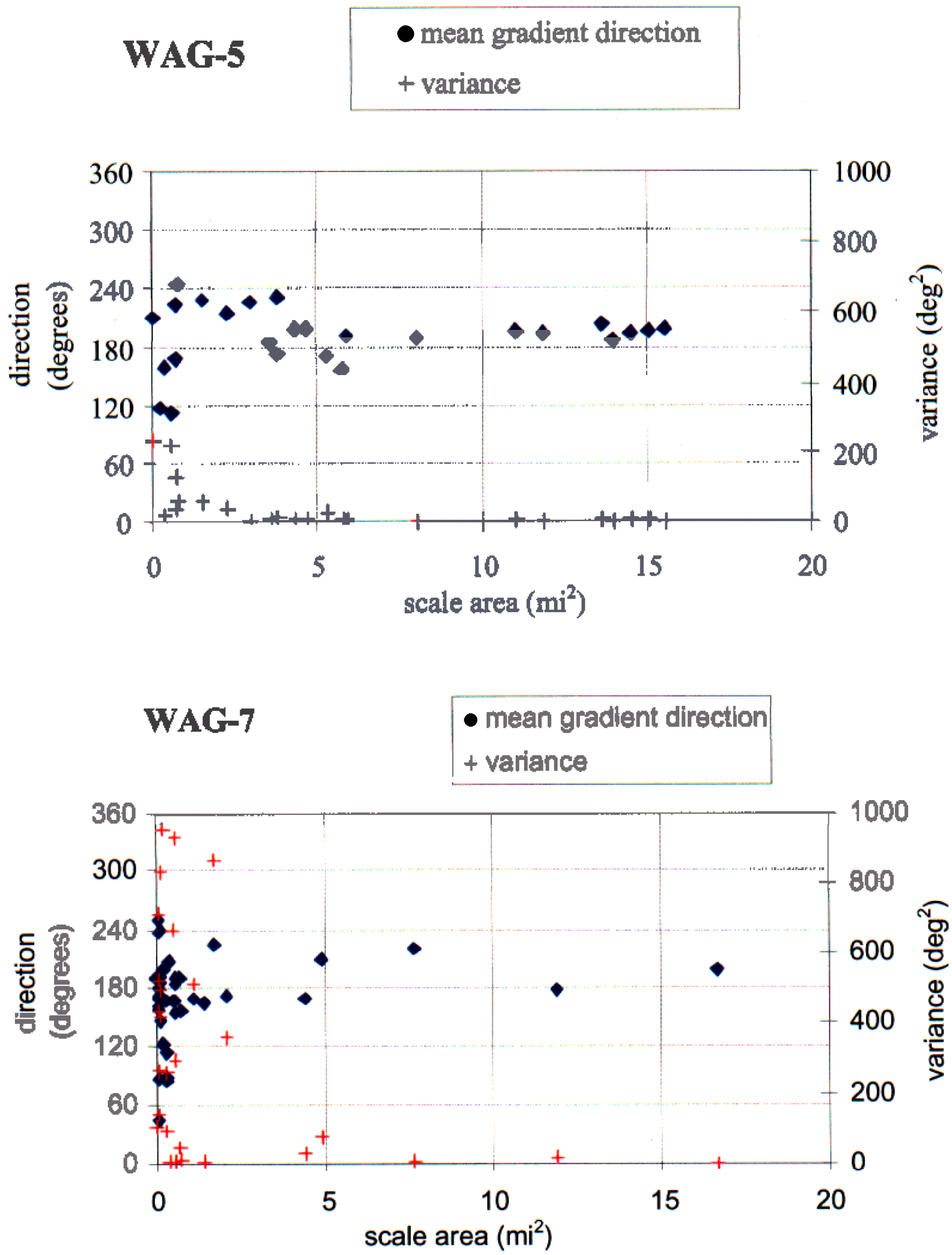

Figure 2-8. Comparison of calculated hydraulic gradient mean direction and variance as a function of scale for Waste Area Groups 5 and 7.

Exercises such as those represented in Figure 2-8 demonstrate the need for the Sitewide groundwater model. Using only small-scale data from individual WAG s for developing CERCLA modeling, creates the risk of misinterpreting flow direction and magnitude due to the limitations of the scale considered.

