HSWA LANL G/M/2000

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U.S. Department of Energy
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Date: November 14, 2000
Refer to: ER2000-0663

RECEIVED 2000

Mr. John Young, Corrective Action Project Leader
Permits Management Program
NMED – Hazardous Waste Bureau
2044 A Galisteo
Santa Fe, NM 87502

SUBJECT: QUARTERLY TECHNICAL REPORT FOR JULY THROUGH SEPTEMBER 2000

Dear Mr. Young:

Enclosed are three copies of the Environmental Restoration Project's Quarterly Technical Report, July Through September 2000. The Quarterly Technical Report presents information from each focus area on the quarter's activities, including regulatory meetings, sampling, cleanups, report writing, and fire recovery activities. Also enclosed is a certification statement signed by the designee owner and operator for the Los Alamos National Laboratory.

If you have questions regarding this report, please contact Dave McInroy at (505) 667–0819 or Gene Turner at (505) 667–5794.

Sincerely,

Julie A. Canepa, Program Manager
Los Alamos National Laboratory
Environmental Restoration

Sincerely,

Theodore J. Taylor, Project Manager
Department of Energy
Los Alamos Area Office

JC/TT/MB/eim

Enclosures: (1) Quarterly Technical Report, July Through September 2000
(2) Certification

8189

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I certify under penalty of law that these documents and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation.

Document Title: Quarterly Technical Report, July through September 2000

Name: Julie A. Canepa Date: 11/15/00

Julie A. Canepa, Program Manager
Los Alamos National Laboratory
Environmental Restoration Project

or

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Theodore J. Taylor, Project Manager
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Environmental Projects
Environment, Safety, and Health Branch

environmental restoration project

A Department of Energy
Environmental Cleanup Program

LA-UR-00-5107
November 14, 2000
ER2000-0587

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Quarterly Technical Report July–September 2000

Los Alamos
NATIONAL LABORATORY
Los Alamos, NM 87545

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LIST OF ACRONYMS AND ABBREVIATIONS

BMP	best management practice
CAB	Citizens Advisory Board
CERCLA	Comprehensive Environmental Response, Compensation, and Recovery Act
CFR	Code of Federal Regulations
CMS	corrective measures study
COPC	chemical of potential concern
DOE	US Department of Energy
DOE-AL	US Department of Energy-Albuquerque Operations Office
DOE-LAAO	US Department of Energy-Los Alamos Area Office
DX	Dynamic Experimentation (Division)
EPA	US Environmental Protection Agency
ER	environmental restoration
ESH	Environment, Safety, and Health (Division)
ESH-18	Water Quality and Hydrology Group
ESH-19	Hazardous and Solid Waste Group
FIMAD	Facility for Information Management, Analysis, and Display
FY	fiscal year
HE	high explosives
HWB	Hazardous Waste Bureau
HSWA	Hazardous and Solid Waste Amendments
IM	interim measure
LANL	Los Alamos National Laboratory
MDA	material disposal area
NCB	NEPA, Cultural, and Biological Resources
NEPA	National Environmental Policy Act
NFA	no further action
NMED	New Mexico Environment Department
NTISV	nontraditional in situ vitrification
PCB	polychlorinated biphenyl
PRS	potential release site
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
RSI	request for supplemental information
SAP	sampling and analysis plan
SMO	Sample Management Office
SOP	standard operation procedure
SOW	statement of work
SWMU	solid waste management unit
TA	technical area
VCA	voluntary corrective action
VCM	voluntary corrective measure

QUARTERLY TECHNICAL REPORT

JULY–SEPTEMBER 2000

LOS ALAMOS NATIONAL LABORATORY

ENVIRONMENTAL RESTORATION PROJECT

ALBUQUERQUE OPERATIONS OFFICE

CONTRACTOR: University of California

PROJECT MANAGER: Julie Canepa

NUMBER OF POTENTIAL RELEASE SITES: Approximately 2,000

POTENTIAL WASTE: Radionuclides, High Explosives, Metals, Organics

1.0 INTRODUCTION

This quarterly report describes the technical status of activities in the Los Alamos National Laboratory (the Laboratory) Environmental Restoration (ER) Project. The activities are divided according to the current focus area structure and then, when applicable, by the technical area (TA) where the specific activity is located. The Hazardous and Solid Waste Amendments (HSWA) portion of the Laboratory's Hazardous Waste Facility Permit (Module VIII, Section P, Task V, C) requires the submission of a technical progress report on a quarterly basis. This report, submitted to fulfill the permit's requirement, summarizes much of the fieldwork, report-writing, and Cerro Grande fire recovery activities performed this quarter in the ER Project.

2.0 FOCUS AREAS

2.1 Canyon Investigations — Focus Area Leader: Allyn Pratt

2.1.1 Ongoing Reach Investigations

2.1.1.1 Acid Canyon (within the Pueblo Canyon watershed)

Phase II field investigations were conducted in Acid Canyon to reduce uncertainties identified following assessment of Phase I analytical data. This work focused on the following three areas.

1. Collecting additional data on the concentrations of radionuclides, inorganic chemicals, and organic chemicals in the South Fork of Acid Canyon (reach ACS). Anomalously high concentrations of several metals were found in the same Phase I sample that yielded the highest results for cesium-137 and strontium-90, and additional samples were collected to evaluate relations of radionuclides and metals in key geomorphic units. In addition, anomalous concentrations of polychlorinated biphenyls (PCBs) were found in several prior samples;

therefore, additional Phase II analyses were focused on better understanding the distribution of PCBs in reach AC-3 (downstream from reach ACS). Several samples were also collected for analyses of perchlorate, an analyte for which no data previously existed, to address New Mexico Environment Department (NMED) concerns.

2. Evaluating the nature and extent of contamination downstream of the South Fork of Acid Canyon (reach AC-3). During Phase I investigations, the upstream half of reach AC-3 was investigated, and in Phase II, geomorphic mapping and field radiological screening were extended downstream to the confluence with Pueblo Canyon. Phase II sediment samples were collected primarily to better define the concentrations and inventory of plutonium-239,240, which had been identified as the primary risk driver in the Pueblo Canyon watershed by prior work in upstream and downstream reaches. Additional Phase II samples were collected to improve knowledge of concentrations of chemicals of potential concern (COPCs) identified in upstream reaches.

3. Filling data gaps concerning potential contaminants upstream of the South Fork of Acid Canyon (reaches AC-1 and AC-2). No previous data existed in these reaches for several radionuclides identified as COPCs in reach ACS, including cesium-137, strontium-90, and tritium, and previous sample sites were resampled for these analytes to test the assumption that the South Fork is the only source for these radionuclides in Acid Canyon. Several samples were also analyzed for perchlorate to provide a comparison with perchlorate results from reach ACS.

2.1.1.2 Cañada del Buey (White Rock Land Transfer Parcel)

A draft report was completed on possible sediment contamination in Cañada del Buey reach CDB-4, within the proposed White Rock land transfer parcel, and the draft was submitted for internal peer review. This report concluded that no analytes are present at levels above background, and therefore there is no need for additional assessment or remediation prior to land transfer. Incorporation of peer review comments is being completed to allow distribution of this report in October 2000.

2.1.1.3 Post-Cerro Grande Fire-Related Characterization

The Cerro Grande fire impacted a large area in the eastern Jemez Mountains, in the Los Alamos townsite, and on Laboratory land. A characterization program is being implemented to address potential contaminant transport related to increased flood potential resulting from the fire. The purpose of the sampling is to obtain data necessary to evaluate the impacts of floods on sediments, surface water, and alluvial groundwater and to support the assessment of human health and ecological risk for areas that are affected by the floods. Characterization of sediments has predominantly occurred at off-site locations, including the confluence of Los Alamos Canyon and the Rio Grande. Surface water and alluvial groundwater characterization has occurred within Laboratory boundaries and in areas on Los Alamos County land and San Ildefonso Pueblo land. The sampling approach is driven by the conceptual model for significant changes in the spatial distribution and concentration of contaminants relative to pre-fire conditions.

The watersheds affected by the fire are prioritized for this work based on known or suspected concentrations and inventory of contaminants. The three highest-priority watersheds are Pueblo, Los Alamos, and Pajarito, although other watersheds are affected and are being addressed.

Data from these characterization efforts are being validated and assessed and will be uploaded to the ER Project website as the data becomes available for publication.

2.2 Material Disposal Areas — Focus Area Leader: John Hopkins

2.2.1 General Information for Material Disposal Areas Focus Area

Members of the Material Disposal Area (MDA) Focus Area in conjunction with the Analysis and Assessment Focus Area held a one-day meeting on August 9, 2000, to discuss long-term site monitoring requirements for MDAs. The purpose of the meeting was to review and discuss the state-of-the-art alternatives and regulatory requirements for long-term monitoring at other arid sites in the Southwest. The goal of the meeting was to develop a preliminary conceptual design for long-term site monitoring at MDAs at the Laboratory for incorporation into future ER Project planning. The meeting was attended by representatives from the US Department of Energy (DOE), Laboratory ER Project, Sandia National Laboratory's ER Project, US Environmental Protection Agency (EPA), Uranium Mill Tailings Remedial Action Program, Nevada Test Site, and NMED-Hazardous Waste Bureau (NMED-HWB). Consultants also attended the meeting.

Members of the MDA Focus Area hosted a two-day workshop in September for the administrative authority on the general use of a probabilistic contaminant fate and transport model planned for use in the corrective-action process.

A draft of the Mesa-Top MDA Focus Area implementation plan was prepared and distributed to members of the MDA core team for review. The team consists of representatives from the DOE-Albuquerque Operations Office (DOE-AL), the Laboratory, and the NMED-HWB. The implementation plan will incorporate the DOE "plug-in" approach for streamlining the corrective action process at the Laboratory's largest MDAs. The implementation plan will replace the draft MDA core document and tier to the ER Project installation work plan.

In September, the MDA core team was given direction by DOE, Laboratory, and NMED-HWB management to plan the work and resource needs for selecting a pilot MDA for application of the MDA implementation plan and to complete alternatives assessments and public hearings on a remedy selection by December 2002.

2.2.2 Technical Area Activities

2.2.2.1 TA-21

PRS 21-027(d)-99, NTISV Cold Demonstration VCM. The draft voluntary corrective measure (VCM) report proposing no further action (NFA) for Potential Release Site (PRS) 21-027(d)-99, the nontraditional in situ vitrification (NTISV) cold demonstration, was completed and is being reviewed. The NMED underground storage tank regulations risk approach was followed to address residual hydrocarbon contamination at the site. Results show no unacceptable risk for industrial or residential land use.

PRS 21-018(a)-99, NTISV Hot Demonstration at MDA V. The field phase of the melt was completed on April 28, 2000. To determine the success of the demonstration, glass samples will be collected from the vitrified product and analyzed. Because of the current surface temperature of the vitrified product (800° F), sample collection will not be attempted until surface temperatures of the glass have cooled to near ambient temperatures.

Demobilization activities were completed in July, and site restoration activities, including reinstallation of stormwater best management practices (BMPs), were completed in August. Waste decontamination fluids generated during decontamination of the hood and the off-gas treatment system and the flush waters

were transported and disposed at TA-50 as low-level radioactive waste. The high-efficiency particulate air filters were disposed at TA-54.

PRS 21-011(k). The fact sheet describing the corrective action to remove residual radionuclide contamination from the hillside below the outfall was prepared and submitted to DOE and presented to NMED for approval. At the NMED monthly meeting in August, it was decided that the corrective action and final remedy for PRS 21-011(k) will be implemented as a VCM. Removal of radionuclide-contaminated soils, sediments, and tuff is scheduled to begin in FY 2001.

PRS 21-024(i). A permitted off-site waste treatment, storage, and disposal facility approved the disposal of the waste remaining in the septic tank; therefore, a fact sheet describing the corrective action was prepared and submitted to DOE and presented to NMED for approval. At the NMED monthly meeting in August, it was decided that the corrective action and final remedy for PRS 21-024(i) would be implemented as a VCM. Septic tank removal activities are scheduled to begin in FY 2001.

PRS 21-029, DP Tank Farm. Monthly site inspections of the two hydrocarbon sheen areas in DP Canyon were conducted in July, August, and September. Copies of these inspection reports are attached as Appendixes A through D. Fingerprinting results from the second hydrocarbon sheen discovered in March confirmed it to be weathered diesel with a fingerprint similar to that of hydrocarbons detected at DP Tank Farm. Fieldwork to complete the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) of DP Tank Farm continued throughout the quarter and involved the collection of surface, near-surface, and subsurface soil; sediment; and tuff samples in accordance with the RFI Phase II sampling and analysis plan (SAP) and the approved response to the request for supplemental information (RSI). Immunoassay test kit and field screening results are continuously reported to NMED. Based on test kit results and numerous site visits, NMED and Laboratory ER Project representatives identified four additional borehole locations in the southwestern portion of DP Tank Farm and approximately four additional auger hole locations in and around the western end of the stream channel to ascertain the lateral and vertical extent of total petroleum hydrocarbon contamination. Test kit results indicate that the extent of contamination for the western portion of DP Tank Farm has been determined. Fixed-laboratory analytical results are undergoing baseline validation and subsequent population of the Facility for Information Management, Analysis, and Display (FIMAD). Clarification of land ownership and approval of an access agreement have delayed the characterization of the eastern-most hydrocarbon seep discovered in March 2000. This final portion of the Phase II RFI will be completed in October, and preliminary analytical results will be discussed with NMED shortly thereafter.

2.2.2.2 TA-49

PRSs 49-001(b, c, d, g), MDA AB, Areas 2, 2A, and 2B. Monthly moisture monitoring was conducted. An annual review of the data is presented in Appendix E. Erosion control BMPs replaced after the Cerro Grande Fire in and around PRS 49-001(g) were inspected and remain in good condition. Additional maintenance in the form of gravel and river rock placement along the west and south sides of the gopher barrier boundary overlaying the earthen cover of MDA AB was completed to prevent further intrusion of gophers beneath the cover.

2.2.2.3 TA-50

Quarterly pore-gas monitoring was initiated in existing borehole 50-9100 in order to monitor the vertical extent of a potential volatile organic compound plume at MDA C. The results for the fourth quarter of

FY 2000 are presented in the annual pore-gas sampling report for TA-50 and TA-54, included as Appendix F of this report.

2.2.2.4 TA-54

A team with representatives from DOE-AL, NMED-HWB, and the Laboratory continued reviewing the TA-54 RFI report. This report is a pilot implementation of DOE's "plug-in" approach for expediting corrective actions as adopted by the focus area and described in the MDA Focus Area implementation plan.

The quarterly pore-gas monitoring at MDAs G and L was completed as required by Module VIII of the Laboratory's Hazardous Waste Facility Permit. An annual review of the data is provided in Appendix F of this report. Field screening results for this pore-gas monitoring effort are not included in this document because of space constraints but are available through the MDA data steward, Bill Hardesty of the ER Project (505-667-0808).

The TA-54 team is nearing completion of a web-based presentation describing the 15-year pore-gas sampling program and results. The MDA Focus Area leader plans to use this as a basis for proposing a reduction in sampling frequency from quarterly to annually, believing that the resources can be better spent on other activities.

PRSs 54-007(c, d, e) and 51-001. Team members prepared the fact sheets describing proposed corrective actions for four abandoned septic systems at TA-54 West and TA-51. The fact sheet for non-HSWA PRSs 51-001 and 54-007(d) was submitted to, and approved by, DOE. The fact sheet for HSWA PRSs 54-007(c, e), now known as PRS 54-007(c)-99, was submitted to, and approved by, DOE and NMED. At the NMED monthly meeting in August, it was decided that the corrective action and final remedy for PRS 54-007(c)-99 will be implemented as a voluntary corrective action (VCA). Septic tank removal activities are scheduled to begin in early FY 2001.

2.3 RCRA Corrective Actions — Focus Area Leader: Warren Neff

2.3.1 High Explosives Production Sites Team

The High Explosives Production Sites Team continued work on fire recovery activities, including new activities initiated as a result of the Cerro Grande fire. The fire burned intensely across many of the team's sites (TAs-6, -9, -11, -16, -22 and -40); therefore, BMPs were installed at numerous sites within those TAs. MDA R (PRS 16-019) was severely burned. Accelerated ER activities were initiated at MDA R; at PRS 16-020, the silver outfall; and at PRS 40-010, a surface disposal area where debris was picked up and disposed off-site.

Moderate progress was made on fieldwork, interim measure (IM) cleanup work, and report-writing activities in support of the PRS 16-021(c) (the 260 outfall) corrective measures study (CMS). The team continued the work outlined in the IM plan for the 260 outfall and the deep drilling at well CdV-R-15-3. Hydrogeology studies, including stream profiles and quarterly sampling, were completed. High-performing team activities continued.

2.3.1.1 TA-16

Hydrogeology. The field team continued to monitor water levels in the Cañon de Valle alluvial wells and in the intermediate-depth wells. Four of the five alluvial wells in Cañon de Valle contained water this quarter, but none of the intermediate-depth boreholes contained water. One alluvial well in Martin Spring Canyon contained water. Water levels were elevated during July and then subsided. Total dissolved solids (as measured via conductivity) were elevated in alluvial waters and surface waters in Cañon de Valle, presumably caused by the effects of the fire.

In September, quarterly samples were collected from Cañon de Valle springs and surface water. In addition, samples from springs and surface water were collected in July and August to evaluate the hydrologic and geochemical effects of the Cerro Grande fire. Stable isotope samples were collected at precipitation events and during quarterly sampling. Every-other-day water samples (bromide tracer) collected from the TA-16 springs showed no bromide tracer breakthrough. Flow-integrated samples were collected in SWSC, Burning Ground, and Martin Springs. Fire damage to autosamplers at SWSC and Martin Springs impeded collection of tracer samples and flow-integrated spring samples. All fourth-quarter results are pending.

Well development, well completion, and Westbay sampling system installation activities were completed at deep groundwater well CdV-R-15-3. Based on geophysical anomalies and observations of water during drilling, six screened intervals were sited last quarter at the following locations: 618–625 ft, 801–808 ft, 965–981 ft, 1235–1279 ft (across the top of the regional aquifer at 1245 ft), 1348–1355 ft, and 1638–1645 ft. Screening geochemical analyses and analyses of turbidity suggest that the well produces water of good quality. Near-detection-limit TNT by-products were detected in the uppermost ephemeral perched zone. The uppermost two screened intervals did not produce water following well installation; the third screen produced a small amount of water; and the three screens within the regional aquifer all produced water. Hydrologic testing was completed in the three regional aquifer screens. Hydraulic conductivity was lowest in the deepest screen.

PRS 16-021(c) CMS. High-explosives (HE) composting and bioremediation tests (W.R. Grace process) using contaminated soil were initiated as a backup to the partially successful zero-valent iron tests. Composting tests were not successful because of the extreme diurnal temperature variations on the Pajarito Plateau. Additional tests are in progress. The W.R. Grace process appeared to decrease the HE concentrations in the test plots. Phytoremediation and stabilization studies were initiated.

PRS 16-021(c) IM. Excavation at the IM project at the 260 outfall was completed. Robotic blending and excavation of the "pond" area were completed. Excavation in the lower drainage was also completed. The lower drainage soil volumes were larger than anticipated. Exploratory excavation around the TA-16-260 troughs was completed to determine whether extensive contamination existed beneath the troughs. Contamination beneath the troughs was extremely limited in extent. A total of approximately 1400 yd^3 was excavated and staged for the IM project.

Verification and waste samples for the IM project were collected. A bromide characterization trench was completed in the 260 "pond" area. An 80-ft borehole was drilled and sampled in the "pond" area.

MDA R. Analytical results were received for waste samples obtained from 1500 yd^3 of soil removed from MDA R (PRS 16-019) as a result of the effects of the Cerro Grande fire; all of the soils are classified as nonhazardous waste. The soils were contaminated with barium and HE and will be disposed using the waste protocols developed for MDA P. The approved RFI work plan sampling for MDA R was implemented. This sampling included more than 100 screening samples, fixed analytical laboratory

surface samples, and laboratory samples from eight boreholes that were drilled into Bandelier Tuff. Results are pending.

Silver Outfall The silver outfall (PRS 16-020) was burned in the Cerro Grande fire, and much of the PRS lies within the floodplain of Cañon de Valle. Hence, an accelerated ER activity was completed at the site to remove high levels of silver, chromium, and polyaromatic hydrocarbons known to be present at the PRS. Approximately 250 yd^3 of soil was excavated and staged for disposal. Both verification and waste characterization samples were collected. Results are pending.

Surface Water. BMPs were inspected and maintained.

2.3.2 Firing Sites Team

Post-Fire BMP Installations. BMP installations were performed at TA-14, -15, and –36 firing site PRSs impacted by the Cerro Grande fire. BMPs included installation of wattles, rock check-dams, and silt fences, as appropriate. BMP installations are documented in a report titled "Cerro Grande Fire Aftermath: Environmental Restoration Project Activities to Reduce the Migration of Contamination from Potential Release Sites" (Veenis 2000, 67370).

2.3.2.1 TA-15

Firing Site R-44. In July 2000, a post-fire accelerated ER activity involving shrapnel and surface debris pickup was conducted at Firing Site R-44 [PRSs 15-006(c) and 15-008(b)]. Visible shrapnel and debris, exposed from the fire on the surface of the PRSs and surrounding areas, were collected for disposal. Approximately 20 yd^3 of low-level radioactive waste, 7 yd^3 of scrap metal, and 0.5 yd^3 of mixed waste were generated during this effort. The shrapnel and debris pickup portion of this project is complete with final waste disposal scheduled to occur in October 2000.

2.3.2.2 TA-36

PRS 36-008. A debris pickup project was conducted at this PRS following exposure of laboratory glassware and other debris from the fire. Approximately 5 yd^3 of solid waste was collected. Final waste disposal is scheduled to occur in October 2000.

2.3.3 Industrial Sites Team

Fire Recovery Activities. During the months of July, August, and September, the Industrial Sites Team continued supporting fire recovery activities. Readiness review procedures, including preparation of health and safety documents and excavation permits, were completed, as well as rehabilitation BMP work at 17 PRSs within TA-46. The BMP work included contour tree-felling, construction of earthen berms for sediment retention at toes of slopes, raking, reseeding, mulching (hydromulch and manual), and diverting run-on throughout the sites. Rehabilitation work was also completed (including the readiness review process) at 18 PRSs in TAs-4, -5, -42, and -48. The BMP work for the latter sites included all the aforementioned efforts as well as shrapnel pickup. The Industrial Sites Team continues to conduct inspections and maintain the 35 PRSs affected by the fire and requiring BMPs.

2.3.3.1 TA-3

PRS 03-010(a). Data analysis and assessment activities for groundwater, surface water, and sediment data collected during the first and second quarter of this FY from areas near and within PRS 03-010(a) were restarted and completed this quarter. During the August monthly meeting with NMED, the structure of the deliverable for reporting the fieldwork and newly acquired data from PRS 03-010(a) was negotiated. The resulting agreement was that the new information would be provided to NMED as an addendum to the original RFI report. The addendum was drafted, peer-reviewed, and completed in September.

PRS 03-056(c). A notice of self-implementing on-site cleanup and disposal of PCB remediation waste at PRS 03-056(c) was prepared and submitted to the EPA PCB Program Office of EPA Region 6, NMED-HWB, and the County of Los Alamos in July. Following the notice submittal, EPA, DOE-Los Alamos Area Office (LAAO), and the Industrial Sites Team participated in a teleconference, during which, the team was instructed to withdraw the notice of "self-implementing on-site cleanup and disposal of PCB remediation waste" and submit a different application for "risk-based disposal approval." However, during this teleconference, EPA approved the proposal in the July notice that waste from the site be disposed at "as found" concentrations (i.e., as remediation waste). The approval means that the waste can go to a solid waste landfill that accepts PCB waste. This is a potential cost savings, provided the waste does not contain an "F" listed component.

The new application for risk-based disposal approval was prepared and submitted in August to the EPA Region 6 PCB Program Office and to NMED-HWB.

Pre-excavation sampling activities were completed in August, and excavation at the site commenced. Approximately 200 yd^3 of PCB-contaminated soils were excavated during the last week of August, and an additional 700 yd^3 were excavated in September. Much of the west slope, mesa top, and drainage channels has been excavated and/or vacuumed down to bedrock. On-site sample analyses from PCB field test kits reveal the project is proceeding as planned. However, the Industrial Sites Team was unable to obtain quick turnaround analysis for waste samples; therefore, the waste is being stored on-site until analytical results are received from off-site laboratories and the roll-offs are profiled. The waste is being inspected on a regular basis to ensure compliance.

Remediation activities were halted at the end of September and will start again once receipt of a 401/404 dredge-and-fill permit is obtained from NMED. This permit is needed prior to excavation of the sediment near the stream running at the toe of the slope being remediated. Another condition pending the start of the activities at PRS 03-056(c) is receipt of analytical results for waste containers so that waste being stored can be shipped off-site, therefore making room for more waste at the site.

2.3.3.2 TA-35

The completion of the TA-35 integrated SAP was delayed by to the Cerro Grande fire. This work has been postponed until next fiscal year because the key personnel needed to complete the integrated SAP were reassigned to fire recovery activities for the remainder of the fiscal year.

2.3.3.3 TA-53

PRS 53-002(a)-99, Northern and Southern Surface Impoundments. Sludge removal activities were conducted through much of July and August at the south lagoon [PRS 53-002(b)] at TA-53. Stringent levels of personal protective equipment to minimize radiological exposure to the field team were

administered. Radiological exposure for the team as a whole, and each individual worker, was constantly measured in real time and by air cams to ensure worker protection.

A path was cut through the lagoon's berm to allow forklifts, backhoes, and bobcats to enter the lagoon, pile up the sludge, and scoop it into fifty-four B-25 boxes (approximately 160 yd^3 of sludge). The boxes were shipped to TA-54. Sludge removal activities were completed in August. Several rain events led to the accumulation of 5000 gal. of water in the south lagoon that had to be pumped before the liner could be removed. Large poly-containers were used to contain the rainwater, which has to be managed as waste until analytical results determine the disposal option. It is anticipated that the water will be released to the TA-53 radioactive liquid waste system, and the sludge and containers will be disposed at TA-54.

Liner removal activities (an additional 60 yd^3 of material) and decontamination of heavy equipment were completed in August. All equipment was released from the site except for the bucket of a backhoe, which may be reused in other radioactively contaminated waste activities.

Drilling began in the south lagoon on September 14, 2000. All samples to determine nature and extent of contamination below the liner (now removed) were collected and submitted to the Sample Management Office before the end of the fiscal year. Fourteen boreholes were drilled to depths up to 15 ft, with four depths being sampled from each location. Decontamination activities for equipment and waste bins were also successfully completed in September.

2.3.4 Townsites Team

The Townsites Team worked to resolve land transfer- and private property-related issues that continued to arise this quarter.

2.3.4.1 TA-0

PRS 00-003-99 [00-003, 00-012, and 00-030(i)]. The VCA for this PRS has been successfully executed. The VCA plan received formal written approval from the NMED, and the VCA report is in preparation.

PRS 00-019. Data analysis for PRS 00-019 is nearing completion, and the VCA completion report is in preparation.

PRS 00-030(g). The RFI report for PRS 00-030(g) is in preparation and has undergone internal Laboratory reviews. Comments resulting from internal review are being resolved and incorporated in preparation for submission to DOE and the NMED.

2.3.4.2 TA-1

PRS 01-001(m). A reported septic system associated with a warehouse building that served the Manhatten Project at TA-1 was believed to exist on private property slated for further development. A solution has been negotiated with the NMED to receive an NFA determination for this PRS; the archival work has been performed; photographic documentation collected; and a letter drafted to satisfy the NMED agreement and allow the development to proceed unimpeded.

PRS 01-001(s). Location 1A of the Western Sanitary Waste Line lies under a proposed construction project on private property and has delayed development activities. This PRS was investigated initially in 1994, and the waste line was removed in 1996. The negotiated supplemental samples were collected,

analyzed, and reported to the administrative authority, who then approved an NFA proposal for this location, thus allowing the property owner to develop the site as planned.

2.3.4.3 TA-73

PRSs 73-001(a,b)-99 [73-001(a–d) and 73-004(d)]. The TA-73 high-performing team has resumed meeting and has made fundamental decisions regarding the progress toward a final remedy for these PRSs. To date the team has determined and agreed that the project will move forward as an integrated, phased VCM and will rely heavily on the NMED Solid Waste Bureau regulations and modeling for municipal landfills rather than RCRA closure and monitoring requirements.

PRS 73-005-99 [73-005, 73-007, C-73-005(a-f)]. The RFI report for PRS 73-005-99, Contractor's Row (work plan PRS aggregate 73-2), has been submitted to the administrative authority.

2.3.5 MDA P Closure

The MDA P closure project continued in Phase I (excavation and disposal) of the closure this quarter. Remote excavation of soil and debris was completed, and non-remote removal of soil that had been contaminated by barium or HE leaching from the landfill began. The remote excavator was used to remove the 387 Burn Pad, which lies within the MDA P work area and is being closed concurrently with the MDA P landfill.

Cerro Grande fire recovery activities for the MDA P Closure were mostly completed last quarter. Some manpower and equipment were diverted for fire suppression at MDA R when the underground fire at that location flared up again.

Approximately 8785 yd^3 of soil and debris were excavated from both lobes of the MDA P landfill this quarter. As part of the 387 Burn Pad Closure activities, 700 yd^3 of soil and 100 yd^3 of concrete were removed. To date, 2605 lb of asbestos and asbestos-containing material also have been disposed. Other disposal activities include disposing of 260 lb of detonable HE and 5300 lb of barium nitrate. In addition, 840 containers requiring characterization have been removed from the landfill to date.

2.4 Groundwater Investigations — Focus Area Leader: Deba Daymon

2.4.1 General Information for Groundwater Investigations Focus Area

The drilling schedule for regional and intermediate depth wells was established for FY 2001. The wells planned are R-5, -7, -8, -13, -22, and -27; CDV-R-37-2; and MCOBT-1 and -2.

2.4.2 Regional Well Activities

2.4.2.1 Regional Well R-7

Drill rig access to Los Alamos Canyon, where regional well R-7 is located, has been denied for the remainder of FY 2000 because of the potential for floods resulting from the Cerro Grande fire. Because of this new site condition, the surface casing installed at R-7 prior to the fire was plugged in July.

2.4.2.2 Regional Well R-9

The following activities occurred this quarter at regional well R-9, located in Los Alamos Canyon:

- installed a dedicated, high-volume pump on August 30;
- constructed well-head protection in September;
- completed second quarter of sampling on September 30; and
- finished the well completion report and transmitted it to DOE in September.

Quarterly groundwater sampling results for well R-9 are provided in Tables 2.4-1 through 2.4-4 in Appendix G of this report.

2.4.2.3 Regional Well R-12

The following activities occurred this quarter at regional well R-12, located in Sandia Canyon:

- completed first quarter of sampling on September 21 and
- finished the well completion report and transmitted it to DOE in September.

2.4.2.4 Regional Well R-15

The following activities occurred this quarter at regional well R-15, located in Mortandad Canyon:

- installed a dedicated, high-volume pump on September 30 and
- finished the well completion report and transmitted it to DOE in September.

Quarterly groundwater sampling results for well R-15 are provided in Tables 2.4-5 through 2.4-8 in Appendix G of this report.

2.4.2.5 Regional Well R-19

The following activities occurred this quarter at regional well R-19, located in Pajarito Canyon:

- completed well development on August 16;
- installed Westbay well sampling system (7 ports) on September 11;
- completed first quarter of sampling on September 30; and
- finished the well completion report and transmitted it to DOE in September.

2.4.2.6 Regional Well R-22

The following activities occurred this quarter at regional well R-22, located on the mesa top at TA-54:

- intiated and completed site preparation activities and
- began drilling activities and as of September 30 drilled to the depth of 1018 ft.

2.4.2.7 Regional Well R-9i

The following activities occurred this quarter at intermediate well R-9i, located in Los Alamos Canyon:

- completed first quarter of sampling on September 15, and
- finished the well completion report and transmitted it to DOE in September.

2.5 Information Management — Focus Area Leader: Steve Bolivar

2.5.1 Team Activities

2.5.1.1 Information Management

Team members worked with the Laboratory's Water Quality and Hydrology Group (ESH-18) to integrate Surface Water Assessment Team data (i.e., erosion data) in the PRS database, identified additional fields needed as a result of fire recovery efforts, and determined how those fields should be populated. Personnel moved data from PRS deliverables into the main document table; made data-type modifications in the NFA fields to accommodate revised data; and put fire recovery data into the ER database.

Centralized data management personnel prepared approximately 1500 sample-collection logs for sampling events and issued corresponding sets of chains of custody and electronic followers (an increase of four times the number prepared last quarter).

Computer support personnel received 719 computer service requests this quarter. The majority of the requests have been completed.

2.5.1.2 ER Database

The ER database continues to be reengineered. The new version consists of several modules that are being designed and reviewed in a prioritized sequence. Personnel are working with users to ensure the necessary fields (i.e., information) are captured within each module. This effort is being completed in concert with ESH-18 to ensure that data from the hydrogeologic work plan (LANL 1998, 59599) are captured and accessible to the ER Project as well as ESH-18. Most design issues have been resolved and teams are starting the implementation phase. The Location and Sample modules are now in production.

2.5.1.3 Sample Management Office

Personnel from the Sample Management Office (SMO) continued to accept field samples, create the necessary paperwork, contact the appropriate laboratories, and ensure the requested information is received. The workload continues to be greatly impacted as the result of fire recovery efforts. For the fiscal year, the SMO handled 10,121 containers. More than 1000 containers were shipped the last week in September. The SMO issued 204 field data groups (number of samples) and had 646 customers this quarter. Personnel handled 5290 containers (a normal work load is 2000).

2.5.1.4 Facility for Information Management, Analysis, and Display

Personnel from FIMAD continued to maintain the present ER database, as well as the spatial data (such as elevation, orthophotographs, etc.). The Cartographic Laboratory completed 191 requests from the ER

Project this quarter. Personnel produced 228 new maps and 540 copies of existing maps. Geographic Information Service personnel are still being used to produce fire recovery maps both for the ER Project and Laboratory management. All flyover flights (photogrammetry, high and low-resolution LIDAR [laser altimetry], and AVIRIS) flights were completed. Data are now being processed.

2.6 Analysis and Assessment — Focus Area Leader: Alison Dorries

2.6.1 General Information for Analysis and Assessment Focus Area

The Analysis and Assessment Focus Area continued to support institutional recovery activities and planning following the Cerro Grande fire. The fire provided opportunities to test several procedures and tools under development by the focus area, such as those designed to improve data quality, accessibility, and reporting activities through programming and automation.

2.6.2 Team Activities

2.6.2.1 Data Analysis and Assessment Team

Data Quality. Seven data validation standard operating procedures (SOPs), LANL-ER-SOPs-15.01 through 15.07, were fully implemented during this quarter. Implementation included training data validators in the use of each SOP through read training, individual instruction, and secondary validation by an experienced and trained data validator. In addition, the Data Quality Task leader participated in two on-site audits of the subcontractor laboratories and one on-site data package assessment of a subcontract laboratory. The conduct of the audits and the assessment was supported by the information provided by the data validation effort. An integrated data quality team that includes data validators, laboratory auditors, and project chemists was formed during the fourth quarter with complete integration of the team expected in the first or second quarter of FY 2001. The team was formed to better coordinate and communicate data quality issues to all data generators and users.

Document preparation activities continued this quarter. Three technical documents are currently in preparation for publication. Data quality documents published this quarter included

- LANL-ER-SOP-15.06, Routine Validation of Gamma Spectroscopy Data and
- LANL-ER-SOP-15.07, Routine Validation of Chemical Separation Alpha Spectrometry, Gas Proportional Counting and Liquid Scintillation Data.

Data Stewardship. The Cerro Grande fire caused work under this task to be refocused and reprioritized into the following three activities.

Database Design and Implementation: The design model for the ER Project technical database was completed for the Location, Sample, Field Measurement, and Chemistry Results Modules. (The design of the Borehole and Well Construction Modules was completed prior to the fire.) The design for the Planning Module is approximately 90% complete. Lookup table values for the Location and Sample Modules have been assigned. Definition of lookup table values associated with the Chemistry Results and the Field Measurement Modules is in progress. The database model has been built on the ER Project's UNIX Oracle system. The Location and Sample Modules have been populated with existing ER data and have been brought into production.

Legacy Data Cleanup and Migration: In order to fully implement the new database model, existing legacy data must undergo cleanup so that the database can be fully constrained and then migrated to the new table structures. Migration strategies were developed to allow these two activities to occur in a complementary, parallel fashion.

Migration plans for the Location and Sample Modules were prepared and implemented. For the Location Module, 17,072 records were reviewed and migrated to the data table LOCATION_HDR. In preparation for migration to the Sample Module, 32,763 sample data records were reviewed and quality flags were assigned to individual meta-data fields. Subsequently, 32,763 records were created in the main data table, SAMPLE_HDR, and 32,984 records were created in the data table SAMPLE_DETAIL. The PRS identification numbers in a linked table were also reviewed, and 1208 values were corrected.

In preparation for migration to the Chemistry Results Module, more than 1,000,000 legacy data records have been migrated from the analytical stage table to the analytical production table on the UNIX Oracle system. Prior to migration, the validation status of each request number had to be verified by manually checking the hard-copy records. Legacy request numbers that had not been validated were validated, and the qualifier flags were entered into the database. Analytical suite values were assigned to more than 600,000 legacy data records in the analytical production table. Population of the analytical production table is a critical step in the overall migration strategy for the analytical records. There are currently 2.2 million legacy data records in the database that will ultimately be migrated to the new Chemistry Results Module; the target date for migration is January 2001.

Data Reporting: A data tracking and status system was developed to track sample data starting with the sample submission to the Sample Management Office, through return of the hard-copy and electronic data, validation, authentication (comparison of hard-copy and electronic records), and migration to the analytical production table. The system integrates for the first time several different tracking mechanisms that exist within the ER Project data management structure and will allow for more effective scheduling of data products.

The ER Project data stewards prepared approximately 167 electronic data sets between the beginning of the second quarter and the end of the fourth quarter of FY 2000. The data sets represent data for more than 900 PRSs with more than 18,000 associated sample identification numbers, for a total of approximately 1.6 million electronic records. Approximately two-thirds of the electronic records processed were associated with fire recovery work.

Data stewards for the Groundwater Investigations Focus Area participated in the capture, management, and presentation of data for the geophysical logging of seven regional wells. A management system for hard-copy records was developed for printouts and videos, and an electronics management system was developed for the ER Project NT server for all occurrences of logging and information transfer. The data stewards also managed the software necessary to view and work with logging data, including resolving software compatibility issues, installing software, and instructing personnel in the use of the new software. Data stewards provided geophysical data in the required format for the five well completion reports delivered in FY 2000.

Data Validation. In order to handle the post-Cerro Grande fire environmental data, a core validation team was developed and trained to the seven new data validation SOPs (listed in the Data Quality section of this report). The validation team performed 320 routine validations between July 3 and September 30, 2000, with an average turn-around time of less than two hours per data package. The team also performed 183 focused validations for special projects, including the Pajarito Plateau baseline water data

set (see Integrated Data Sets) and post-fire stormwater data collected by ESH-18. New data tables were implemented on the ER Project's UNIX Oracle system to track the validation status of request numbers.

The data authentication process (comparison of electronic records with hard-copy records) underwent review and was reengineered to be more efficient. The reengineered process accurately tracks the authentication status so data can be migrated from the stage table to the production table immediately following authentication.

Integrated Data Sets. Receipt and assessment of data for the additional background groundwater samples collected in March and April were delayed by the Cerro Grande fire. Work is progressing on a technical report summarizing the results of the background groundwater sampling effort.

2.6.2.3 Risk Assessment and Review Team

Risk Assessment Team. Team members continued to update and maintain the ECORISK database. Activities included some additional reviews, parameter quality assurance checks, inclusion of a database default calculation engine, validation of the calculation engine, and preparation of the September 2000 version of the database. The latest version of the database was delivered to the ER Project on September 29, 2000.

Team members finalized the analysis of field data on the western bluebird and ash-throated flycatcher nesting study. This information was summarized and prepared for final presentation.

Risk assessment team members continue to support and interact with the Flood Risk Assessment Team as part of the institutional response to the Cerro Grande fire. The Risk Assessment subteam has finalized a draft of the conceptual site model and has compiled tables of pathways and parameters for the various activities that may occur.

Team members have continued to assist in the writing and organization of the TA-54 RFI report for the MDA Focus area. Activities have included review of the conceptual model and risk assessment chapters and meetings with NMED to determine information needed in the report.

Members of the Risk Assessment Team met with the East Jemez Natural Resource Council to discuss natural resource management and ecological risk assessment.

The risk assessment team has also been tasked with documenting the methodology for calculating radiological screening action levels. A draft of this methodology will be available in November.

Peer Review Team. Forty-seven peer reviews were conducted in this quarter, including twenty read reviews, seven panel reviews, nineteen statement-of-work reviews, and one decision review.

2.6.2.4 Strategic Decision Analysis Team

Strategic Decision Analysis Task. In the final quarter of FY 2000, the strategic decision analysis task team identified, and began implementing, several "tools" to aid in the development of documented, transparent, reproducible, and technically-defensible conceptual models for complex sites, most notably the 11 large mesa-top MDAs at the Laboratory. These tools were developed by, and for, the international nuclear waste repository technical community, which provides a high degree of credibility and technical rigor that is appropriate for these sites.

Integrated Modeling Task. The Integrated Modeling Task Team completed the scope of work assigned for FY 2001 and also completed additional scope focusing on the potential hydrologic impact of the Cerro Grande fire due to natural disturbance of the pre-fire watershed as well as engineered flood-mitigation structures. An important milestone was the initiation of reactive-transport modeling of uranium in wet canyon systems, a task that includes evaluation of uranium colloids. Another important milestone was the translation of deterministic process-level models of long-term contaminant transport at MDAs into stochastic models that more effectively evaluate uncertainties associated with transport processes over long periods of time (thousands of years). These deterministic and stochastic models will be used to support capping/stabilization final remedy selection for mesa-top MDAs and to support long-term monitoring program designs for these (and other) sites.

Long-Term Monitoring Task. The long-term monitoring task team participated in a day-long meeting on intermediate-term (i.e., 10 to 50 years) monitoring needs for mesa-top MDAs to support the presumptive capping/stabilization final remedy. The team also completed a pilot application of multivariate and multidimensional environmental data analysis, which will be a very powerful tool in streamlining long-term environmental monitoring in terms of both target analytes and monitoring frequency and duration.

Team members also participated in discussions and workshops related to the DOE's overall long-term environmental stewardship program, including a technology-needs conference.

2.7 Regulatory Compliance — Focus Area Leader: Dave McInroy

2.7.1 General Information for Regulatory Compliance Focus Area

Monthly meetings with NMED continued this quarter, as well as meetings regarding special topics such as permit modification, IMs, VCAs/VCMs, and RSI responses.

In the aftermath of the Cerro Grande fire, team members continued to work with other ER Project focus areas to determine the current regulatory status as well as sampling and waste characterization needs to ensure the success of accelerated ER activities implemented at PRSs and related sites located in flood plains.

Team members performed the following miscellaneous tasks:

- participated as members of high-performing teams for the TA-35 integrated SAP, TA-54 RFI/MDA implementation, permit modification/Annual Unit Audit, ecological risk assessment, and the 260 outfall;
- submitted final FY 2000 consolidation worksheets and provided descriptors for consolidated units;
- provided regulatory support of cleanup initiatives at TA-53;
- began reviewing and revising information in the PRS database;
- provided regulatory support for final cleanup of numerous PRSs at TA-21; and
- conducted operations and waste management audits of ER field operations.

2.7.2 Team Activities

2.7.2.1 Communications and Outreach Team

The Communications and Outreach Team was reorganized this quarter. The land transfer and Native American Initiative projects are now under the focus area's Regulatory Compliance and Integration Team.

Staff members participated in the DOE Stewardship Conference on Land Transfer Issues August 2–4, 2000. The team leader gave a presentation at the conference on the status of the ER Project land transfer issues at the Laboratory.

Cerro Grande Fire Outreach/Inreach Activities. The team continues to be involved with ER Project Cerro Grande fire recovery efforts. On August 30, 2000, team members organized a meeting and a tour for a Santa Fe New Mexican reporter to view the ER Project sites affected by the fire. Team members continue to prepare fire updates and presentations for the Northern New Mexico Citizens Advisory Board (CAB) monthly public meetings and to provide environmental restoration tours to local, state, national media personnel, Native American pueblos, citizens groups, etc. Team members have filled many requests for maps, documents, and photographs related to the Cerro Grande fire and have included them on our external web page.

Team members organized and participated in many meetings and tours regarding concerns related to the potential release sites affected by the Cerro Grande fire. Some of the meetings/tours included the following:

- July 7, 2000 – CBS Media staff
- July 7, 2000 – New Mexico Attorney General and staff
- July 13, 2000 – NBC Nightly News media staff
- July 13, 2000 – Albuquerque Journal North staff
- July 13, 2000 – Congressman Tom Udall and staff
- July 13, 2000 – EPA and NMED staff
- August 30, 2000 – Santa Fe New Mexican news staff

General Outreach Activities. Team members participated in the following activities this quarter:

- hosted the ER Project quarterly public meeting at Fuller Lodge in Los Alamos on September 14, 2000. Project staff gave presentations on several best management practices and the cleanup of the TA-53 lagoons (source removal) project.
- participated in the monthly Solid Waste Management Unit (SWMU) Working Group meetings.
- hosted the ER Project monthly public availability sessions.
- Prepared a poster session and participated at the Concerned Citizens for Nuclear Safety organization's one-day workshop held on July 18, 2000.
- Organized the July 19, 2000, public meeting for the ER Project Request for Permit Modification. The purpose of the public meeting was to inform the public about the nine potential release sites requested for removal from the Laboratory's Hazardous Waste Facility Permit.

Northern New Mexico Citizens Advisory Board Activities. The Communications and Outreach Team participated and made presentations at the Northern New Mexico CAB's monthly public meetings. Staff also attended and participated in their monthly ER Subcommittee meetings.

2.7.2.2 Tracking, Contracts, and Training Team

PRS and Future Deliverables Tracking. In support of the PRS tracking effort, team members generated PRS reports in response to requests from the attorney general. The team also continued working to integrate the PRS database with the ESH-18 erosion database. Team members entered updated work element codes and status information on PRSs, modified the PRS database to reflect the FY 2000 PRS consolidation effort, and made corrections to information in the Documents database. The new PRS data steward began working on data quality assurance and identification of programming issues. Team members continued to track future deliverables and work with project personnel regarding possible date changes for deliverables.

Closeout for PRSs. Team members continued progress on a quality review for existing PRS closeout files, developed new PRS closeout files, and coordinated with the ER Project's Records Processing Facility on closeout issues and submittal of closeout information.

Training. Team members began developing a formal and automated system to track all ER Project staff and subcontractor training on a database tied to the Laboratory-wide Employee Development System. Job categories for ER workers were identified, and then regulations, DOE orders, and internal Laboratory documents were reviewed to confirm formal training requirements for specific job categories.

Contracting. Work continued on individual task order statement of work (SOW) reviews. Approximately 20 SOWs were reviewed this last quarter. Additionally, work continued and a decision peer review was held on the new Prime SOW.

2.7.2.3 Regulatory Compliance and Facility Integration Team

Team members continued to provide assistance with regulatory compliance issues for activities within the ER Project this quarter. Personnel provided regulatory reviews of documents prepared by the ER Project and participated in peer reviews. Deployed personnel from the Laboratory's Hazardous and Solid Waste Group (ESH-19) participated in the reviews as subject matter experts regarding hazardous and solid waste issues. In addition, ESH-19 personnel assisted the Firing Sites Team in submitting a notification for a newly identified PRS at TA-36 to NMED-HWB. The site has been assigned PRS number 36-008.

ESH-19 deployed personnel finalized Quality Procedure 5.8, "Identification, Documentation, and Reporting of Newly Discovered PRSs." This revised procedure supercedes the ER Project Administrative Procedure AP-04.1 and is now available on the ER internal Web site.

Clean Water Compliance. Team members participated in various meetings addressing clean water compliance issues. Monthly SWMU Working Group meetings were held with representatives from Los Alamos County, DOE, and the ER Project. Issues discussed included an update on fieldwork in Acid Canyon and at the Sombrillo area (PRS 00-019), old Catholic Church [PRS 00-030(g)], DOE-LAAO (PRS 00-012), DP Tank Farm (PRS 21-029), and land transfer parcels.

Team members continued meetings with the Watershed Integration Team and the Interagency Flood Risk Assessment Team for discussions on "key parameters" to be sampled for as a result of the Cerro Grande

fire. Additional meetings were held with the Pajarito Plateau Watershed Partnership, including field trips sponsored by Los Alamos County staff.

Other clean water compliance activities included the following:

- initiated discussions with the Army Corps of Engineers and the NMED Surface Water Quality Bureau regarding a 401/404 dredge and fill permit for all fire-related activities and PRS 03-056(c);
- completed summary report describing ER Project activities to reduce the migration of contamination from PRSs as a result of the Cerro Grande fire;
- coordinated efforts for additional BMP installations at the Laboratory's Dynamic Experimentation (DX) Division PRSs at sites not impacted by the fire;
- completed annual site compliance evaluations for existing stormwater pollution prevention plans at MDA AB, MDA P, and the 16-260 outfall, and for the umbrella SWMU/stormwater pollution prevention plans; and
- submitted the annual BMP update to HWB describing the status of BMPs installed resulting from Surface Water Assessment Team recommendations.

Waste Management Activities. Team members reviewed and provided comments on six waste characterization strategy forms. Team members coordinated on-site waste management, characterization, transportation, and disposal for wastes generated at MDA C at TA-50, DP Tank Farm (PRS 21-029), and the NTISV site at TA-21. Team members developed waste characterization strategies for corrective actions to begin at PRSs 21-011(k), 21-024(f,) 21-024(i), 51-001, 54-007(c, d, e). Regulatory support continued for the MDA P project.

Natural Resource Management Activities. A team representative attended the East Jemez Resource Council meeting which included discussions on wildfire implications for environmental protection and resource management.

The team representative continued to participate in meetings of the Pajarito Plateau Watershed Partnership to discuss a number of issues, including the Cerro Grande fire, Burn Area Emergency Rehabilitation Team activities, future projects to promote revegetation of burned forest lands, the process to formalize a partnership, application for 501(c)(3) status with the Internal Revenue Service, and the finalization of EPA's Section 319 grant applications for future funding. The representative completed the required training for the NEPA, Cultural, and Biological Resources (NCB) Laboratory Implementation Requirement and was designated the authorized NCB reviewer for the ER Project. The representative has completed NCB Screening checklists/reviews for PRSs in TA-16 and TA-18. The team member continues to be ER Project point of contact for the Interagency Wildfire Management Team working to mitigate wildfire on Laboratory property and participated with the Natural Resource Science Team reviewing proposals for post-fire analysis and recovery work.

Land Transfer Activities. The team completed Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 120(h) reviews of the Manhattan Monument and Site 22 land transfer parcels. This information will be attached to the deeds at the time of property transfer (tentatively scheduled for November 2000). Team representatives also participated in various meetings with DOE, NMED-HWB, and the public regarding the Cerro Grande fire to address any land transfer concerns.

2.7.2.4 Special Projects and Deployed Generalist Team

In the aftermath of the Cerro Grande fire, team members continued to work with other ER Project focus areas to determine the current regulatory status as well as sampling and waste characterization needs to ensure the success of accelerated ER activities implemented at PRSs and related sites located in flood plains.

High-performing teams continue to show progress. Members of the permit modification/annual unit audit team continued gathering information, attending meetings, and visiting sites to address NFA proposals. Specifically, the NFA proposals will be submitted for public comment prior to removal of the sites from Module VIII of the Laboratory's Hazardous Waste Facility Permit. In August 2000, the team also prepared and submitted a new Class I permit modification request for eight NFA proposals to NMED and continued review and information gathering for approximately 50 PRSs to be included in a Class III permit modification request in early fiscal year 2001.