2.1.8.3 Evaluate Middle-1823 Data Set and Correlate to INEEL Scale Flow Paths. This section presents the following data: drilling summary, Middle-1823 water chemistry, the stratigraphy of Middle-1823 and its environs, and the relationship of Middle-1823 to local stratigrapghy.

2.1.8.3.1 Drilling Summary—A new deep corehole, Middle-1823, located approximately 0.75 mi southwest of Test Reactor Area (TRA), was drilled in FY-03 to provide stratigraphic and hydrogeologic data to fill gaps identified and discussed in the OU 10-8 RI/FS Work Plan (DOE-ID 2002). Drilling of Middle-1823 commenced on October 30, 2002, and continued to November 8, 2002, when a depth of 500 bgs was reached. Coring commenced on December 2, 2002, using a PQ wire line system and 134-mm rods, and ended on February 28, 2003. Coring was conducted initially using only water as coring fluid. The use of polymer and bentonite as a coring fluid was approved and used from 672.5-ft bgs to total depth. Samples were taken every 100 ft (as possible) during coring operations, to provide a vertical profile of the geochemistry of the aquifer.

After the corehole reached a total depth of 1653.1 ft bgs, a string of perforated NQ (59-mm) drill rods were temporarily installed down hole. A temperature probe was run down hole to record a temperature log one month after installation. In addition, the NQ rods were removed and the corehole was abandoned from total depth to 728.5 ft bgs. A 6-in. well screen (0.050 slot) was installed from 720 to 680 ft bgs, with a filter pack of 6 × 9 silica sand from 728.5 to 666 ft bgs and a bentonite seal to ground surface. Details of the drilling and coring can be found in the *End of Well Report for MIDDLE-1823 Waste Area Group 10 Deep Corehole Vertical Profile* (INEEL 2003b).

2.1.8.3.2 Middle-1823 Water Chemistry—Interpretation of the water chemistry data from Middle-1823 suggests that drilling mud compromised several of the depth-discrete samples collected in the deep corehole. Although the required purge volumes completed and in most cases exceeded the required minimum of three borehole volumes, close examination of the water chemistry indicated that the drilling mud was not removed sufficiently to capture pristine aquifer water. The purge water had to be containerized until analysis confirmed that the water could be discharged to the ground. Purging could not continue long enough to remove all of the drilling fluid because of limited storage capacity in wintertime. More than 10 well volumes were purged in an effort to complete the cleanup. In addition to introducing foreign substances, the drilling mud also affected the filtration of samples. The filtration completed during sampling was not sufficient to completely remove suspended particles. Filter integrity was lost due to the amount of suspended particles, which allowed particles to bypass the filters, possibly causing a flux of cations into the acidified samples. Makeup water used for drilling also influenced the sampling results. High levels of metals found in the single source of water (i.e., the INTEC Coal Fire Well) may have increased the metal results in intervals that were cored using this water.

Due to past activities at TRA, tritium and hexavalent chromium were principle contaminants of concern during the drilling of Middle-1823. Tritium and hexavalent chromium were not found above MCLs in any sampled interval. Filtered total chromium was found in all sample intervals; however, the levels were determined to be below MCLs. The highest level of unfiltered total chromium (191 μg/L) was located in the 1,204-ft sample zone. Filtration difficulties are apparent in examination of chromium results. The 896-ft sample interval showed a level of filtered hexavalent chromium that exceeded the level of unfiltered total chromium. The laboratory was contacted and indicated that proper procedures for the sample were not followed and that the sample result may not be accurate. Using the unfiltered total chromium level as a conservative indicator of the hexavalent chromium showed the level of hexavalent chromium to be well below the MCL. Full analytical results of the sampling are located in the End of Well Report for Middle-1823, found in Appendix D.

2.1.8.3.3 Stratigraphy of Middle-1823 and Its Environs—A video log was run on the top 500 ft of the borehole on November 8, 2002. Subsequently, the borehole was cored from 500 to 1653 ft bgs. The well was completed with temporary casing to 1627 ft bgs. Borehole geophysical logs were run from inside the temporary core rod for natural gamma, gamma-gamma (density), and neutron response on January 22, 2003, and for temperature on February 19, 2003. The hole from 730 to 1653.1 ft bgs was then filled with bentonite/slough and abandoned. A permanent well was installed in the remaining borehole with a completion depth of 728.5 ft bgs. Study of the borehole determined the following:

The Vadose Zone—The rocks of Well Middle-1823 are mostly basalt with occasional poorly consolidated sedimentary interbeds. An interval of interbedded sediments and basalts occurs in the vadose zone from ~160 to ~300 ft bgs. Within this interval, the neutron log indicates that a silty sand and gravel bed at ~220 ft bgs may be water saturated. Based on the combined lithological, natural gamma, and neutron logs, the rocks below this interval to the top of the aquifer are a sequence of relatively dry pahoehoe basalts.