Team members continued to review and prioritize 16 PRSs proposed for NFA in previous permit modification requests, where NMED is requiring one additional sample before approving the NFA proposals for public comment and subsequent removal from Module VIII.

Team members began drafting sampling plans for the approximately 40 PRSs requiring between two and five confirmation samples to confirm the NFA proposal for those sites.

Support to Focus Areas. Personnel from the Special Projects and Deployed Generalist Team are deployed to the operational focus areas to provide support regarding regulatory issues. In addition to providing general regulatory compliance assistance this quarter, such as reviewing documents, attending operational focus area meetings, and participating in peer reviews for operational focus area documents, the deployed members of the team assisted with the following tasks in the operational focus areas.

Canyons Investigations Activities. The deployed regulatory generalist assigned to the Canyons Focus Area provided support for several fire recovery activities. The generalist provided support for requesting discharge of purge water from alluvial wells being sampled after the Cerro Grande fire and for planning sampling and excavation activities at TA-2 and Mortandad Canyon during accelerated ER activities following the fire.

The deployed generalist also reviewed and approved for the ER project several Laboratory emergency projects being performed in the canyons in response to flood concerns following the Cerro Grande fire.

Groundwater Investigations Activities. The deployed regulatory generalist assigned to the Groundwater Investigations Focus Area provided support for notice-of-intent discharges from R-9i, R-19, and CdV-R15-3 deep wells. The generalist also provided support for quarterly sampling of R-9i and R-19 and provided waste management support for well R-22. The generalist submitted notices of intent to discharge for R-22 and sampling notifications for R-9i, R-9, R-12, R-15, and CdV-R-15-3.

MDA Activities. The deployed regulatory generalist assigned to the MDA Focus Area participated in several meetings and site tours with NMED, DOE, and MDA Focus Area staff and assisted with numerous MDA projects, which include the following:

- Helped organize and attended a one-day meeting on August 9, 2000, to discuss long-term site monitoring requirements for MDAs.

- Provided oversight support of waste management, site restoration (including BMPs) and regulatory compliance issues following completion of the NTISV hot demonstration at MDA V [PRS 21-018(a)-99].

- Provided oversight of contractors implementing the Phase II investigation of DP Tank Farm (PRS 21-029). The team member continued to work closely with NMED staff, sharing investigation results and determining new borehole and auger hole locations to confirm nature and extent of residual total petroleum hydrocarbon contamination.

- Prepared and submitted the fact sheet describing the corrective action and final remedy for PRS 21-024(i) to DOE, which was subsequently approved by DOE and presented at the August NMED monthly meeting.

- Prepared the fact sheet for PRS 21-011(k) describing the corrective action to remove residual radionuclide contamination from the hillside below the outfall. The fact sheet was submitted to DOE and presented to NMED for approval.

- Provided information regarding the current status of characterization/remediation and waste characterization of PRSs 21-013(d,e), 21-024(f), 21-029, and C-21-015 included in the Accelerated Los Alamos County Land Transfer Proposal and regarding resources required to complete remaining activities to ensure transfer by early 2001.

- Inspected erosion control BMPs replaced after the Cerro Grande fire in and around PRS 49-001(g), and provided oversight of maintenance activities along the west and south sides of the gopher barrier boundary overlaying the earthen cover of MDA AB.

- Prepared the fact sheets describing proposed corrective actions for four abandoned septic systems at TA-54 West and TA-51. The fact sheet for non-HSWA PRSs 51-001 and 54-007(d) was submitted to and approved by DOE. The fact sheet for HSWA PRSs 54-007(c ,e), now known as PRS 54-007(c)-99, was submitted to, and approved by, DOE and NMED. The team member is providing support for waste characterization of sludge remaining in the four septic tanks and preparation of the VCA plans.

In support of field activities, the team member completed waste management and stormwater inspections at TA-21, TA-49, and TA-50 and supervised the maintenance activities to deter any future gopher intrusion beneath the earthen cover at MDA AB at TA-49. The team member reviewed and provided comments on waste characterization strategy forms and waste profile forms for the pending VCAs/VCMs at PRSs 21-011(k), 21-024(i), 51-001, 54-007(c)-99, and 54-007(d) and conducted waste storage area inspections at the NTISV hot demonstration site (PRS 21-018(a)-99, MDA C at TA-50 and DP Tank Farm (PRS 21-029).

The deployed team member continued to participate in the MDA/TA-54 High-Performing Team meetings and assisted in preparation and review of the MDAs accelerated approach and the draft Mesa-Top MDAs implementation plan.

RCRA Corrective Actions Activities. The deployed regulatory generalist assigned to the RCRA Corrective Actions Focus Area attended various meetings, assisted with preparation, review, and/or comment resolution of several documents, conducted site visits of current field activities, and participated in a variety of fire recovery activities.

The deployed generalist provided additional support to the focus area by preparing, reviewing, and/or resolving comments on various sampling notifications, documents, and other submittals. Sampling notifications were prepared for accelerated ER activities at PRS 16-020 (silver outfall) and PRS 16-019 (MDA R); geomorphologic and phytoremediation studies and quarterly sampling for PRS 16-021(c)-99 (the 260 outfall); and completion of RFI activities at PRS 53-002(b) (the TA-53 southern lagoon). Review was conducted for the RFI report for PRS 00-030(g) (the old Catholic church septic tank and outfall) and the addendum to the RFI report for PRS 03-010(a) (the mercury SWMU). Waste characterization strategy forms for accelerated ER activities at PRSs 16-020, 36-008, and 40-010 were also reviewed. Site visits were conducted during field activities to review waste management practices at the PRS 03-056(c) former PCB transformer storage area and the PRS 16-020 silver outfall. The generalist also completed the following activities regarding PRS 03-056(c):

- participated in a conference call with EPA to discuss the regulatory approach and cleanup activities;
- withdrew the previously submitted EPA notice for self-implementing cleanup and disposal of PCB remediation waste at PRS 03-056(c);
- assisted with preparation and submittal of the risk-based disposal option package under 40 CFR 761.61," PCB Remediation Waste"; and
- accompanied EPA representatives on several visits to the site.

The deployed generalist assisted with other activities, including evaluating data and preparing and presenting relevant information associated with the Closure Plan for the TA-16-394 Burn Tray at a monthly NMED/Laboratory ER meeting; assisting with information gaps for sites to be included in a future permit modification request; and preparing a draft letter summarizing an NFA recommendation for PRS 01-001(m) (Septic Tank 275). The generalist also continued to update the database, recording PRSs and associated fire-related information.

3.0 REFERENCES

LANL (Los Alamos National Laboratory), 1998. "Hydrogeologic Workplan," Los Alamos National Laboratory report, Los Alamos, New Mexico. (LANL 1998, 59599)

S. Veenis, 2000. "Cerro Grande Fire Aftermath: Environmental Restoration Project Activities to Reduce the Migration of Contamination from Potential Release Sites," Los Alamos National Laboratory report LA-UR-00-3767, Los Alamos, New Mexico. (Veenis 2000, 67370).

Appendix A

DP Tank Farm Site Inspection, July 5, 2000

DP Tank Farm "Localized Hydrocarbon Sheen Area" Site Inspection

1. Date and time of visit:

The site was visited on **Wednesday, July 5, 2000,** at 2:45 p.m. by Rick Kelley. Other personnel on-site were Robert Trujillo and Ron Trueblood. Conditions were partly sunny, breezy, dry, and hot (87°).

2. Presence of standing or running water:

A large amount of standing water was present at both the original location and at the downstream location. No water flow was observed in the canyon and from the culverts at the head of the canyon. Approximately 0.83 in. of precipitation had fallen since last month's visit; however, the past three days have been dry.

3. Location and intensity of odors, staining, or sheens:

Original Location: Weak to moderate hydrocarbon odors were detected in the air in the canyon bottom. Some of the odor may have been generated as a result of on-going sampling activities. Significant sheens were observed on the water in the area of disturbed gravels and on rocks and water pools in the area of previous sampling. Little or no odor was associated with the upstream sheens, and what odor was present more closely resembled motor oil rather than weathered diesel.

Downstream Location: A moderate odor was detected in the ambient air. No odors or sheens were located in the surrounding rocks or soil. No sheens were noted.

4. Medium in which stains or sheens are observed:

Stains were observed in loose soil and gravel in the stream channel and sheens were observed on water after the soil was disturbed and at the area of previous sampling. Sheens were also observed on rock surfaces in the stream channel.

5. How odors were identified:

A faint hydrocarbon odor was detected in the ambient air near the stream channel. Stronger petroleum hydrocarbon odors were identified in loose sediment held to the nose.

6. Photographs:

The following photographs were taken during the site visit.

Photo 1. Culverts at the head of DP Canyon, showing slight water flow.

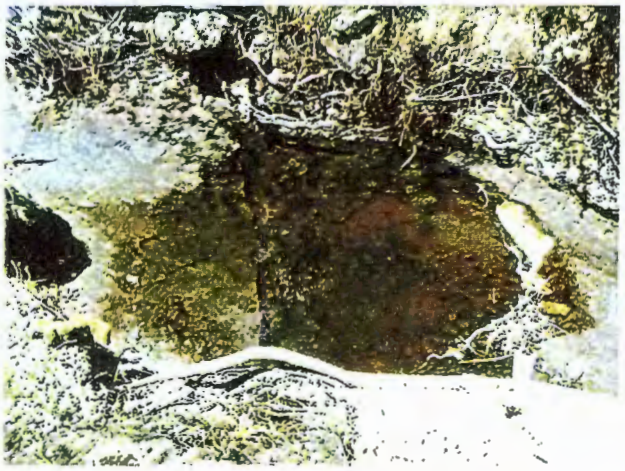

Photo 2. Small pool of water with submerged clay-filled fracture in stream channel.

Photo 3. Close-up of stream channel in the area of soil staining, showing oil sheen.

Photo 4. Area of previous sample locations, looking upstream, showing no water flow. Note new sample locations.

Photo 5. Stream channel in the area of previous sample locations, looking downstream. Flags indicate new sample locations.

Photo 6. Close-up of stream channel Photo 5, showing new borehole location

Photo 7. Water pool at downstream location, showing sheen.

Photo 8. Close-up of water pool at downstream location, showing sheen on rock.

Photo 9. Stream channel in the area downstream location, showing standing water.

Appendix B

DP Tank Farm Site Inspection, July 21, 2000

DP Tank Farm "Localized Hydrocarbon Sheen Area" Site Inspection

1. Date and time of visit:

The site was visited on **Friday, July 21, 2000**, at 3:00 p.m. by Rick Kelley. Other personnel on-site included Robert Trujillo. Conditions were partly cloudy, breezy, humid, and warm (80°).

2. Presence of standing or running water:

A large amount of standing water was present at both the original location and at the downstream location. Moderate flow was observed in the canyon and from the culverts at the head of the canyon, with a heavier flow at the downstream location. Approximately 0.44 in. of precipitation had fallen since the July 7, 2000, visit, and scattered monsoon showers had ended at about 2:00 p.m.

3. Location and intensity of odors, staining, or sheens:

Original Location: No hydrocarbon odors were detected in the air in the canyon bottom. No odors were detected in sediment or gravel along the stream channel. No sheens or staining were observed anywhere in this reach of the canyon, either on rocks or on standing water.

Downstream Location: No hydrocarbon odors were detected in the air or in sediment or gravel at the downstream location. No sheens or staining were noted on either rocks or standing water.

4. Medium in which stains or sheens are observed:

Loose soil and gravel in the stream channel were inspected for stains. Water (following soil disturbance), areas of previous sampling, and rock surfaces in the stream channel were inspected for sheens.

5. How odors were identified:

Two observers attempted to detect hydrocarbon odors while walking the length of the canyon upstream and downstream of the original sheen location. At the original location, sediment was scooped from the stream channel and held to the nose to detect any hydrocarbon odors present.

6. Photographs:

The following photographs were taken during the site visit.

Photo 1. Culverts at the head of DP Canyon, showing moderate water flow.

Photo 2. Small pool of water with submerged clay-filled fracture in stream channel.

Photo 3. Close-up of stream channel in the area of original soil staining, showing no sheen.

Photo 4. Area of previous sample locations, looking upstream. Note new sample location.

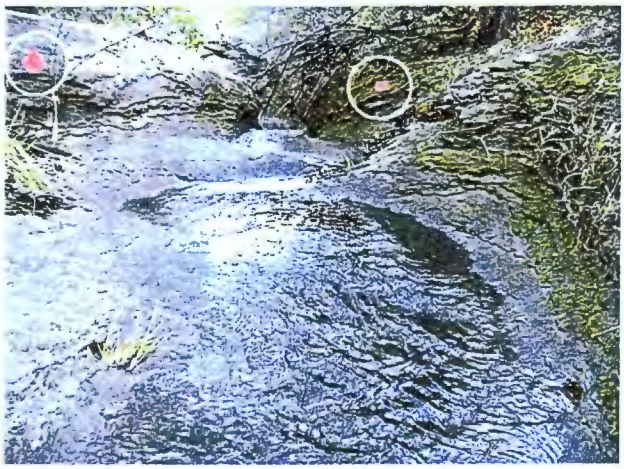

Photo 5. Stream channel in the area of previous sample locations, looking downstream. Flags indicate new sample locations.

Photo 6. Downstream location, showing large pool and moderate flow of water.

Photo 7. Water pool at downstream location.

Appendix C

DP Tank Farm Site Inspection, August 7, 2000

DP Tank Farm "Localized Hydrocarbon Sheen Area" Site Inspection

1. Date and time of visit:

The site was visited on **Monday, August 7, 2000**, at 3:00 p.m. by Rick Kelley. Other personnel on-site included Robert Trujillo. Conditions were partly cloudy, humid, and hot (85°), with slight breezes.

2. Presence of standing or running water:

A large amount of standing water was present at both the original location and at the downstream location. Only slight flow was observed in the canyon and from the culverts at the head of the canyon, with a slightly heavier flow at the downstream location. Approximately 0.99 in. of precipitation had fallen since last month's visit, with 0.17 in. falling on August 6th, the day before this inspection. The standing water had a nearly opaque milky white appearance from an unknown source.

3. Location and intensity of odors, staining, or sheens:

Original Location: No hydrocarbon odors were detected in the air in the canyon bottom. No odors were detected in sediment or gravel along the stream channel. No sheens or staining were observed anywhere in this reach of the canyon, either on rocks or on standing water. The milky white water had no distinct odor that could be identified with any substance, either hydrocarbons or other.

Downstream Location: The downstream location was not inspected on this date because a monsoon thunderstorm began during the inspection, causing unsafe conditions for approach to the downstream location. RFI sampling began at the downstream location on 8/28, at which time no sheen was visible and no odors were detected in the air. 2.03 in. of precipitation had fallen between 8/6 and 8/28.

4. Medium in which stains or sheens are observed:

Stains were looked for in loose soil and gravel in the stream channel; sheens were looked for on water after the soil was disturbed and at areas of previous sampling. Sheens were also looked for on rock surfaces in the stream channel.

5. How odors were identified:

Two observers attempted to detect hydrocarbon odors while walking the length of the canyon upstream and downstream of the original sheen location. At the original location, sediment was scooped from the stream channel and held to the nose to detect any hydrocarbon odors present.

6. Photographs:

The following photographs were taken during the site visit.

Photo 1. Culverts at the head of DP Canyon, showing very slight water flow.

Photo 2. Area of previous sample locations, looking upstream, showing slight water flow.

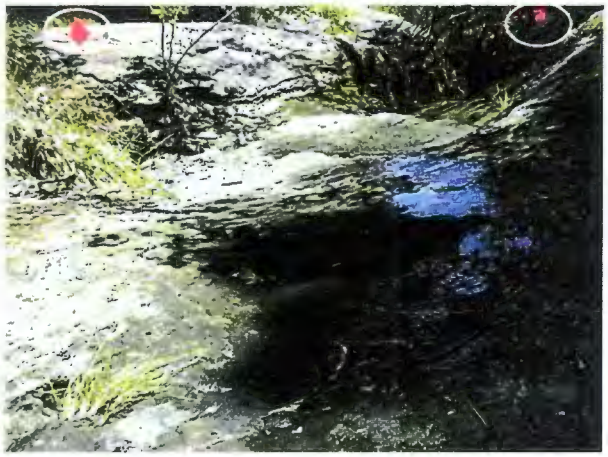

Photo 3. Stream channel in the area of previous sample locations, looking downstream. Flags indicate new sample locations.

Appendix D

DP Tank Farm Site Inspection, September 6, 2000

DP Tank Farm "Localized Hydrocarbon Sheen Area" Site Inspection

1. Date and time of visit:

The site was visited on **Wednesday, September 6, 2000**, at 2:30 p.m. by Rick Kelley. Other personnel on-site included Robert Trujillo. Conditions were partly cloudy, dry, and hot (88°), with slight breezes.

2. Presence of standing or running water:

Small pools of standing water were present at both the original location and at the downstream location. Only very slight flow was observed from the culverts at the head of the canyon, with little or no flow at the original and downstream locations. Approximately 1.86 in. of precipitation had fallen since last month's visit; however, only 0.01 in. had fallen in the 18 days prior to this inspection.

3. Location and intensity of odors, staining, or sheens:

Original Location: Distinct, strong hydrocarbon odors were detected in the air in the canyon bottom. Strong odors were also detected in sediment or gravel along the stream channel. Strong sheens and staining were observed in this reach of the canyon, both on rocks and on standing water.

Downstream Location: Faint hydrocarbon odors were detected at the downstream location, both in the ambient air and from sediment held to the nose. Faint sheens were observed on standing water only; no sheens or staining were observed on rocks.

4. Medium in which stains or sheens are observed:

Stains were observed in loose soil and gravel in the stream channel; sheens were observed on the surface of standing water. Sheens and staining were also observed on rock surfaces in the stream channel.

5. How odors were identified:

Two observers attempted to detect hydrocarbon odors while walking the length of the canyon upstream and downstream of the both the original sheen location and the downstream location. At both locations, sediment was scooped from the stream channel and held to the nose to detect any hydrocarbon odors present.

6. Photographs:

The following photographs were taken during the site visit.

Photo 1. Culverts at the head of DP Canyon, showing very slight water flow.

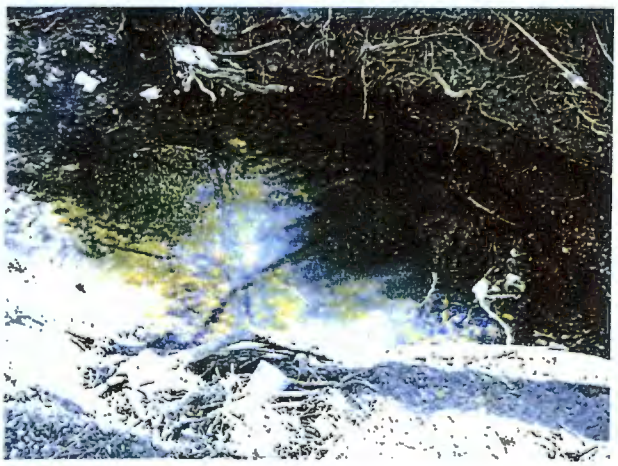

Photo 2. Small pool of water near original sheen location.

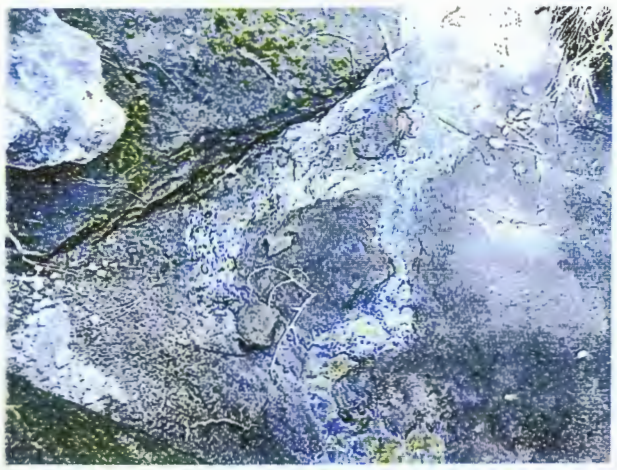

Photo 3. Close-up of stream channel in the area of previous sampling, showing strong sheen near clay-filled fracture.

Photo 4. Area of previous sample locations, looking upstream.

Photo 5. Stream channel in the area of previous sample locations, looking downstream, showing dry conditions.

Photo 6. Stream channel in the area of original sheen location, looking downstream, showing sheen on surface of small pools.

Photo 7. Stream channel in downstream location.

Appendix E

Annual Moisture Monitoring Report
Technical Area 49, Material Disposal Area AB

ANNUAL MOISTURE MONITORING REPORT

TECHNICAL AREA 49, MATERIAL DISPOSAL AREA AB

MDA Focus Area

Environmental Restoration Project

Los Alamos National Laboratory

November 2000

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1. INTRODUCTION

During February and March of 2000, in accordance with the fact sheet dated January 28, 2000 (Canepa and Taylor 2000), three new shallow neutron access holes and two time domain reflectometry (TDR) arrays were installed within the topsoil and crushed tuff cover at Material Disposal Area (MDA) AB, Technical Area 49 (TA-49). Each access hole terminates in the underlying Tshirege Member of the Bandelier Tuff. The three access holes, Facility for Information Management, Analysis, and Display location IDs 49-10046, 49-10047, and 49-10048, have a 2-in. aluminum casing that extends to the bottom of the access hole. Holes were formed with an 11-in.-diameter auger and backfilled in sequence of removal with cuttings from around the access tubes. Adjacent to access holes 49-10046 and 49-10048 are two TDR arrays each consisting of a shallow horizontal TDR probe positioned horizontally just beneath the surface soil (~6 in.) and TDR probes positioned vertically beneath the cover materials at 10 ft and 6 ft. A schematic of a TDR array and a neutron access hole is shown in Figure 1. The TDR probes are Campbell Scientific Model C5615-L water content reflectometers. Table 1 describes the TDRs. A tipping bucket rain gauge was installed at the surface of the cover near access hole 49-10046 to monitor levels of precipitation at the site. See Figure 2 for the location of access holes, TDR probes, the rain gauge, the cover, and the silt fence.

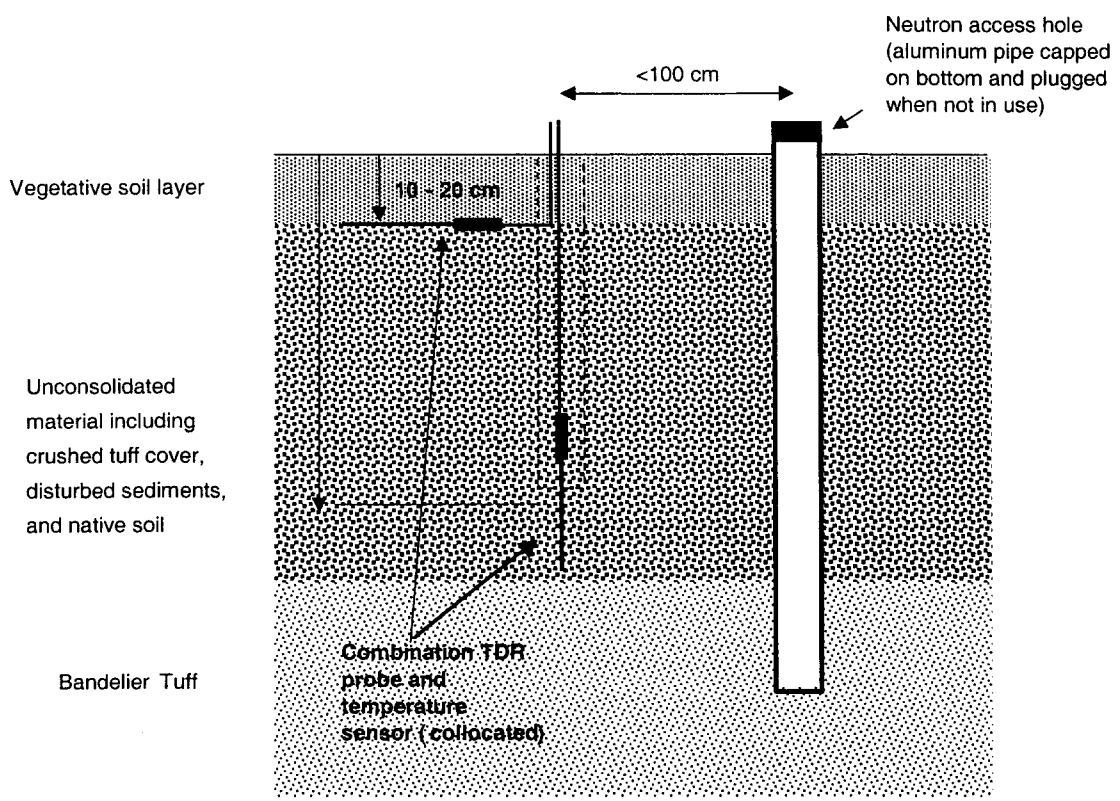

Figure 1. Schematic of a TDR array and neutron access hole

In February 2000, monthly neutron moisture measurements began at access holes TH-1, TH-2, TH-3, TH-4, TH-5, 2A-O, 2A-Y, 2B-Y, and the three new access holes, 49-10046, 49-10047, and 49-10048. Access holes TH-1, TH-2, TH-3, TH-4, TH-5, 2A-O, 2A-Y, and 2B-Y are open boreholes at depth with a section of PVC surface casing running through the unconsolidated materials to the surface. Monitoring is performed during the last week of each month. A new CPN 503 DR hydroprobe moisture gauge (neutron probe) with serial number H300205495 was acquired for this project in March 2000, and all subsequent neutron moisture measurements at TA-49 have utilized this probe. Consistent use of one probe for neutron moisture measurements and the consistent monthly frequency will provide comparable data for statistically significant trend analysis. Beginning April 16, 2000, TDR measurements and precipitation quantities were recorded twice a day to a Campbell Scientific data logger.

Table 1. TDR Array Descriptions

TDR Number	Array Type	Depth (ft)
TDR1	Vertical, within soil overlaying Bandelier Tuff	10
TDR2	Horizontal, at bottom of topsoil	0.5
TDR3	Vertical, within El Cajete pumice	6
TDR4	Horizontal, at bottom of topsoil	0.5

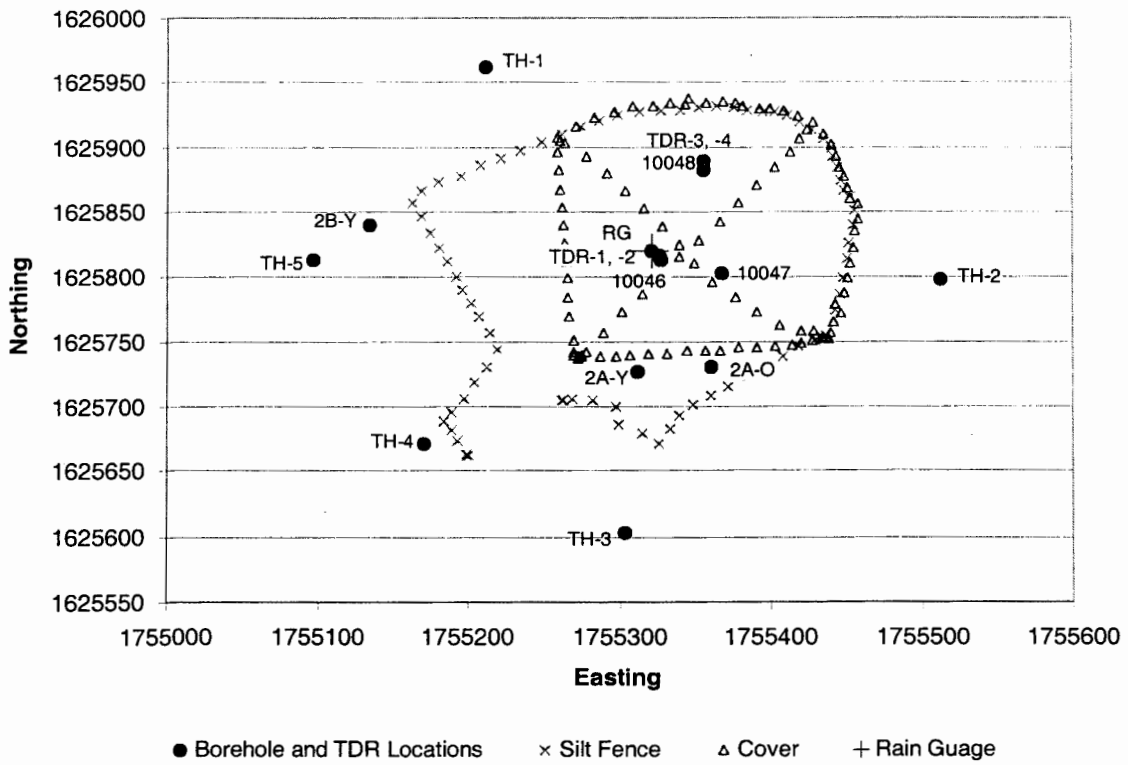

Figure 2. Plan view of instrumentation and access hole locations at TA-49

2. MOISTURE MONITORING RESULTS

2.1 Neutron Logging

Because three new access holes were drilled and logged during the second quarter of Fiscal Year 2000, a new calibration equation was required to convert raw counts from the 2-in. aluminum access holes to volumetric water contents. At TA-49, the composition of the unconsolidated materials beneath the topsoil/crushed tuff cover varies with depth and location. The unconsolidated materials include a well-graded base coarse, crushed tuff, and clay as well as native soils and El Cajete pumice. Analytical laboratory measurements of gravimetric moisture content and bulk density varied significantly among different materials and for samples of similar materials from different access hole locations. Therefore, meaningful calibrations could not be derived from these data, and the standard factory calibration for a 2-in. aluminum access hole will be used for these access holes. The factory calibration for a 2-in. aluminum pipe to convert counts to volumetric water content is ([count/stdcount] *17.4556-1.2378). The use of factory calibration will provide a semiquantitative measurement of water content. Although, accurate measurements of water content cannot be obtained without media-specific calibration curves, the monitoring will provide a very precise data set for trend analysis. Trend analysis of moisture content through time is the desired method for monitoring cap performance relative to the cover material's ability to prevent water flux toward the source.

Neutron counts were recorded into a spreadsheet, and a corresponding volumetric water content was calculated for each. Figures 3 through 8 show moisture vs. depth over time for each of the neutron access holes (from the time period where the new probe was being used).

2.2 TDR and Precipitation Measurements

The Campbell Scientific data logger was programmed to record a timestamp, temperature, TDR raw frequencies, and precipitation (in.). The program converts raw frequency to volumetric water content and then records the data (both raw and converted) to a .dat file.

The rain gauge that was built into the field installation was damaged by the Cerro Grande fire and did not operate appropriately from June to mid-August. To track precipitation during this period, data were retrieved from the Los Alamos National Laboratory (Laboratory) weather station at TA-49 (Figure 9). See Figures 10 and 11 for a display of TDR moisture measurements and precipitation from April 15 through August 31, 2000.

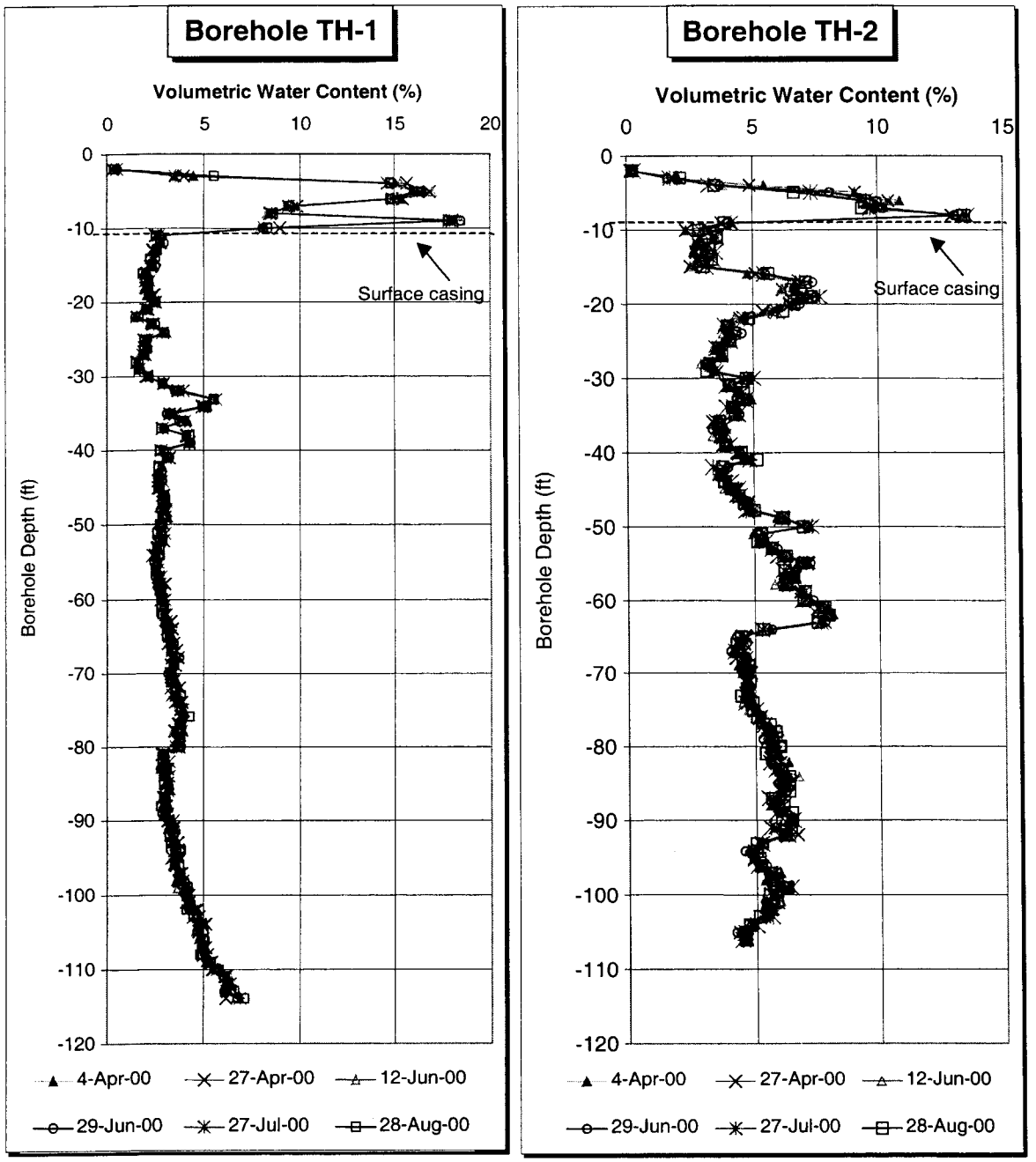

Figure 3. Neutron probe moisture measurements for access holes TH-1 and TH-2

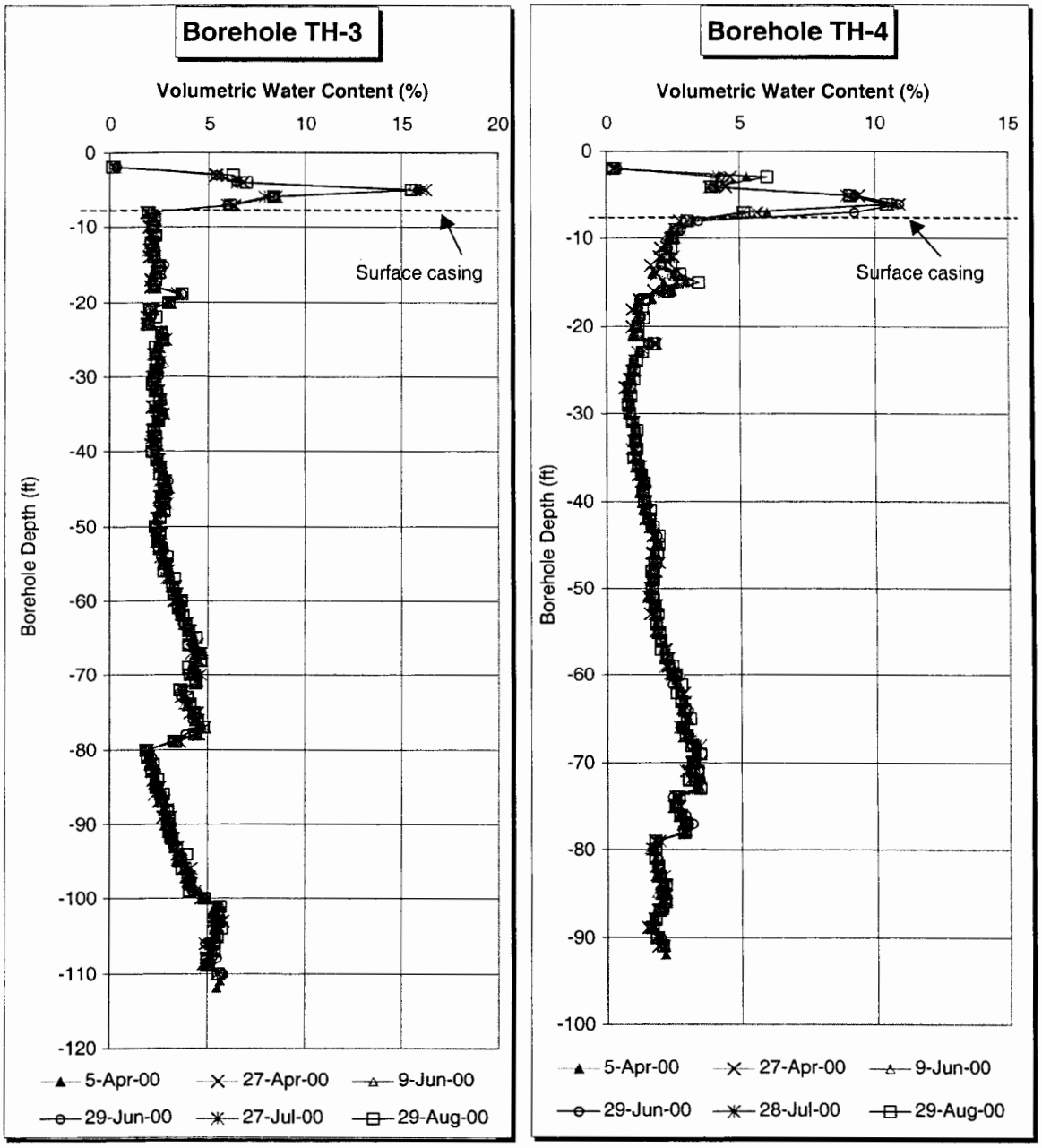

Figure 4. Neutron probe moisture measurements for access holes TH-3 and TH-4

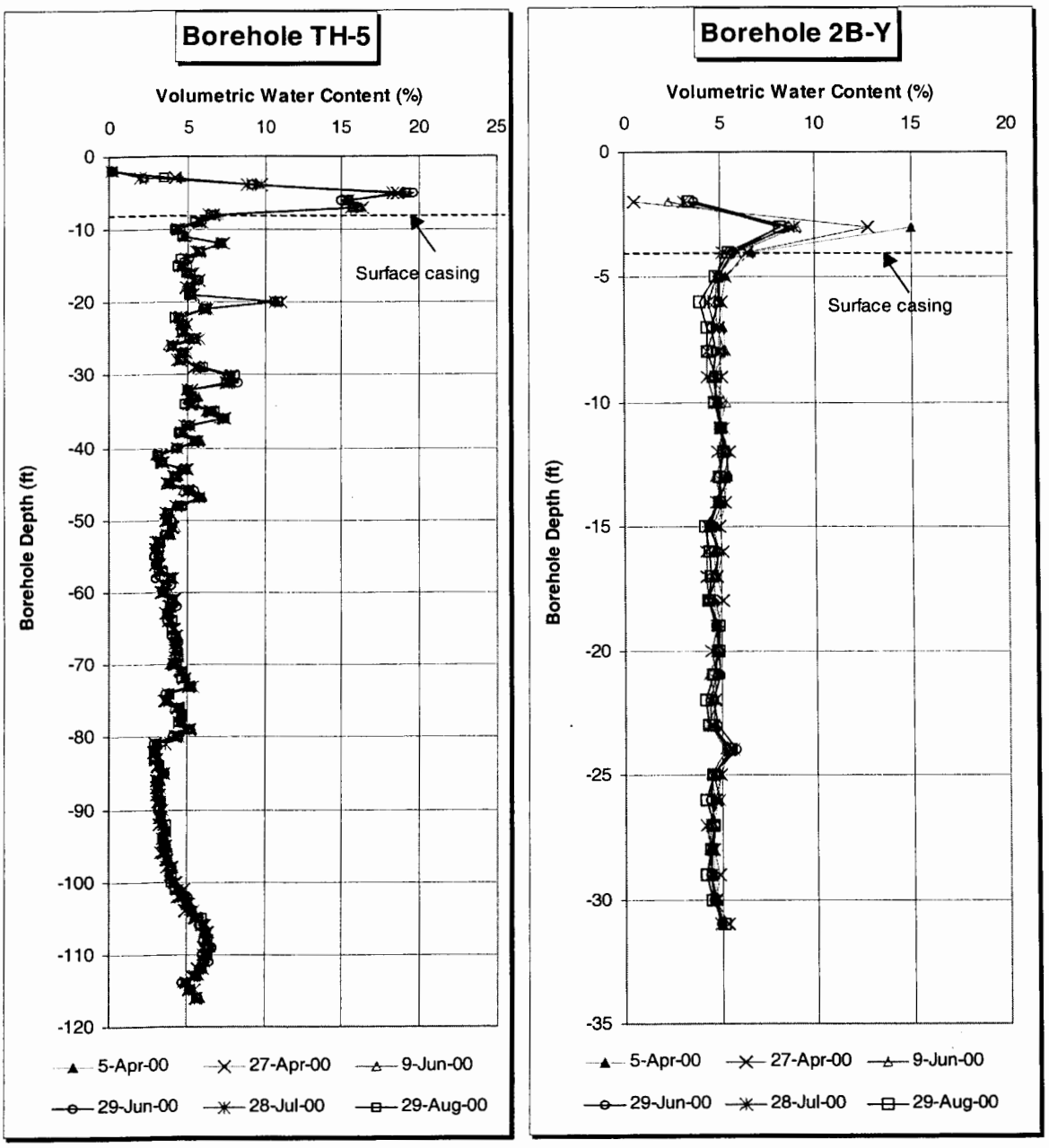

Figure 5. Neutron probe moisture measurements for access holes TH-5 and 2B-Y

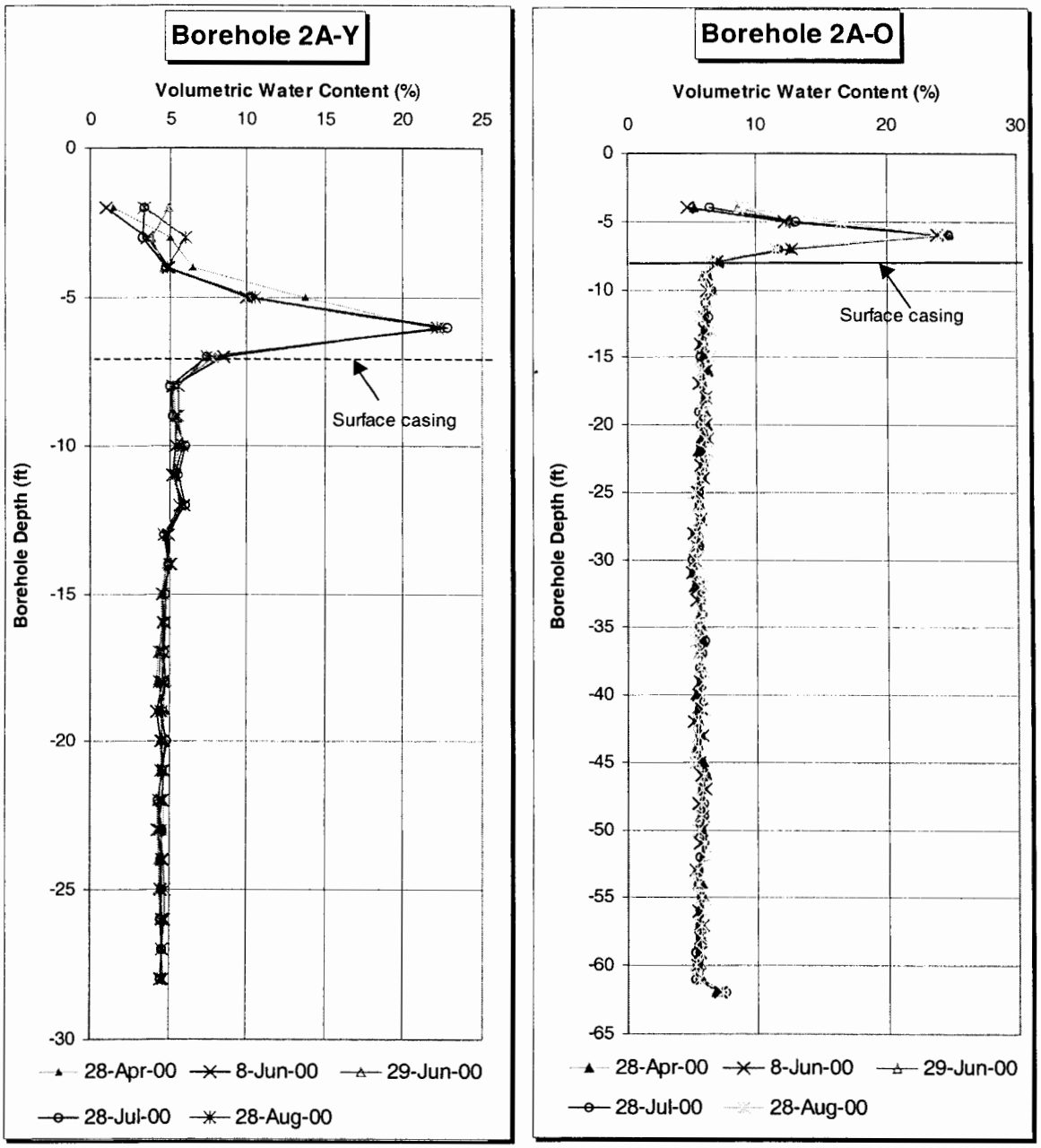

Figure 6. Neutron probe moisture measurements for access holes 2A-Y and 2A-O

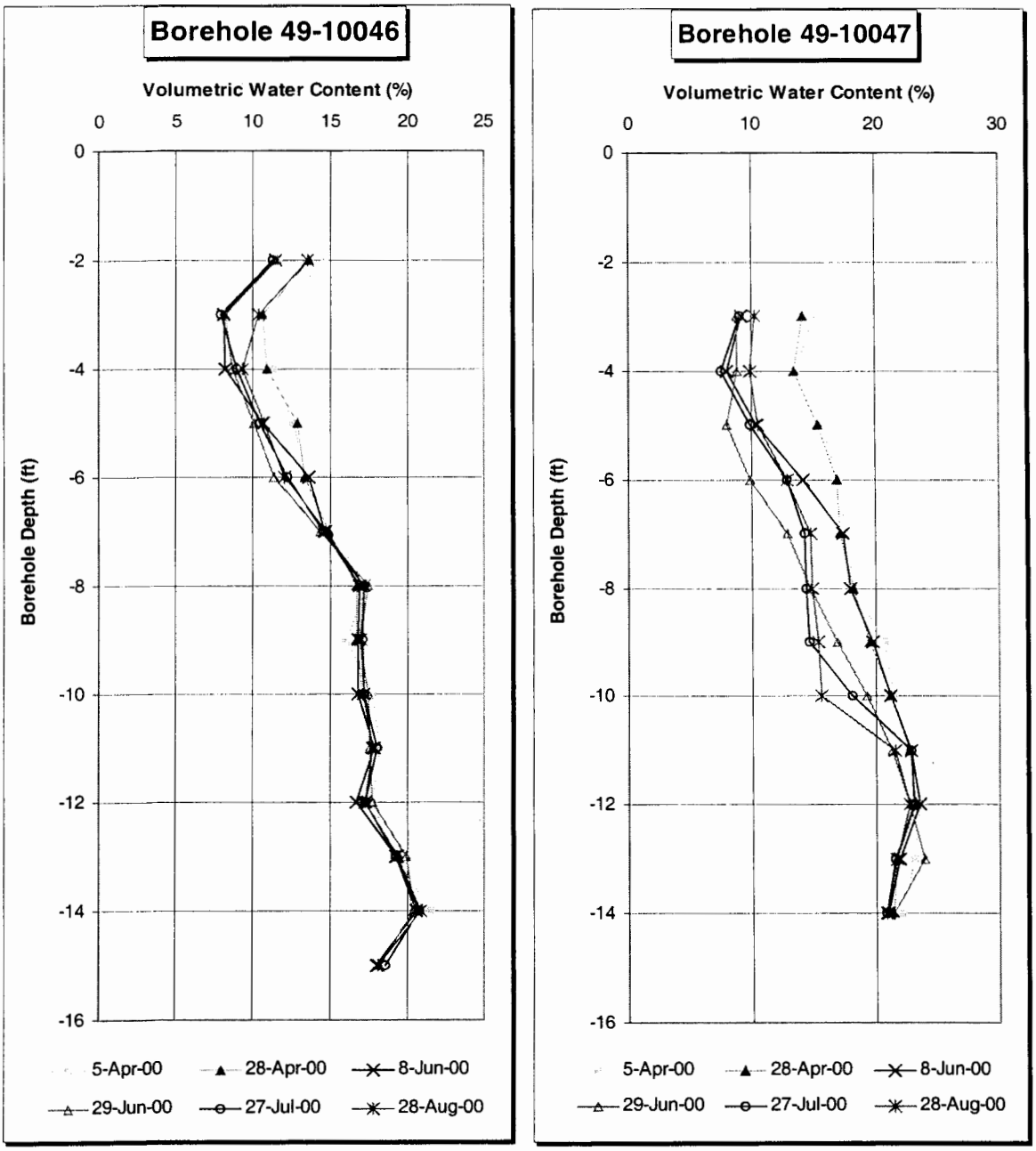

Figure 7. Neutron probe moisture measurements for access holes 49-10046 and 49-10047