The Aquifer—The neutron and temperature logs show that the top of the aquifer is at ~490 ft bgs and the bottom is at ~1030 ft bgs. From just above the top of the aquifer to below ~600 ft bgs are several sequences of thinly bedded, scoriaceous, near-vent basalts. The slope of the temperature log is slightly less steep in this interval, possibly reflecting slightly lower transmissivity in these near-vent facies, compared to less disturbed basalts below 700 ft bgs where the temperature curve is steepest and the aquifer is essentially isothermal. Between ~950 ft and ~1030 ft bgs, the slope of the temperature curve begins to shallow, suggesting that the transmissivity at the bottom of the aquifer decreases below ~950 ft until flow is choked off below ~1030 ft bgs.

The Sub-Aquifer Zone—Below ~1030-ft bgs, the temperature increases along the ambient lithostatic gradient. Below ~1100 ft bgs, basalts become increasingly altered. More than half of the rocks exposed in the sub-aquifer are sedimentary interbeds, with three 40 ft thick clayey-silty-sand layers between ~1080 and ~1260 ft bgs, and a 250-ft layer of interbedded sands, silts, and clays below ~1290 ft bgs.

2.1.8.3.4 The Relationship of Middle-1823 to Local Stratigraphy—Like many other boreholes near TRA and INTEC, strata in Middle-1823 can only be correlated to interbeds and basalts at depths above 500 ft, and correlated at depth to units between 500 and 1500 ft bgs as far as WO-2. Shallow correlations with sediments and one basalt flow group with an age between 414 and 637 ka can be made north to Site-19, south to ICPP-SCI-V-214, and east to USGS-84. East-west correlations are difficult in this area due to the data gap between TRA and INTEC. At depth, the sequence of the four thick interbeds in the sub-aquifer zone can be correlated to the thick sequence of deep interbeds in the bottom of TRA-DISP and to interbeds between 1100 and 1600-ft bgs in WO-2. Though less confident than the correlation to TRA-DISP, the correlation to the WO-2 provides additional age constraint to MIDDLE-1823 of 982 ka for the basalt immediately above the 250 ft thick interbed at ~1290 ft bgs, and of pre-Olduvai SubChron age (1.77 Ma) for the basalt at ~1540 ft bgs at the bottom of the hole. No correlations even at depth are possible north of Site-19 and MTR-Test at TRA and USGS-121 at INTEC, which is likely due to the disruption of the local geology by the northwest-trending volcanic rift zone whose surface expression is AEC Butte immediately north of TRA.

Currently, a significant data gap in subsurface stratigraphy and vertical water chemistry exists between the INTEC and the TRA facilities. In the absence of deep chemical and stratigraphic data from this area, it is impossible to evaluate the lateral extent of the major sedimentary interbeds and the vertical variation in the water chemistry. Due to a lack of sufficient stratigraphic information, correlations in the subsurface cannot be made with any confidence, specifically between well pairs USGS-121/USGS-80, CPP-2/USGS-66, USGS-43/USGS-66, USGS-43/USGS-76, USGS-45/USGS-84, or USGS-39/USGS-84. These well pairs bridge the gap between TRA and INTEC. This lack of correlation does not allow for the development of any conclusions concerning the vertical mobility of contaminants at the INEEL. The inability to correlate interbeds from the TRA area to INTEC has led to problems in the development of the OU 10-08 Sitewide conceptual aquifer model. The current flow model does not adequately address the thermal chemistry interactions coupled with the thick interbeds that are believed to exist below the Big Lost River trough playing an important role in the restriction of vertical groundwater movement. The age dates and paleomagnetic inclination data available for three of the wells introduce a 400-ft depth discrepancy in correlated units between the north and south ends of the combined INTEC and TRA area when applied to subsurface correlations. A strategically placed deep corehole and monitoring well between INTEC and TRA will allow for the development of the long-range correlations necessary to develop a more accurate Sitewide conceptual model.

2.1.8.4 Update INEEL-wide Advective Flow Fields—As a first step towards an understanding of the INEEL-wide advective flow fields, the water table map for the INEEL was updated using water levels measured in July 2002 and October 2002. It was necessary to use older water level measurements for some wells because they were not measured in 2002. Table 2-2 summarizes the data used for developing the water table map.

Contours were generated using Surfer v.7 (i.e., Golden Software, 1999). The water level data, along with the coordinates for each data point, were point-kriged in Surfer using a linear variogram model with slope equal to one and no anisotropy. The effects of contour smoothing were minimal during several test cases; therefore, the contour lines presented here have not been smoothed. The 2002 water table map is presented in Figure 2-9.

As mentioned above, it was necessary to use older water level measurements for wells not sampled during 2002. Therefore, hydraulic heads are constant at those locations and with the previous water table map prepared in 1999. Over the course of time as regional water levels fall or rise, the hydraulic gradient presented may not be an accurate reflection of actual conditions. It is recommended that some of the wells located outside the INEEL boundary (e.g., ARCO-TEST, PARK-BELL, etc.) be monitored periodically to maintain a better degree of accuracy in future recontouring of the INEEL water table map.

2.1.9 Task #9—Develop and Implement Institutional Controls

A remedial design/remedial action (RD/RA) work plan has been prepared to address the development and implementation of both institutional controls and ecological monitoring, laboratory-wide at the INEEL. This plan, the *Remedial Design/Remedial Action Work Plan for Operable Units 6-05 and 10-04, Phase I* (DOE-ID 2004), also provides for the removal or isolation of identified surface unexploded ordnance and trinitrotoluene or RDX fragments that pose an unacceptable near-term physical hazard, as outlined in the *Operations and Maintenance Plan for Operable Units 6-05 and 10-04, Phase I* (DOE/ID 2003) that will accompany the RD/RA Work Plan. Surface unexploded ordnance and trinitrotoluene or RDX fragments identified during routine operations will be assessed by explosives experts and will be removed and disposed of or isolated in an exclusion zone if they pose an unacceptable near-term physical hazard. Removal or isolation activities during the implementation of this remedial design/remedial action phase will not initiate full remediation of the contaminated areas. Full remediation will be performed in subsequent phases.

Table 2-2. Water level data used in preparation of the 2002 INEEL Water Table Map.

Well Name	Date Measured	Water Elevation (ft amsl)	Well Name	Date Measured	Water Elevation (ft amsl)
ANP-06	7/02	4578.79	USGS-026	10/02	4574.58
ANP-09	10/02	4558.69	USGS-027	10/02	4554.56
DH-1B	10/02	4517.12	USGS-031	7/02	4528.28
LF2-10	10/02	4449.78	USGS-032	7/02	4518.21
M1SA	9/02	4424.07	USGS-086	10/02	4424.56
MTR TEST	10/02	4454.09	USGS-097	10/02	4474.06
NO NAME 01	7/02	4576.18	USGS-100	10/02	4478.31
NPR TEST	10/02	4467.34	USGS-101	10/02	4476.80
NRF-7	7/02	4475.59	USGS-104	10/02	4429.78
NRF-MON-A-011	7/02	4475.38	USGS-106	10/02	4424.41
NTP-AREA 2	7/02	4454.86	USGS-107	7/02	4435.18
SITE-09	10/02	4449.08	USGS-108	10/02	4421.86
SITE-14	10/02	4517.32	USGS-109	10/02	4419.46
SOUTH-MON-A-002	9/02	4440.33	USGS-110	7/02	4432.96
SOUTH-MON-A-003	9/02	4426.90	USGS-120	10/02	4423.34
USGS-001	10/02	4431.74	USGS-122	9/02	4453.16
USGS-005	10/02	4467.09	USGS-OBS-A-124	10/02	4417.06
USGS-007	10/02	4571.53	3190-2284	9/02	4500.55
USGS-008	10/02	4425.63	ANP-07	4/02	4579.29
USGS-009	10/02	4421.40	HWY-1C	7/99	4500.55
USGS-011	10/02	4411.03	PARK-BELL	7/99	4778.55
USGS-012	10/02	4485.61	ARCO-TEST	7/99	4793.67
USGS-014	10/02	4414.57	SIMPLOT-1	7/99	4682.93
USGS-015	10/02	4487.82	D&W-HANSEN	7/99	4843.84
USGS-017	10/02	4475.26	SWEET-SAGE	7/99	4797.41
USGS-018	10/02	4527.94	USGS-013	7/99	4388.41
USGS-019	10/02	4520.46	3475-2595	7/99	4686.09
USGS-020	10/02	4451.62	SITE-01A	7/89	4380.21
USGS-024	10/02	4574.28			