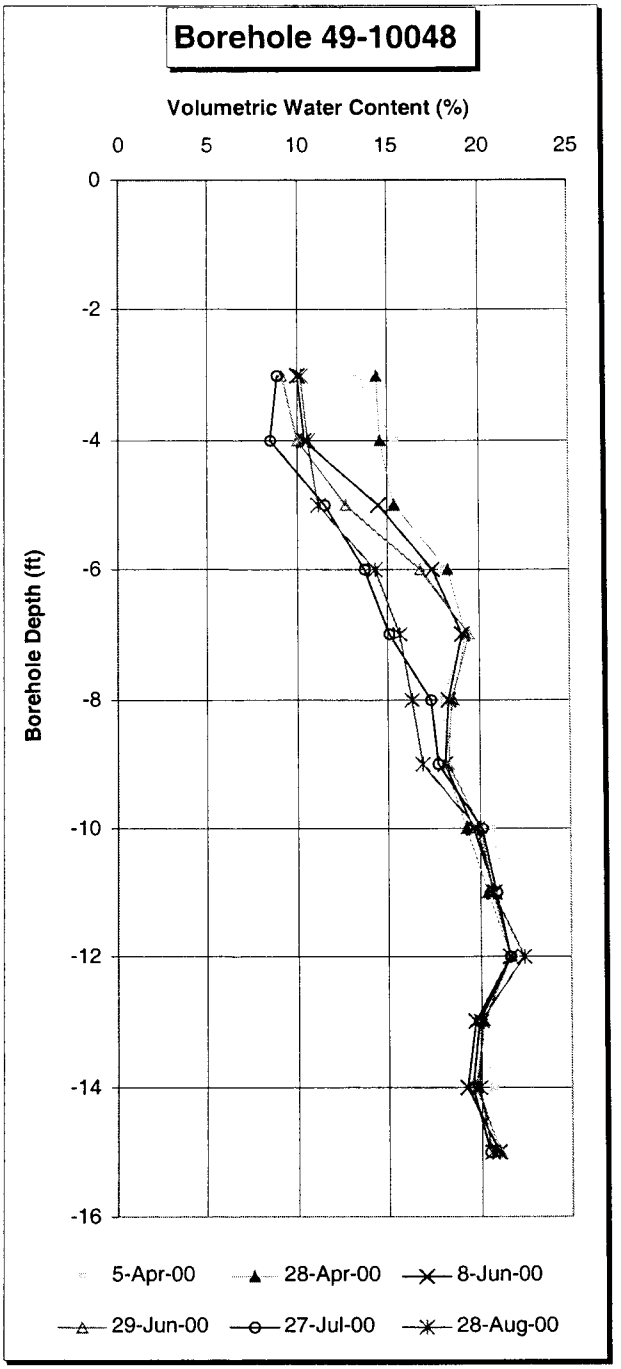

Figure 8. Neutron probe moisture measurements for access hole 49-10048

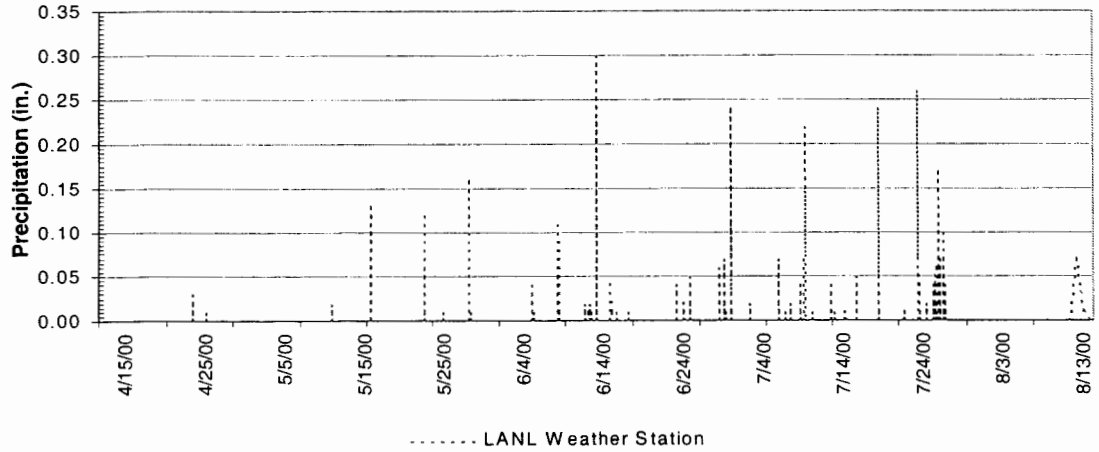

Figure 9. Precipitation data obtained from the TA-49 meteorological station

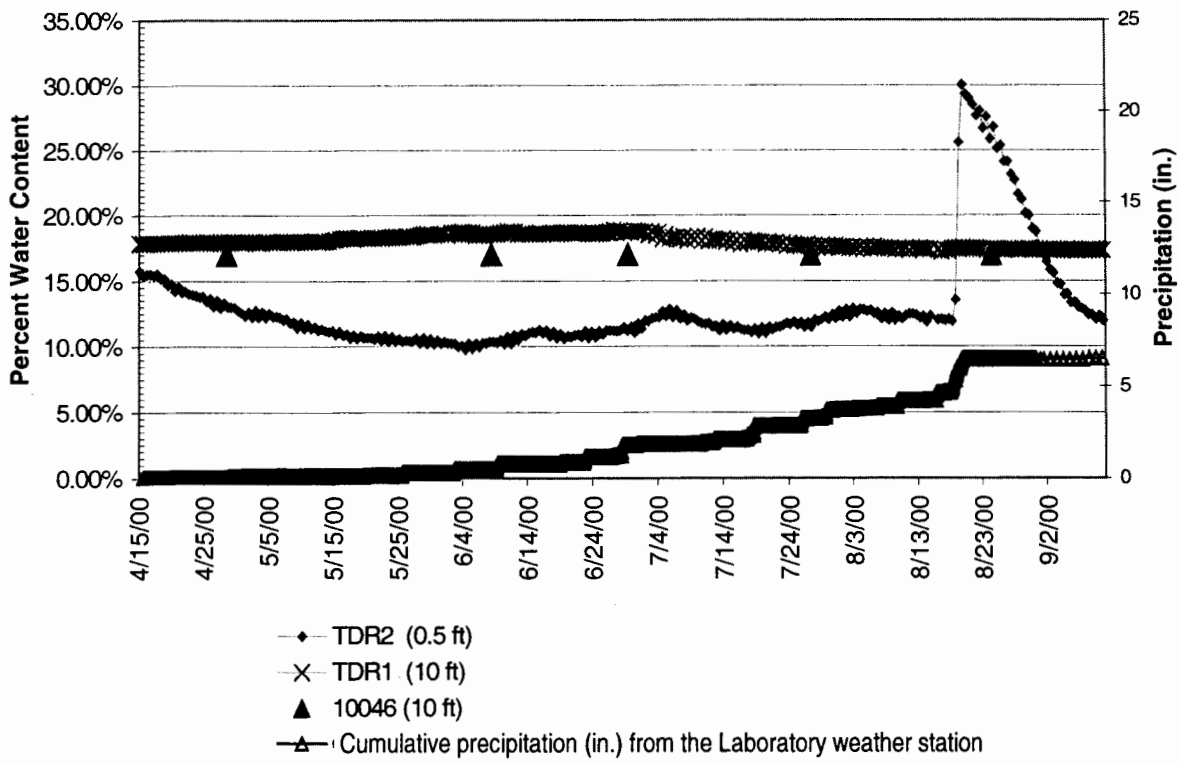

Figure 10. TDR measurements compared with neutron measurements at access hole 49-10046, which is in close proximity to and at the same corresponding depths as TDR2

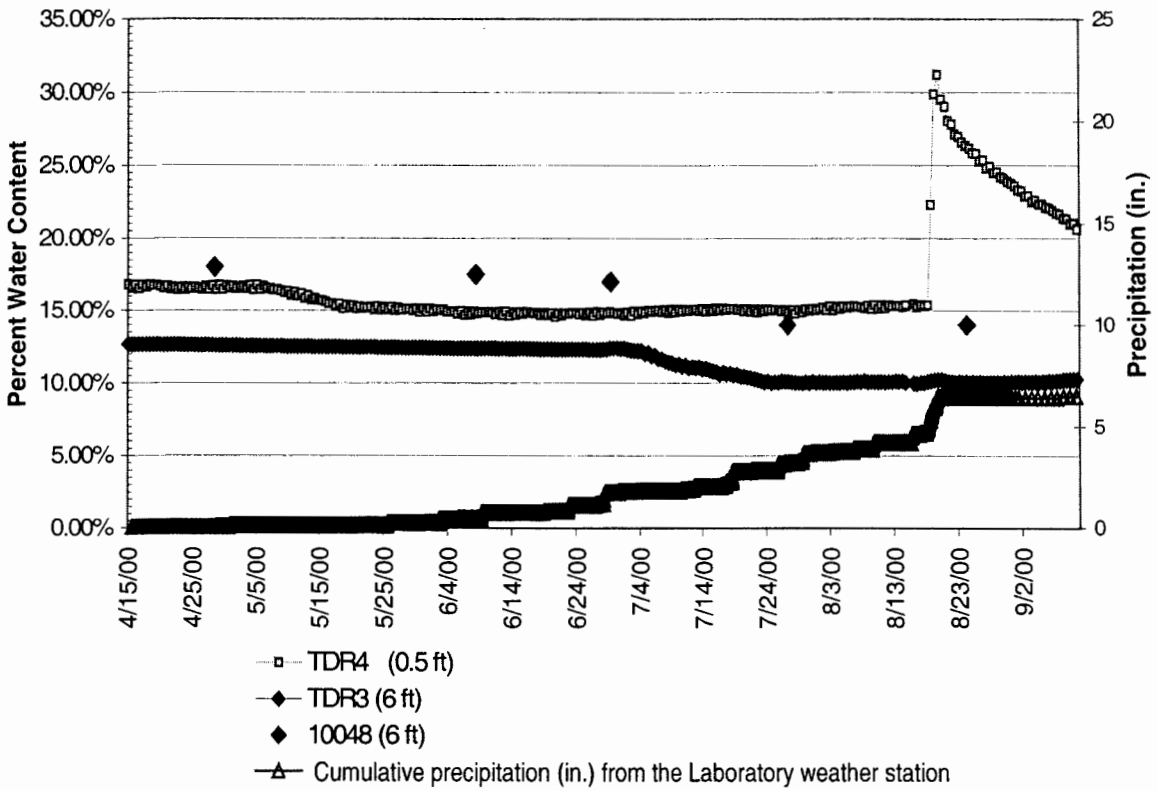

Figure 11. TDR measurements compared with neutron measurements at access hole 49-10048, which is in close proximity to and at the same corresponding depth as TDR3

3. DATA MANAGEMENT

A Microsoft Access database was designed and implemented to store all data collected during the TA-49 Moisture Monitoring Program. The database contains four tables titled Access_Hole_Coordinates and Landmark_Locations, Neutron_Data, TDR_Data, and Weather_Station_Precip. Queries were performed on these tables to retrieve and present data in a format desirable for visualization and trending analysis. The database also allows the user to create reports from the queries. The database is not included with this report because of space limitations but is available upon request.

4. DATA ANALYSIS

4.1 Trend Analysis of Neutron Data

A student t-test analysis was established to identify trend changes in moisture over time for each of the neutron access holes. The trending analysis will only be performed on data collected using the new neutron probe, which was purchased for this project in late March 2000. As of September, only five data events were available for the student t-test, this number of events is not sufficient to perform a statistically significant trend analysis. A minimum of eight months of data will be required to perform a statistically significant trend analysis.

4.2 Correlation between TDR Measurements and Precipitation Events

The weather in and around Los Alamos was relatively dry from February to June, with limited rainfall and no snow melt. This is represented by the drying trend displayed by TDR measurements through this period. The weather station showed several precipitation events during the months of June through August, a period known for local thunderstorms. The shallow TDR moisture levels correlated positively with these precipitation events displaying a moderate increase in moisture content. Each of these events was short and intense resulting in limited infiltration, if any. However, on August 18 moisture from a Gulf of Mexico hurricane resulted in steady showers over two days generating infiltration through the topsoil, as shown by the rapid rise in moisture content in the shallow TDR probes. To date, this effect has not been detected by the two deep TDR probes. The deep TDR moisture levels continued to decrease through this period showing a 1% to 2% drop in moisture over the four months.

4.3 TDR and Neutron Comparisons

The moisture monitoring system is performing as expected with consistent results between TDR arrays and neutron logging. Figures 10 and 11 display the deep TDR data associated with access holes 49-10046 and 49-10048. The neutron probe data from the same depth as the deep TDR probes are also shown. As previously stated, no statistically significant trends have been identified in the neutron data; however, the observed decrease in moisture content by the deep TDR probes is traced by the corresponding neutron probe data. The neutron probe data differ from the TDR results by no more than 2% volumetric water content. The correlation between the two moisture monitoring methods will become more meaningful as further data are collected and significant seasonal inputs occur.

5. CONCLUSIONS AND RECOMMENDATIONS

The neutron log data indicate that moisture levels have remained stable over the monitoring period with consistent trends with depth from month to month. Across the site, neutron probe data indicate that volumetric water content is greatest in the unconsolidated materials overlying the Bandelier Tuff. This trend occurs in the covered area of MDA AB and at access holes located in undisturbed areas. Beneath this interface and within the Bandelier Tuff, water content is dramatically less, which indicates limited infiltration through the contact. These observations indicate that the volumetric water content in only the unconsolidated materials varies with seasonal moisture input through infiltration and removal by evapotranspiration. The effects of this near-surface variation in water content are not observed within the relatively dry Bandelier Tuff. It is anticipated that because of seasonal infiltration events the water content in the unconsolidated materials will continue to vary while remaining constant at depth in the Bandelier Tuff. To date, insufficient data exist to quantify these trends.

The precipitation for the period of operation was below average, and the spring and summer seasons have a relatively high potential for evapotranspiration. Therefore, it is not unexpected that the moisture content decreased or remained constant within the cover materials since installation of the monitoring system. The exception to this trend occurred in August when a steady rain resulted in a near-surface infiltration event only detected by the shallow (0.5 ft.) TDR probes. This impulse has yet to be identified at depth and was not discernable in any of the neutron logs, which illustrates the ability of the shallow TDR array to detect small impulses of water through the topsoil. Whether or not this moisture reaches the deeper array will provide an indication of the cover's performance with regard to infiltration. Further collection of continuous

TDR and monthly neutron probe data will enable the quantification of the cover performance with respect to moisture content; as well as validate the effectiveness of the TDR probes as an effective instrument for long-term moisture monitoring.

6. REFERENCE

Canepa, J., and T. Taylor, January 28, 2000. "Material Disposal Area (MDA) AB Moisture Monitoring," Los Alamos National Laboratory memorandum to J. Kieling, Los Alamos, New Mexico.

Appendix F

Pore-Gas Sampling at Technical Areas 50 and 54
Material Disposal Areas C, G, and L
Annual Report for Fiscal Year 2000

PORE-GAS SAMPLING AT TECHNICAL AREAS 50 AND 54 MATERIAL DISPOSAL AREAS C, G, AND L ANNUAL REPORT FOR FISCAL YEAR 2000

MDA Focus Area

Environmental Restoration Project

Los Alamos National Laboratory

November 2000

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1. INTRODUCTION

This report documents the analytical results for the first three quarters of subsurface pore-gas sampling for volatile organic compounds (VOCs) for Fiscal Year (FY) 2000 at Los Alamos National Laboratory (the Laboratory), Technical Area 54 (TA-54). Samples were collected during the fourth quarter; however, they are not presented because of delays in receipt of data from the analytical laboratory. These results will be presented in the subcontractor's fourth-quarter report for FY 2000, which will be attached to the next quarterly report. Field screening results are documented in this report for all four quarters of FYs 1999 and 2000.

Pore-gas sampling is required by Module VIII of the Laboratory's Hazardous Waste Facility Permit in Section C.5, "Unsaturated Zone Monitoring" (EPA 1990). The approved plan (Tiedman 1993) for pore-gas sampling is included with the Laboratory's response (Glatzmaier 1993) to an Environmental Protection Agency (EPA) notice of deficiency (Driscoll 1992) addressing the Laboratory's Resource Conservation and Recovery Act facility investigation work plan for TA-54 (LANL 1992). The purpose of the pore-gas sampling at TA-54 Material Disposal Areas (MDAs) L and G is two-fold:

- to identify changes in contaminant concentrations at the perimeter of the relatively well-characterized plume at MDA L as an indicator of outward plume expansion (i.e., extent) and
- to monitor for contaminants and changes in contaminant concentration distributions within the plumes at MDAs L and G as an indicator of changes warranting further attention (i.e., nature).

Twenty-eight Environmental Restoration (ER) Project wells are available for pore-gas sampling at TA-54. Additionally, the Laboratory TA-54 Area G Performance Assessment Maintenance Team has made available five wells identified as PAMG wells. Each quarter, all available wells (ER Project wells and PAMG wells) are screened with the Brüel and Kjaer (B&K) multigas monitor, Type 1302, for 1,1,1-trichloroethane (TCA), trichloroethene (TCE), Freon-11, and Freon-113. The Operable Unit (OU) 1148 work plan requires the collection of SUMMA canister samples from 12 wells each quarter for analyses of VOCs by EPA Method TO-14 (LANL 1992). Of these 12 samples, 7 are to be selected from a list of 10 wells located at MDA L, and 2 are to be selected from a list of 4 wells located at MDA G. Thus, 9 of the 12 samples collected each quarter are limited to a defined set of 14 ER Project wells. This leaves three samples for each quarter that will be collected from among the remaining 14 available ER Project pore-gas sampling wells and the 5 PAMG wells.

SUMMA canister samples are drawn from one of the several sampling ports available at each well. The port sampled for TO-14 analyses is the one with the highest combined TCA and TCE concentrations, as determined by field screening of every port using the B&K multigas monitor. Each port is purged and monitored with field instruments until CO_2 levels have stabilized at values representative of subsurface pore-gas conditions and is then screened with the B&K.

During the fourth quarter of FY 2000, well 50-9100 within MDA C at TA-50 was added to the quarterly sampling program. The initial results for 50-9100 will be discussed later in this report.

2. RESULTS

Pore-gas was sampled each quarter of FY 2000 at TA-54 MDAs L and G in accordance with the OU 1148 work plan. This report will compare the first three quarters of analytical results to identify changes in extent and nature of the vapor-phase VOC plumes. These results of the quarterly pore-gas sampling have

been documented in the ER Project quarterly reports. Screening results are displayed as three-dimensional visualizations.

2.1 Quarterly B&K Screening

All available ports at MDAs G and L were screened with the B&K. Analytical laboratory results and field-screening measurements indicate that concentrations of TCA are higher than any other VOC near the source area and at the plume boundaries. Therefore, B&K screening results of TCA concentrations have been used to develop three-dimensional visualizations representative of the VOC plume extent.

Figure 1 is an aerial view of MDA L at TA-54. Cross section A-A′ is perpendicular to the mesa and cross section B-B′ is along the middle of the mesa parallel to the sides. Structures are the current operational facilities.

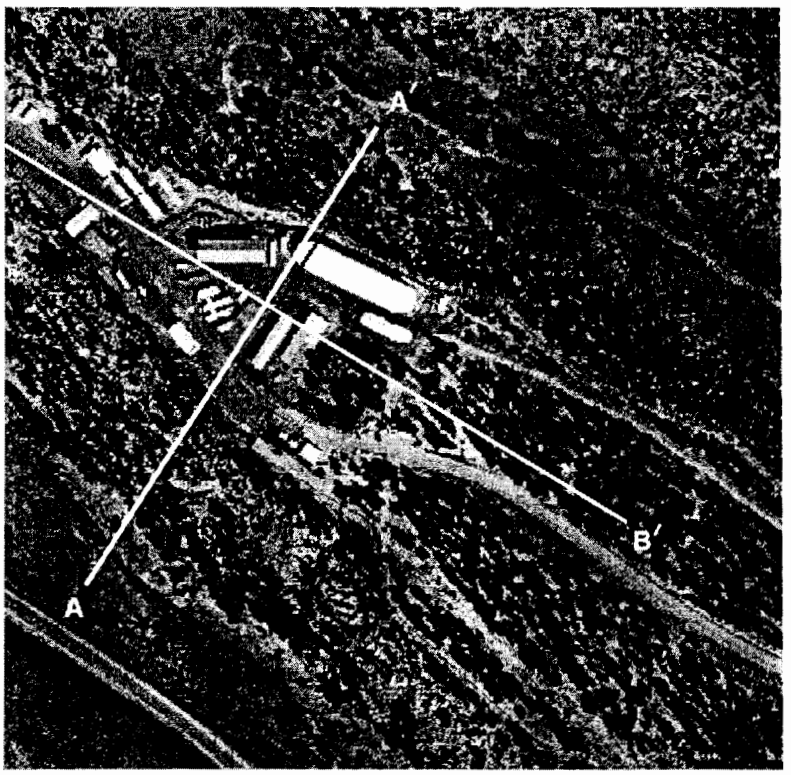


Figure 1. Aerial view of MDA L at TA-54

Figures 2 through 9 display MDA L quarterly results of the three-dimensional visualizations for FY 1999 and FY 2000. Complete screening of all available wells began during the first quarter of FY 1999; prior screening data sets lack sufficient spatial measurements to allow meaningful interpolation for visualization.

Each figure includes an aerial view of the plume contours at 60 ft below the mesa top; well locations are identified. TCA concentration contours for 10, 100, and 500 parts per million volume (ppmv) are represented. The 10-ppmv contour represents the lower limit of the field-screening data reliability (5–10 ppmv). Each figure also depicts the plume contours across transects A-A′ and B-B′.

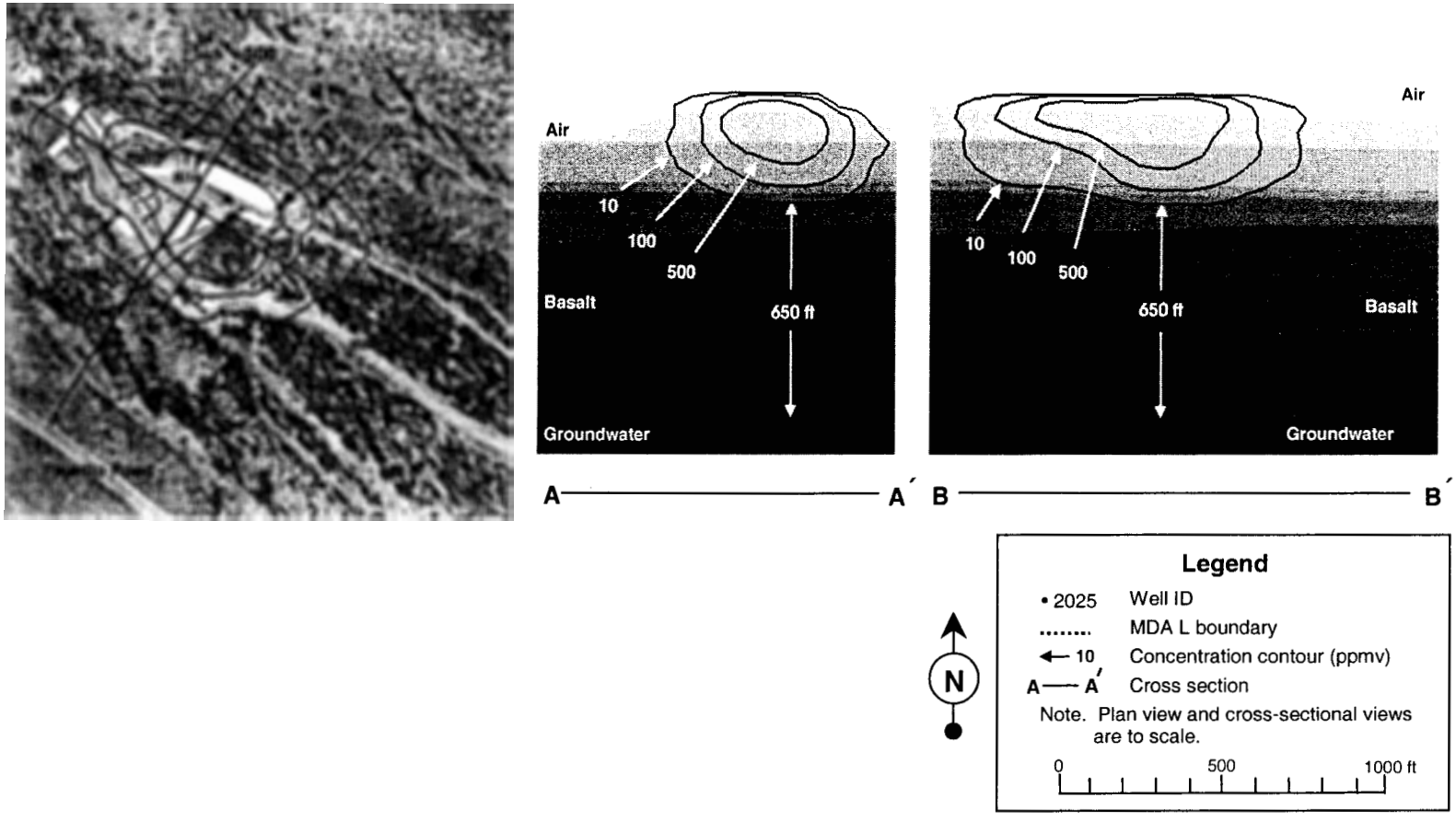


Figure 2. MDA L field-screening results for the first quarter of FY 1999

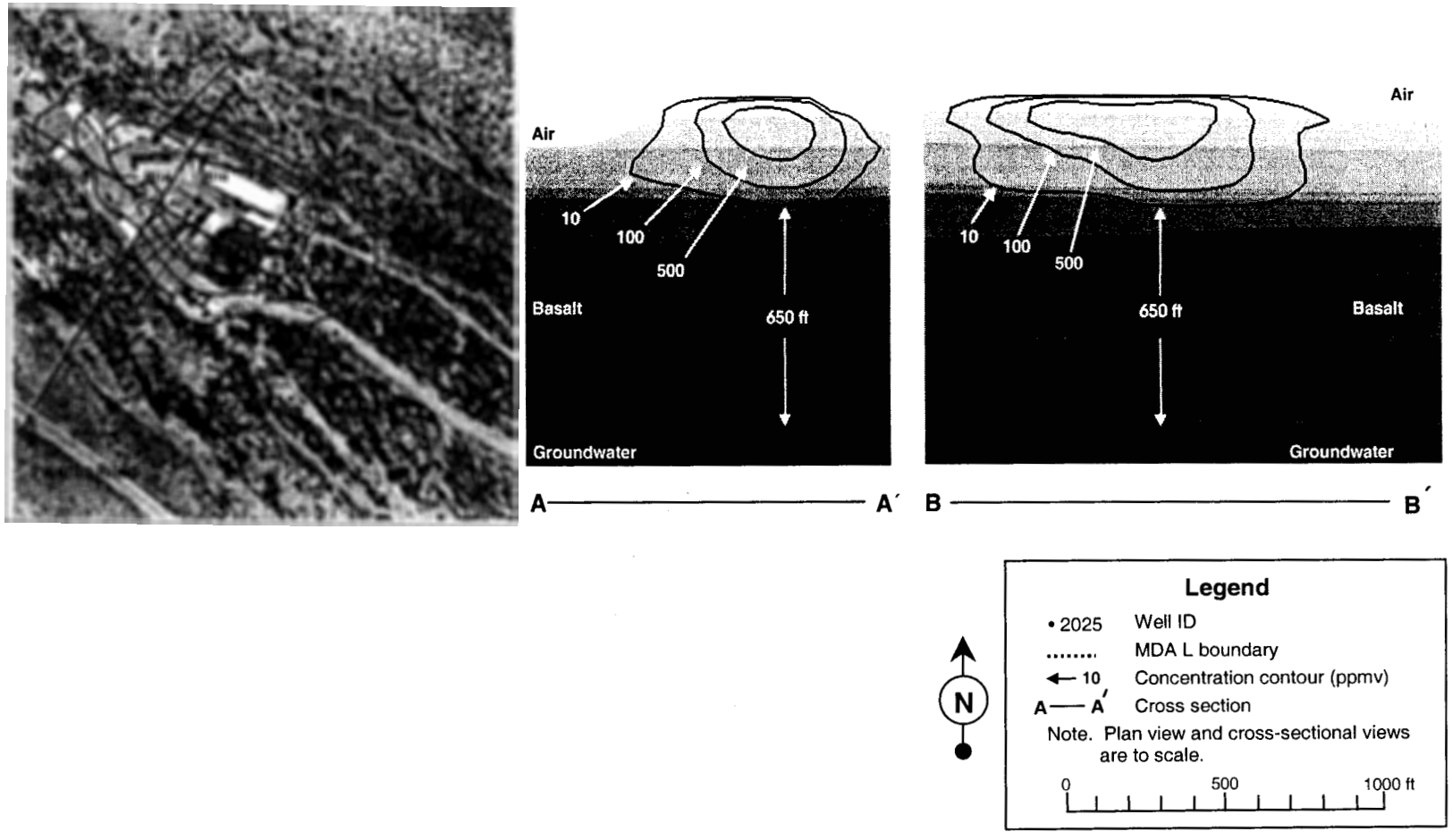


Figure 3. MDA L field-screening results for the second quarter of FY 1999

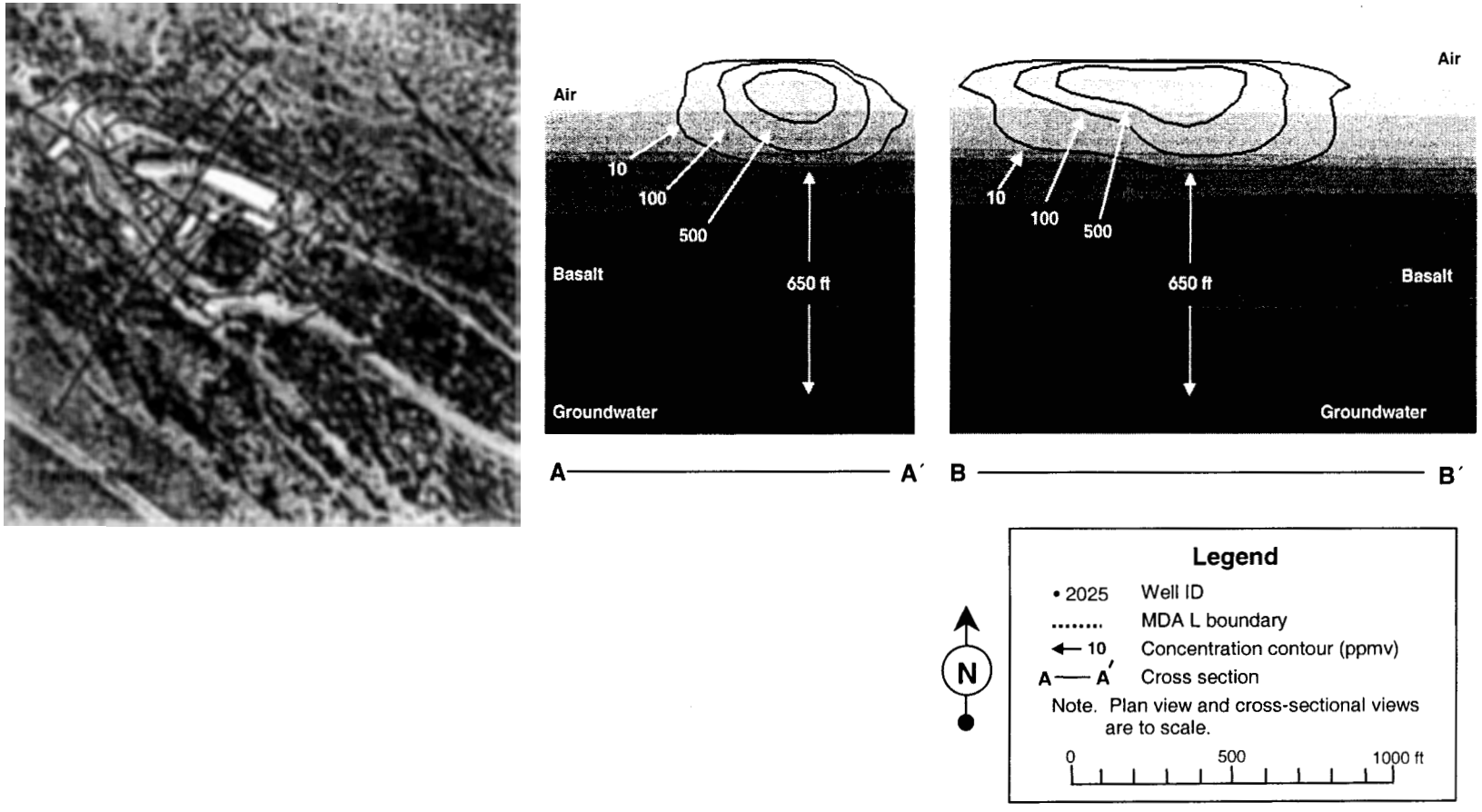


Figure 4. MDA L field-screening results for the third quarter of FY 1999

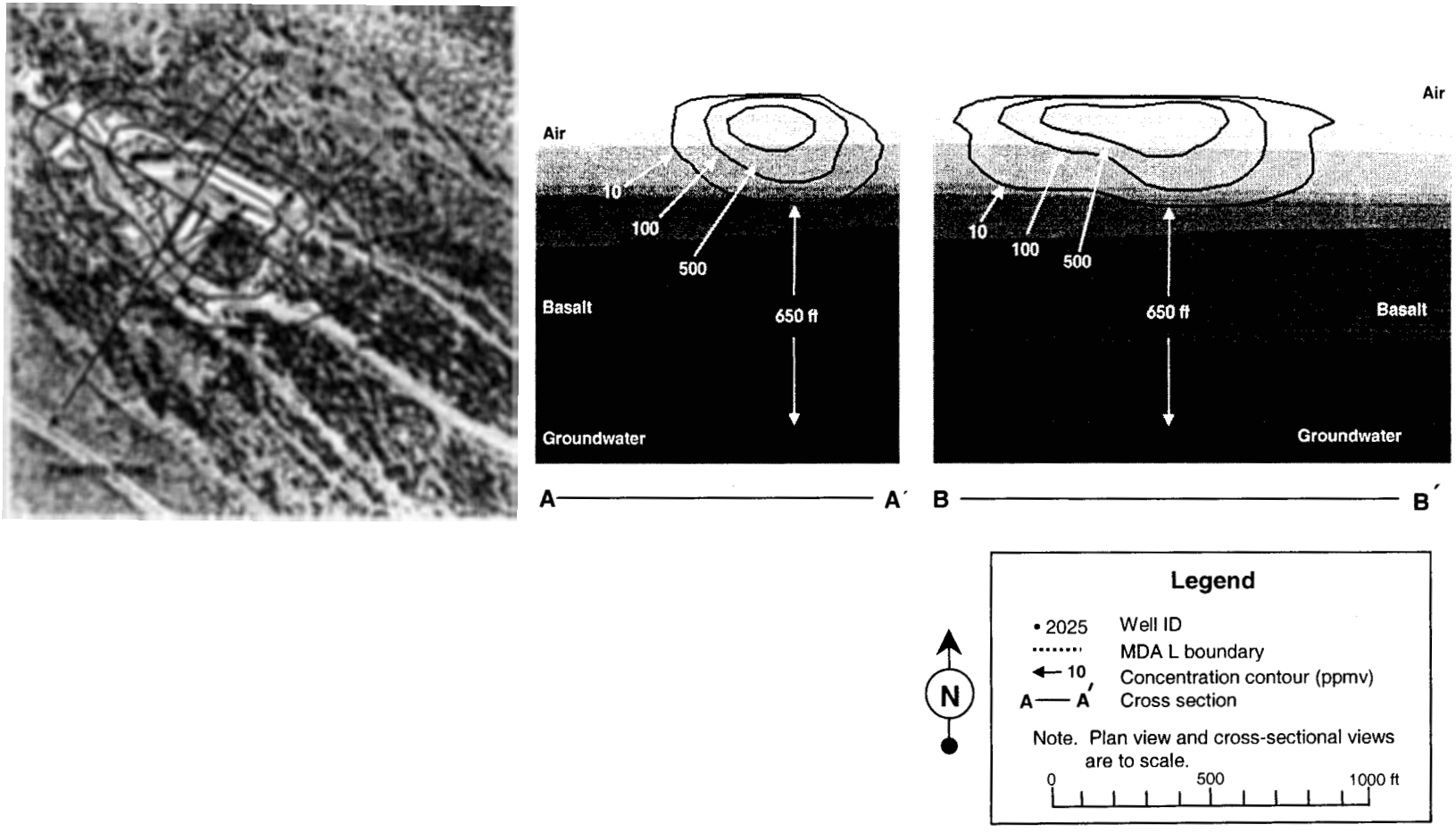


Figure 5. MDA L field-screening results for the fourth quarter of FY 1999

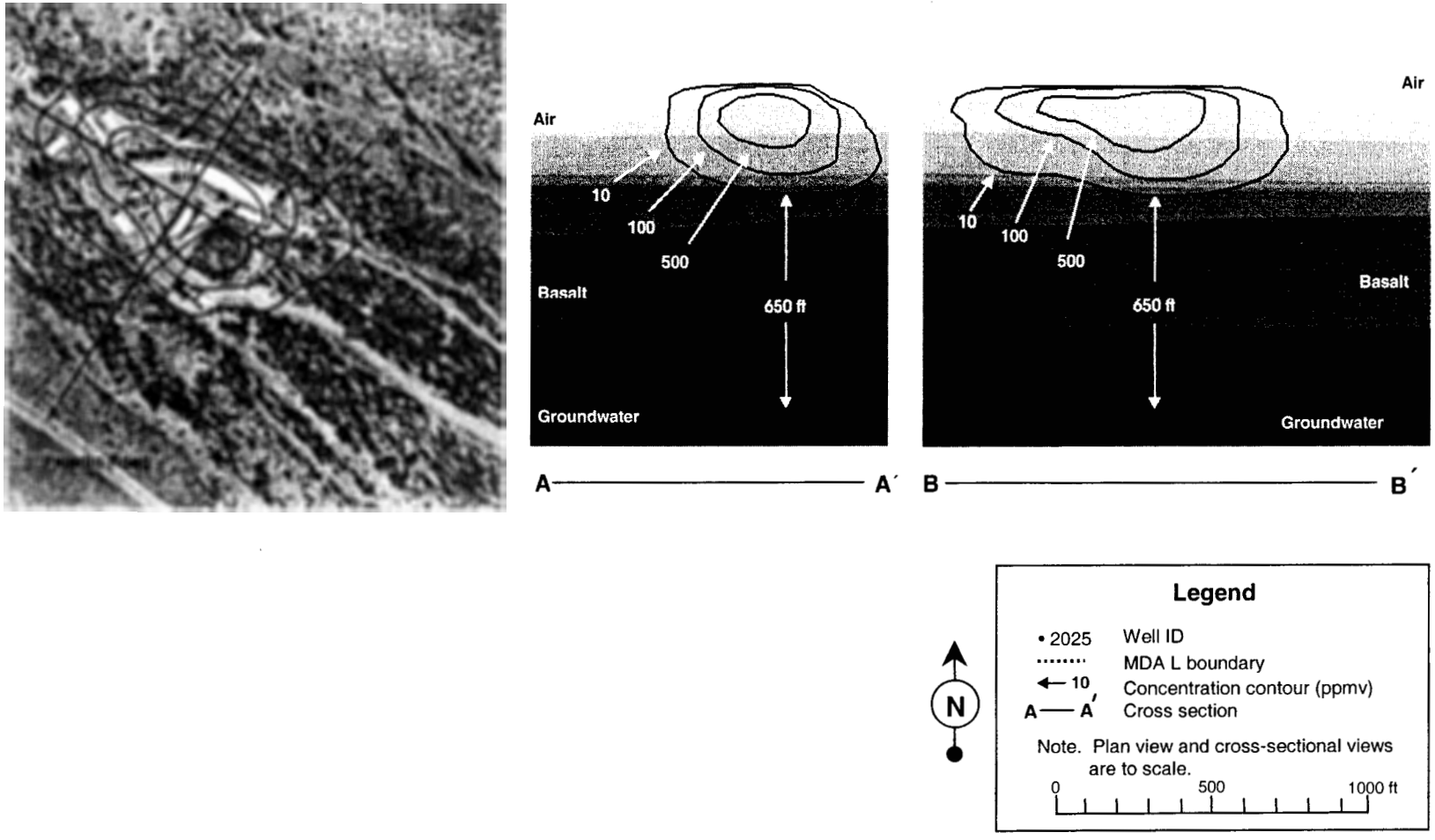


Figure 6. MDA L field-screening results for the first quarter of FY 2000

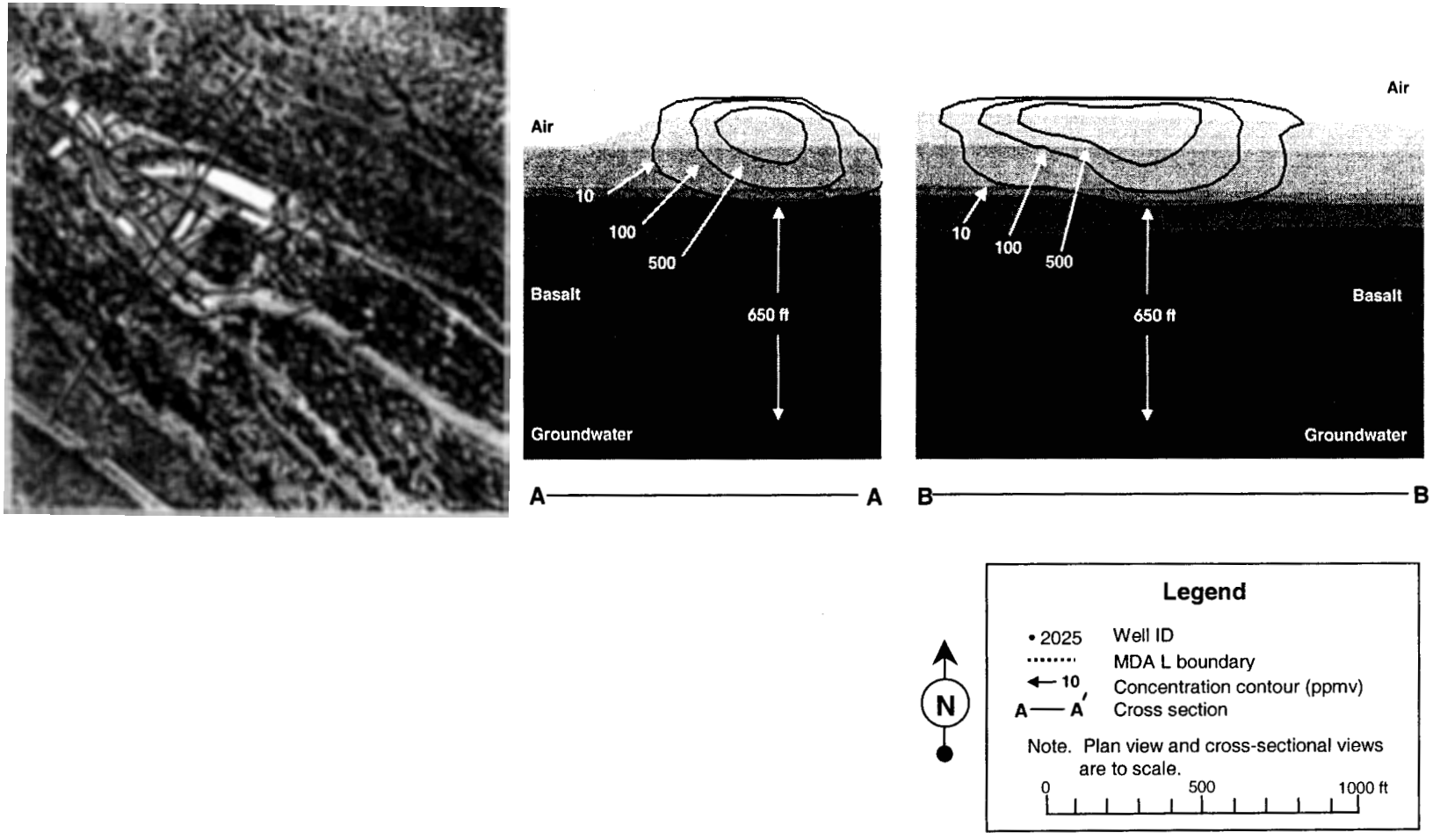
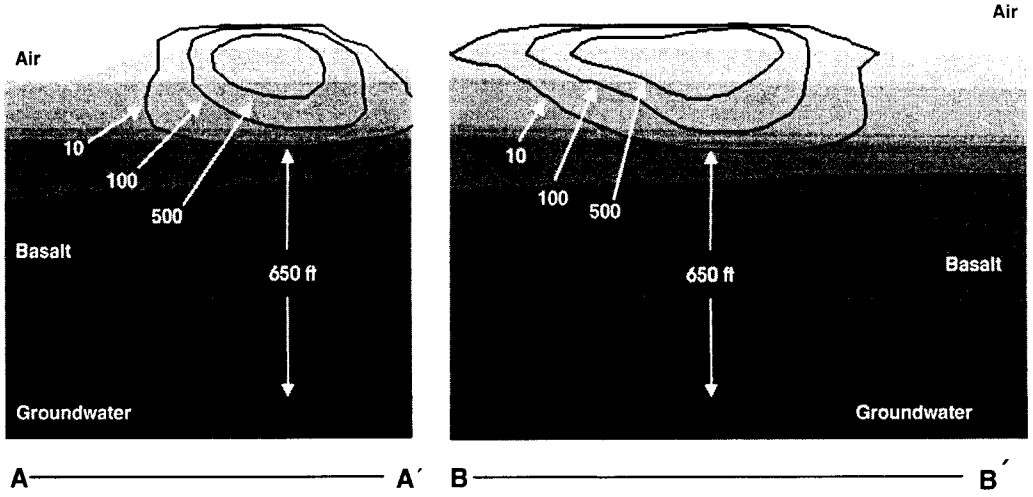


Figure 7. MDA L field-screening results for the second quarter of FY 2000



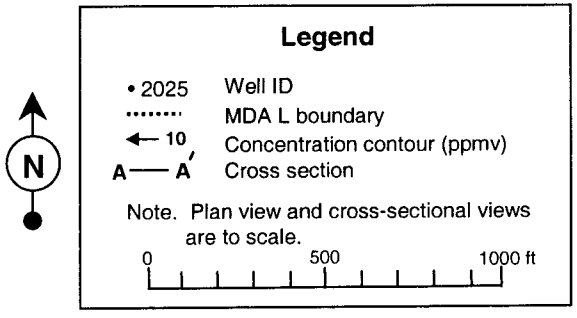


Figure 8. MDA L field-screening results for the third quarter of FY 2000

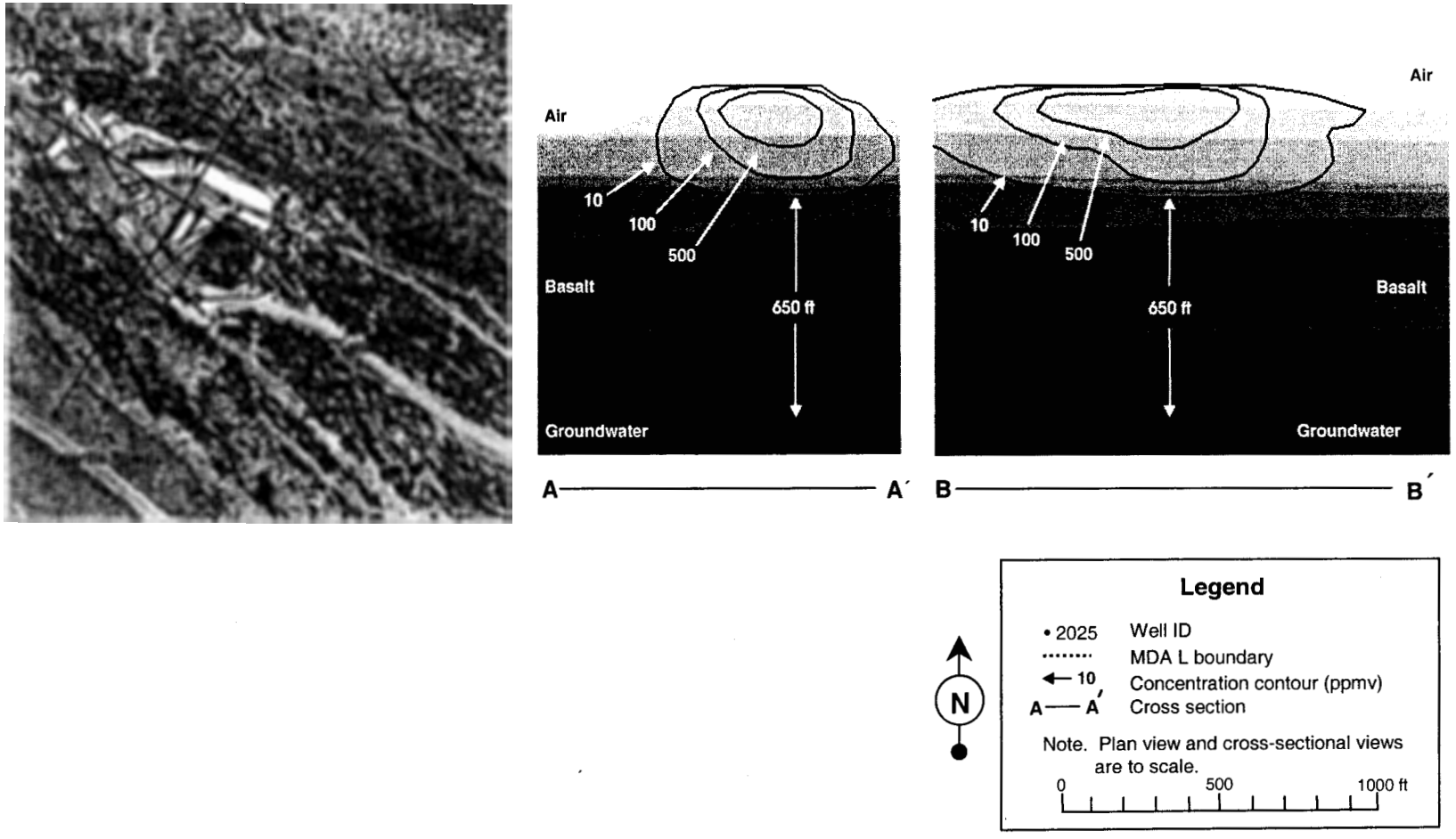


Figure 9. MDA L field-screening results for the fourth quarter of FY 2000

Comparison of Figures 2 through 9 indicates that the VOC plume, as represented by TCA screening data, has been near a steady-state condition since the first quarter of FY 1999. The figures indicate that the extent of the plume along transect A-A′ is bounded by the mesa sides. The screening results also indicate that the 10-ppmv contour remained relatively constant at 650 ft above the regional groundwater table. The maximum TCA concentrations represented by the 500-ppmv contour is coincident with the disposal shafts and pits of MDA L and have remained steady since FY 1999. The figures show that the extent of the MDA L plume is well defined by the extensive array of vapor-monitoring wells.

Figures 10 and 11 display the MDA G extent of TCA contamination as defined by the available wells each quarter. During FY 2000, the Laboratory TA-54 Performance Assessment Maintenance Team equipped five additional wells at MDA G with positive pressure membranes and vapor-monitoring ports. These wells were sampled, as available, to further characterize the nature and extent of VOCs at MDA G. A three-dimensional visualization was initiated. However, to date, insufficient data exist spatially and through time to show a meaningful three-dimensional interpretation. Further sampling of the four MDA G wells in FY 2001 will fill this data need.

2.2 SUMMA Canister Analysis

The OU 1148 work plan requires the collection of SUMMA canister samples from 12 wells each quarter for analyses of VOCs by EPA Method TO-14 (LANL 1992). Nine of these samples are limited to defined lists for MDAs L and G, while three samples are to be collected from remaining locations. During FY 2000, the Laboratory TA-54 Area G Performance Assessment Maintenance Team wells were made available to provide further spatial monitoring coverage within MDA G. Wells throughout the plume were selected for sampling, and different wells were sampled each quarter, within the limits of the sampling plan. Additionally, SUMMA samples were collected at the port depth with the highest VOC concentration identified during the screening. Therefore, the results of the SUMMA canister samples are representative of the nature of the plume biased toward the highest concentration region. Tables 1 and 2 list the detected VOCs, number of detects, and the range of the reported concentrations for the VOC plumes at MDAs L and G for the first three quarters of FY 2000. One duplicate sample was collected each quarter for QA/QC purposes, and a thirteenth sample was collected during the third quarter.

Data for the first three quarters of FY 2000 SUMMA samples indicate that the plumes at MDAs L and G consist primarily of TCA, TCE, 1,1-dichloroethene, 1,1-dichloroethane, tetrachloroethene, and Freons. Because samples have not been collected from the same well location and port depth, the analytical data are insufficient to perform a statistically significant trend analysis. However, qualitative assessment of the extensive distribution of sample data from throughout the plumes over time, in combination with the data visualization, indicates that the nature and extent of the plumes are not changing.