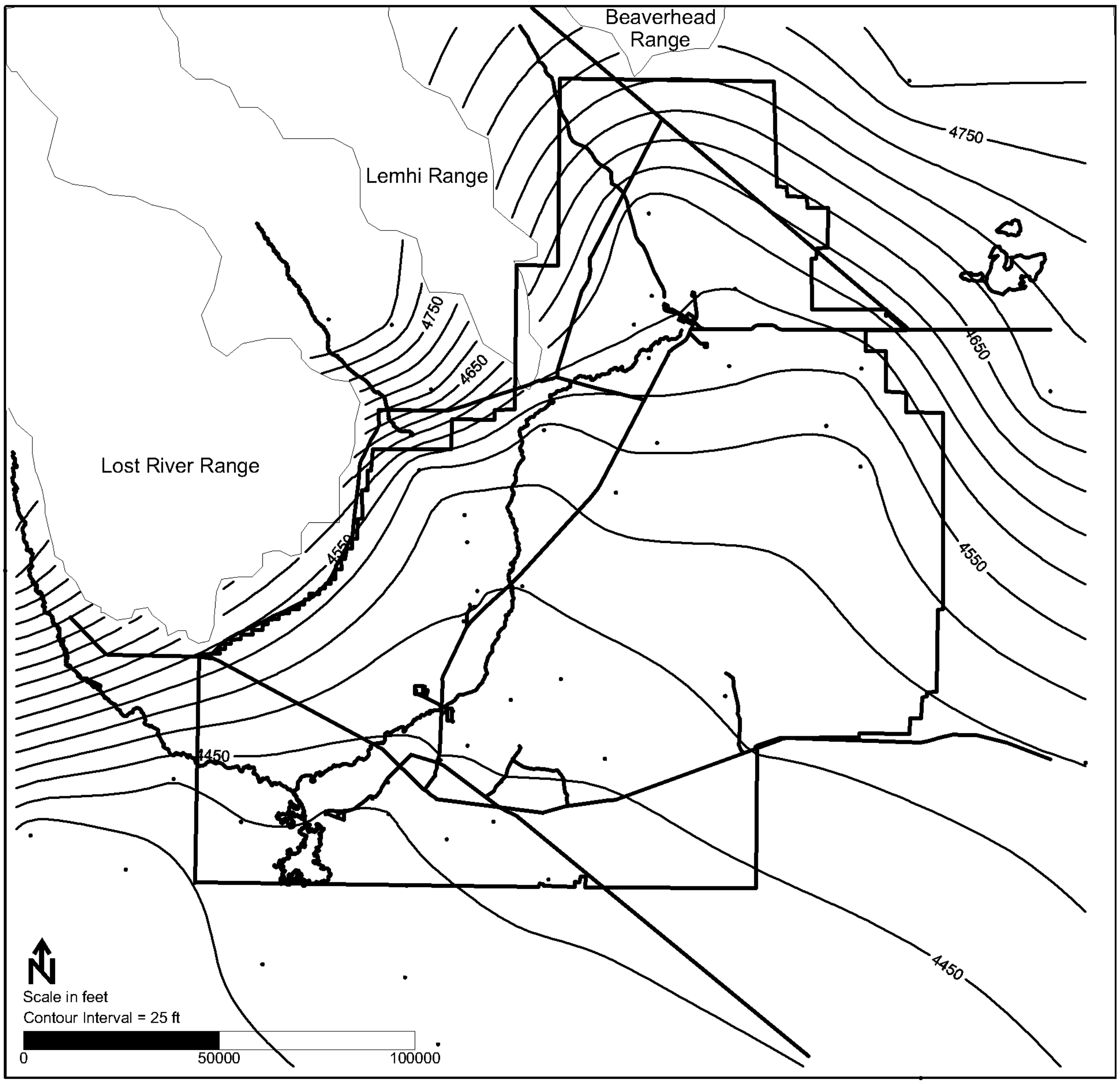

Figure 2-9. Idaho National Engineering and Environmental Laboratory Water Table Map for 2002.