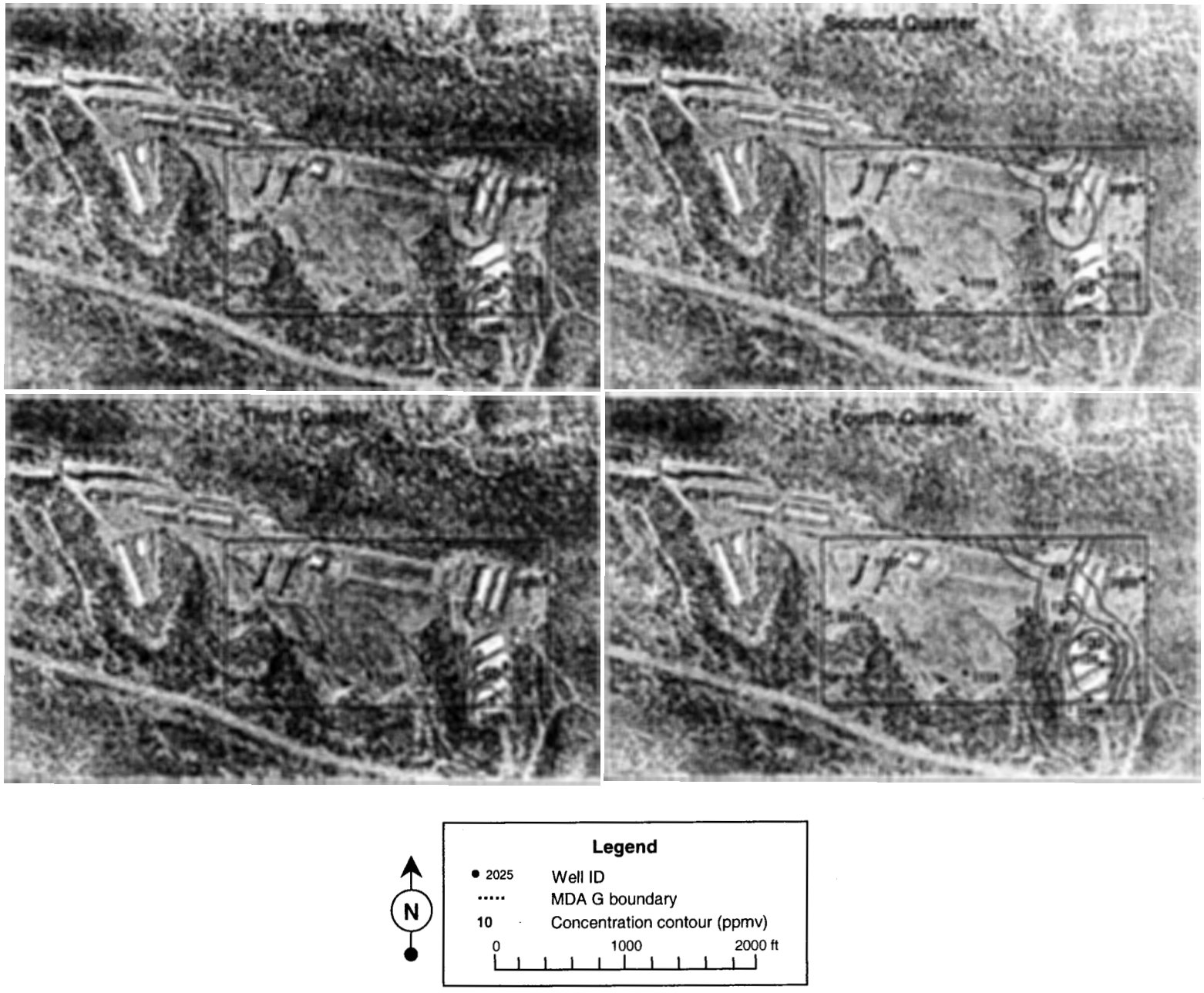


Figure 10. MDA G field-screening results for FY 1999

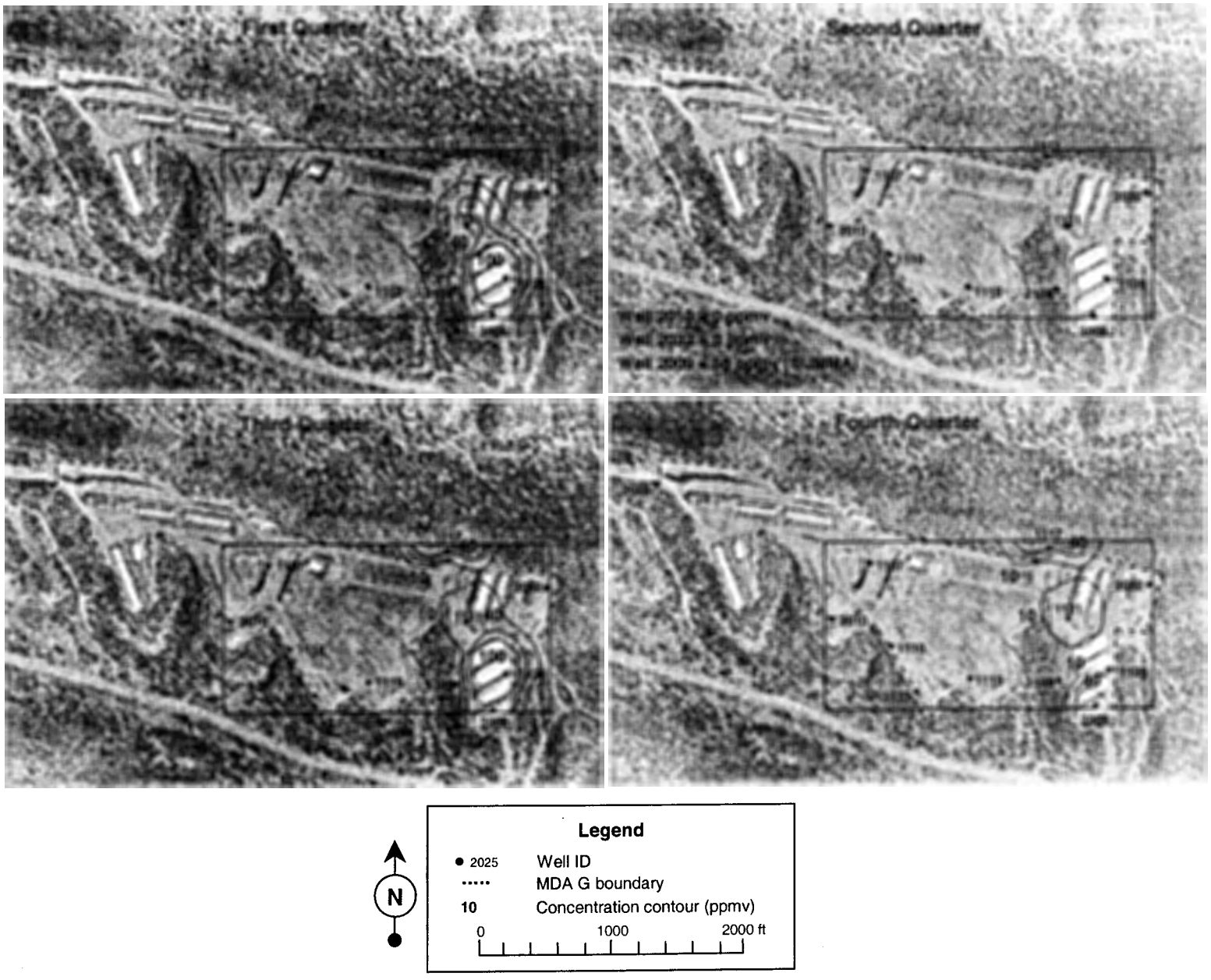


Figure 11. MDA G field-screening results for FY 2000

Table 1
Summary of Detected Analytes at MDA L for the First Three Quarters of FY 2000

Analyte	Frequency of Detection	Concentration Range (ppmv)
Dichlorodifluoromethane*	22/32	0.0031 to 0.64
Trichlorofluoromethane*	25/32	0.0036 to 81
Dichloroethene[1,1-]	31/32	0.0051 to 49
Trichloro-1,2,2-trifluoroethane[1,1,2-]*	32/32	0.0036 to 400
Dichloroethane[1,1-]	27/32	0.00029 to 140
TCA	32/32	0.0039 to 3500
TCE	31/32	0.012 to 2600
Tetrachloroethene	27/32	0.0031 to 160
Methylene chloride	23/32	0.0028 to 270
Acetone	2/32	0.0031 to 0.0037
Carbon tetrachloride	9/32	0.00047 to 17
Toluene	5/32	0.00041 to 9.4
Trichloroethane[1,1,2-]	1/32	22
Benzene	2/32	0.0026 to 2.5
n-Butane	2/32	0.00071 to 0.00095
Pentane	1/32	0.00073
n-Hexane	1/32	0.0018
Xylene (total)	1/32	2.4

* This chemical is one of the Freons.

Table 2
Summary of Detected Analytes at MDA G for the First Three Quarters of FY 2000

Analyte	Frequency of Detection	Concentration Range (ppmv)
Dichlorodifluoromethane*	4/8	0.006 to 0.34
Chlorodifluoromethane*	2/8	0.0019 to 0.0021
Trichlorofluoromethane*	3/8	0.014 to 0.89
Dichloroethene[1,1-]	7/8	0.0021 to 7.7
Trichloro-1,2,2-trifluoroethane[1,1,2-]*	5/8	0.0042 to 2.5
Dichloroethane[1,1-]	7/8	0.001 to 5
TCA	8/8	0.0075 to 140
TCE	6/8	0.00037 to 19
Tetrachloroethene	7/8	0.0061 to 1.1
Dichloroethene[1,2- cis]	1/8	0.0004
Acetone	2/8	0.0075
Vinyl acetate	1/8	0.00081
2-Butanone	1/8	0.0014

* This chemical is one of the Freons.

2.3 Data Management

Databases FY 2000 data include TO-14 analytical results and B&K screening measurements; data for the first three quarters have been entered and validated. The focused validation of the fixed laboratory analytical results identified two organic compounds (chloroform and 1,2-dichloroethane) that were improperly reported as detected in all samples. The false positives were the result of the analytical laboratory's improper interpretation of the mass spectral results. For gas chromatography/mass spectroscopy analyses, the spectrum scan at the apex of the chromatogram is compared with the library reference spectrum for the target analyte in a given retention time window to allow for the positive identification of the target analyte. The quality of match between the reference spectrum and the spectrum scan is assigned a Q-value between 1 and 100; a Q-value of 100 represents a perfect match between the sample spectrum scan and the reference library scan. Although the analytical laboratory did not assign Q-values to the data, the raw mass data for the spectrum scans and the reference spectra were provided as part of the data package. These were used in the focused validation of the FY 2000 pore-gas data to determine whether these two compounds were detected. The focused validation confirmed that the mass spectrum scans were the result of interferences from other compounds within the same retention time windows and are not consistent with chloroform and 1,2-dichloroethane.

2.4 MDA C 50-9100 Well Installation and Initial Results

During the fourth quarter of FY 2000, borehole 50-9100 located at TA-50 MDA C was equipped with a positive pressure membrane for quarterly pore-gas monitoring. The membrane has 10 vapor-sampling ports at discrete depths. Sampling consisted of screening all ports with the B&K for VOCs and collecting two SUMMA canister samples for TO-14 analysis. B&K screening results are presented in Table 3. The maximum concentration of TCA was 11.4 ppmv detected at the 120-ft port. The maximum concentration of TCE was 12.9 ppmv detected at the 200-ft port. The SUMMA canister samples were collected from ports at 90 ft and 315 ft. The analytical results have not been received but will be documented in the subcontractor's fourth-quarter report for FY 2000. Before the FY 2001 first-quarter sampling, the port at 103 ft will be repaired.

3. CONCLUSIONS AND RECOMMENDATIONS

The purpose of the unsaturated zone monitoring for VOCs at TA-54 MDAs L and G is to define the nature and extent of the vapor-phase VOC plumes. The extensive screening of the MDA L plume since the first quarter of FY 1999 indicates that concentrations have remained steady. The nature of the MDA L plume, as defined by the analytical TO-14 data, did not change during FY 2000 sampling. The MDA L plume consists primarily of TCA, TCE, 1,1-dichloroethene, 1,1-dichloroethane, tetrachloroethene, and Freons.

During FY 2000, additional monitoring wells at MDA G were provided by the Laboratory TA-54 Performance Assessment Maintenance Team. These additional wells were also screened and sampled when available; they are primarily used for routine moisture monitoring. A three-dimensional visualization was initiated to evaluate the extent of VOCs at MDA G. SUMMA canister sampling for FY2000 indicates that the nature of VOC contamination at MDA G is similar to that of MDA L. However, the concentrations are two orders of magnitude less than those found in the MDA L plume. This difference is expected because a greater mass of VOCs was disposed of at MDA L than at MDA G.

Table 3
Fourth-Quarter Sample Screening Results for Well 50-9100

Depth	Time	TCA (ppm)	TCE (ppm)	Freon-11 (ppm)	Freon-113 (ppm)	CO_2 B&K (ppm)	Water Vapor (ppm)	CO_2 Vaisala (%)
Ambient 1	1403	-0.45	-0.225	-0.025	0.292	436	14100	0.08
Ambient 2	1407	-0.434	0.177	-0.029	-0.19	466	14000	0.08
Ambient 3	1412	-0.443	0.0351	-0.036	-0.154	420	13600	0.08
Low standard	1418	31.6	5.94	-0.121	-0.028	206	16300	n/a[a]
Purge	1422	-0.073	0.282	-0.021	-0.039	419	14500	n/a
High standard	1426	425	79.9	-2	-0.925	107	16100	n/a
Purge	1430	-0.434	0.177	-0.029	-0.19	466	14000	0.08
20 ft	1440	-5.1	3.05	-0.473	1.91	27000	19000	1.695
50 ft	1447	-3.1	7.39	-0.651	2.62	35400	19700	2.27
90 ft	1454	0.788	9.48	-0.644	2.23	35600	19400	2.255
103 ft	N.A.[b]	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.52
120 ft	1511	11.4	10.2	-0.614	1.32	32900	18700	1.94
160 ft	1518	7.21	11.8	-0.566	1.4	29200	18700	1.675
200 ft	1526	10.3	12.9	-0.472	0.903	25900	18900	1.475
233 ft	1534	11.2	12.7	-0.458	0.59	24300	18400	1.34
260 ft	1542	11.1	11.9	-0.417	0.562	22500	18400	1.24
315 ft	1550	2.37	1.79	0.271	2.02	4660	20200	1.2
SUMMA 90 ft	1558	0.788	9.48	-0.644	2.23	35600	19400	2.255
SUMMA 315 ft	1610	2.37	1.79	0.271	2.02	4660	20200	1.2

[a] n/a = not applicable.
[b] N.A. = not available. The port at 103 ft was blocked.

While the nature and extent of the plumes have been well defined by the TO-14 data collected from different wells and depths, no single port has been sampled enough times by the current method so that trend analysis of the analytical data could be performed. The recommended quarterly sampling for FY 2001 is defined in Table 4 with the preferred well location and sampling depths. After completion of the proposed FY 2001 sampling schedule, a minimum of six data points will exist for each of the defined wells at the same port. This sampling scheme will provide comparable data that can be used to identify and quantify trends of plume nature over time and will validate the plume extent defined by the B&K screening data. This sampling schedule also meets the requirements defined by the OU 1148 work plan. The reasoning for each well and depth selection is listed in Table 4. Wells 54-2002 and 54-2029 are located nearest the source and at the eastern perimeter of the plume at MDA L. These two wells will be sampled at the designated depth during every quarter of FY 2001, which will provide enough data for a statistically significant trend analysis of the plume. If the static nature of the plume continues through FY 2001, the data set from these two wells will be used to quantify the concentration distribution at the source area and at the perimeter of the MDA L plume. Ports from wells 54-1015 and 54-1016 will be sampled to determine the nature and extent of VOCs at depth beneath MDA L within the underlying

basalt. The sample schedule for MDA G wells will provide for a statistically significant trend analysis of subsurface VOC concentrations. Further sampling of PAMG wells will be used to define the nature of subsurface contamination in areas not yet characterized by historic ER well locations.

Table 4
Proposed FY 2001 SUMMA Sampling Schedule

Quarter	Well	Site	Port Depths (ft)	Reasoning
1	54-2009	MDA G	62	Nature
	54-2010	MDA G	53	Permit
	54-2002	MDA L	100	Source
	54-2029	MDA L	100	Perimeter
	54-1015	MDA L	385	Basalt
	54-2021	MDA L	100	Permit
	54-2023	MDA L	159	Permit
	54-2030	MDA L	100	Permit
	54-2034	MDA L	60	Permit
	54-2026	MDA L	160	Data gap
	54-1111	PAMG	—[a]	Nature
	54-1117	PAMG	—	Nature
	Duplicate	TBD[b]	TBD	Precision
	Calibration gas	n/a[c]	n/a	Accuracy
	Blank	n/a	n/a	Laboratory contamination
2	54-2009	MDA G	62	Nature
	54-2032	MDA G	156	Permit
	54-2002	MDA L	100	Source
	54-2029	MDA L	100	Perimeter
	54-1016	MDA L	390	Basalt
	54-2012	MDA L	28	Permit
	54-2031	MDA L	100	Permit
	54-2026	MDA L	160	Permit
	54-2022	MDA L	80	Permit
	54-2021	MDA L	100	Data gap
	54-1117	PAMG	—	Nature
	54-1121	PAMG	—	Nature
	Duplicate	TBD	TBD	Precision
	Calibration gas	n/a	n/a	Accuracy
	Blank			Laboratory contamination

Table 4 (continued)

Quarter	Well	Site	Port Depths (ft)	Reasoning
3	54-2009	MDA G	62	Nature
	54-2033	MDA G	100	Permit
	54-2002	MDA L	100	Source
	54-2029	MDA L	100	Perimeter
	54-1015	MDA L	385	Basalt
	54-2021	MDA L	100	Permit
	54-2023	MDA L	159	Permit
	54-2030	MDA L	100	Permit
	54-2034	MDA L	60	Permit
	54-2026	MDA L	160	Data gap
	54-1111	PAMG	—	Nature
	54-1121	PAMG	—	Nature
	Duplicate	TBD	TBD	Precision
	Calibration gas	n/a	n/a	Accuracy
	Blank	n/a	n/a	Laboratory contamination
4	54-2009	MDA G	62	Nature
	54-2010	MDA G	95	Permit
	54-2002	MDA L	100	Source
	54-2029	MDA L	100	Perimeter
	54-1016	MDA L	390	Basalt
	54-2012	MDA L	28	Permit
	54-2031	MDA L	100	Permit
	54-2026	MDA L	160	Permit
	54-2022	MDA L	80	Permit
	54-2030	MDA L	160	Data gap
	54-2028	MDA L	100	Perimeter
	54-1015	MDA L	350	Tuff
	54-2025	MDA L	100	Nature
	Duplicate	TBD	TBD	Precision
	Calibration gas	n/a	n/a	Accuracy
	Blank	n/a	n/a	Laboratory contamination

[a] A dash indicates that the depth has not yet been determined. It will be determined after first-quarter sampling is complete. The limited data set for these wells does not allow us to determine the peak concentrations or source depth at these wells.

[b] TBD = to be determined.

[c] n/a = not applicable.

To further validate comparison of field screening (B&K) to TO-14 analytical results, additional quality controls will be implemented to the field-screening instrumentation. These controls will include development of purge characteristic curves for all ports to confirm that proper purge occurs before any sampling. A routine quality control check of the field equipment will be documented before and after each

quarterly sampling event. The routine evaluation will include leak checks and instrument response to valid calibration gases.

No significant changes in the nature or extent of VOCs at TA-54 were identified during the first three quarters of pore-gas sampling for FY 2000. The nature and extent of the plumes at both MDAs L and G remained static. If these trends continue and are quantifiable by the proposed sampling schedule for FY 2001, the frequency of sampling can be reduced to annual events.

4. REFERENCES

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Appendix G

First Quarter of Groundwater Sampling Results
Wells R-9 and R-15
February 2000

Table 2.4-1
Regional Well R-9 first quarter samples taken table

Sample ID	Location ID	Field Preparation	Depth (ft)	Anions[a]	Cyanide	Non-TAL Metals[b]	TAL Metals	Uranium	Water Quality Parameters[c]	High-Explosive	Pesticides/PCBs	SVOCs	VOCs	Am-241	Gamma Spectroscopy	Gross Alpha/Beta	Gross Gamma	Tritium	Isotopic Plutonium	Isotopic Uranium	Strontium-90
CALA-00-0014	LA-00168	F	688	6490R	—	6487R	6524R	6524R	6489R 6499R	—	—	—	—	6491R	6491R	6491R	6491R	—	6491R	6491R	6491R
CALA-00-0013[d]	LA-00168	NF	688	6490R	6487R	6487R	6524R	6524R	6493R	6488R	6486R	6486R	6486R	6491R	6491R	6491R	6491R	6521R	6491R	6491R	6491R

[a] Anions = Ammonia, bromide, chloride, fluoride, nitrate/nitrite, oxalate, perchlorate, sulfate.

[b] Non-TAL Metals = Boron, molybdenum, silicon, strontium.

[c] Water Quality Parameters = Alkalinity, deuterium/hydrogen, nitrogen-15/nitrogen-14, oxygen-18/oxygen-16, total Kjeldahl nitrogen, total organic carbon, total phosphorus.

[d] Field Parameters on Not Filtered Sample = pH - 7.45 SU, conductivity - 239 us/cm, temperature - 22.7 C, turbidity - 2.02 NTU.

Table 2.4-2

Regional Well R-9 First Quarter Sample Results: Data Summary for Inorganic Parameters

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (μg/L)	Non Detected Value (μg/L)	Drinking Water MCL[a] (μg/L)	Frequency of Detects >Drinking Water MCL	NMED[b] Groundwater Standard[c] (μg/L)	Frequency of Detects >NMED Groundwater Standard
Alkalinity	1	688	2/28/00	F[d]	1	1	120000	—[e]	—	—	—	—
Alkalinity	1	688	2/28/00	NF[f]	1	1	120000	—	—	—	—	—
Aluminum	1	688	2/28/00	F	1	0	—	[69]	50	0/1	5000	0/1
Aluminum	1	688	2/28/00	NF	1	1	310	—	—	—	—	—
Ammonia (expressed as N)	1	688	2/28/00	F	1	0	—	[500]	—	—	—	—
Ammonia (expressed as N)	1	688	2/28/00	NF	1	0	—	[500]	—	—	—	—
Antimony	1	688	2/28/00	F	1	0		[0.683]	6	0/1	—	—
Antimony	1	688	2/28/00	NF	1	1	1.41	—	—	—	—	—
Arsenic	1	688	2/28/00	F	1	0	—	[2.3]	50	0/1	100	0/1
Arsenic	1	688	2/28/00	NF	1	0	—	[2.3]	—	—	—	—
Barium	1	688	2/28/00	F	1	1	99	—	2000	0/1	1000	0/1
Barium	1	688	2/28/00	NF	1	1	110	—	—	—	—	—
Beryllium	1	688	2/28/00	F	1	1	0.011	—	4	0/1	—	—
Beryllium	1	688	2/28/00	NF	1	1	0.018	—	—	—	—	—
Boron	1	688	2/28/00	F	1	1	56	—	—	—	750	0/1
Boron	1	688	2/28/00	NF	1	1	56	—	—	—	—	—
Bromide	1	688	2/28/00	F	1	0	—	[16]	—	—	—	—
Bromide	1	688	2/28/00	NF	1	0	—	[16]	—	—	—	—
Cadmium	1	688	2/28/00	F	1	0	—	[0.13]	5	0/1	10	0/1
Cadmium	1	688	2/28/00	NF	1	0	—	[0.13]	—	—	—	—

Table 2.4-2 (continued)

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (µg/L)	Non Detected Value (µg/L)	Drinking Water MCL (µg/L)	Frequency of Detects >Drinking Water MCL	NMED Groundwater Standard (µg/L)	Frequency of Detects >NMED Groundwater Standard
Calcium	1	688	2/28/00	F	1	1	26000	—	—	—	—	—
Calcium	1	688	2/28/00	NF	1	1	26000	—	—	—	—	—
Chloride	1	688	2/28/00	F	1	1	6860	—	250000	0/1	250000	0/1
Chloride	1	688	2/28/00	NF	1	1	6510	—	—	—	—	—
Chromium	1	688	2/28/00	F	1	0	—	[1.6]	100	0/1	50	0/1
Chromium	1	688	2/28/00	NF	1	1	18	—	—	—	—	—
Cobalt	1	688	2/28/00	F	1	1	0.52	—	—	—	50	0/1
Cobalt	1	688	2/28/00	NF	1	1	0.69	—	—	—	—	—
Copper	1	688	2/28/00	F	1	0	—	[0.42]	1300	0/1	1000	0/1
Copper	1	688	2/28/00	NF	1	1	2	—	—	—	—	—
Cyanide (total)	1	688	2/28/00	NF	1	0	—	[10]	—	—	—	—
Fluoride	1	688	2/28/00	F	1	1	309	—	4000	0/1	1600	0/1
Fluoride	1	688	2/28/00	NF	1	1	303	—	—	—	—	—
Iron	1	688	2/28/00	F	1	1	83	—	300	0/1	1000	0/1
Iron	1	688	2/28/00	NF	1	1	12000	—	—	—	—	—
Lead	1	688	2/28/00	F	1	0	—	[0.01]	15	0/1	50	0/1
Lead	1	688	2/28/00	NF	1	1	9.27	—	—	—	—	—
Magnesium	1	688	2/28/00	F	1	1	5600	—	—	—	—	—
Magnesium	1	688	2/28/00	NF	1	1	5700	—	—	—	—	—
Manganese	1	688	2/28/00	F	1	1	190	—	50	1/1	200	0/1
Manganese	1	688	2/28/00	NF	1	1	370	—	—	—	—	—
Mercury	1	688	2/28/00	F	1	0	—	[0.011]	2	0/1	—	—
Mercury	1	688	2/28/00	NF	1	0	—	[0.011]	—	—	2	0/1

Table 2.4-2 (continued)