Also accompanying the RD/RA Work Plan (DOE-ID 2004) will be an institutional control plan that documents how the INEEL will comply with the Record of Decision mandated Sitewide institutional controls. The plan will describe the work procedures that the INEEL will use to institute, maintain, and evaluate the required existing and future institutional controls. This plan is based on guidance in the May 3, 1999, EPA Region 10 final policy on the use of institutional controls at federal facilities (EPA 1999). The policy established measures that ensure short- and long-term effectiveness of institutional controls that protect human health and the environment at federal facility sites undergoing remedial action pursuant to CERCLA (42 USC § 9601 et seq.) and/or corrective action pursuant to Resource Conservation and Recovery Act (RCRA) regulations (42 USC § 6901 et seq.). The plan will be updated as (a) new information regarding sites becomes available, (b) as other requirements related to institutional controls are specified in post-ROD documentation, or (c) when institutional controls change or are terminated.

2.1.10 Task #10—Risk Evaluation for Groundwater

This task will be one of the last tasks completed during the RI/FS process for OU 10-08. Currently, the project is interacting with other WAGs to be able to incorporate the results of the individual WAG risk evaluations into the OU 10-08 risk evaluation for groundwater.

2.1.11 Task #11—Verification of Water Level Measuring Points

The INEEL awarded two contracts in FY 2003 to perform well maintenance on approximately 46 wells. Work included removing and replacing down-hole equipment such as pumps, riser pipes, and electrical cables; extending protective casing; installing barriers around the wellhead; and repairing or replacing wellhead boxes. The details of the required maintenance for wells can be found in Table 2-3. If needed after the required maintenance, the water level measuring points will resurveyed.

Table 2-3. Wells that received maintenance in Fiscal Year 2003.

Official Name	Common Name	Well ID	Required Maintenance
USGS-020	USGS-20	469	Install a new pump provided by the United States Geological Survey (USGS), replace galvanized pipe with stainless steel pipe, redevelop as necessary.
USGS-067	USGS-67	516	Replace galvanized pipe with stainless steel pipe.
USGS-058	USGS-58	507	Replace galvanized pipe with stainless steel pipe.
USGS-065	USGS-65	514	Replace galvanized pipe with stainless steel pipe.
34 wells	34 wells	NA	Replace wellhead box with a cap, and extend the surface casing as needed.
PBF-MON-A-003	PBF-MON-3	1087	Shorten surface casing, replace 30A, 600V electrical plug, replace wellhead box with cap.
PBF-MON-A-004	PBF-MON-004	1094	Replace pump and pipe, and electrical cable extend surface casing, replace wellhead box with cap.
LF2-12	LF2-12	724	Cut riser and vapor port, install a cap at the wellhead.
TRA-06A	TRA-06A	763	Deepen the pump from 486 ft to 545 ft bgs, extend surface casing, replace landing plate, replace wellhead box with cap.
USGS-019	USGS-019	468	Replace galvanized well pipe with stainless steel; redevelop as necessary.
USGS-073	USGS-073	522	Extend casing by 30 in., install four jersey barriers around wellhead, and install a well cap.
USGS-088	USGS-088	537	Replace galvanized pipe with stainless steel, redevelop.
ARA-MON-A-001	ARA-MON-1	1003	Replace pump and pipe, and redevelop; replace wellhead box with a well cap.

2.2 Activities for Fiscal Year 2004

The FY 2004 scope for the OU 10-08 RI/FS annual evaluation will include the following:

- Coordinate with the development of the comprehensive groundwater sample results database (this task will be accomplished under a separate work package. Progress will be included in the annual OU 10-08 RI/FS report) (Act #C3550005).

  Note: This activity is considered to be an emerging issue and is currently coded as unfunded. Potential impact is that the data needs for the OU 10-08 RI/FS will not be appropriately identified and data required to support the RI/FS will not be captured.

- Evaluate the groundwater data in relation to the monitoring network of 23 wells with the information incorporated into the annual OU 10-08 RI/FS report (Act #C3550010).

- Evaluate potentially commingled plumes incorporating annual data (Act #C3550015).

  Note: This activity is considered to be an emerging issue and is currently coded as unfunded. Potential impact is that data sharing between the other WAGs and WAG 10 will not take place. This could result in incorrect evaluation of commingled plumes in the future affecting the future development of the RI/FS.

- Evaluate groundwater quality for trends comparing new analytical results with current groundwater model predictions (Act #C3550020).

- Review the procedures for incorporating new sites into WAG 10 (Act #C3550025).

- Evaluate the effectiveness of the phytoremediation of mercury in soil at site TSF-08 (Act #C3550030).

- Update the Sitewide groundwater model using currently available data (Act #C3550035).

  Note: This activity is considered to be an emerging issue and is currently coded as unfunded. Potential impact is that the identification of data gaps would not occur until some time in the future, resulting in increased costs to the project in an effort to close those data gaps at some point in the future.

- Evaluate risk from contaminants of concern to groundwater, incorporating currently available data (Act #C3550040).

- Generate annual water table and recharge maps, incorporating current water level data (Act #C3550045).

- Prepare the draft annual OU 10-08 RI/FS report (Act #C3550050).

- Perform the ORB review of the draft annual OU 10-08 RI/FS report (Act #C3550055).

- Incorporate resolutions to ORB review comments on the draft annual OU 10-08 RI/FS report (Act #C3550060).

- Submit the annual OU 10-08 RI/FS report to Department of Energy Idaho Operations Office (NE-ID) for transmittal to the Agencies (Act #C3550065).

The FY 2004 scope for the installation of a new deep corehole/monitoring well between TRA and INTEC, in support of the OU 10-08 RI/FS, will include the following:

- Revise the WAG 10 groundwater monitoring plan to incorporate sampling in support of the new deep corehole that will be converted into a monitoring well (Act #C3550070)
- Revise drilling specifications (Act #C3550075)
- Prepare a scope of work for the drilling subcontract (Act #C3550080)
- Prepare the required work control documentation (Act #C3550085)
- Install the new deep corehole and convert the corehole into a monitoring well (Act #C3550090)
- Complete sampling in accordance with the revised groundwater monitoring plan (Act #C3550095)
- Perform sample analysis and validation of analytical results (Act #C3550100)
- Prepare a draft end of well report for the deep corehole/monitoring well (Act #C3550105)
- Perform the ORB review of the draft end of well report for the deep corehole/monitoring well (Act #C3550110)
- Incorporate resolutions to the ORB review comments on the draft end of well report for the deep corehole/monitoring well (Act #C3550115)
- Submit the end of well report to NE-ID for transmittal to the Agencies for the deep corehole/monitoring well (Act #C3550120).

Note: The installation of a new deep corehole/monitoring well is considered to be an emerging issue and is currently coded as unfunded. Under the Life Cycle Baseline, drilling of new wells and coreholes needed to support the OU 10-08 RI/FS is not scheduled to begin until FY 2009. It is the technical recommendation that drilling begin in FY 2004 on those coreholes/monitoring wells believed to be needed to fulfill major data gaps, such as the data gap existing between the TRA and INTEC plumes. This action is recommended to provide information that may lead to the identification of other, yet unknown, data gaps that may lead to the installation of more coreholes/monitoring wells than is currently identified in the Life Cycle Baseline. Delay in drilling these wells would lead to increased costs to the project in the future and possibly to delays in development of a technically sound RI/FS.

2.3 Activities for Fiscal Year 2005

The FY 2005 scope for the OU 10-08 RI/FS annual evaluation will include the following:

- Coordinate with the development of the comprehensive groundwater sample results database (this task will be accomplished under a separate work package. Progress will be included in the annual OU 10-08 RI/FS report) (Act #C3555005).
- Evaluate the groundwater data in relation to the monitoring network of 23 wells with the information incorporated into the annual OU 10-08 RI/FS report (Act #C3555010).
- Evaluate potentially commingled plumes incorporating annual data (Act #C3555015).
- Evaluate groundwater quality for trends comparing new analytical results with current groundwater model predictions (Act #C3555020).
- Update the Sitewide groundwater model using currently available data (Act #C3555025).
- Evaluate risk from contaminants of concern to groundwater, incorporating currently available data (Act #C3555030).
- Generate annual water table and recharge maps, incorporating current water level data (Act #C3555035).
- Prepare the draft annual OU 10-08 RI/FS report (Act #C3555040).
- Perform the ORB review of the draft annual OU 10-08 RI/FS report (Act #C3555045).
- Incorporate resolutions to ORB review comments on the draft annual OU 10-08 RI/FS report (Act #C3555050).
- Submit the annual OU 10-08 RI/FS report to NE-ID for transmittal to the Agencies (Act #C3555055).

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