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (μg/L)	Non Detected Value (μg/L)	Drinking Water MCL (μg/L)	Frequency of Detects >Drinking Water MCL	NMED Groundwater Standard (μg/L)	Frequency of Detects >NMED Groundwater Standard
Molybdenum	1	688	2/28/00	F	1	0	—	[3.3]	—	—	—	—
Molybdenum	1	688	2/28/00	NF	1	1	4.5	—	—	—	—	—
Nickel	1	688	2/28/00	F	1	1	5.7	—	100	0/1	200	0/1
Nickel	1	688	2/28/00	NF	1	1	12	—	—	—	—	—
Nitrate + Nitrite (expressed as N)	1	688	2/28/00	F	1	1	520	—	10000	0/1	—	—
Nitrate + Nitrite (expressed as N)	1	688	2/28/00	NF	1	1	460	—	—	—	—	—
Oxalate	1	688	2/28/00	F	1	0	—	[113]	—	—	—	—
Oxalate	1	688	2/28/00	NF	1	0	—	[113]	—	—	—	—
Perchlorate	1	688	2/28/00	F	1	1	1.65	—	—	—	—	—
Perchlorate	1	688	2/28/00	NF	1	0		[1.51]	—	—	—	—
Phosphorus (total)	1	688	2/28/00	F	1	1	51	—	—	—	—	—
Phosphorus (total)	1	688	2/28/00	NF	1	1	52	—	—	—	—	—
Potassium	1	688	2/28/00	F	1	1	4000	—	—	—	—	—
Potassium	1	688	2/28/00	NF	1	1	4000	—	—	—	—	—
Selenium	1	688	2/28/00	F	1	0	—	[3.8]	50	0/1	50	0/1
Selenium	1	688	2/28/00	NF	1	0	—	[3.8]	—	—	—	—
Silicon Dioxide	1	688	2/28/00	F	1	1	70620	—	—	—	—	—
Silicon Dioxide	1	688	2/28/00	NF	1	1	72760	—	—	—	—	—
Silver	1	688	2/28/00	F	1	0	—	[0.64]	100	0/1	50	0/1
Silver	1	688	2/28/00	NF	1	0	—	[0.64]	—	—	—	—
Sodium	1	688	2/28/00	F	1	1	17000	—	—	—	—	—

Table 2.4-2 (continued)

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (μg/L)	Non Detected Value (μg/L)	Drinking Water MCL (μg/L)	Frequency of Detects >Drinking Water MCL	NMED Groundwater Standard (μg/L)	Frequency of Detects >NMED Groundwater Standard
Sodium	1	688	2/28/00	NF	1	1	18000	—	—	—	—	—
Strontium	1	688	2/28/00	F	1	1	160	—	—	—	—	—
Strontium	1	688	2/28/00	NF	1	1	160	—	—	—	—	—
Sulfate	1	688	2/28/00	F	1	1	5790	—	250000	0/1	600000	0/1
Sulfate	1	688	2/28/00	NF	1	1	5670	—	—	—	—	—
Thallium	1	688	2/28/00	F	1	1	0.626	—	2	0/1	—	—
Thallium	1	688	2/28/00	NF	1	1	0.489	—	—	—	—	—
Total Kjeldahl Nitrogen	1	688	2/28/00	F	1	0	—	[100]	—	—	—	—
Total Kjeldahl Nitrogen	1	688	2/28/00	NF	1	1	450	—	—	—	—	—
Uranium (by KPA[g])	1	688	2/28/00	F	1	1	1.74	—	—	—	5000	0/1
Uranium (by KPA)	1	688	2/28/00	NF	1	1	1.77	—	—	—	—	—
Uranium by (ICPMS[h])	1	688	2/28/00	F	1	1	1.72	—	—	—	5000	0/1
Uranium by (ICPMS)	1	688	2/28/00	NF	1	1	1.68	—	—	—	—	—
Vanadium	1	688	2/28/00	F	1	1	6.9	—	—	—	—	—
Vanadium	1	688	2/28/00	NF	1	1	7.9	—	—	—	—	—
Zinc	1	688	2/28/00	F	1	0	—	[3.4]	5000	0/1	10000	0/1
Zinc	1	688	2/28/00	NF	1	1	9.1	—	—	—	—	—

Table 2.4-2 (continued)

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (μg/L)	Non Detected Value (μg/L)	Drinking Water MCL (μg/L)	Frequency of Detects >Drinking Water MCL	NMED Groundwater Standard (μg/L)	Frequency of Detects >NMED Groundwater Standard
Stable Isotopes (mils)												
δD/H	1	688	2/28/00	NF	1	1	-76	—	—	—	—	—
δN—15/N—14	1	688	2/28/00	NF	1	1	3.5	—	—	—	—	—
δO—18/O—16	1	688	2/28/00	NF	1	1	-10.5	—	—	—	—	—

[a] MCL = Maximum contaminant level. US Environmental Protection Agency (EPA) MCLs are from *National Primary Drinking Water Regulations*, 40 CFR Part 141. US E.P.A. secondary MCLs are from *National Secondary Drinking Water Regulations*, 40 CFR Part 143. State of New Mexico MCLs are from *Drinking Water Regulations*, 20 NMAC 7.1.

[b] NMED = New Mexico Environment Department.

[c] State of New Mexico groundwater standards are from *New Mexico Water Quality Control Commission Regulations, Ground and Surface Water Protection*, 20 NMAC 6.2.

[d] F = Filtered.

[e] Value is not available or not applicable.

[f] NF = Nonfiltered.

[g] Kinetic phosphorescence analysis.

[h] Inductively coupled plasma mass spectrometry.

Table 2.4-3
Regional Well R-9 First Quarter Sample Results: Data Summary for Radionuclides

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (pCi/L)	Non Detected Value (pCi/L)	Drinking Water MCL[a] (pCi/L)	Frequency of Detects >Drinking Water MCL
Americium-241	1	688	2/28/00	F[b]	1	0	—[c]	[0.013]	—	—
Americium-241	1	688	2/28/00	NF[d]	1	0	—	[0.03]	—	—
Cesium-134	1	688	2/28/00	F	1	0	—	[0]	—	—
Cesium-134	1	688	2/28/00	NF	1	0	—	[0]	—	—
Cesium-137	1	688	2/28/00	F	1	0	—	[-0.5]	—	—
Cesium-137	1	688	2/28/00	NF	1	0	—	[-0.9]	—	—
Cobalt-60	1	688	2/28/00	F	1	0	—	[0.4]	—	—
Cobalt-60	1	688	2/28/00	NF	1	0	—	[1.6]	—	—
Europium-152	1	688	2/28/00	F	1	0	—	[0.4]	—	—
Europium-152	1	688	2/28/00	NF	1	0	—	[0.5]	—	—
Gross Alpha Radiation	1	688	2/28/00	F	1	1	1.8	—	15	0/1
Gross Alpha Radiation	1	688	2/28/00	NF	1	1	1.32	—	—	—
Gross Beta Radiation	1	688	2/28/00	F	1	1	4.5	—	—	—
Gross Beta Radiation	1	688	2/28/00	NF	1	1	3.55	—	—	—
Plutonium-238	1	688	2/28/00	F	1	0	—	[-0.007]	—	—
Plutonium-238	1	688	2/28/00	NF	1	0	—	[0.0084]	—	—
Plutonium-239	1	688	2/28/00	F	1	0	—	[0.007]	—	—
Plutonium-239	1	688	2/28/00	NF	1	0	—	[-0.005]	—	—
Ruthenium-106	1	688	2/28/00	F	1	0	—	[-12]	—	—
Ruthenium-106	1	688	2/28/00	NF	1	0	—	[3]	—	—
Sodium-22	1	688	2/28/00	F	1	0	—	[0.4]	—	—

Table 2.4-3 (continued)

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (pCi/L)	Non Detected Value (pCi/L)	Drinking Water MCL (pCi/L)	Frequency of Detects >Drinking Water MCL
Sodium-22	1	688	2/28/00	NF	1	0	—	[-0.4]	—	—
Strontium-90	1	688	2/28/00	F	1	0	—	[0.04]	8	0/1
Strontium-90	1	688	2/28/00	NF	1	0	—	[0.05]	—	—
Tritium	1	688	2/28/00	NF	1	1	13.98	—	20000	0/1
Uranium-234	1	688	2/28/00	F	1	1	1.14	—	—	—
Uranium-234	1	688	2/28/00	NF	1	1	1.06	—	—	—
Uranium-235	1	688	2/28/00	F	1	1	0.049	—	—	—
Uranium-235	1	688	2/28/00	NF	1	1	0.034	—	—	—
Uranium-238	1	688	2/28/00	F	1	1	0.63	—	—	—
Uranium-238	1	688	2/28/00	NF	1	1	0.62	—	—	—

[a] MCL = Maximum contaminant level. US Environmental Protection Agency (EPA) MCLs are from *National Primary Drinking Water Regulations*, 40 CFR Part 141. US E.P.A. secondary MCLs are from *National Secondary Drinking Water Regulations*, 40 CFR Part 143. State of New Mexico MCLs are from *Drinking Water Regulations*, 20 NMAC 7.1.

[b] F = Filtered.

[c] Value is not available or not applicable.

[d] NF = Nonfiltered.

Table 2.4-4

Regional Well R-9 First Quarter Sample Results: Data Summary for Detected Organic Chemicals

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (μg/L)	Drinking Water MCL[a] (μg/L)	Frequency of Detects >Drinking Water MCL	NMED[b] Groundwater Standard[c] (μg/L)	Frequency of Detects >NMED Groundwater Standard
Benzene	1	688	2/28/00	NF[d]	1	1	1.9	5	0/1	10	0/1
Toluene	1	688	2/28/00	NF	1	1	1.1	1000	0/1	750	0/1
Total Organic Carbon	1	688	2/28/00	F[e]	1	1	670	—[f]	—	—	—
Total Organic Carbon	1	688	2/28/00	NF	1	1	26000	—	—	—	—

[a] MCL = Maximum contaminant level. US Environmental Protection Agency (EPA) MCLs are from *National Primary Drinking Water Regulations*, 40 CFR Part 141. US E.P.A. secondary MCLs are from *National Secondary Drinking Water Regulations*, 40 CFR Part 143. State of New Mexico MCLs are from *Drinking Water Regulations*, 20 NMAC 7.1.

[b] NMED = New Mexico Environment Department.

[c] State of New Mexico groundwater standards are from *New Mexico Water Quality Control Commission Regulations, Ground and Surface Water Protection*, 20 NMAC 6.2.

[d] NF = Nonfiltered.

[e] F = Filtered.

[f] Value is not available or not applicable.

Table 2.4-5
Regional Well R-15 First Quarter Samples Taken Table

Sample ID	Location ID	Field Preparation	Depth (ft)	Anions [a]	Cyanide	Non-TAL Metals [b]	TAL Metals	Uranium	Water Quality Parameters [c]	High-Explosive	Pesticides/PCBs	SVOCs	VOCs	Am-241	Gamma Spectroscopy	Gross Alpha/Beta	Gross Gamma	Tritium	Isotopic Plutonium	Isotopic Uranium	Strontium-90
CAMO-00-0002	MO-00051	F	960-1020	6494R	—	6470R	6519R	6519R	6473R	—	—	—	—	6472R	6472R	6472R	6472R	—	6472R	6472R	6472R
CAMO-00-0003 [d]	MO-00051	NF	960-1020	6494R	6470R	6470R	6519R	6519R	6475R	6469R	6468R	6468R	6468R	6472R	6472R	6472R	6472R	6520R	6472R	6472R	6472R

[a] Anions = Ammonia, bromide, chloride, fluoride, nitrate/nitrite, oxalate, perchlorate, sulfate.

[b] Non-TAL Metals = Boron, molybdenum, silicon, strontium.

[c] Water Quality Parameters = Alkalinity, deuterium/hydrogen, nitrogen-15/nitrogen-14, oxygen-18/oxygen-16, total Kjeldahl nitrogen, total organic carbon, total phosphorus.

[d] Field Parameters on Not Filtered Sample = pH - 7.9 SU, Conductivity - 130 us/cm, Temperature - 16.9 C, Turbidity - 3.0 NTU.

Table 2.4-6

Regional Well R-15 First Quarter Sample Results: Data Summary for Inorganic Parameters

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (μg/L)	Non Detected Value (μg/L)	Drinking Water MCL[a] (μg/L)	Frequency of Detects >Drinking Water MCL	NMED[b] Groundwater Standard[c] (μg/L)	Frequency of Detects >NMED Groundwater Standard
Alkalinity	1	1020	2/23/00	F[d]	1	1	51000	—[e]	—	—	—	—
Alkalinity	1	1020	2/23/00	NF[f]	1	1	58000	—	—	—	—	—
Aluminum	1	1020	2/23/00	F	1	0	—	[61]	50	0/1	5000	0/1
Aluminum	1	1020	2/23/00	NF	1	0	—	[96]	—	—	—	—
Ammonia (expressed as N)	1	1020	2/23/00	F	1	0	—	[500]	—	—	—	—
Ammonia (expressed as N)	1	1020	2/23/00	NF	1	0	—	[500]	—	—	—	—
Antimony	1	1020	2/23/00	F	1	0	—	[0.683]	6	0/1	—	—
Antimony	1	1020	2/23/00	NF	1	0	—	[0.683]	—	—	—	—
Arsenic	1	1020	2/23/00	F	1	0	—	[2.3]	50	0/1	100	0/1
Arsenic	1	1020	2/23/00	NF	1	0	—	[2.3]	—	—	—	—
Barium	1	1020	2/23/00	F	1	1	24	—	2000	0/1	1000	0/1
Barium	1	1020	2/23/00	NF	1	1	25	—	—	—	—	—
Beryllium	1	1020	2/23/00	F	1	1	0.025	—	4	0/1	—	—
Beryllium	1	1020	2/23/00	NF	1	1	0.05	—	—	—	—	—
Boron	1	1020	2/23/00	F	1	1	19	—	—	—	750	0/1
Boron	1	1020	2/23/00	NF	1	1	20	—	—	—	—	—
Bromide	1	1020	2/23/00	F	1	0	—	[16]	—	—	—	—
Bromide	1	1020	2/23/00	NF	1	0	—	[16]	—	—	—	—
Cadmium	1	1020	2/23/00	F	1	0	—	[0.162]	5	0/1	10	0/1
Cadmium	1	1020	2/23/00	NF	1	0	—	[0.145]	—	—	—	—

Table 2.4-6 (continued)

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (µg/L)	Non Detected Value (µg/L)	Drinking Water MCL (µg/L)	Frequency of Detects >Drinking Water MCL	NMED Groundwater Standard (µg/L)	Frequency of Detects >NMED Groundwater Standard
Calcium	1	1020	2/23/00	F	1	1	12000	—	—	—	—	—
Calcium	1	1020	2/23/00	NF	1	1	12000	—	—	—	—	—
Chloride	1	1020	2/23/00	F	1	1	3700	—	250000	0/1	250000	0/1
Chloride	1	1020	2/23/00	NF	1	1	3670	—	—	—	—	—
Chromium	1	1020	2/23/00	F	1	1	2.6	—	100	0/1	50	0/1
Chromium	1	1020	2/23/00	NF	1	1	4.6	—	—	—	—	—
Cobalt	1	1020	2/23/00	F	1	0	—	[0.39]	—	—	50	0/1
Cobalt	1	1020	2/23/00	NF	1	0	—	[0.39]	—	—	—	—
Copper	1	1020	2/23/00	F	1	0	—	[0.42]	1300	0/1	1000	0/1
Copper	1	1020	2/23/00	NF	1	1	1.3	—	—	—	—	—
Cyanide (total)	1	1020	2/23/00	NF	1	0	—	[10]	—	—	—	—
Fluoride	1	1020	2/23/00	F	1	1	209	—	4000	0/1	1600	0/1
Fluoride	1	1020	2/23/00	NF	1	1	271	—	—	—	—	—
Iron	1	1020	2/23/00	F	1	1	210	—	300	0/1	1000	0/1
Iron	1	1020	2/23/00	NF	1	1	520	—	—	—	—	—
Lead	1	1020	2/23/00	F	1	1	0.126	—	15	0/1	50	0/1
Lead	1	1020	2/23/00	NF	1	1	0.477	—	—	—	—	—
Magnesium	1	1020	2/23/00	F	1	1	3400	—	—	—	—	—
Magnesium	1	1020	2/23/00	NF	1	1	3400	—	—	—	—	—
Manganese	1	1020	2/23/00	F	1	1	18	—	50	0/1	200	0/1
Manganese	1	1020	2/23/00	NF	1	1	24	—	—	—	—	—
Mercury	1	1020	2/23/00	F	1	0	—	[0.011]	2	0/1	—	—
Mercury	1	1020	2/23/00	NF	1	0	—	[0.011]	—	—	2	0/1

Table 2.4-6 (continued)

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (μg/L)	Non Detected Value (μg/L)	Drinking Water MCL (μg/L)	Frequency of Detects >Drinking Water MCL	NMED Groundwater Standard (μg/L)	Frequency of Detects >NMED Groundwater Standard
Molybdenum	1	1020	2/23/00	F	1	0	—	[3.3]	—	—	—	—
Molybdenum	1	1020	2/23/00	NF	1	0	—	[3.3]	—	—	—	—
Nickel	1	1020	2/23/00	F	1	1	1.9	—	100	0/1	200	0/1
Nickel	1	1020	2/23/00	NF	1	1	2.8	—	—	—	—	—
Nitrate + Nitrite (expressed as N)	1	1020	2/23/00	F	1	1	2200	—	10000	0/1	—	—
Nitrate + Nitrite (expressed as N)	1	1020	2/23/00	NF	1	1	2000	—	—	—	—	—
Oxalate	1	1020	2/23/00	F	1	0	—	[113]	—	—	—	—
Oxalate	1	1020	2/23/00	NF	1	0	—	[113]	—	—	—	—
Perchlorate	1	1020	2/23/00	F	1	1	2.41	—	—	—	—	—
Perchlorate	1	1020	2/23/00	NF	1	1	3.45	—	—	—	—	—
Phosphorus (total)	1	1020	2/23/00	F	1	1	65	—	—	—	—	—
Phosphorus (total)	1	1020	2/23/00	NF	1	1	78	—	—	—	—	—
Potassium	1	1020	2/23/00	F	1	1	1900	—	—	—	—	—
Potassium	1	1020	2/23/00	NF	1	1	2000	—	—	—	—	—
Selenium	1	1020	2/23/00	F	1	0	—	[3.8]	50	0/1	50	0/1
Selenium	1	1020	2/23/00	NF	1	0	—	[3.8]	—	—	—	—
Silicon Dioxide	1	1020	2/23/00	F	1	1	70620	—	—	—	—	—
Silicon Dioxide	1	1020	2/23/00	NF	1	1	72760	—	—	—	—	—
Silver	1	1020	2/23/00	F	1	0	—	[0.202]	100	0/1	50	0/1
Silver	1	1020	2/23/00	NF	1	0	—	[0.201]	—	—	—	—
Sodium	1	1020	2/23/00	F	1	1	9100	—	—	—	—	—

Table 2.4-6 (continued)

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (μg/L)	Non Detected Value (μg/L)	Drinking Water MCL (μg/L)	Frequency of Detects >Drinking Water MCL	NMED Groundwater Standard (μg/L)	Frequency of Detects >NMED Groundwater Standard
Sodium	1	1020	2/23/00	NF	1	1	9200	—	—	—	—	—
Strontium	1	1020	2/23/00	F	1	1	55	—	—	—	—	—
Strontium	1	1020	2/23/00	NF	1	1	55	—	—	—	—	—
Sulfate	1	1020	2/23/00	F	1	1	5200	—	250000	0/1	600000	0/1
Sulfate	1	1020	2/23/00	NF	1	1	5170	—	—	—	—	—
Thallium	1	1020	2/23/00	F	1	1	0.966	—	2	0/1	—	—
Thallium	1	1020	2/23/00	NF	1	1	1.51	—	—	—	—	—
Total Kjeldahl Nitrogen	1	1020	2/23/00	F	1	0	—	[100]	—	—	—	—
Total Kjeldahl Nitrogen	1	1020	2/23/00	NF	1	0	—	[100]	—	—	—	—
Uranium (by ICPMS [g])	1	1020	2/23/00	F	1	1	0.342	—	—	—	5000	0/1
Uranium (by ICPMS)	1	1020	2/23/00	NF	1	1	0.34	—	—	—	—	—
Uranium (by KPA [h])	1	1020	2/23/00	F	1	1	0.39	—	—	—	5000	0/1
Uranium (by KPA)	1	1020	2/23/00	NF	1	1	0.39	—	—	—	—	—
Vanadium	1	1020	2/23/00	F	1	1	5.9	—	—	—	—	—
Vanadium	1	1020	2/23/00	NF	1	1	5.9	—	—	—	—	—
Zinc	1	1020	2/23/00	F	1	0	—	[2.8]	5000	0/1	10000	0/1
Zinc	1	1020	2/23/00	NF	1	0	—	[4.9]	—	—	—	—

Table 2.4-6 (continued)

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (μg/L)	Non Detected Value (μg/L)	Drinking Water MCL (μg/L)	Frequency of Detects >Drinking Water MCL	NMED Groundwater Standard (μg/L)	Frequency of Detects >NMED Groundwater Standard
Stable Isotopes (mils)												
δD/H	1	1020	2/23/00	NF	1	1	-82	—	—	—	—	—
δN-15/N-14	1	1020	2/23/00	NF	1	1	-0.8	—	—	—	—	—
δO-18/O-16	1	1020	2/23/00	NF	1	1	-11.2	—	—	—	—	—

[a] MCL = Maximum contaminant level. US Environmental Protection Agency (EPA) MCLs are from *National Primary Drinking Water Regulations*, 40 CFR Part 141. US E.P.A. secondary MCLs are from *National Secondary Drinking Water Regulations*, 40 CFR Part 143. State of New Mexico MCLs are from *Drinking Water Regulations*, 20 NMAC 7.1.

[b] NMED = New Mexico Environment Department.

[c] State of New Mexico groundwater standards are from *New Mexico Water Quality Control Commission Regulations, Ground and Surface Water Protection*, 20 NMAC 6.2.

[d] F = Filtered.

[e] Value is not available or not applicable.

[f] NF = Nonfiltered.

[g] Kinetic phosphorescence analysis.

[h] Inductively coupled plasma mass spectrometry.

Table 2.4-7

Regional Well R-15 First Quarter Sample Results: Data Summary for Radionuclides

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (pCi/L)	Non Detected Value (pCi/L)	Drinking Water MCL[a] (pCi/L)	Frequency of Detects >Drinking Water MCL
Americium-241	1	1020	2/23/00	F[b]	1	0	—[c]	[0.019]	—	—
Americium-241	1	1020	2/23/00	NF[d]	1	0	—	[0.018]	—	—
Cesium-134	1	1020	2/23/00	F	1	0	—	[1.3]	—	—
Cesium-134	1	1020	2/23/00	NF	1	0	—	[-0.1]	—	—
Cesium-137	1	1020	2/23/00	F	1	0	—	[-0.5]	—	—
Cesium-137	1	1020	2/23/00	NF	1	0	—	[-0.2]	—	—
Cobalt-60	1	1020	2/23/00	F	1	0	—	[-0.4]	—	—
Cobalt-60	1	1020	2/23/00	NF	1	0	—	[0]	—	—
Europium-152	1	1020	2/23/00	F	1	0	—	[-3.8]	—	—
Europium-152	1	1020	2/23/00	NF	1	0	—	[-1.8]	—	—
Gross Alpha Radiation	1	1020	2/23/00	F	1	0	—	[0.51]	15	0/1
Gross Alpha Radiation	1	1020	2/23/00	NF	1	0	—	[0.66]	—	—
Gross Beta Radiation	1	1020	2/23/00	F	1	1	1.98	—	—	—
Gross Beta Radiation	1	1020	2/23/00	NF	1	1	3.1	—	—	—
Plutonium-238	1	1020	2/23/00	F	1	0	—	[0.007]	—	—
Plutonium-238	1	1020	2/23/00	NF	1	0	—	[0.003]	—	—
Plutonium-239	1	1020	2/23/00	F	1	0	—	[0.004]	—	—
Plutonium-239	1	1020	2/23/00	NF	1	0	—	[0.03]	—	—
Ruthenium-106	1	1020	2/23/00	F	1	0	—	[-3]	—	—
Ruthenium-106	1	1020	2/23/00	NF	1	0	—	[0]	—	—

Table 2.4-7 (continued)

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (pCi/L)	Non Detected Value (pCi/L)	Drinking Water MCL (pCi/L)	Frequency of Detects >Drinking Water MCL
Sodium-22	1	1020	2/23/00	F	1	0	—	[0.3]	—	—
Sodium-22	1	1020	2/23/00	NF	1	0	—	[1.9]	—	—
Strontium-90	1	1020	2/23/00	F	1	0	—	[-0.03]	8	0/1
Strontium-90	1	1020	2/23/00	NF	1	0	—	[0.14]	—	—
Tritium	1	1020	2/23/00	NF	1	0	—	[0.606]	20000	0/1
Uranium-234	1	1020	2/23/00	F	1	1	0.279	—	—	—
Uranium-234	1	1020	2/23/00	NF	1	1	0.311	—	—	—
Uranium-235	1	1020	2/23/00	F	1	1	0.048	—	—	—
Uranium-235	1	1020	2/23/00	NF	1	1	0.076	—	—	—
Uranium-238	1	1020	2/23/00	F	1	1	0.143	—	—	—
Uranium-238	1	1020	2/23/00	NF	1	1	0.148	—	—	—

[a] MCL = Maximum contaminant level. US Environmental Protection Agency (EPA) MCLs are from *National Primary Drinking Water Regulations*, 40 CFR Part 141. US E.P.A. secondary MCLs are from *National Secondary Drinking Water Regulations*, 40 CFR Part 143. State of New Mexico MCLs are from *Drinking Water Regulations*, 20 NMAC 7.1.

[b] F = Filtered.

[c] Value is not available or not applicable.

[d] NF = Nonfiltered.

Table 2.4-8
Regional Well R-9 First Quarter Sample Results: Data Summary for Detected Organic Chemicals

Analyte	Screen	Depth (ft)	Collection Date	Field Preparation	Number of Analyses	Number of Detects	Detected Value (μg/L)
Total Organic Carbon	1	1020	2/23/00	F[a]	1	1	370
Total Organic Carbon	1	1020	2/23/00	NF[b]	1	1	13000

[a] F = Filtered.

[b] NF = Nonfiltered.